MODELING AGGREGATE PRIVATE CONSUMPTION BEHAVIOUR IN ETHIOPIA

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Modeling Aggregate Private Consumption Behaviour in Ethiopia

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Solomon Tesfay

Table of Contents

ABSTRACT

The study analyses aggregate private consumption behaviour in Ethiopia using multivariate co-integration and error correction approaches. Two alternative models based on the `absolute income' and `permanent income' hypotheses are specified and estimated concentrating on the major macroeconomic aggregates as explanatory variables. Private consumption is found to be highly sensitive to, both current disposable income and anticipated permanent income. Trends in government spending, inflation and broad money are also seen to be important in explaining the observed fluctuations in private consumption. The parameters relating these macroeconomic variables to private consumption are found to be stable over time implying reliable predictive power of the estimated error-correction models.

CHAPTER ONE

INTRODUCTION

1.1. The Background

With an estimated population of 58 million (Census, 1994) and per capita income of 100 USD (World Bank , 1997), Ethiopia is the second poorest economy in the world. Agriculture has remained the dominant sector of the economy, constituting around 55% of the GDP, 85% of the total employment and 90% of the export earnings (MEDAC, 1997). As it is true for all backward agrarian economies like that of Ethiopia, the economy has been highly susceptible to volatility in weather conditions. Cyclical drought and famine together with the recurrent war have been some of the sad experiences of the economy in the past.

The sample period to be considered under this study incorporates three different economic policy regimes. The first period (1960-1974) represents the years of the feudal regime. During that period the economy was performing relatively well except for one major drought in 1973. The average growth rate in the real GDP during that period was 4.2% per annum (MEDAC). The emergence of an active private sector especially in commercial farming, is said to have significantly contributed to the relatively good performance of the economy at the period (See Dessalegn, 1984).

With the introduction of the centrally planned economic system in 1974, however, the growth performance of the economy has dramatically deteriorated with an overall average annual increase in the real GDP of about 1.9% from 1974 to 1990 (MEDAC). Since population has been growing at an annual average of 2.6%, per capita income has been declining by an

average of around 0.7% during the period. This has meant a significant decline in the living standards of the people. Although a number of factors might have contributed to the extremely poor performance of the economy during the period, the dominance of inefficiently large public sector, the unmotivated workforce due to the unsafe political environment created by the regime, huge military together with recurrent drought and war are some of the main factors responsible for this poor performance.

After the downfall of the `socialist' system in 1991 a market of oriented economic policy is being reinstated. A number of market liberalisation and economic reform measures are undertaken by the new government. Although accurate data is scanty for this period the official statistics indicate that some sectors of the economy are recovering from the extremely `dismal' situation in which they had been during the previous regime. The private sector is trying to come out but not as it was expected at beginning. In some of the years agricultural production has shown an improvement due mainly to good weather conditions and large-scale extension services. Overall however, there is little indication of a perceptible change in the living standards of the people.

Due to such a dependency of the economy on subsistence rain fed agriculture, the domestic capacity to mobilise resources for development is extremely weak. In 1996 for instance, around 90% of the domestic production was for consumption (private and government). At the same time the gross capital formation was around 19% of the GDP which implies that about half of it was financed from external sources. The large shares of both external and domestic deficits in GDP along with a persistent rise in external indebtedness of the country, clearly indicate the extreme dependency of the economy on external assistance and loan.

1.2. Statement of the Problem

Private consumption is usually the largest component of the aggregate economic spending of both developed and developing countries. In 1996 for instance, private consumption constituted around 67% of the GDP of the USA and 80% of the GDP of Ethiopia. That is why the behaviour of private consumption remains one of the most important areas of macroeconomic research.

We will have at least three main reasons why we would be interested in studying private consumption behaviour. For one thing, private consumption is one of the major indicators of economic welfare. What is happening to private consumption following different policy practices would tell us something about the effect of those policies on the living standards of the people. Hence, consumption behaviour needs to be studied as an end in itself.

Another reason why private consumption behaviour would be important (in developing countries in particular) is due to its implications for the process of capital formation. The sustained economic growth through the continuous process of capital formation (investment) would require the sacrifice of current consumption (for saving). What people do with their current income is then a key indicator of what will happen to the long run growth of the economy.

The contribution of private consumption to the process of capital accumulation comes through another channel as well. The fact that private consumption is the major component of aggregate spending makes it a key determinant of the demand (market) situation for both local and foreign investment. The knowledge of the behaviour of private consumption would therefore, enable us to predict the trends in the market situation for these two key ingredients of

the process of economic growth.

When it comes to the case of Ethiopia, the issue of private consumption behaviour is of double importance. On the one hand, Ethiopia is one of the backward agrarian economies where majority of the people produce for subsistence and have little to save for future capital formation. Even that subsistence level of consumption is highly uncertain and unpredictable due to the extreme dependence of the production process on the vagaries of nature. On the other hand there is a widely held view that Ethiopians are one of the extravagant societies which tend to consume whatever temporary booms in their income. This might be due partly to the prevalence of the large number and variety of ceremonial practices and the influence of highly extravagant feudal tradition.

This being the general concern, however, there is little consensus in the literature as to what exactly determines private consumption behaviour. A number of alternative theories and conflicting evidence are in place for both developed and developing countries. In the case of Ethiopia there are few studies, if any, that have tried to analyse private consumption behaviour in the macroeconomic context. The few available studies concentrated on the other side of consumption i.e. saving, and only marginally treated private consumption behaviour. It is the existence of this gap that inspired the current study.

1.3. Objective of the Study

Understanding the factors influencing private consumption behaviour and predictions regarding the effects of government policies on saving behaviour have been central in macroeconomics. There are three main theoretical perspectives on this issue; the Keynesian "absolute income hypothesis", the "permanent income hypothesis of" Friedman (1957), and the

"life cycle" models developed by economists like Ando and Modigliani (1963). The Keynesian approach generally emphasises the current income as the basic determinant of current consumption while the life cycle and permanent income models are based on the idea that consumers prefer to smooth their consumption over time through of borrowing and lending.

The objective of this paper is, therefore, to test the relevance of these hypotheses using macroeconomic data for Ethiopia, taking the specific realities of the economy into consideration. Given an extremely backward agrarian economy which is totally dependent upon the vagaries of nature and where modern capital markets are almost non-existent the behaviour of private consumption in Ethiopia may not fit in the framework of the neo-classical theories of consumption behaviour. For one thing the absence of well developed credit markets is likely to impose a binding liquidity constraint on the consumer preferences to smooth consumption over time. Foreign aid has remained a practical substitute for limited availability of borrowing at times of shortfalls in income. The dependency of the economy on the weather conditions is also likely to impose a higher degree of income uncertainty than would be expected under the traditional models of consumption behaviour. The rapid growth rate in population along with low economic growth is another factor which might affect private consumption behaviour in Ethiopian context.

Daniel (1995) has incorporated some of these country specific elements into his savings function for Ethiopia. Since private consumption and savings are determined under more or less similar behavioural framework his findings for the savings function can be taken as a springboard for the study of consumption behaviour to be undertaken here. But some of his findings for the variables considered to be basic determinants of private saving in Ethiopia had serious problems due probably to mis-specification of the model and some methodological

shortcomings. For instance, the proxy variable introduced to account for the effect of liquidity constraints (M2) had unexpected sign and was insignificant.

Asmerom (1992) has also estimated simple saving and consumption functions using OLS where he found negative correlation between permanent income and savings and marginal propensity to consume greater than one. His results are, of course, in contrast to what economic theory predicts, and hence indicate that there were some serious problems with his model and estimation procedure. One obvious problem with his estimation procedure is application of OLS to nonstationary series which results in a "spurious" correlation rather than actual.

In this paper therefore an attempt is made to estimate different consumption functions by specifying and estimating a general Vector Auto Regressive (VAR) dynamic model[1] for private consumption and its determinants. Specifically, both the short run and long run relationships between private consumption, income[2], government spending, inflation and broad money will be estimated using multivariate econometric analysis. The effects of drought and major changes in government are captured using dummy variables. And finally the model will be tested for parametric stability.

1.4. Significance of the Study

Understanding the driving forces behind the fluctuations in private consumption, would help to influence both the process of economic growth and the living standards of the people. The knowledge of how the aggregate consumption pattern would react to both exogenous and endogenous shocks, would enable the policy makers to exploit the favourable shocks and take

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[1] *see description and advantages of such a model under the Methodology section.*

2 Two specifications implied by the Keynesian absolute income hypothesis and

counteractive measures against the possible consequences of negative shocks.

In this paper both the long run and short run responses of private consumption to its determinants will be estimated using co-integration analysis. The outcomes of the study may provide useful inputs to the formulation of development plans and policies. A number of questions with policy implications such as what do people do with their temporary booms in income? how do they manage to maintain their welfare in times of shortfalls in income? and how do they plan for the long run ? can be answered by estimating consumption functions.

1.5. Organisation of the Study

The study is organised as follows. A brief survey of both theoretical and empirical literature is made in the second chapter. In the third chapter the background information on the characteristics of the Ethiopian economy, concentrating on issues related to consumption behaviour, are briefly reviewed. In chapter four models are specified to test the alternative hypotheses on consumption behaviour and empirical estimation of the models is undertaken in chapter five. Summary of the empirical results and concluding remarks are provided in the last chapter.

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the permanent income-life cycle hypotheses are estimated.

CHAPTER TWO

LITRATURE REVIEW

2.1. Theoretical Perspectives

There are three main theoretical developments in consumption behaviour. One is the Keynesian absolute income hypothesis where consumption is basically a function of the contemporaneous income. The other influential theoretical development was Friedman's `permanent income hypothesis' where consumption is assumed to be proportional to permanent income and uncorrelated with "transitory" or temporary income. There are also life-cycle models of consumption behaviour developed by the seminal work of Modigliani and Brumberg (1954) and Ando and Modigliani (1963). In the life-cycle models the expectations of decline in earnings at the retirement age play important role in influencing current consumption behaviour. In the absence of uncertainty both the permanent income and life-cycle models predict no correlation between current income and current consumption (Abel, 1990:30). Before a detailed survey of the studies on the empirical validity of these theories is considered in the next section, it would be useful to briefly review the underlying behavioural tenets of each of them.

2.1.1. The Keynesian Approach

According to the Keynesian "absolute income" hypothesis real consumption in period t is a 'stable' function of real income in the same period. As it was stated by his fundamental psychological law, "men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not as much as the increase in their income" (Keynes, 1936:36). In other words, the marginal propensity to consume (MPC) from one

additional unit of income was assumed to be greater than zero but less than one. Keynes also expected the proportion of income spent on consumption (Average propensity to consume, APC) to decline as the total income increases. A simple consumption model incorporating these basic Keynesian assumptions can be formulated as;

$$C_t = \alpha_0 + \alpha_1 Y_t + \varepsilon_t$$

where, C_t = real consumption at time t,

Y_t = real income at time t

$$APC = \frac{C_t}{Y_t} = \frac{\alpha_o}{Y_t} + \alpha_1$$

$$0 < MPC = \frac{dC_t}{dY_t} = \alpha_1 < 1$$

$\alpha_0 > 0$, ε_t = error term

Thus, the APC declines as income rises. In practice a number of models consistent with this basic Keynesian model are formulated and empirically estimated. For instance, interest rate and the lags of both consumption and income can be included as explanatory variables. And distinction is usually made between shortrun and longrun behaviour of aggregate consumption.

As it is summarised by Spanos (1989) and Thomas (1989), the early empirical findings were not conclusive as to the validity of the Keynesian postulates. It was this inconsistency in empirical findings that resulted in the development of new theories of aggregate consumption behaviour in the 1950s, the most important of which are discussed below.

2.1.2. Permanent Income Theory

Under the permanent income hypothesis (PIH) consumers are seen as making consumption decisions based on expected (normal) income rather than current income. The underlying assumption is that a consumer has an intertemporal utility function that depends on consumption in every period of his life (Abel, 1990:729). There is no period-by-period constrained maximisation that requires consumption in a given period to depend on income in that period. This implies that the permanent income hypothesis is implicitly assuming a consumer facing no liquidity constraints in any given period.

Based on these micro economic foundations[3] an aggregate permanent income model can be formulated assuming the difference between measured and permanent (expected) income to be `transitory' income. Since consumption is assumed to be proportional to permanent income (Y_t^p) and uncorrelated with transitory income;

$$C_t = \alpha_1 Y_t^p + \varepsilon_t$$

where,

The error term ε_t captures the effect of unpredictable components such as transitory income.

In the longrun, when the economy reaches static equilibrium, consumption and income are expected to be constant and hence the PIH predicts that the long run income elasticity of consumption is unity. In its extreme form PIH predicts consumption to be equal to permanent income.

All the predictions of the permanent income hypothesis (PIH) are based on the assumption that consumers can borrow and lend as much as they want at a constant interest rate.

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[3] *for details of microeconomic foundations of PIH see (Abel, 1990; Barro, 1993).*

In addition, for the predictions of PIH to be valid, the income generating process in every period should be deterministic so that consumers can make a reasonably accurate forecast of their income over time. If income follows a stochastic process however, we would in general expect a positive correlation between contemporaneous income and consumption (Abel, 1990:722). A review of the empirical validity of the PIH and the other hypotheses is given in the next section.

2.1.3. The Life-Cycle Model

The life-cycle hypothesis of consumption behaviour is based on the assumption that the ability of consumers to earn income declines at the later periods of their life and hence consumers try to take this into account while making their current consumption decisions (see Ando and Modigliani, 1963). In other words, consumers are expected to save part of their current income in order to provide for consumption at their retirement age. The wealth accumulated through such a process of saving will have important effect on consumer preferences to balance consumption throughout their life time. Wealth is therefore, important factor determining the consumption behaviour at each point in time. Two different formulations of the life-cycle model can emerge depending on the assumptions we make regarding the income generating process (Abel, 1990).

If income follows a deterministic process (predictable), consumption at time t would simply be equal to permanent income at the same period which is given as the sum of the return on the accumulated non-human wealth (W_t) and the return on human wealth, H_t, (labour earnings at time t) (See Modigliani, 1986);

$C_t = Y^p_t = a_1 W_t + a_2 H_t$

Where,

C_t is consumption at time t, Y_t^p is permanent income at time t, a_1 and a_2 are constant returns on non-human and human wealth respectively.

In such a deterministic environment the predictions of the life-cycle model are similar to that of the permanent income hypothesis. A slight difference would, however, be expected when the consumer spends some of the principal in addition to the return on his wealth and this is generally true for a consumer with a finite life horizon (Ando and Modigliani, 1963).

When stochastic (uncertain) income is assumed, on the other hand, a more general model where consumption is related to wealth and current and past incomes is implied (Modigliani, 1975). In such a model, consumption is expected to respond to unanticipated changes in permanent income. The formulation of such a model depends on the specific stochastic process we assume for income. If we expect income (y_t) to evolve over time according to univariate autoregressive process, then consumption at time t, (C_t) can be represented [4] as;

$C_t = rw_t + a(L)(Y_t - Y) + \varepsilon_t$

where,

r= Return on Wealth

a(L)= Polynomial in the lag operator L

Y= the average of past incomes

In such a model, fluctuations in consumption would be identical to fluctuations in permanent income. The effect of demographic variables such as family composition and age structure i.e. the effect of dependants the consumer has to support throughout his life time can

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[4] *for details see Abel (1990).*

easily be incorporated into the life-cycle models.

Empirical estimation of the life cycle-models using aggregate data is constrained by the absence and incompleteness of time series data on wealth. This is particularly true for developing countries and Ethiopia is not an exception.

2.1.4. Other Hypotheses

The usual practice in both Keynesian and Neo-classical consumption functions discussed above is to include the fixed distributed lag of the income variable to account for the effect of expected future income (see Hall, 1978). However such an assumption of backward looking expectations formation was severely criticised by Lucas (1976). Lucas argued, that economic agents are `rational' and hence do not keep up committing `systematic mistakes'; they do not expect the future to be exactly like the past since they learn from their past mistakes.

In response to the criticisms of the `rational expectations' school led by Lucas, Hall (1978) formulated an alternative hypothesis for modelling consumption. He hypothesised that `no variable apart from current consumption should be of any value in predicting future consumption' (Hall, 1978: 971). He critically examined the stochastic implications of the life-cycle-permanent income models and concluded that income itself is endogenous in the model. i.e. all the information required to forecast future level of income and consumption is incorporated in the current level of consumption. The only adjustment required is just to correct the current level of consumption for trend.

Such a model where the variable depends only on its one period lag is called a random-walk, and for consumption at time t, (C_t) it will be,

$C_t = \alpha_t C_{t-1} + \varepsilon_t$

where, ε_t is unpredictable at time t.

Assuming a constant interest rate the random-walk formulation of consumption implies that consumption lagged more than one period has no predictive power for current consumption and consumption is unrelated to any economic variable that is observed in earlier periods (see Hall, 1978:972). These are testable implications which can easily be verified using the time-series data on consumption and other relevant variables such as income.

Attempts are also made to relax the assumption of perfect capital markets with constant interest rate and no liquidity constraints. As it is mentioned earlier the permanent income and life-cycle models are based on the assumption of no liquidity constraints. Deaton (1989) developed a consumption model where households cannot borrow but accumulate assets as "a buffer stock to protect decline in consumption when incomes are low" (Deaton, 1989:61).

In the liquidity constrained environment consumption is expected to fluctuate more, following the ups-and-downs in income since consumers cannot smooth their consumption pattern through borrowing. Theoretical models where interest rate is allowed to vary in general imply an ambiguous aggregate effect of interest rate on consumption behaviour. This is due to the fact that a change in interest rate has both income and substitution effects which have opposite influence on consumption behaviour. A rise in interest rate means higher interest income for the net lenders and hence they will tend to spend more as they feel wealthier with rise in interest rate. On the other hand, the substitution effect of a higher interest rate is to make current consumption more expensive compared to future consumption and thus reduce the current consumption. The net effect will, therefore, depend on the relative strength of each effect in specific situations.

2.2. Review of Empirical Studies

Empirical studies conducted on consumption behaviour are quite numerous and the findings as well are diverse. Hence, it will not be feasible to try to review every piece of work done in the area due to both time and material resource limitations. Attempt will, therefore, be made to review some representative studies for the theories discussed in the previous section.

2.2.1. Empirical Findings in Developed Countries

In the 1940s and early 1950s, a number of studies were conducted to test the validity of the Keynesian absolute income hypothesis. Most of the studies as summarised by Ferber (1962,1973) were concerned with estimating the Keynesian consumption function by simply regressing the time-series aggregates of consumption expenditures on the aggregate disposable income usually for short periods of time. The results of those studies appeared to be consistent with the Keynesian postulates. As it is clearly stated by Ferber (1973: 1304), in all the cases,

> ... the multiple correlation coefficient exceeded 0.95, the current income variable accounted for most of the variability in consumption and the marginal propensity to consume out of current income was less than the average propensity, both being less than unity.

However, the adequacy of those Keynesian consumption functions was questioned when Kuznets (1946,1952) reported a constant average propensity to consume and declining marginal propensity to consume along with rising income using cross sectional data at various points in time for USA. The stability of the Keynesian consumption function was also questioned since it neglected many other important variables such as prices, expectations and past income which

could result in the shift of the parameters of the function (Farrel, 1959). It was in response to these inadequacies that new theories of consumption behaviour were developed in the 1950s and early 1960s.

After the development of the two influential theories of consumption behaviour i.e. permanent income hypothesis and the life-cycle hypothesis, empirical studies were mainly concerned with testing the superiority of one theory over another in explaining the observed consumption behaviour. Using time series data for U.S.A, Friedman (1957) found a constant ratio of consumption to permanent income and continuously rising income elasticity of consumption. The permanent income was measured as deviations from the trend level of income. He claimed that the findings were consistent with the predictions of his permanent income hypothesis. Friedman as well arrived at similar conclusions from cross sectional household budget data.

Ando and Midigliani (1963) also came up with empirical results consistent with their hypothesis. Using a sample of U.S.A data they estimated the coefficient of the wealth variable to be in the range from 0.04 to 0.10 which was close to the prevailing interest rate as predicted by the theory.

Since then, however, a number of studies attempting to test these alternative hypotheses emerged with quite diverse outcomes. Hendry (1974) estimated aggregate consumption function for UK using quarterly data. Consumption was regressed on its lag and contemporaneous income including quarterly dummies. The result was contrary to the Keynesian absolute income hypothesis. Consumption was found to depend more on its lag rather than contemporaneous income.

Most of the empirical studies on consumption behaviour conducted before 1978 did not consider the problems associated with 'non-stationary' series. It was as a result of a highly influential paper on consumption by Davidson, Hendry, Srba and Yeo (1978) that the problems of modelling non-stationary series was formally introduced into econometrics. In that path-breaking study they specified a simple dynamic model for consumption trying to incorporate both short run and long run effects of income on consumption. Their results from UK quarterly data favoured only short run effects and that was said to be a clear indication of some problems associated with the assumptions of the permanent income and life-cycle hypotheses (see Davidson et al, 1978:680).

Another powerful insight into the behaviour of aggregate consumption was made by Hall (1978). He empirically tested his random-walk formulation of consumption behaviour using aggregate quarterly consumption data for U.S.A. Consumption was found to be highly sensitive to its immediate lagged value. Neither consumption lagged more than one period nor past values of the real disposable income were found to be significant in predicting the current level of consumption. His findings are consistent with the predictions of his random-walk hypothesis, but he did not explicitly produce evidence against the competing theories.

In the studies relating to the life-cycle-hypothesis and permanent income hypothesis, the measurement of permanent income has always remained one of the problems limiting the accuracy of the empirical estimation. Bhalla (1980) tried to construct two measures of permanent income using longitudinal (Panel) data. One approach suggested by him (p. 725) is to estimate the stable relationship between income and its determinants and to use the predicted value from that function as an approximation to permanent income. The other alternative is to use the weighted average of past incomes as it has conventionally been done since Friedman

(1957). He applied the two techniques to estimate savings functions for Indian households. Elements of both Keynesian and permanent income hypothesis were supported by his results using both techniques.

Based on the observed empirical inadequacies of the life-cycle model Modigliani (1986) tried to incorporate some new issues and relax some of the assumptions of the basic model. He has explained the possible effects of the non-constant interest rate, life cycle of earning and family size, lengths of working and retired life, liquidity constraints and the `bequest motive' on the basic life-cycle-hypothesis and concluded that the predictions of the basic model will not be significantly affected due to the incorporation of these new issues.

The modifications by Modigliani (1986) were basically a response to empirical evidence produced against the life cycle and permanent income hypotheses by a number of studies in the early 1980s. Flavin (1981) for instance, used the same data set that was analysed by Hall (1978) and rejected the restrictions imposed by permanent income hypothesis at 50% level of significance. On the other hand he rejected the hypothesis that "consumption exhibits no excess sensitivity to current income" at 0.5% level of significance and the result was said to be "a strong evidence against the permanent income hypothesis." Hayashi (1985) also came to similar conclusions using cross-sectional data sets. These authors suggested liquidity constraints as the possible reasons for the failure of permanent- income-life-cycle hypotheses.

Following the modifications suggested by Modigliani (1986) and the earlier studies, Zeldes (1989) tested the permanent income hypothesis against the alternative hypothesis that "consumers optimise subject to a well specified sequence of borrowing constraints" (p.305). He conducted a test for whether the introduction of liquidity constraint will lead to a violation of the

unconstrained Euler equation.[5] The Euler equation between the current and the next period is said to be violated "when the Lagrange multiplier associated with transferring resources between the current and next period is positive" (Zeldes, 1988: 361). Using panel data of income dynamics for US families, he obtained a result which supports the hypothesis that "inability to borrow against future labour income affects the consumption of a significant portion of the population."

Lehmussaari (1990) estimated a simple error-correction model for aggregate consumption behaviour in Scandinavian countries and Finland and obtained a significant effect of wealth and growth rate in disposable income on consumption. The result was consistent with the life-cycle hypothesis upon which his model was built. The study also identified structural changes in the relationships due to financial deregulation (except for Sweden). Bayoumi and MacDonald (1994) estimated a similar error correction model for 15 developed countries allowing for the possible effect of the international capital market integration. They have found consumption to be "excessively dependent on disposable income except for Japan where national consumption appeared to be fully integrated with the rest of the world" (p.15). Their results in general support the Keynesian absolute income hypothesis i.e. the 'excess sensitivity' of consumption to current income which might be due to the prevalence of liquidity constraints.

Faruqee et al (1996) analysed the effect of government debt on consumption for 18 of the largest industrial countries. They specified a consumption model with liquidity constraints and age-dependent wage income. Through different simulation exercises their model predicted a significant negative effect of a rise in government debt/GDP ratio on consumption and the effect

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[5] *an equation representing the maximum expected life time utility which is a function of consumption among other variables (see Zeldes (1988:315).*

is said to have come through the rise in interest rate following the rise in public debt.

With regard to the effect of interest rate on consumption behaviour, Zuliu Hu (1993) examined the intertemporal relations between aggregate consumption and returns on assets for twenty OECD countries. Using full information maximum likelihood estimation technique, they obtained significantly large elasticities of intertemporal substitution implying that interest rate is an important determinant of consumption behaviour. The result contradicts the zero intertemporal substitution implied by the life-cycle-permanent income hypothesis. But their model might have been misspecified since it did not incorporate the more realistic features such as liquidity constraints.

Bayoumi (1997) analysed the importance of risk-sharing behaviour in explaining the response of consumption to changes in current income. The model specified for testing the relative importance of the path implied by risk-sharing behaviour and by sensitivity of consumption to current income was estimated using consumption data across Canadian provinces. The result indicates that both changes in income and risk-sharing behaviour are significant in explaining consumption but more of the trend on consumption behaviour was found to be determined by risk-sharing behaviour of consumers. The effect of risk-sharing behaviour was relatively lower when terms that capture the behaviour of unemployment insured consumers were included. The results of this study cast some doubt on the conclusions of the earlier studies which did not take account of the possible effect of uncertainty on consumption.

From this brief summary of the studies on developed countries we may conclude that empirical characterisation of consumption behaviour is yet an unsettled issue. Consensus is not yet arrived on the effect of even the seemingly obvious determinant of consumption behaviour, income. Through time however, empirical studies are diverting their attention to more practical

and realistic issues such as liquidity constraints, uncertainty and problems of non-stationary series. A further development of empirical research in this direction is believed to result in a better understanding of consumption behaviour.

2.2.2. Survey of Empirical Studies in Developing Countries

Empirical research on consumption behaviour on developing countries is a relatively recent phenomenon compared to the early attention it got in developed countries. It was in the late 1980s that due emphasis started to be laid on consumption studies in developing countries. In the case of developing countries the assumptions of the life-cycle permanent income hypotheses are highly challenged due to the prevalence of liquidity constraints and uncertainty together with poverty (see Deaton, 1989). In a situation where people have little chance to smooth their consumption through borrowing, consumption in the current period is expected to depend on what people earn in the current period. Uncertainty about the future income on the other hand may lead to the reduction in consumption at present in order to buffer consumption in the future when income is low.

One of the earliest attempts to model consumer behaviour in developing countries was made by Giovannini (1983). He estimated a saving function with rational expectations for a set of 7 Asian developing countries. For both OLS and instrumental variable estimation, he obtained saving highly sensitive to its lag (and to growth rate of income in the case of OLS) but unresponsive to interest rate and foreign savings. But his model specification can be criticised for taking no account of the possible effect of liquidity constraints.

Rossi (1988) tried to identify the effect of liquidity constraints in his Vector Auto Regressive model specified for consumption and its determinants for a set of developing

countries. He assumed liquidity constraints to be substantial in the countries where the use of resources from the International Development Association (IDA) is common. He anticipated the omission of liquidity constraints to bias down the estimate for intertemporal elasticity of substitution i.e. the interest elasticity of consumption. He also anticipated consumption in the liquidity constrained economies to strongly react to expected changes in income. He separately estimated the model for Sub-saharan Africa, Middle East and North Africa, East and South Asia and the pacific, Southern Europe, Central America and the Caribbean, and South America taking sample countries from each region. His estimation results using time-series data from the sample regions clearly show the importance of liquidity constraints in explaining consumption behaviour. His study also shows the significant role that real interest rate plays while government spending was found to be insignificant except for the Sub Saharan Africa. Rossi (1989) extended his model to include the effect of demographic variables (dependency rates) and found his results inconclusive except for the Southern Europe where the effect was found to be 'sizeable' (p.175).

Lahiri (1990), on the other hand, estimated an error correction consumption model for 8 Asian developing countries incorporating the effect of age structure of the population and found that demographic variation was one of the most important factors to explain diversity in consumption behaviour among the sample countries. Raut and Virmani (1989) tested Hall's random walk hypothesis for 23 developing countries using time series data. The original random walk hypothesis with constant interest rate was rejected by the data. However, when variable interest rate was assumed, the data was found to be consistent with the random-walk hypothesis (p.390). But their estimates might have been biased due to the omission of borrowing constraints.

Using cross-country household data for 10 developing countries, Schmidt-Hebbel et al (1992) confirmed the central role that current income and wealth play in determining household consumption in the presence of liquidity constraints. Liquidity constraints were found to be the major factor explaining household consumption while real interest rate was insignificant. Ogaki et al (1995) undertook an analytical comparison of consumer response to interest rate in low-income and middle income countries and concluded that the effect of interest rate on consumption is itself a function of the level of income (p.27).

The earlier finding by Lahiri (1990) with regard to the effect of demographic variables was again confirmed by another co-integration analysis undertaken by Faruqee and Hussain (1995) for four Asian countries. Applying the two-stages Engle Granger procedure[6], they found that the short run dynamics in consumption/saving behaviour is basically due to growth in income and financial deepening. But the long-run shifts in consumer behaviour were mainly due to shifts in the relative size of the working-age population (p.28).

Dayal-Gulati and Thimann (1997) carried out a comparative study for the empirical determinants of consumer behaviour in South East Asia and Latin America. Growth and demographic variables, financial deepening (measured by M2/GDP), macroeconomic instability proxied by volatility in inflation, and external factors were included in their model. In addition, their model considered other policy variables such as central government balance, social security expenditure and pension fund savings. The results from their fixed-effects panel estimation indicate that policy variables were particularly important in influencing saving/consumption behaviour in both Asian and Latin American samples (p.21). Growth rate in income, financial deepening and macroeconomic stability were also important.

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[6] *The method is described in the Methodology section.*

When it comes to the Ethiopian case there are only few studies which have analysed consumption behaviour in the macroeconomic framework. Asmerom (1987) estimated the effect of demographic variables on saving behaviour taking estimated dependency ratios as a proxy. Using simple OLS estimation he obtained that dependency ratio significantly affects saving behaviour. However, since the data for population in the different age groups was estimated through linear interpolation both consumption and population data are likely to be non-stationary and OLS estimation might not be valid. The consumer price index included as a proxy for the effect of real interest rate had a negative sign but was not statistically significant. Asmerom (1992) also estimated the Keynesian and permanent income specifications for consumption in Ethiopia using permanent income forecasted from two years moving average process. He obtained a negative relationship between consumption and permanent income and positive relationship between consumption and transitory income. But the R^2 from his OLS estimation was very small. The results for the Keynesian absolute income specification were not consistent with a priori restrictions implied by the theory. In both cases, however, the structural break during 1974 revolution was found to be important in shifting the consumption functions.

Daniel (1995) has also analysed private saving behaviour using macroeconomic data. Unlike the earlier studies by Asmerom, Daniel incorporated some realistic features such as liquidity constraints and uncertainty due to rainfall variability and war. He estimated both static and a simple dynamic (error-correction) specifications. Since his ADF and DF tests clearly show that all the time-series variables in the model are non-stationary, only the results of the dynamic specification are econometrically valid. But his analysis was mainly based on, the OLS estimation results since the Engle-Granger test did not produce conclusive evidence of

cointegration[7] for most of his equations. In his final savings equation, estimation results using the Engle-Granger two step procedure clearly show that saving is highly responsive to transitory income[8]. Foreign saving and government tax were also found to have a significant negative effect on private saving while rainfall variability had significant positive effect. The proxy variable introduced to account for the effect of liquidity constraints, i.e. lag of broad money, has unexpected positive sign though it is not significant. In addition, the absolute magnitude of the coefficient of the error correction term is greater than one which is not meaningful.

In general as it is true in the case of developed countries, the empirical literature in developing countries as well doesn't have a conclusive evidence as to what exactly determines private consumption behaviour. As it has been argued by a number of studies, however, the effects of liquidity constraints, uncertainty and fluctuations in contemporaneous income seem to be more pronounced in the case of developing countries. This might be due to the importance of subsistence considerations rather than intertemporal consumption smoothing as predicted by the traditional theories (Deaton 1989).

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[7] *This can be due to the weak power of the Engle-Granger procedure in identifying cointegration.*
[8] *Transitory income was predicated using variability in rainfall (see Daniel (1995): 49).*

CHAPTER THREE

AN OVERVIEW OF THE MACROECONOMY OF ETHIOPIA

No study of private consumption behaviour will be fully illuminating unless it is seen under a broader macroeconomic context. Private consumption behaviour is closely associated with the issues of capital formation and economic growth, demographic dynamics, financial and fiscal policies, inflation, domestic credit situation and cultural practices. The influence of the rest of the world can also be reflected through trends in terms of trade, balance of trade, external credit and assistance. Although a full account of all these factors is beyond the scope of this study, a brief review of some of the issues is made in this chapter[9].

3.1. Growth, Investment and Saving

The sample period to be considered for this study incorporates three different policy regimes in the history of Ethiopian economy. The first period, 1960-1973 represents the last years of the long imperial regime. During the next 17 years, 1974-1991, the economy was subject to the principles of central planning and management. And the last period, 1992-1998, is the period where some attempts have been made to reform, liberalise and stabilise the economy that suffered from central guidance under the previous regime.

While a strong political pressure for change was mounting, the economy was performing relatively well in the period 1960-1973. The growth rate in real GDP averaged 4.2% while the growth rate of the population over the period, was around 2.6%. This meant a 1.6% overall annual growth rate in per capita income. In the same period the gross domestic capital formation

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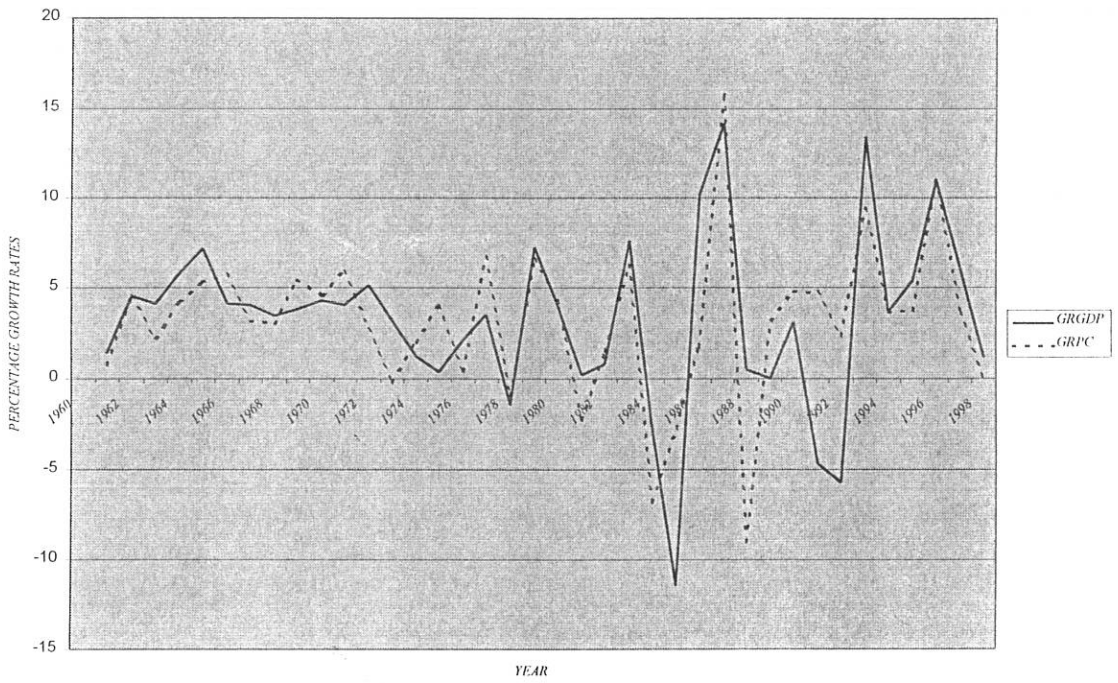
[9] *All the data used for discussion in this chapter are attached as an appendix.*

constituted around 12.8% of GDP while the average share of gross domestic saving in GDP was 11.3%, resulting in an average resource gap of only 1.5%. Although it was much lower than what is conventionally recommended to achieve sustainable economic growth, the saving performance of the economy at the period was not bad compared to the performance in the rest of the periods .

Fig.1:GROWTH RATE IN REAL GDP (GRGDP) AND PRIVATE CONSUMPTION (GRPC)



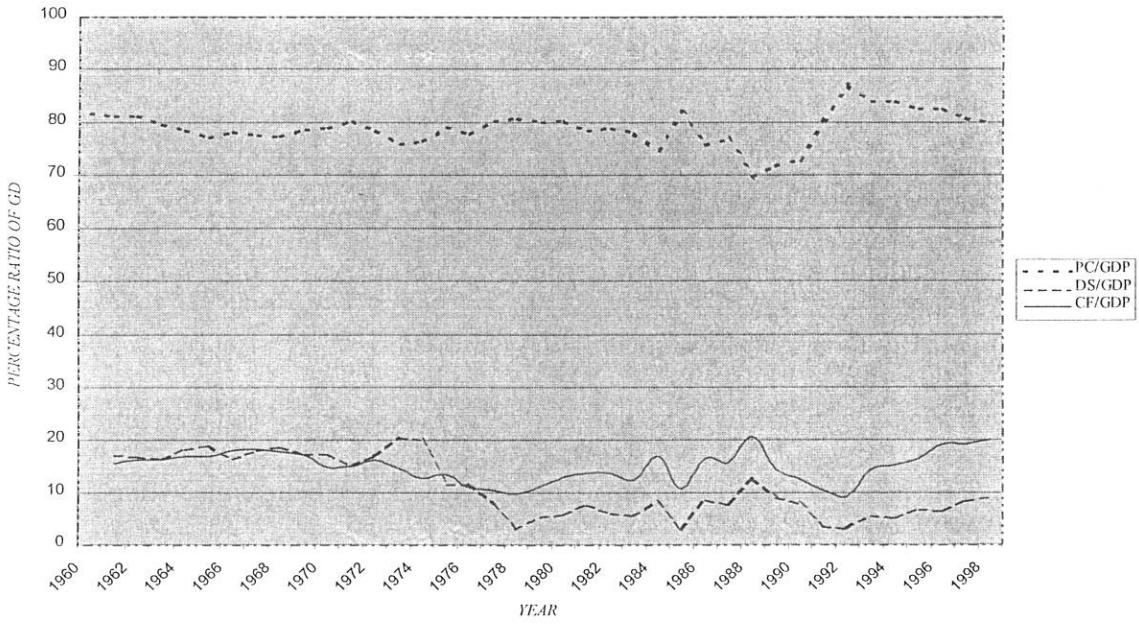
Source : MEDAC (Various Reports)

The picture dramatically changed with the introduction of command economy in 1974 . For the period 1974-1991 although the economy was characterised by high ups and downs in the growth process, the overall performance was extremely poor. The average annual growth rate in the real GDP for the whole period was around 1.9% in the face of a 2.7% annual growth rate in the population. This implies that per capita income was declining on average in the period.

Large negative growth rates were observed in the years 1984-85 and 1991-92. The former was due to one major drought and the latter was due to war and political instability.

In the period 1974-1991 the earlier good saving performance of the economy was also reversed (Fig.2). The average ratio of gross domestic saving to GDP which was 11.3% for the earlier period declined to 4.98%. The worst in the period was where the gross domestic saving

Fig.2: PRIVATE CONSUMPTION (PC/GDP), GROSS DOMESTIC SAVING (DS/GDP) AND GROSS CAPITAL FORMATION (CF/GDP) AS RATIOS OF GDP



Source: MEDAC (Various Reports)

as a ratio of GDP was a mere 0.18% Although an accurate data for the distinction between public and private sector contribution is not available the poor saving performance of the domestic economy in the period can be associated with the fast and continuous rise in government consumption rather than private consumption (see Fig.5). In fact, private consumption as the ratio of GDP was declining in the period. In the face of declining gross domestic saving however, the gross domestic capital formation (investment) remained at a

relatively high level of 11.72% as average ratio of GDP. This wide resource gap implies that most of the gross domestic investment, which was of course predominantly public, was financed through borrowing.

As to the recent past the official statistics indicate that the trends in some of the most important macroeconomic parameters are getting reversed due to the economic reform and stabilisation measures undertaken. The average growth rate in real GDP for the period 1992-1997 is around 5% which is at least greater than the growth rate in the population. As it is depicted in fig 2 both gross domestic saving and investment have been continuously rising after 1992. But the response does not seem to be as fast as it was anticipated at the beginning of the economic reform period.

It would be useful to see what was happening to private consumption in the context of the above discussion. As it is shown in (Fig.1) the growth rate in private consumption appears to fluctuate following the ups and downs in the growth rates of GDP with few exceptions. There is no indication of smooth consumption path in the face of fluctuating income as it was predicted by the permanent income - life-cycle hypothesis. And this clearly reflects the reality in the domestic economy which is dominated by the poor subsistence households who primarily depend on their current income to finance their current consumption. Looking at (Fig. 1) we cannot see much evidence of the lag effect of the current income on the next years consumption. But it seems that consumers have some anticipation about future income while making current consumption decisions; consumption tends to rise or fall slightly before income actually falls or rises. This can be due to the observed weather condition in the current period which indicates what will happen to income in the next period .

As it would obviously be expected private consumption and gross fixed capital

formation follow opposite trends [see Fig. 2]. This simply means resources that are left over the current consumption are used to finance investment, which is a key element in the process of economic development

3.2. Financial Development

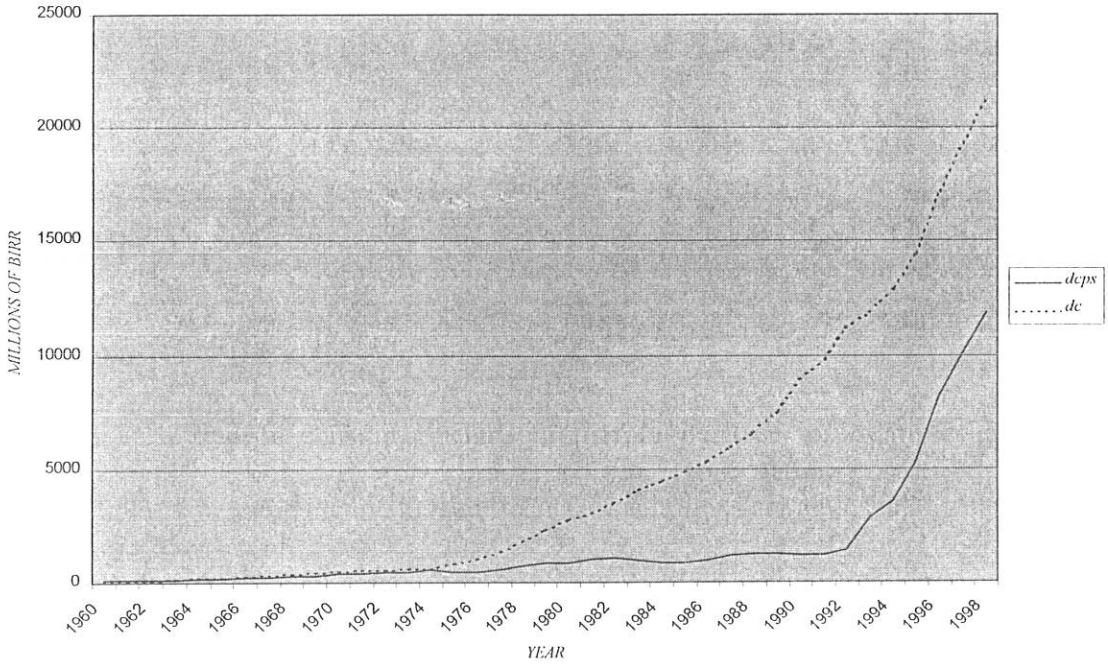
Development in the financial sector has traditionally been considered as one of the most important factors influencing consumer behaviour. While the development of financial markets provides a number of alternative saving instruments and returns on the saved resources it can also encourage consumption by alleviating borrowing constraints. One way to measure the extent of financial development in an economy is by looking at the number, geographical distribution and activities of banks and other financial institutions.

Modern banking practice was formally introduced in Ethiopia in 1905 when an Egyptian National Bank was allowed to open a branch in Addis Ababa which was later replaced by the Bank of Abyssinia (Belay, 1987). Following the establishment of some Italian Banks during the occupation, the State Bank of Ethiopia was established in 1942. The large state owned Commercial Bank of Ethiopia was established in 1963 when the State Bank of Ethiopia was split into the National Bank of Ethiopia and the Commercial Bank (Befekadu, 1992). Although there are few recently established private banks and few other specialised state owned banks (Development Bank and Construction and Business Bank) the commercial banking practice in Ethiopia has been and is dominated by the Commercial Bank of Ethiopia. In addition to the banking system the state owned and private insurance companies and the Social Security Authority are included in the current financial sector of Ethiopia.

This being the overall picture, however, the formal financial sector is said to have had

limited influence on consumer behaviour in Ethiopia (see for example Itana (1994), Mauri (1987)). For one thing the mentioned financial institutions are almost all located

Fig.3 TOTAL OUTSTANDING DOMESTIC CREDIT (DC) AND DOMESTIC CREDIT TO THE PRIVATE SECTOR (DCPS)



Source: National Bank of Ethiopia (Various Reports)

in large towns and cities and hence are highly detached from the rural communities who consist the bulk of the private sector in Ethiopia. Even for those who have access however, the credit environment has been highly restrictive and of course beyond the reach of the poor. In fact none of the financial institutions mentioned above have been engaged in providing credit for direct consumption. But this could not have been a serious problem since the credit obtained for investment purposes can be used to retain some of the own resources for the purpose of consumption.

Looking at the credit side of the picture, therefore we can see little association between

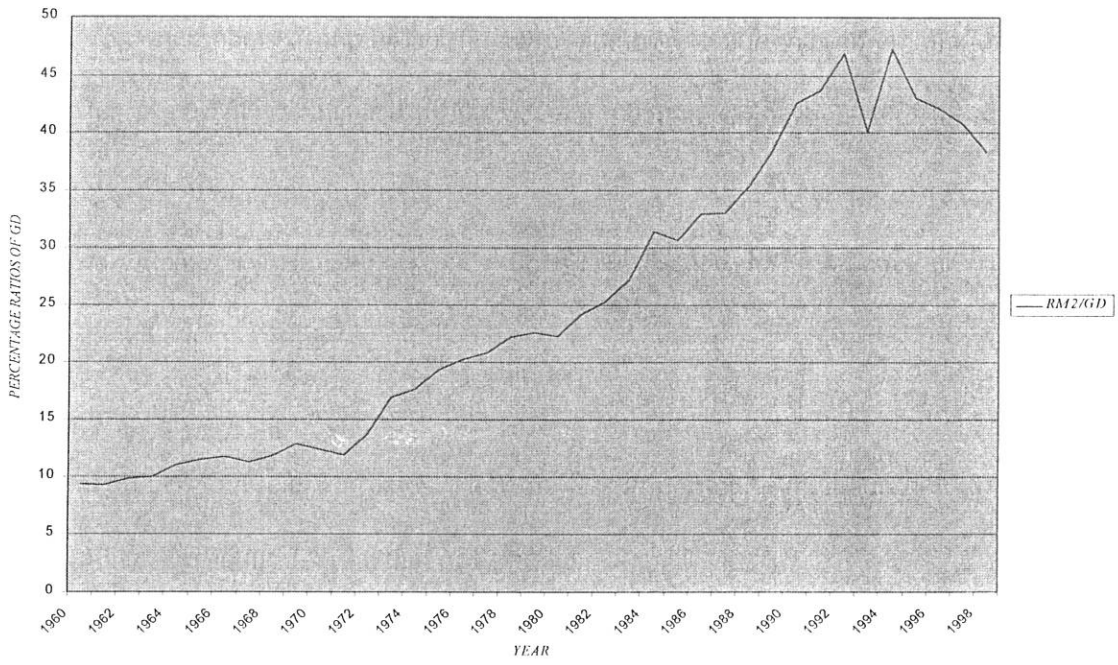
the formal financial system and the private sector. Total outstanding domestic credit to the private sector as a ratio of GDP remained less than 10% for most of the years considered under this study. Although the total domestic credit was continuously rising its orientation has significantly varied from regime to regime [see Fig. 3]. During the imperial regime the average share of the private sector in the total domestic credit was around 75%. This has declined to less than 9% during the military regime. This shows that the fast growth observed in the domestic credit during the military regime was to finance the mounting government deficits observed in the same period. In the current period the share of the private sector is once again rising.

The financial sector could also influence the consumer behaviour through the returns it provides on the saved resources. But interest rates have been administratively fixed and hence had little connection with the demand and supply situation in the financial market or inflation (see Itana ,1994]. Overall, however, the financial sector is said to have remained highly liquid not because of high interest rates provided but rather due to restricted credit environment and limited investment outlets (World Bank, 1991). In fact, real interest rate was either negative or close to negative for most of the years under consideration. But the saving and time deposits, which basically belong to the private sector, were continuously rising. As mentioned earlier, however, what is happening in the formal financial sector only partially reflects the reality since it is not accessible to the majority of people.

A broader measure of financial development in an economy is the ratio of broad money (M2) to GDP widely used as a measure of financial deepening [see Dayal- Gulati and Thimann (1997), Schimdt-Hebbel et.al (1992). As it shown in Fig.4 the ratio M2/GDP has been continuously rising, especially after 1974. In fact, developments in the broad money are closely associated with the developments in domestic credit and bank deposits. Saving and time

deposits are components of the broad money in addition to currency in circulation and demand deposits that are highly influenced by the developments in domestics credit. Since all the time and saving deposits belong to the private sector and the bulk of the currency in circulation is held by individuals [see Befedadu (1992), Itana (1994)], the developments in broad money are expected to have some influence on the consumption smoothing strategies of the private sector. In general, however, the services of the formal financial sector are highly associated with investment and commercial activities. They are less important at the household level, especially in a non monetised economy like that of Ethiopia.

Fig.4: BROAD MONEY AS RATIO OF GDP (RM2/GD)



Source: National Bank of Ethiopia (Various Reports)

As it is emphasised by some studies on the financial sector in Ethiopia [Dejene (1993) , Mauri (1987), Dessalegn (1984)] the informal financial activities are more important at the

household level. The informal financial activities include the traditional saving institutions such as Ekub, Iddir and Mahber as well as the traditional money lenders ("Arata Abedari"). Although exhaustive evidence is lacking, the few available studies have argued that the traditional institutions are still important in saving and borrowing activities of the households both in rural and urban areas. A survey conducted by the Ministry of Agriculture (1983/84) has reported that around 80% of peasant credit was from friends, relatives and neighbours at zero interest and 80% of the credit was for consumption, purposes. Savings in the rural areas are usually made in the form of less liquid physical assets and cattle that cannot be used for the purpose of consumption smoothing in the short run thus necessitating some sort of borrowing. Ikub and Iddir are common in urban areas as well. In general, while it is known that the traditional institutions of mutual support have even a longer history of existence than the formal financial institutions, their significance and extent of community participation is a subject to further study.

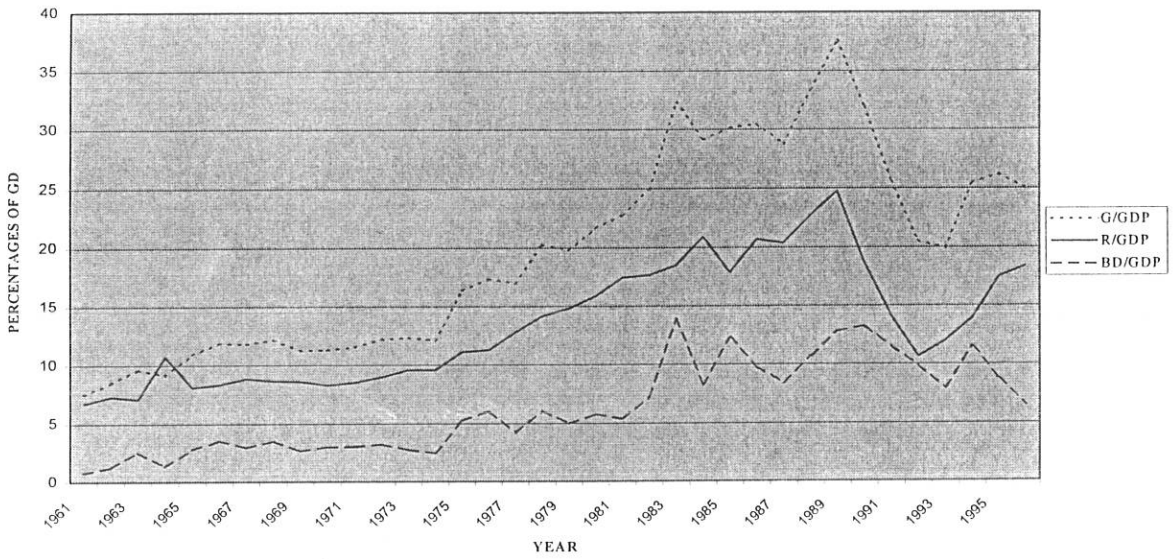
3.3. Fiscal Policies and Macroeconomic Stability

Fiscal policies have traditionally been assigned three broad functions: distributive function, stabilisation function, allocation and growth function. To achieve one or a mix of these functions the two basic instruments of fiscal policy, i.e. taxation and government spending, are employed. Both of these instruments can have a significant influence on how economic agents behave regarding their production and consumption decisions. Using the instrument of taxation it is possible to influence both the incentive structure and income distribution while government spending is used to influence the aggregate demand situation and growth prospectus of the economy.

In Ethiopia the modern fiscal policy system was formally instituted in the early 1940s. In

proclamation 8(1942) the imperial government stated that "in order to accomplish the establishment of our government , the prosperity of the country and the well-being of our people

Fig.5: GOVERNMENT SPENDING (G/GDP), GOVERNMENT REVENUE (R/GDP)AND BUDGET DEFICIT (BD/GDP)



Source : Ministry of Finance (Various Reports)

land taxes shall be levied" (Negarit Gazeta, 1st year, No 1:17]. This is not to mean that there were no taxes and government spending prior to that period. For hundreds of years, highly exploitative feudal tax systems that left the majority on a mere subsistence, have been in place. But those huge amounts of resources extracted from the majority were essentially used to finance feudal extravagance and the individual interests of the lords and leaders rather than serving the development and equity objectives as required by the modern fiscal policy. The discouraging tax policies and the inappropriate utilisation of the resources therefrom are some of

the factors to blame for the poor development performance of the country in the past.

Initially taxes were collected both in kind and in the form of money. Organised statistics is not available on the amount and type of taxes that were collected prior to 1950. Starting from 1950, however, the Ministry of Finance prepares annual reports on the central government budgetary revenue and expenditures and the discussion here is based on those reports.

Throughout, taxes dominate the total revenue of the government and indirect taxes have remained the major component of the tax revenue itself. What this means is that the burden of government tax has remained on the ordinary consumer. To mention some of the developments in government revenue: the absolute magnitude of the total government revenue has increased from 66.7 million Birr in 1950 to 6,966.2 million in 1996, out of which 56.3 million and 4,723.6 million respectively were tax revenues.

The total government revenue for the period 1960-1973 has on average remained at a moderately low level of 8.6% of GDP out of which 89% was tax revenue. In that period, tax revenue was basically dominated by indirect taxes on domestic goods and services as well as on international trade. The military regime, which succeeded the imperial one, has shown a dramatic achievement in revenue collection. The total revenue which was 9.59% of GDP in 1974 has risen to 24.8% of GDP in 1989. In the next few years government revenue declined due to war and instability. During the period the share of non-tax revenue in the total increased from 13.1% in 1974 to 39.2% in 1989. This was largely due to the expansion in public enterprises and non-tax contributions from the public (Wegene, 1994). The tax collection effort of the military regime was generally successful due essentially to the close connection and strict control mechanisms it has established on the individual property and activities both in the rural and urban areas. The current government is gradually recovering from the low level of revenue it

has started with. The actual revenue as a ratio of GDP increased from the minimum of 10.62 % in 1992 to 18.36% in 1996. The share of tax revenue in the total was 67.8% in 1996. The share of non tax revenue is generally declining in this period which can be due to the withdrawal of the government from some business activities.

On the expenditure side, the imperial period was more prudent compared to the other two. The total government expenditure as a ratio of GDP ranged from 5.77% in 1960 to 12.19% in 1973. Thus the fiscal deficit for the corresponding years ranged between 0.7% of GDP and 2.74% of GDP. The average fiscal deficit for the period was around 1.4% of GDP and in fact there was budget surplus in none of the years.

During the military regime government expenditure increased from 12.06% of GDP in 1974 to 37.56% of GDP in 1989. Despite a considerable achievement in revenue collection, the government deficit in the period was growing at an alarming rate due to the accelerating government expenditure which was dominated by defence expenditure. The widening resource gap mentioned in section 3.1 alone was another dimension of the rising fiscal deficits observed in the period. Fiscal deficit mounted to 13.23% of GDP in 1990 from 2.46% in 1974 and the average fiscal deficit for the period was 8.1% of GDP. Fiscal deficit in the current period is still high although some decline is observed. The average for the period 1992-1996 was 6.5% of GDP.

With regard to macroeconomic stability, what matters most is the way budget deficits are financed. What is most important about fiscal policy is the extent to which it affects private consumption and the overall level of economic activity through its effect on disposable income and prices. If the government mainly relies on domestic credit for its deficit financing, this may result in higher real interest rate while over reliance on foreign borrowing results in appreciating

real exchange rate which itself worsens the current account deficit. Fiscal deficit financing through money creation can trigger inflationary pressure in the economy resulting in a lower real disposable income of individual consumers. In Ethiopia different fiscal deficit financing mechanisms have been in place as described below.

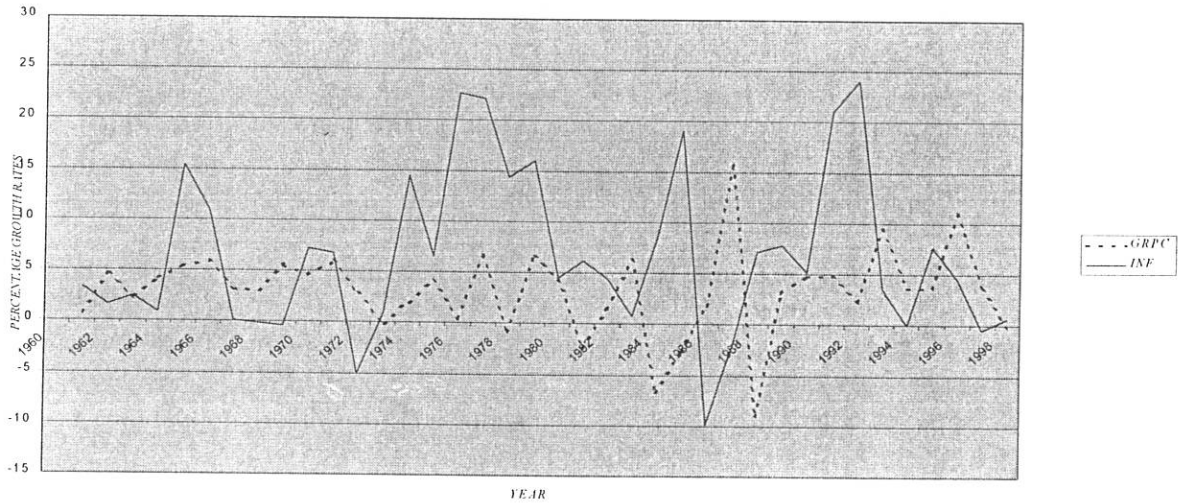
During the imperial regime, fiscal deficit financing requirement was not that large to introduce major macroeconomic imbalances in the economy. That is why inflation was on average 1% during 1960-1973. Fiscal deficit in the period was basically financed from external sources. Still, however the current account was in a healthy situation for most of the years. In fact the trade balance was surplus in some of the years including 1974. In this period, therefore, we do not expect severe crowding out of the private sector by the public sector.

The major sources of finance for the large fiscal deficits during the military regime were domestic credit, money creation and external borrowing and assistance. The fast and continuous rise observed in monetary aggregates was due basically to the fast expansion of domestic credit to the government. The money supply (M1) has risen from 659.4 million in 1974 to 6,199 million in 1991 while the broad money (M2) increased form 1,066.6 to 8,387 in 1991. At the same time outstanding domestic credit to the government increased from 96.7 million in 1974 to 8,656 million in 1991. External borrowing was equally important in financing government deficit although some decline was observed during the final years of the military regime. Similar patterns in public deficit financing were followed for some time after 1991. But the government has stopped direct borrowing from domestic sources after 1996. As it is reported in annual budget proclamations the government has started to pay back part of its accumulated domestic debt.

What is interesting about the period after 1974 is that inflation has remained at a

moderately low level in the face of administratively fixed interest rates and fast growing domestic credit and thus money supply (see Fig.6). The average inflation rate for the period, as measured by the growth rate in the Addis Ababa consumer price index, was only 8.3% per annum. One possible reason can be the strict control on the prices of major consumer items that was exercised during the period. Another possible explanation is the decline in the velocity of circulation of money (GDP/ M2) or the existence of 'monetary deepening'[see Eshetu and Mekonnen, 1992:20]. In this connection we should also consider the possible underestimation of the actual production by the official statistics. The steady growth of money-to-GDP ratio indicates that the growth rate in money supply was taking the officially reported GDP into account. But as it is revealed by the revised series of national accounts[10] the official

Fig.6: INFLATION (INF) AND GROWTH RATE IN PRIVATE CONSUMPTION (GRPC)



Source : Reports of the National Bank of Ethiopia for CPI and MEDAC for Private Consumption.

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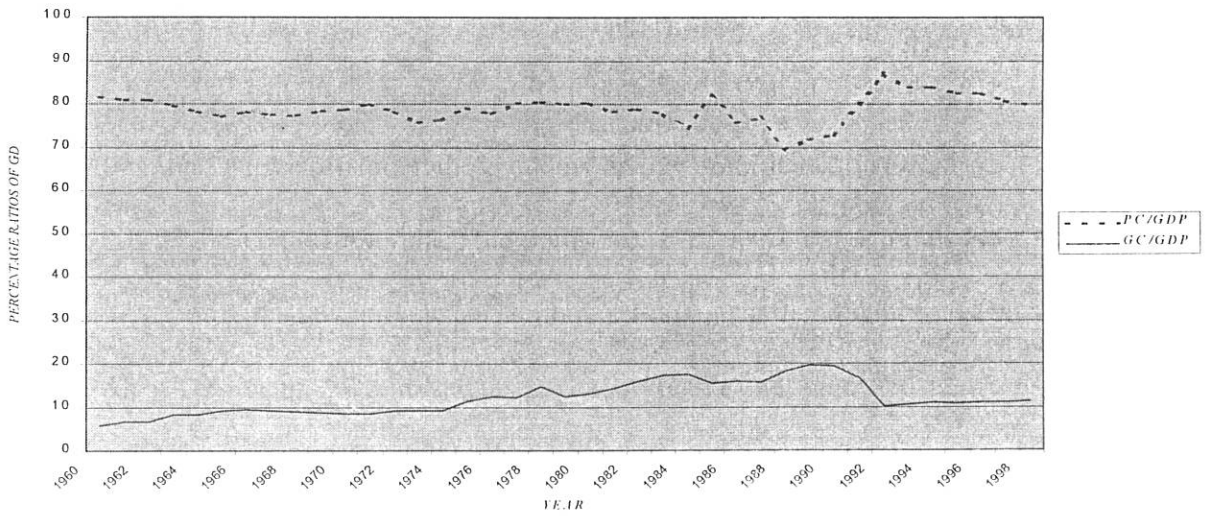
10 *The revised series was produced in 1994*

national accounts figures were underestimated.There were a number of underground production and business activities which might have absorbed part of the additional money supply thus mitigating the inflationary pressure.

Even after the price controls are removed and the interest and exchange rates are partially liberalised i.e. after 1992, the inflation rate is still low compared to other countries that are found under similar conditions. The average annual rise in consumer prices for the period 1992-1996 is 9.3%. Although a number of hypotheses are made, the factors which tend to suppress the inflationary pressure in the economy are not empirically investigated.

It would be useful to place the point of the discussion above into the context of the objective of the current study, private consumption. Looking at the mounting fiscal deficits and fast growing government tax revenue on the one hand and declining per capita production on the other, one would naturally be able to imagine the pressure under which the private sector had been performing in the period after 1974. The inflationary pressure itself,

Fig.7: GOVERNMENT CONSUMPTION (GC/GDP) AND PRIVATE CONSUMPTION (PC/GDP)



Source: The Reports of MEDAC (Various Issues)

real purchasing power of the already meagre disposable income. The provision of some consumer items at low controlled prices and some subsidies could not have significantly mitigated the resulting loss in welfare since they were highly limited in supply [see Eshetu and Mekonnen ,1992]. That is probably why we observe a continuous decline of private consumption as the ratio of GDP while government consumption as the ratio GDP was rising [see fig. 7]. The trend is somewhat reversed after 1993.

3.4. External Factors

As mentioned at the beginning of the chapter, the influence of the rest of the world on domestic consumers can come through the import and export price chocks and the resulting effect on the current account balance. In a developing country like that of Ethiopia, the external influence can also come through the external debt position and the flow of external assistance.

The situation in the balance of payments of Ethiopia cannot be seen separately from the internal imbalance discussed in the previous section. Prior to 1974 where the internal imbalance was relatively low the balance of payments was in a healthy situation. The average current account deficit for the period 1960-1973 was 2.7% of GDP. In fact the trade balance was positive in 1974. Since then, however the current account deficit was growing at a very fast rate to reach 6.28% of GDP. No sign of improvement is shown in the current account even after some liberalisation measures on exchange rate and other prices are undertaken in 1992. The average current account deficit for the period 1992-1996 was 5% of GDP. The trade deficit in 1995 was around 3.8 billion .

The basic cause for the mounting current account deficits was the rapid growth in the value of imports in the face of sluggish and in some cases declining value of exports. As it is

always said, around 60% of Ethiopia's export is coffee and what happens to the total value of exports highly depends on coffee price situation in the world market. That is so because there has not been a major improvement in the volume of exports to compensate for the decline in value due to the decline in prices. The terms of trade has been fluctuating along with the fluctuations in coffee prices. For all the years before 1974 the terms of trade was greater than 100 (1980 base year). This has continued for some time in the 1970s except for 1974 and 1975. But in the1980s and 1990s it was generally less than 100 except for few years in which there were coffee booms.

The corollary to mounting current account deficit is a rising external debt and debt service requirements. In fact there was little external debt and debt service requirement before 1974. Since then, however, the external debt situation of the country has been continuously deteriorating. The external debt as a radio of GDP averaged 37.2% for the period 1974-1991 and the external debt service ratio averaged 46.5% of GDP in the same period. [11] There is no improvement in the situation even after 1991. The debt service requirement was 57.3% in the period 1992-1996. The external debt has been accumulating in such an alarming rate despite an equally huge inflow of foreign assistance and grants. Foreign aid has been particularly important during drought and famine years.

All these developments would have some influence on how the private sector in the domestic economy has to behave. The fast accumulating external debt would have to be paid back through increased domestic tax and earnings in some later date which would have some influence on the expectations of the private sector. The deteriorating terms of trade for primary

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[11] *The information is obtained from various issues of quarterly Bulletins of the National Bank of Ethiopia*

exports clearly shows that we are moving to the point where we can no longer finance our increasing demand for imports by concentrating on these few lines of exports. The importance of external aid in financing the domestic shortfalls itself indicates the subsistence nature of the domestic economy. Foreign aid in this sense conveys some message to the private sector as to what it should do to fill the gap that is currently covered by foreign aid.

CHAPTER FOUR

DATA SOURCE, METHODOLOGY AND MODEL SPECIFICATION

4.1. Methodology

After the publication of Davidson and others paper (1978) , the problem of nonstationarity has become one of the main issues in modelling time-series variables. Any stochastic process (X_t) is said to be stationary if "the joint and conditional probability distributions of the process are unchanged if displaced in time" (Charemza and Deadman, 1993:118). ie.if,

$E(X_t)$ = constant= μ

$Var(X_t)$= constant = δ^2 and $Cov\ (X_t\ X_{t+j}) = \delta_j$

then, X_t is said to be stationary and if any of these conditions is violated the process is nonstationary. As it is indicated by the third condition, stationarity requires the covariance between two periods to depend only on the gap between the two periods but not on the actual time the covariance is considered.

For nonstationary series, which is the case for most macroeconomic time-series, the standard statistical procedures for testing the adequacy of a model such as t and F tests are no longer valid; the diagnostic test statistics may look promising even in the absence of sensible economic relationship among the variables. But if the nonstationary series are cointegrated, i.e if there exists a stable long run linear combination of the variables which is stationary, then we can estimate economically sensible relationship among the variables. There are two common methods for testing co-integration and estimating the relationship among co-integrated variables; the Engle and Granger (1987) two-step procedure and the Johansen's (1988) maximum

likelihood method.

4.1.1 The Engle-Granger Two-Step Procedure

In the Engle-Granger Two-Step procedure, if the time-series variables in the model are all integrated of order one[12] the long run linear combination (Co-integrating vector) is estimated by running OLS on the long run equation of the form:

$$Y_t = \beta_1 X_{it} + \beta_2 X_{2t} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (a)$$

In the second step the residual from (a) i.e.

$$e_t = Y_t - \beta_1 X_{1t} - \beta_2 X_{2t} \ldots\ldots\ldots\ldots\ldots\ldots (b)$$

is tested for stationarity. If e_t is found to be stationary then the variables are co-integrated[13] and the first lag of the residual (e_t) is taken as the error correction mechanism (ECM) in a model of first differences i.e.

$$\Delta Y_t = \alpha_1 \Delta X_{1t} + \alpha_2 \Delta X_{2t} + \alpha_3 (Y_{t-1} - \beta_1 X_{1t-1} - \beta_2 X_{2t-1}) + u_t$$

The coefficient of ECM_{t-1}, α_3, measures the speed at which the process tends to return back to its long run equilibrium after temporary disturbances in the short run.

The Engle-Granger two step procedure was, however, found to have a number of shortcomings. For one thing, it assumes the linear combination represented by (a), i.e. the co-integrating vector, to be unique which may not always be the case. For another, it treats the variables on the right hand side of (a) to be exogenous which is not true in most cases. In general, therefore, the Engle- Granger single equation method is said to be weak for testing cointegration among variables (see Charemza and Deadman, 1993:201). A more powerful test and estimation procedure for co-integration was suggested by Johansen (1988). The Johansen

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12 A stochastic process X_t is said to be integrated of order d ,I(d), if it becomes stationary after it is first-differenced d times. If it is stationary at levels it is said to be I(0).

13 As it is defined by Engle and Granger (1987) two time series variables X_t and Y_t are said to be cointegrated of order d,b where $d \geq b \geq 0$ if the two variables are integrated of order d and there exists a linear combination of the two variables which is integrated of order d-b.

procedure does not require a priori endogenous-exogenous distinction among the variables. It can also identify multiple co-integrating vectors. The analysis in this paper will, therefore, depend on the Johansen's maximum likelihood estimation procedure.

4.1.2 The Johansen's Maximum Likelihood Procedure

The Johansen procedure is used to test and estimate co-integration in a "multivariate setting." Vector auto regression (VAR) is one form of multivariate modelling where no variable in the system is assumed to be exogenous a priori .

The starting point in such a method as it was first done by Sims (1980) is, therefore, to formulate a General (unrestricted) Vector Auto Regressive model in which each current (non lagged) variable in the model is regressed on all other variables lagged a certain number of times i.e.

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + ... + A_k Z_{t-k} + \lambda D + \mu + \varepsilon_t .....(i)$$

where,

Z_t is vector of non stationary variables,

D is a vector of dummies,

μ is vector of deterministic components such as deterministic time trends and constants, and

ε_t is vector of error terms.

The resulting linear combination is taken as ECM.

The VAR system under equation (i) can be rewritten in the error correction form as ,

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \ldots + \Gamma_{k-1} \Delta Z_{t-k+1} + \pi Z_{t-k} + \mu + \lambda D + \varepsilon_t$$

$$= \pi Z_{t-k} + \sum_{i=1}^{k-1} \Gamma_i \Delta Z_{t-i} + \lambda D + \varepsilon_t \ldots\ldots (\ ii\ )$$

where,

$\Gamma_i = -[\ I - A_1 - \ldots . A_i]$, i= 1, ..., K-1

Δ = first difference operator

$\pi = -[I - A_1 - \ldots - A_k]$

I = a unit matrix

Such a "co-integrating transformation" is done by adding $Z_{t-1}, Z_{t-2}, \ldots, Z_{t-k}$ and $A_1 Z_{t-2}, A_2 Z_{t-3}, \ldots, A_{k-1} Z_{t-k}$ to both sides of (i) and rearranging.

Briefly, the error correction properties of the system introduced by Johansen (1988) are associated with the characteristics of the matrix π which is an (nxn) matrix since there are n variables constituting the vector Z_t. The rank of matrix π, which is given by the number of significant eigenvalues in the matrix, represents the number of independent rows which are the cointegrating vectors.

(a) If the rank of matrix π is equal to n, that is, the total number of variables in the VAR model, the vector Z_t is stationary (the variables are stationary at levels and no error-correction formulation is required). If π has a zero rank on the other hand i.e. if it is a null matrix , πZ_{t-k} component of (ii) will be zero and hence the variables will not be cointegrated.

(b) Cointegration of the variables is possible only when the rank of π is less than the number variables in the VAR system i.e. r<n. In such a case as Johansen (1988) has shown π can be

represented as ,

$$\pi = \alpha\beta'$$

where, α and β are both (n x r) matrices.

Matrix β is the co-integrating matrix with the property that $\beta'Z_t$ is I(0) ,i.e, $\beta'Z_t$ is stationary and the variables in Z_t are co-integrated with the co-integrating vectors β_1, β_2,..., β_r that are particular columns of β. In a VAR model consisting of n variables therefore, there can be r=n-1 cointegrating vectors.

There are two likelihood ratio tests, suggested by Johansen, to determine the rank of π and thus the number of cointegrating vectors. One is the Lambda trace test statistic where the null hypothesis is that "there are at most r co-integrating vectors" and begins from r=0. The other one is the maximum eigenvalue test (Lambda max) which tests the existence of r co-integrating vectors against r + 1.

If the case where rank of π = r < n is true and we have $\pi = \alpha\beta'$, the column of β after normalisation represent long run parameters relating the variables in their equilibrium situation. The matrix α represents the error correction parameters which measure the `speed of adjustment' from temporary disturbances in the equilibrium relation.

The first step for both the Johansen method and the Engle-Granger two-step method is to determine the order of integration of the variables. This is done using the Deckey-Fuller or Augmented Dickey-Fuller tests for unit root.

4.1.3. Testing for Time-Series Properties of the Variables.

If a non-stationary series, Y_t, becomes stationary after being first differenced d times, then it is said to be integrated of order d i.e it is I(d). If Y_t is stationary at levels it is I(0) and if Y_t

is not I(0) it is said to have a unit root.

The Dickey Fuller Test for the existence of unit root assumes Y_t to be a random walk process given as,

$$Y_t = \rho Y_{t-1} + \varepsilon_t \ldots\ldots$$

where,ε_t is white noise disturbance term.

The test is for $\rho = 1$ or by deducting Y_{t-1} from both sides of the equation,

$$Y_t - Y_{t-1} = \rho Y_{t-1} - Y_{t-1} + \varepsilon_t$$

$$\Delta Y_t = \delta Y_{t-1} + \varepsilon_t$$

where, $\delta = \rho - 1$ or $\rho = \delta + 1$

The DF test is now for $\delta = 0$ against the alternative $\delta < 0$. Rejection of $\delta = 0$ in favour of the alternative $\delta < 0$ implies that Y_t is integrated of order zero. We can include either or both a constant and a linear deterministic trend in the random walk equation.

If the error term is not white noise i.e if it does not have a zero mean and constant variance, however, the DF test will not be valid. The Augmented Dickey-Fuller test takes care of the possible autocorrelation in the error terms by augmenting the random walk equation with some more lags of Y_t as;

$$\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^{k-1} \delta_i \Delta Y_{t-i} + \varepsilon_t$$

The testing procedure is the same as DF test and it can also be modified by adding a linear deterministic trend and drift (constant).

4.2. Data

Obtaining an accurate and consistent data set for macroeconomic time-series is one of the main problems limiting economic research in developing countries. In most cases the available data set are not long enough to allow a reliable long run analysis. This is especially true for Ethiopia where the responsible statistical institutions are limited both in number and capacity. Even their history of existence is not long enough to enable them to produce the ideal data set for the kind of study to be undertaken here.

It is only after 1961 that a well organised national accounts information is available for Ethiopia. This will limit the sample period for this study to 1961-1998 which will only be reasonably long to analyse the cointegration of 4 to 5 variables.

This being the case, the data for private consumption and GDP is obtained from the national accounts series of the Ministry of Economic Development and Cooperation (MEDAC). The problem here is that MEDAC has revised the national accounts series in 1994.But the new series of national accounts goes back to only 1981 and the old series is available only up to 1994.Hence the date for GDP and private consumption are taken from the new series for the period 1981-1998 and for the rest of the years the new series is extrapolated back using the growth rates of the old series .The disposable income is computed by deducting taxes, subsidies and other transfers from GDP. Private consumption was calculated as a residual from the national accounts identity in the old series. But it is independently estimated in the new series.

Data on monetary variables and consumer price index (CPI) are obtained from the reports of National Bank of Ethiopia. As it is usually done the Addis Ababa consumer price index is taken as a proxy for the overall price level in the country. For the years 1997 and 1998 the Addis Ababa CPI is calculated using the national inflation rate. Government expenditure,

taxes, subsidies and transfers are obtained from the reports of Ministry of Finance on government budgetary revenue and expenditure.

4.3. Model Specification

Since the primary objective of this study is to test the Keynesian absolute income hypothesis and the permanent income-life cycle hypotheses in the Ethiopian context, two alternative equations based on these competing theories are specified.

In the Keynesian approach consumption at time t (C_t) is assumed to be a function of disposable income at the same period, (Y_t). In the log linear form the relationship can be specified as,

$$C_t = \beta_0 + \beta_1 y_t + \varepsilon_t$$

where,

C_t is log of private consumption at time t,

y_t is log of disposable income at time t,

β_1 is elasticity of private consumption to disposable income.

For the Keynesian hypothesis to hold, $\beta_1 < 1$, which is the case when the marginal propensity to consume (MPC) is less than the average propensity to consume (APC)[14] as it was postulated by Keynes for the short run. Average propensity to consume is expected to decline as income rises overtime; thus MPC = APC in the long run.

In empirical studies a number of variables have been included on the right hand side of equation (1). If the extreme Keynesian position that consumption is only a function of contemporaneous income is true, the coefficients of all the other explanatory variables will not

be significantly different from zero.

Interest rate is one of the most commonly included variables in empirical studies of consumption functions (see for instance Giovannini(1983), Rossi (1988,1989)).The theoretical expectation regarding the effect of interest on private consumption behaviour is ,however, ambiguous. On the one hand the rise in interest rate raises the opportunity cost of current consumption resulting in reduced level of consumption. On the other hand, the rise in interest rate means higher expected interest income making consumers feel wealthier than before. This effect tends to encourage current level of consumption. The overall effect depends on the relative strength of the substitution and wealth effects. The empirical evidence so far is not conclusive.

Another variable which is usually included in empirical consumption equations is inflation rate. The effect of inflation as well comes through different channels and its overall effect is not clearly known a priori. One channel is through its effect on the purchasing power of current income where the rise in the overall price level tends to reduce the current level of consumption. Inflation can also influence the real interest rate whose effect is ambiguous[15]due to opposite income and substitution effects. The third possible effect is due to the fact that inflation rate is the leading indicator of macroeconomic stability in the economy. High fluctuations in the price level are taken as manifestations of macroeconomic instability which makes predictions about future income highly uncertain. This may result in some precautionary savings thus reducing current level of consumption (see Deaton,(1989)). In the case of Ethiopia, since the nominal interest rate has remained fixed for most of the years considered in the study, changes in real interest rate primarily reflect the effect of inflation. Hence inflation rate rather than real

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[14] $\beta_1 = APC/MPC$

interest is included in the model so that it would be possible to capture the other effects of inflation as well.

The trends in government spending are also expected to have some influence on private consumption behaviour (see Dayal-Gulati & Thimann(1997), Rossi (1988)).In fact, it is the effect of government expenditure and revenue policies and how they are financed that matter most for policy purposes. Expansionary public expenditure policies may call for large transfer of resources from the private sector to the government thus reducing the disposable income of the private sector. On the other hand, government expenditure on socio-economic services may substitute for the private sector expenditure requirements on these services. The two effects tend to set off each other, but the net effect depends on the relative strength of each. The effect may also come through the influence of government deficit financing practices on inflation and interest rate although this particular effect might not have been important in Ethiopia due to fixed interest rates and generally low inflation rates.

Most of the recent studies also try to capture the effect of liquidity constraints by including some proxy variables in the empirical consumption equations (see Rossi (1988), Hayashi (1985)). Availability of credit and accumulated liquid assets can mitigate the effect of fluctuations in current income on current consumption. The variable that can broadly capture some of these effects is broad money which consists of time and saving deposits in addition to currency in circulation and demand deposits (Schimdt-Hebbel etal, (1992)). Broad money (M2) in this sense shows the extent of liquidity in the economy. It also represents most of the financial wealth of the private sector since time and saving deposits as well as currency in circulation largely belong to the private sector. In both cases growth in M2 is expected to encourage private

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[15] *Real interest rate is nominal interest rate less inflation.*

consumption. Broad money is therefore included in the equations to capture the effect of the extent of liquidity and financial wealth on private consumption.

The consumption function based on the simple Keynesian equation and incorporating some other possible explanatory variables in light of the preceding discussion is specified as,

$C_t = f(Y_t^d, G_t, P_t, M2_t)$.....(2)

where,

C_t =Real Private Consumption at Time t,

Y_t^d =Real Disposable Income at Time t,

G_t =Deflated Government Expenditure in Year t,

P_t = The Consumer Price Index as a Proxy for the Overall Price Level,

$M2_t$ = The Deflated Broad Money.

The long run consumption equation corresponding to (2) in the loglinear form will be,

$$c_t = \alpha_0 + \alpha_1 y^d_t + \alpha_2 g_t + \alpha_3 p_t + \alpha_4 M2_t + \varepsilon_t \quad \text{.....(3)}$$

where, α_1, α_2, α_3, and α_4 are long run elasticities and ε_t is the error term. The long run elasticities will be estimated using Johansen's Maximum Likelihood Method. The elements of the estimated cointegrating vector represent the long run coefficients. The anticipated signs for the elasticities are $\alpha_1 > 0$ and $\alpha_4 > 0$ but we cannot a priori determine those of α_2 and α_3.

The cointegrating vector showing the stable long run linear combination of consumption and its determinants is used as error correction mechanism (ECM) in the error correction model.

The error correction representation for (3) can be derived by rewriting the equation in a general Autoregressive Distributed Lag form as,

$$c_t = \beta_o + \sum_{i=1}^{k} \beta_{1i} y^d_{t-i} + \sum_{i=1}^{k} \beta_{2i} m2_{t-i} + \sum_{i=1}^{k} \beta_{3i} p_{t-i} + \sum_{i=1}^{k} \beta_{4i} g_{t-i} \quad \text{.....(4)}$$

The appropriate lag length to be included for each of the explanatory variables is not known a priori. It is to be determined from the data and hence the equations are specified in the general form here. This issue will be picked in the next chapter.

Adding and subtracting terms appropriately and including dummies for drought and government change (4) can be written in the error correction form as ,

$$\Delta c_t = \beta_o + \sum_{i=1}^{k-1}\theta_{1i}\Delta c_{t-i} + \sum_{i=0}^{k-1}\theta_{2i}\Delta y^d_{t-i} + \sum_{i=0}^{k-1}\theta_{3i}\Delta m2_{t-i} + \sum_{i=0}^{k-1}\theta_{4i}\Delta p_{t-i} + \sum_{i=1}^{k-1}\theta_{5i}\Delta g_{t-i} + \theta_6 ECM_{t-1} + \theta_7 DD + \theta_8 DG + u_t \quad \text{.....(5)}$$

where,

ECM_{t-1} = The lag of error correction mechanism,

DD = Dummy for drought,

DG = Dummy for government change,

Δ = First difference operator

u_t = The error term

Equation (5) contains both short run and long run information. The long run information is contained in the error correction term (ECM_{t-1}). The coefficient of this term is a priori expected to be negative, implying that the process is converging to its long run equilibrium. The magnitude of the coefficient of this term measures the rate at which the deviation from the long run equilibrium is declining. A positive coefficient for the ECM implies a diverging rather than converging process. The coefficients of the first-differenced variables represent the short run

relationship between consumption and its determinants.

The consumption equation implied by the permanent income – life cycle hypotheses can be specified analogously. According to these hypotheses consumption is proportional to permanent income and uncorrelated with transitory income. This will be tested replacing the current disposable income in the above specifications by estimated permanent income. As it is usually done (see Paxson (1992), Bhalla (1980)) permanent income is estimated as three years moving average of disposable income. This is based on the assumption that consumers will not expect their income in the near future to deviate much from their average income in the recent past. In other word , adaptive expectations formulating bahaviour is assumed in computation of permanent income here. The responsiveness of private consumption to transitory income can also be tested specifying similar equations. Transitory income is calculated as deviation of the actual income at time (t) from the estimated permanent income.

CHAPTER FIVE

EMPIRICAL ANALYSIS

5.1. Testing For the Unit Roots

Before any meaningful regression analysis is performed with time series variables it is essential to test the existence of unit roots in the variables and thus establish the order of integration of the variables. Direct application of OLS to trended time series variables, be it stochastic or deterministic time trend, usually results in spurious correlation rather than actual. One of the earlier solutions suggested to the problem of the existence of stochastic trends in the data was to estimate the relationship in first-differences rather than at levels (Enders ,1995). Inclusion of a linear time trend in the regression equation on the other hand may help to capture some of the deterministic components of the trending process.

The co-integration analysis and the associated error- correction modelling are among the latest solutions to the problem of estimating the relationships among variables that have stochastic time trends or unit roots. Estimation of the co-integrating relationships to be undertaken in the next section requires all the time-series variables in the model to be integrated of order one . The most commonly used test for the order of integration of time series variables is the augmented Dickey-Fuller (1981), ADF, test for the existence of unit –roots. The values of the ADF test statistics for all the time -series variables included in the estimation process are presented in table (1) below.

Table 1

The Results of ADF Test

VARIABLE (IN LOGARITHM)	NULL ORDER	
	I(2)	I(1)
C_t	-5.3324**	-0.39584
y^d_t	-6.6065**	-0.58232
y^p_t	-3.0523*	-0.26355
$M2_t$	-5.0591**	-1.9287
P_t	-4.0944**	-0.36225
g_t	-4.5503**	-1.6576

Critical Values : 5% = 2.945, 1% = 3.623; the single star (*) shows rejection of the null hypothesis at 5% and the double star (**) shows rejection at 1%; the sample size is 1962 to 1997 for levels and 1963 to 1997 for first differences; constant term and one period lag are included.

As it was briefly discussed in chapter 4, the null hypothesis for the null order 1(1) of the DF or the ADF test is that "the variable has a stochastic time trend (unit root)" which is tested against the alternative hypothesis that the variable is stationary, I(0). Analogously, the null hypothesis for the null order I (2) is that "the first difference of the variable has a unit root" to be tested against the alternative that the first difference of the variable is stationary. As it is presented in table (1) the null order I(2) is rejected for all the variables while I(1) is not rejected[16].That is, none of the variables are stationary at levels while their first differences are stationary. Hence we can take all the time-series variables in the model as an I (1) processes.

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[16] The null hypothesis of the existence of a unit root is rejected when the value of the ADF test statistic is negative with an absolute magnitude greater than the absolute value of the given critical values (Charemza and Deadman,1992).

5.2 Estimation of the Longrun Relationships

The fact that all the time-series variables in the specified consumption equations are nonstationary implies that, taken alone, the individual variables do not have a tendency to return back to their long run level (Enders, 1995). Nonstationary variables can have variances or covariances that are a function of time and hence may tend to drift upwards or downwards from their long run mean as a result of purely stochastic or random shocks. Sometimes the mean itself might be a function of time in which case the time series process is said to have a deterministic trend. Thus the mean of nonstationary processes may tend to decline or rise over time .

However, theories of aggregate consumption behaviour predict the existence of a stable and stationary long run relationship between consumption and its determinants. One of the most recent arguments of these theories is that even if the individual variables entering the consumption function are nonstationary, they have a long run linear combination that is stationary. Such a linear combination (the co-integration[17] vector) is taken to represent the long run equilibrium relationship.

The method selected for estimation of the long run relationship between private consumption and its specified determinists under this study is the Johansen's (1988) maximum likelihood method. This method produces consistent estimators of the long run parameters about which various restrictions can be tested using likelihood ratio (LR) statistics. This is so because Jahansen (1988) and Johansen and Juselius(1990) have shown that the limit distribution of these

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[17] *"The idea behind co-integration is that sometimes the lack of stationarity of a multidimensional process is caused by common stochastic trends, which can be eliminated by taking suitable linear combinations of the processes thereby making the linear combination stationary"(Johansen, 1996: 72)*

estimators is Gaussian and hence the likelihood ratio test statistics for testing hypothesis about restrictions on the parameters are asymptotically distributed as χ^2 variables.[18]

The results of the Johansen's co-integration test and the estimated longrun coefficients for both absolute income and permanent income specifications are reproduced[19] under table (2) and table (3) respectively. Through a long routine of eigenvalue algorithm and manipulation of the associated covariance matrix, the Johansen method enables us to estimate the reduced form longrun coefficients, the adjustment parameters and the maximum number of possible co-integrating vectors from a vector auto regressive (VAR) process of a certain order. The determination of the order of VAR process is usually a matter of try and error (Charemza and Deadman, 1992). Inclusion of long lags may take care of the possible autocorrelation in the error terms of the equations in the VAR model. However, lag lengths greater than two are usually devoid of economic sense for annual data (Enders, 1995). Since the results are to be used for further economic interpretation, therefore, a VAR process of order one VAR(1) is selected for estimation here.[20]

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[18] *for details see Johansen (1996)*

[19] *The econometrics package PcFIML 8.0 is used for estimation.*

[20] *Tests of autocorrelation for both individual equations in the VAR (1) process and the vector as a whole did not show serious problem of autocorrelation.*

Table 2

Co-integration Analysis (Absolute Income Specification)

Eigenvalue	0.665	0.487	0.255	0.186	0.082
Null hypothesis	r=0	r≤1	r≤2	r≤3	r≤4
Alternative Hypotheses:					
λ_{max}	r > 0	r > 1	r > 2	r > 3	r > 4
λ_{trace}	r = 1	r = 2	r = 3	r = 4	r = 5
λ_{max}	39.34**	24.03	10.58	7.41	3.08
95% critical value	36.4	30.3	23.8	16.9	3.7
λ_{trace}	84.44**	45.1	21.07	10.49	3.08
95% critical value	77.7	54.6	34.6	18.2	3.7

Standardized β' eigen vectors

C_t	Y^d_t	g_t	P_t	$M2_t$
1.00	-1.44	0.28	-0.32	-0.93
-0.82	1.00	-0.01	0.15	-0.07
6.38	-3.93	1.00	-2.90	2.62
0.54	1.22	0.13	1.00	-0.16
-5.67	-6.50	3.53	1.88	1.00

Standardized adjustment (α) coefficients

C_t	-0.160	0.006	-0.030	-0.094	-0.001
y^d_t	0.077	-0.799	-0.034	-0.064	-0.001
g_t	-0.076	-2.152	-0.041	0.148	-0.024
P_t	-0.273	0.129	0.060	-0.126	-0.005
$M2_t$	0.558	0.500	0.032	-0.056	-0.005

LR - test of zero-restrictions on α coefficients

	C_t	y^d_t	g_t	P_t	$M2_t$
χ^2 (1)	-	0.339[0.56]	0.047[0.83]	1.977[0.16]	10.94[0] ***

LR-test of zero-restrictions on the longrun elasticites (β-coefficients of the first row vecor)

	C_t	y^d_t	g_t	p_t	$M2_t$
χ^2 (1)	-	2.979[0.08]*	15.145[0]***	3.638[0.05]**	14.471[0]***

The Correlation Matrix

	C_t	y^d_t	g_t	p_t	$M2_t$
C_t	1.0				
y^d_t	0.82	1.0			
g_t	0.12	0.36	1.0		
p_t	-0.19	-0.45	-0.38	1.0	
$M2_t$	-0.28	-0.33	-0.06	0.56	1.0

Summary of Vector Diagnostic Tests

Vector AR 1-2 F(50,71) = 0.796(0.80]

Vector normality χ^2 (10) = 40.85[0]***

Vector X_i^2 F(150,51)= 0.479[0.99]

Vector $X_i.X_j$ χ^2 (300)= 322.69 [0.18]

- λmax and λtrace are the Johansen's maximal eigenvalue statistics and the trace statistics for testing co-integration; *** , ** , * show ejection of the null hypotheses are 1%, 5% and 10% respectively; values in [ ] are probabilities of rejection.
- constant term and deterministic time trend were included unrestricted.

Table 3

Cointegration Analysis (Permanent Income Specification]

Eigenvalue	0.765	0.560	0.271	0.188	0.025
Null Hypothesis	r=0	r≤1	r≤2	r≤3	r≤4
λmax	50.7***	28.74	11.08	7.287	0.899
95% critical value	36.4	30.3	23.8	16.9	3.7
λ trace	98.71***	30.3	23.8	16.9	3.7
95% critical value	77.7	54.6	34.6	18.2	3.7

Standardized β' eigenvectors

C_t	y^p_t	g_t	p_t	$M2_t$
1.00	-1.42	0.16	-0.25	-0.45
-0.843	1.00	0.05	0.14	-0.45
1.16	-0.14	1.00	-1.22	0.43
0.60	0.86	0.24	1.00	-0.40
0.30	-5.19	0.51	-0.16	1.00

Standardized α (adjustment) Coefficients

C_t	-0.22	0.22	-0.05	-0.08	0.00
y^p_t	0.23	-0.17	-0.02	-0.03	0.00
g_t	0.09	-1.22	-0.12	0.12	-0.06
P_t	-0.19	-0.70	0.08	-0.16	0.00
$M2_t$	0.53	0.46	0.05	-0.07	-0.02

The Correlation Matrix

	C_t	Y^{pt}	g_t	P_t	$M2_t$
C_t	1.0				
y^p_t	0.62	1.0			
g_t	0.14	0.17	1.0		
P_t	-0.15	-0.14	-0.43	1.0	
$M2_t$	-0.29	-0.22	-0.04	0.54	1.0

LR-test of zero-restrictions on α coefficients

	C_t	$y^p{}_t$	g_t	p_t	$M2_t$
$\chi^2(1)$	-	2.106 [0.15]	0.070[0.79]	0.802[0.37]	9.273[0]***

LR- test of zero restrictions on the first row vector of the β matrix

	C_t	$y^p{}_t$	g_t	p_t	$M2_t$
χ^2	-	8.170[0]***	12.402[0]***	7.48[0.01]***	5.263[0.02]**

Summary of Vector Diagnostic tests

Vector AR 1-2 F(50,71)=1.248[0.19]

Vector normality $\chi^2(10) = 24.478[0.10]$

Vector X_i^2 F(150,51) = 0489[0.99]

Vector X_i, X_j $\chi^2(300) = 321.46[0.19]$

As presented in table (2) and table (3), the two tests developed by Johansen (1988) could identify one co-integration vector for both specifications. With these tests the decision to reject or not to reject the null hypothesis is made by comparing the computed maximum and trace eigenvalues (λmax and λtrace) with the given critical values. If the computed value of the test statistics is greater than the critical value, the null hypothesis is rejected. In both specifications, the null hypothesis of "no co-integrating vector" i.e. r= 0, is rejected (at 5% for absolute income and 1% for permanent income specifications) using both tests. But the null hypothesis of "at most one co-integrating vector", i.e. r≤ 1, is not rejected implying that only one of the eigenvalues is significant.

When a single co-integrating vector is obtained, there is only one linear combination of

the variables, represented by the first row of the β' matrix, that is stationary. The combinations represented by the rest of the rows are not stationary.

However, one has to be careful in interpreting the combination represented by the co-integrating vector as the longrun equilibrium relationship. The co-integrating vector as estimated by the Johansen's method provides the reduced form of the long run relationship (J.Doornik and D.Hendry, 1994). But the reduced form may not coincide with the structural relationship. To obtain economically valid structural relationship we have to impose and test various restrictions motivated by economic arguments and modify the co-integration relationship based on the results of these tests (Harris, 1995: 104).

The reduced form relationships as represented by the first row vectors of the β' matrices are,

$$C_t = 1.44\ y^d_t - 0.28g_t + 0.32p_t + 0.93M2_t \quad ....(5.1)$$

$$C_t = 1.42y^p_t - 0.16g_t + 0.25p_t + 0.45M2_t \quad .....(5.2)$$

Since the equations are specified in logarithms the coefficients are the reduced forms of the long run elasticities. The signs of the elasticities are consistent with theoretical expectations. The effects of government spending (g_t) and price (p_t) were ambiguous[21] at the theoretical level. If we were to take the reduced forms as close representations of the structural relationships, the results indicate that the changes in both current disposable income (y^d_t) and estimated permanent income (y^p_t) would result in more than proportionate change in current consumption. The effect of broad money is positive as it was anticipated. To see the validity of these results, few theoretically motivated restrictions are tested on the co-integrating vectors.

The first set of restrictions tested is whether the individual elasticities are significantly

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21 *See the arguments in the model specification section .*

different from zero or not. Using the likelihood ratio test- statistic that has a χ^2 distribution with one degree of freedom, the zero-restrictions are rejected (at conventional levels of significance) for all the elasticities in both equations. The joint restriction that all the elasticities are equal to zero is also rejected[22] at 1% level of significance.

A restriction is also tested as to whether private consumption is solely explained by income components as it was held by the extreme versions of the absolute income and permanent income hypotheses. The restriction to be tested in this case is whether the co-integrating vector is [1,-1,0,0,0,] which is rejected at 1% for both equations. The LR-test statistic for such a restriction is χ^2 (4) = 21.939 [0] for (5.1) and χ^2 (4) = 26.048(0) for (5.2) thus highly rejecting the restriction that consumption is only explained by income variable. Similarly, the restriction that consumption is proportional to permanent income, given the other explanatory variables are also included, is rejected[23] at 5%. But the same restriction, i.e. the long run elasticity of private consumption to current disposable income is equal to one, is not rejected[24]. This is an evidence against the permanent income hypothesis which assumes consumption to be proportional to permanent income

With regard to the adjustment (α) coefficients, only the first columns of the α-matrices are relevant since one co-integrating vector is obtained for both equations. The coefficients in these columns measure the feedback effects of the lagged disequilibrium on each of the variables in the system. The first elements of the column relate to the consumption equations and hence represent the weight at which the lags of the co-integrating vectors enter the error correction consumption models. The coefficients are negative as expected and thus measure the speed at

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*22 LR- test, χ^2 (4) = 32.806 [0]*** for equation (5.1) LR-Test, χ^2 (4) = 45.205 [0]*** for equation (5.2)*
23 LR-test, χ^2 (1) = 6.24 (0.013)
24 LR-test, χ^2(1) = 3.44 (0.06)

which the deviation from equilibrium is declining from one period to the next. The speed of adjustment seems to be faster in the case of permanent income specification, -0.22, compared to -0.16 in absolute income specification.

To see whether the co-integrating vector can also enter the equations for the rest of the variables in the VAR process, we have to test the statistical significance of the rest of the weighting coefficients (α_s) in the first columns of the adjustment matrices (see Johansen , 1992). If all these coefficients are not significantly different from zero, the identified co-integrating vector would not be of much relevance in explaining the variables in the system other than consumption. In such a case the variables can be taken as 'weakly exogenous' in the consumption function. As reported in table (1) and table (3), zero-restriction on the α - coefficient is not rejected for all the variables except the monetary variable, M2, in both equations. Hence the equations for consumption and broad money can be estimated simultaneously conditional upon the rest of the variables in the system. This result will be important in the estimation of error-correction models in the next section.

In general, the results from estimation of VAR (1) process seem to be sufficient to explain the specified long run consumption functions. The results of the diagnostic tests for the identified in both specifications. However, normality of the residuals is rejected in both cases. But for a reasonably large sample (conventionally, greater than 30) the results are still valid invoking the Central Limit Theorem (see Kmenta, 1986). As shown by the correlation matrices, no serious problem of multicollinearity is identified in both specifications. It is only in the case of money and price that correlation among the residuals is slightly greater than 0.5 which is still not serious enough to render the results invalid (see Maddala, 1992).

To see whether we can obtain comparable results from the Engle-Granger two-step procedure, the results of estimation using this method are briefly presented here. The first step in this method is to estimate the long run equation by OLS where all the time-series variables in the equation are I(1). The results from such an estimation including constant and deterministic time trend, as it was done in the case of Johansen procedure, are,

$$C_t = -1.55 + 1.12y^d_t - 0.05g_t + 0.2p_t + 0.01M2_t - 0.01t \quad \text{.....(5.3)}$$
$$(-1.7)\ (13.1)\ \ (-2.2)\ \ (5.0)\ \ (0.1)\ \ (-2.0)$$

$R^2 = 0.99, \quad \delta = .025, \quad DW = 1.7, \quad T = 36$

$$C_t = -0.84 + 1.19y^p_t - 0.02g_t + 0.12p_t + 0.28M2_t - 0.01t \quad \text{.....(5.4)}$$
$$(-0.42)\ (9.27)\ (-0.63)\ (3.0)\ \ (-3.48)\ (1.25)$$

$R^2 = 0.99, \quad \delta = 0.033, \quad DW = 1.8, \quad T = 36$

- the figures in parenthesis are t-values,
- t stands for deterministic time trend,
- equation (5.3) is for absolute income (y^d_t) specification and (5.4) is for permanent income (y^p_t) specification.

To test for co-integration the residuals were saved from (5.3) and (5.4) and tested for stationarity using ADF test .The deterministic time trend and constant were excluded from the ADF test since they were included in the co-integrating regression under (5.3) and (5.4) (see Charemza and Deadman, 1992). The values of the ADF test statistics including one period lag are,

ADF(1) = - 2.69 for (5.3)

ADF (1) = -5.18 for (5.4)

Since the critical values are, -1.95 for 5% and -2.63 for 1% we reject the null hypothesis that the residuals have a unit root, i.e. the variables are co-integrated and hence the lag of the residuals

can be used as ECM in the models of first differences. Although the results from such a method have a number of problems[25], we could arrive at the same results to that of Johansen's procedure regarding co-integration.

Finally an attempt was made to estimate the long run properties of consumption including estimated transitory income as explanatory variable. But the transitory income, estimated as the deviation of the actual disposable income from the permanent income, was found to be stationary at levels and hence it was not possible to undertake any meaningful co-integration analysis using this variable. Since transitory income essentially captures the temporary fluctuations in income, it was expected to be less important in the long run model where we analyse the longrun equilibrium properties.

5.3. Estimation of Error-correction Models

The long run relationship estimated in the previous section is only one part of the complete model required to understand the behavioural relationship between private consumption and its specified determinants. An equally important, or even more important from economic policy perspective, will be the shortrun dynamic relationship. Having already obtained the long run relationship, therefore, an attempt will be made to estimate the error correction forms of the specified consumption equations, that incorporate the short term interactions and the speed of adjustment towards longrun equilibrium. In the error-correction models, the shortrun disequilibrium is approximated by the first lag of the estimated long run linear combination. This in our case represents the deviations of the actual values of consumption from the estimated longrun values at any particular period. The short term interactions are the

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[25] *See section (4.1) in the previous chapter.*

relationships between the first differences of the variables.

The procedure adopted for estimation is in line with the Hendry's approach of general-to-specific modelling. In such an approach we first begin with a large model including as a many of the explanatory variables and their lags as possible. Then the insignificant explanatory variables and lags are continuously dropped until we end up with a parsimonious model with few explanatory variables but more acceptable in terms of significance, economic interpretation and diagnostic validity.

In estimating error correction models in a multivariate framework, the issue of weak exogeneity of the explanatory variables has important implications. If all the other variables except the dependent variable of interest are fond to be weakly exogenous, we can leave the multivariate setting and go to single equation analysis. In such a situation, we can assume that no important information is contained in the estimated long run linear combination to explain the variables found to be weakly exogenous (Harris (1995), Enders (1995)). Hence we can estimate the equations specified for the endogenous variable(s) conditional on those weakly exogenous variables.

As it is shown in the previous section, however, weak exogeneity was rejected for one of the explanatory variables specified for consumption, i.e. M2, using the LR-test for zero-restrictions on the adjustment coefficients. This implies that the discovered long run linear combination may contain some important information that can also explain the behaviour of money supply. In such a situation the consumption equations have to be simultaneously estimated along with money supply equations. The analysis here, therefore, begins with the simultaneous estimation of consumption and money supply equations using the two stages least square (2SLS) method.

The results from the 2SLS estimation of the general unrestricted error correction specifications, in which private consumption and money supply were made endogenous are presented as equations (5.5) and (5.6). Only the results for consumption equations are reported since our main interest is not in the behaviour of money supply.

In these equations one period lag of each variable is included in addition to dummy for drought (dd), dummy for change in government (dg) and deterministic time trend. As it was done for the VAR process in the previous section the lag length here as well is restricted to one[26]. In the VAR process lags greater than one were also tried but they were not significant. However, the VAR (1) process provided reasonably good results as it would be expected for annual data.

The 2SLS Estimates of the General Error Correction Representations for Private Consumption

$$\Delta C_t = \underset{(-1.62)}{-1.45} - \underset{(-4.38)}{0.78}\Delta C_{t-1} + \underset{(6.18)}{0.70}\Delta y^d_t + \underset{(3.26)}{0.52}\Delta y^d_{t-1} + \underset{(0.1)}{0.01}M2_{t-1} + \underset{(1.88)}{0.1}\Delta p_t - \underset{(-0.34)}{0.03}p_{t-1} - \underset{(-1.9)}{0.06}g_t$$
$$- \underset{(-0.7)}{0.02}\Delta g_{t-1} - \underset{(-1.65)}{0.17}ECMA_{t-1} - \underset{(-1.6)}{0.01}t - \underset{(-2.08)}{0.02}dg - \underset{(-2.22)}{0.04}dd \quad \ldots\ldots\ldots\ldots\ldots\ldots (5.5)$$

$\sigma = 0.0194$

n= 34 (1964-1997)

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26 *In fact the lag of the first-difference contains information about the second lag of the variables at levels.*

Diagnostic Tests,

AR 1-2F (2,19) = 0.236(0.79]

Normality χ^2 (2) = 3.97 [0.14]

ARCH 1 F (1,19)= 0.47 [0.50]

Vector AR 1-2 F(8,32)= 0.76(0.63)

Vector normality χ^2 (4) = 5.54 [0.24]

$$\Delta C_t = \underset{(-1.86)}{-2.9} - \underset{(-1.61)}{0.36}\Delta C_{t-1} + \underset{(2.43)}{1.03}\Delta y^p_t - \underset{(-1.56)}{0.46}\Delta y^p_{t-1} - \underset{(-0.04)}{0.005}M2_{t-1} - \underset{(-0.24)}{0.02}\Delta p_t - \underset{(-1.25)}{0.16}\Delta p_{t-1}$$
$$- \underset{(-0.24)}{0.01}\Delta g_t + \underset{(0.86)}{0.05}\Delta g_{t-1} - \underset{(-1.9)}{0.48}ECMP_{t-1} - \underset{(-1.84)}{0.02}t - \underset{(-1.84)}{0.03}dg - \underset{(-1.74)}{0.04}dd \quad \ldots\ldots(5.6)$$

$\sigma = 0.034$

n = 34(1964-1997)

Diagnostic tests,

AR 1-2F (2,17)= 21.16[0]

Normality χ^2(2) = 2.12 [0.78]

ARCH 1 F (1,17) = 0.244 [0.63]

Vector AR 1-2F (8,32)= 1.593 [0.17]

Vector normality χ^2 (4)= 2.554 [0.63]

For both equations the values in parentheses under each coefficient are t-ratios while those in square brackets, [ ], are probabilities. $ECMA_{t-1}$ and $ECMP_{t-1}$ stand for the first lags of the co-integrating vectors for the absolute income specification and the permanent income specification respectively. The symbols dg, dd and t represent dummy for changes in

government, dummy for drought and deterministic time trend respectively[27]. AR 1-2F(2,19) and AR 1-2F (2,17) are the Breusch-Godfrey Lagrange Multiplier (LM) test statistics for serial auto correlation up to the second lag; ARCH is a test for auto-regressive conditional heteroscedasticity; normality χ^2 (.) is the Jarque-Bera test for normality and, σ is the standard error of the regression.

Although the estimated equations for the other endogenous variable (M2) are not reported, the model was estimated as a vector consisting of the equations for consumption and money. That is why the diagnostic tests relating to the individual consumption equations are few compared to what would have been obtained from OLS estimation of a single equation. The OLS will be applied to parsimonious models for which single equation specification is justified from what follows in the next few paragraphs.

Since all the variables included in the general error correction representations, (5.5) and (5,6), are stationary, statistical evaluation of the equations based on the reported t- ratios and diagnostic tests is valid. For equation (5.5), representing the absolute income specification, no problems of misspecification are evident according to the reported diagnostic tests. Problems of autocorrelation, nonnormality and auto-regressive conditional heteroscedasticity are rejected for both individual consumption equation and the vector consisting the consumption and broad money (M2). The signs of the coefficients as well are acceptable. But there are a number of statistically insignificant coefficients. The smallest coefficient with the smallest t-ratio is that of the monetary variable, $M2_{t-1}$. The error-correction Mechanism ($ECMA_{t-1}$) has a negative coefficient with a magnitude almost equal to the corresponding adjustment coefficient that was obtained in the long run analysis.

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[27] *The rest of the variables are as defined in the Model Specification section.*

In the case of equation (5.6), in which the first difference and the lag of the current disposable income (Δy^d_t) are replaced by the estimated permanent income, (Δy^p_t), the Breusch-Godfrey LM test suggests some evidence of auto-recreation. This can result in inefficient coefficient estimates. The coefficient of the error correction mechanism in equation (5.6) is large compared to both the corresponding adjustment coefficient in the longrun analysis and the comparable coefficient in the absolute income specification. The coefficient of the estimated permanent income (y^p_t) is close to one (1.03) while it is 0.7 for current disposable income. This result has further persisted in the reduced parsimonious models presented under equation (5.7) and (5.9). It means that consumption tends to respond almost proportionately to the growth rate in permanent income and less than proportionately to the growth rate in current disposable income. In general, however, equation (5.5) and (5.6) can not be taken as the final models for consumption. Like equation (5.5), equation (5.6) contains a number of statistically insignificant coefficients. Thus, in line with the Hendry's approach of general-to-specific modelling we have to leave these over-parametrized equations and develop more parsimonious ones through a sequential elimination of insignificant variables.

For the subsequent model reduction process, however, the simultaneous equation framework, is left and single equation estimation is adopted since no meaningful money supply equations could be developed in the alternative simultaneous equation specifications. The coefficient of the error correction mechanism was positive implying a diverging money supply path rather than convergence towards the longrun equilibrium.In addition, the estimated money supply equations could not pass the parameter stability tests. According to Hendry (1988) failure to pass the parameter constancy test in such a simultaneous estimation can be taken as indicative of the weak exogeneity of the variable in the system. Plots of the sequential one-step ahead

chow-test and one-step ahead residuals, for the money supply equations corresponding to equations (5.5) and (5.6) are given in Fig. (8) and Fig.9 below. Both equations failed to pass the parameter constancy tests. Thus we can safely assume that broad, money as well is weakly exogenous in the system. Hence we can specify consumption equations conditional on all the other explanatory variables and thus resort back to single equation estimation.

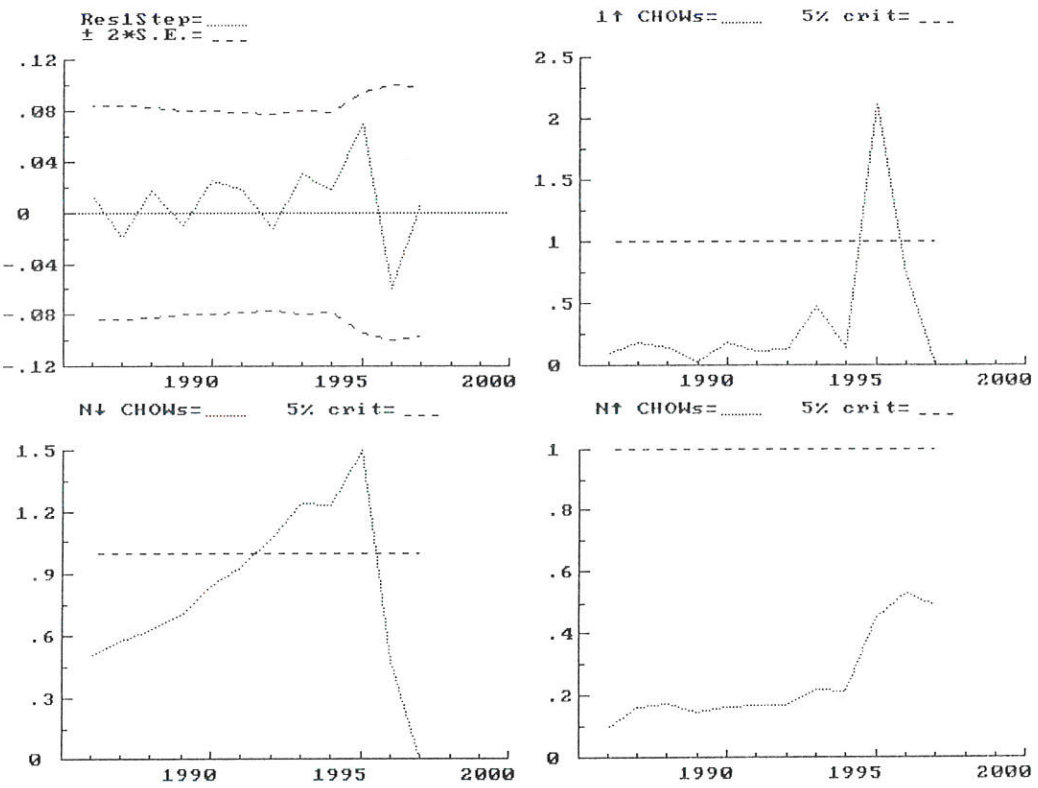


Fig. 8. Parameter Stability Tests for Estimated Money Supply Equation in 2SLS Estimation of Equation of (5.5)

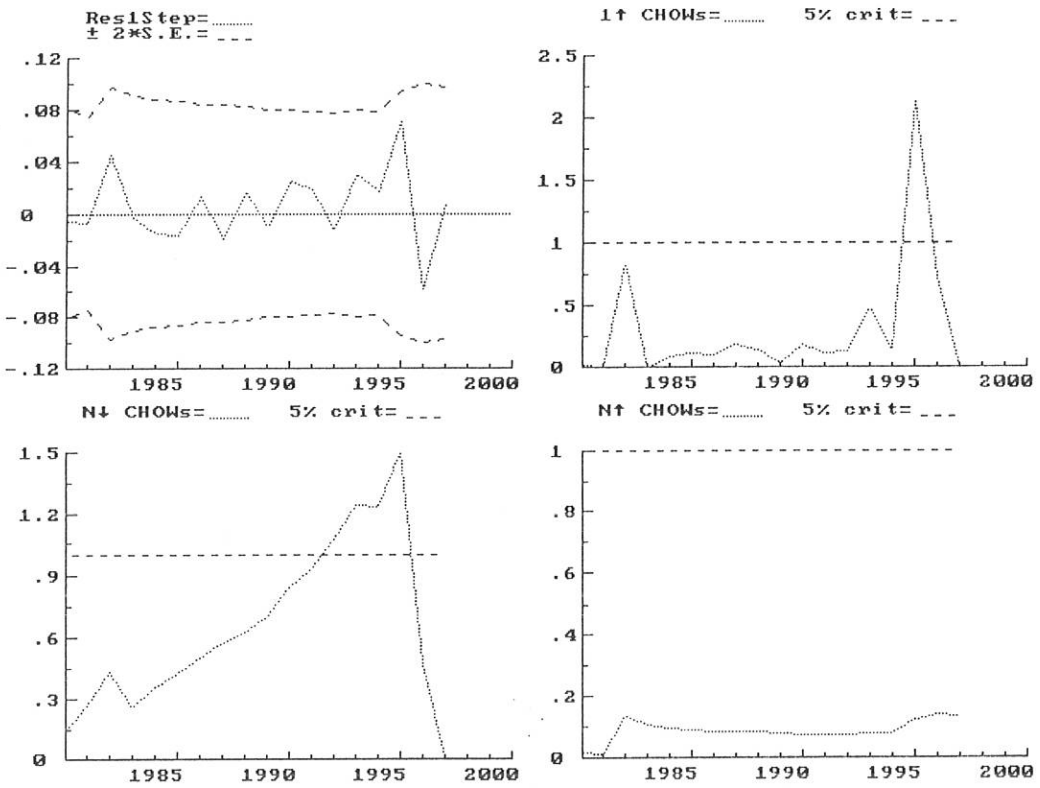


Fig. 9: Stability tests for Money supply Equation in the 2SLS Estimation of Equation (5.6)

To begin the model reduction process single equations similar to (5.5) and (5.6) are estimated using OLS the results of which are reported as (5.5') and (5.6') below. The slight differences in the coefficients are due to the explicit inclusion of the first difference of the logarithm of broad money ($\Delta M2_t$) together with its lag. It was excluded form (5.5) and (5.6) due to its specification as an endogenous variable.

The results from OLS estimation of the general error-correction representations of real private consumption (C_t) conditional on real disposable income (y^d_t) or estimated real permanent income (Y^p_t) government spending (g_t) and price (p_t).

$$\Delta C_t = -1.55 - 0.78\Delta C_{t-1} + 0.70\Delta y^d_t + 0.52\Delta y^d_{t-1} + 0.02\Delta M2_t + 0.01\Delta M2_{t-1} + 0.09\Delta p_t$$
$$(-1.51)\quad(-4.28)\quad(6.04)\quad(3.18)\quad(0.24)\quad(0.1)\quad(1.4)$$
$$-0.03\Delta p_{t-1} - 0.06\Delta g_t - 0.02\Delta g_{t-1} - 0.18ECMA_{t-1} - 0.01t - 0.02dg - 0.04dd \ldots\ldots\ldots\ldots (5.5')$$
$$(-0.35)\quad(-1.87)\quad(-0.67)\quad(1.53)\quad(-1.5)\quad(-2.05)\quad(-2.13)$$

$R^2 = 0.88$, $F(13,20) = 11.17$ [0], $\sigma = 0.0199$, $n = 34$, $DW = 2.12$,

RSS = 0.008, AR 1-2 $F(2,18) = 0.216$ [0.81], ARCH 1 $F(1,18) = 0.537$ [0.47],

Normality $\chi^2(2) = 4.02$ [0.13], RESET $F(1, 19) = 0.039$ [0.85]

$$\Delta C_t = -3.03 - 0.35\Delta C_{t-1} + 1.04\Delta y^p_t - 0.45\Delta y^p_{t-1} + 0.02\Delta M2_t - 0.002\Delta M2_{t-1} - 0.03\Delta p_t$$
$$(-1.7)\quad(-1.5)\quad(2.37)\quad(-1.52)\quad(0.16)\quad(-0.02)\quad(-0.28)$$
$$-0.16\Delta p_{t-1} - 0.01\Delta g_t + 0.04\Delta g_{t-1} - 0.49ECMP_{t-1} - 0.02t - 0.03dg - 0.05dd \ldots\ldots\ldots\ldots (5.6')$$
$$(-1.23)\quad(-0.23)\quad(0.85)\quad(-1.73)\quad(-1.7)\quad(-1.8)\quad(-1.7)$$

$R^2 = 0.67$, $F(13, 20) = 3.14$ [0.01], $\sigma = 0.0328$, $n = 34$, $DW = 2.49$, RSS = 0.021,

AR 1-2 $F(2, 18) = 3.04$ [0.07], ARCH 1 $F(1, 18) = 0.36$ [0.57],

Normality $\chi^2(2) = 0.528$ [0.77], RESET $F(1, 19) = 1.01$ [0.33]

These results from OLS estimation closely resemble the previous results obtained using 2SLS estimation. But there are some new diagnostic tests which could help in further evaluation of the equations. The newly introduced Ramsey's RESET general test for misspecification is not significant for both equations. There is slight improvement in the previously reported serial auto-correlation in the permanent income specification. Otherwise there is no much change in the magnitude and significance of the estimated coefficients.

Starting form (5.5') and (5.6') and sequentially eliminating insignificant explanatory variables, therefore, the reduced parsimonious models are developed for both specifications. In the process of elimination, the F-test for model reduction was used as a criteria to decide whether a variables is incorrectly dropped or not. If a variable with significant explanatory power is wrongly dropped, the F-test t rejects that particular reduction and the variable has to be

retained. The parsimonious model developed from (5.5') through the process of continuous reduction is presented as equation (5.7) below.

$$\Delta C_t = -1.48 - 0.76\Delta C_{t-1} + 0.71\Delta y^d_t + 0.50\Delta y^d_{t-1} - 0.06\Delta g_t + 0.1\Delta p_t - 0.17ECMA_{t-1}$$
$$(-2.82)\quad (-5.24)\qquad (6.65)\qquad (4.69)\qquad (-2.21)\quad (1.90)\quad (-2.88)$$
$$- 0.01t - 0.02dg - 0.04dd \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5.7)$$
$$(-2.77)\quad (-2.43)\quad (-2.35)$$

$R^2 = 0.87$, $F(9, 24) = 18.57$ [0], $\sigma = 0.0184$, $n = 34$, $DW = 2.27$, $RSS = 0.0082$,

AR 1–2 $F(2, 22) = 0.602$ [0.56], ARCH 1 $F(1, 22) = 0.964$ [0.34],

Normality $X^2(2) = 1.368$ [0.50], $X^2(16, 7) = 0.542$ [0.85],

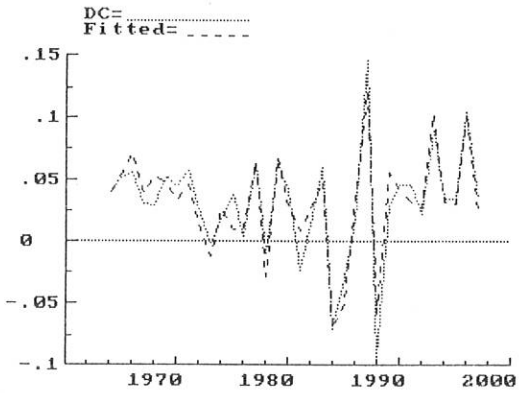
RESET $F(1, 23) = 0.005$ [0.96)

Figures in the parentheses under each coefficient are t-ratios while those in square brackets, [.], are probability values for the various tests.

The estimated coefficients in equation (5.7) are all significant with theoretically anticipated signs. Elimination of the statistically insignificant variables did not produce much change in the magnitude of the coefficients of the remaining variables implying that the dropped variables were in fact irrelevant to the model. This is further justified by the diagnostic tests none of which suggest misspecification of the reduced equation at 5% level of significance. The F-test for the joint significance of the coefficients strongly rejects the null hypothesis that all the coefficients are zero at the same time. The relatively large R^2 also indicates that private consumption is sufficiently explained as equation (5.7). More importantly, the estimated coefficients are statistically valid since the residuals are suggested to have all the required basic properties. No evidence of auto-correlation is found in the residuals up to the second lag. The normality of the errors as well is not rejected by the Jarque Bera test. Similarly, the White's test for heteroscedasticiy does not reject the null hypothesis that the error term is homoscedastic. The

presence of auto-regressive conditional heteroscedasticity in the residuals is also rejected and the possibility of the general functional form misspecification is strongly rejected by the Ramsey's RESET test. The relationship between the actual and fitted values of the growth rate of private consumption from equation (5.7) is presented as Fig. 10 below .

Fig. 10: Actual and Fitted Values for Private Consumption from Equation (5.7)



In the process of model reduction from (5.5) to (5.7) the monetary variable and its lag are dropped since they could not be found significant in any of the alternative specifications. The broad money was meant to capture the effect of the growth rate[28] in the liquidity situation in the economy and the financial wealth of the private sector on the growth rate in private consumption. The result for this particular specification is consistent with Daniel's (1995) finding in the general savings functions for Ethiopia. In his case the monetary variable was not only insignificant but also with unexpected sign.

With regard to the income variable, both the contemporaneous growth rate and the lagged growth in disposable income are seen to have significant positive impact on the growth rate in private consumption. But the relationship is less than proportionate. According to the results a 1% change in the growth rate of current disposable income will produce around 0.71% direct change in the growth rate of current private consumption while a 1% change in the growth rate of disposable income in the previous year will result in a 0.5% direct change in the growth rate of the current level of consumption. In the longrun case, on the other hand, we did not reject the proportionality between the change in the current level of income and the change in private consumption. This suggests that the Keynesian hypothesis regarding the rise in marginal propensity to consume over time has some ground in the case of Ethiopia.

The effect of the growth rate in government spending on the growth rate in private consumption is found to be significantly negative. Theoretically the effect is ambiguous. The negative effect indicates that the appropriation of resources from the private sector has remained much more significant than the return provision of services from the government which could

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[28] Since logarithms of the variables are used for estimation their first differences are growth rates.

help the private sector to retain some of its income for own consumption or saving. The effect of government spending was negative in the longrun relationship as well.

The growth rate in the price level, i.e. the inflation rate has a positive coefficient which is significant only at 10%. The effect of inflation on consumption is positive when its indirect effect through the real interest rate outweighs the effect through macroeconomic instability and purchasing power of income. The result indicates the former has remained stronger in Ethiopia. The coefficient of the price variable is also positive in the long run model.

The adjustment coefficient has remained robust to different specifications in the case of absolute income specification. It has consistently been around 17%. The corresponding α-coefficient in the long run model is 16%. It means that other things remaining constant, around 17% of the previous year's disequilibrium in the long run relationship will disappear in the current period. For developing economies like that of Ethiopia, predominated by strong structural rigidities, annual adjustment of 17% back from temporary shocks seems to be quite reasonable. Daniel (1995)[29] using the Engle-Granger two step procedure found speed of adjustment coefficient greater than 100% which is not very meaningful.

As presented under equation (5.7) the growth rate in private consumption is also affected by its lagged growth rate, dummy for drought and changes in government. The lag of the growth rate in private consumption is seen to have a negative effect on the current growth in consumption. It means that, other things remaining constant, the more consumption has grown the previous period the less one would be able to raise consumption above the previous level .

The coefficients of the two dummies as well are found to be statistically significant. The

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[29] *The only comparable study available on Ethiopia in this regard*

dummy for drought (dd) was assigned a value of one during the drought years and zero otherwise. The coefficient is significantly negative implying that the growth rate in private consumption significantly declines in drought years. This somehow reflects the prevalence of liquidity constraints that result in failure to smooth consumption in times of short falls in income. The dummy for government change (dg) was given a value one for the period 1974-1991 and zero otherwise assuming that the current and the imperial economic policy regimes are more alike than the military regime. The coefficient of dg is significantly negative reflecting the continues decline in the growth rate in private consumption during the military regime which can be due to both the decline in per capita income and the transfer of substantial amount of resources from the private sector to the government. The fact that the coefficient of the deterministic time trend is significantly negative, while the logarithm of private consumption is in first differences, reflects this persistent decline in the growth rate of private consumption. This shows that the deterministic trend in the data can persist even after the stochastic trend is removed through first-differencing.

The equation selected as parsimonious in the case of permanent income specification is quite different from that of absolute income specification. The permanent income specification comparable to equation (5.7), the estimation results of which are presented under equation (5.8) below, contains only a few statistically significant coefficients.

$$\underset{(1.38)}{\Delta C_t = -1.4} \underset{(-2.46)}{- 0.47\Delta C_{t-1}} \underset{(2.26)}{+ 1.02\Delta y^p_t} \underset{(-1.72)}{- 0.46\Delta y^p_{t-1}} \underset{(-0.66)}{- 0.05\Delta p_t} \underset{(-0.31)}{- 0.02\Delta g_t} \underset{(-1.44)}{- 0.23 EMCP_{t-1}}$$

$$\underset{(-1.37)}{-0.01t} \underset{(-1.64)}{- 0.02dg} \underset{(-2.1)}{- 0.05dd} \qquad \text{.....(5.8)}$$

$R^2 = 0.64$, $F(9,24) = 4.68$ [0], $\sigma = 0.0314$, $n = 34$, $DW = 2.71$, RSS=0.0237

AR 1-2 $(2, 22) = 8.806$ [0.002], ARCH 1 $F(1, 22) = 2.751$ [0.111], Normality $\chi^2(2) = 0.724$ [0.696],

X_i^2 $F(16, 7) = 1.063$ [0.497], RESET $F(1, 23) = 1.731$ [0.201]

This equation is similar to equation (5.7) except that the first difference of the logarithm of the current disposable income and its lag are replaced by the first differences of the logarithms of the estimated permanent income and its lag. But the results are poor both in terms of significance of the coefficients and the diagnostic adequacy. Above all, there is evidence of auto-correlation in the error terms and hence the estimated coefficients might be inefficient. In addition, most of the coefficients, including the coefficient of the error correction mechanism, are not statistically significant. Thus, equation (5.8) can not be taken as parsimonious by any standard. Starting from equation (5.6') and sequentially eliminating insignificant variables, however, a more acceptable representation of the permanent income specification is developed as,

$$\Delta C_t = \underset{(-3.2)}{-2.68} - \underset{(-5.0)}{0.78}\Delta C_{t-1} + \underset{(3.09)}{0.95}\Delta y^p_t + \underset{(1.81)}{0.19}\Delta M2_{t-1} - \underset{(-3.27)}{0.44}EMCP_{t-1}$$
$$\underset{(-3.23)}{-0.02}t - \underset{(-2.42)}{0.03}dg - \underset{(-2.42)}{0.04}dd \qquad (5.9)$$

$R^2 = 0.64$, $F(7,26) = 6.49\ [0.00]$, $\sigma = 0.0304$, $n = 34$, $DW = 2.56$,

AR 1-2 $F(2, 24) = 2.342\ [0.12]$, ARCH 1 $F(1, 24) = 0.494\ [0.49]$,

Normality $\chi^2(2) = 1.532\ [0.46]$, X_i^2 $F(12, 13) = 0.419\ [0.93]$,

RESET $F(1, 25) = 1.035\ [0.32]$.

Figures in the parenthesis under each coefficient are t-ratios while those in square brackens, [ ], are probabilities.

All the coefficients in equation (5.9) are statistically significant with theoretically anticipated signs. Since there is no evidence of misspecification in the diagnostic tests the estimated coefficients can be taken as valid. In addition, the explanatory power of this highly reduced model is very close to the corresponding general unrestricted error correction model

under equation (5.6), i.e. the R^2 was 67% in the general model while it is 64% in the reduced parsimonious model. That means, much information is not lost by eliminating the statistically insignificant variables.

While the monetary variable and its lag were dropped from the parsimonious absolute income equation under (5.7), the lag of $\Delta M2_t$ is significant at 10% in the case of permanent income equation under (5.9) and the sign of its coefficient is positive as it was expected. That means, the growth in the broad money at the end[30] of the previous period has a positive influence on the growth of private consumption in the next period. This might be due to growth in the liquid assets of the private sector (it can be cash or saving and time deposits) that can be used to finance short term consumption. Along with the relatively large reduced form elasticities obtained for broad money in the long run equations, the result indicates that the extent of liquidity has some direct influence of private consumption. Thus liquidity constraints should not simply be assumed away in the specification of consumption functions as it is usually done in the permanent income hypothesis.

The coefficient of the estimated permanent income (y^p_t) in equation (5.9) is close to one which means consumption will tend to grow almost proportionately to the average growth rate in disposable income in the recent past. This result is in favour of the initial version of permanent income hypothesis which was developed under the assumption of adaptive expectations. Under this assumption, consumption was seen to be proportional to anticipated permanent income, expectations about future income being made adaptively (Friedman, 1957). That seems to have some ground in the data for Ethiopia according to the results from both the long run and short run analysis.

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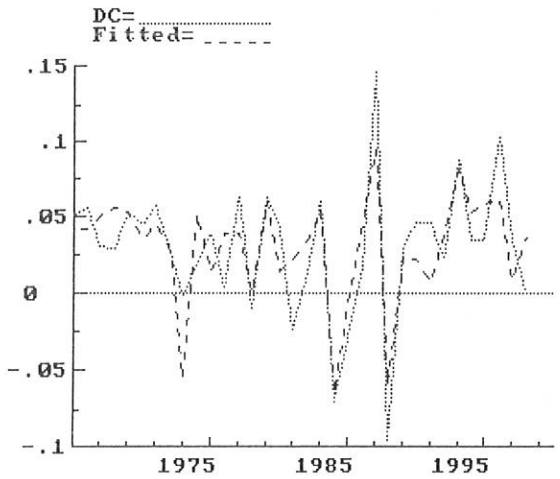
30 *The data used for money supply is that of end of period- i.e.* broad money at July, 7 each year.

The speed of adjustment coefficient is relatively large in the case of permanent income specification than the absolute income specification. That is also true in the longrun estimation. It might be due to the relatively smooth income path in the case of permanent income than the current disposable income. In equation (5.9), the dummies are also significant as in equation (5.7). The plot of the actual and fitted values for equation (5.9) are presented in Fig. 11 below.

Fig. 11: Actual and Fitted Values for Private Consumption from Equation (5.9)



5.4. Testing for Parameter Stability

If any model involving time series economic relationship is to be used for prediction, its estimated parameters should be constant overtime. There are a number of tests used to identify specific points within the sample period or post sample periods where structural breaks in the model have occurred. Due to the limited number of observations available, it will not be possible to test the post sample stability of the estimated coefficients. But using the plots of recursive least squares coefficients, one-step residuals and scaled recursive Chow test statistics, the within sample constancy of the parameters of equations (5.7) and (5.9) is tested below.

Applying recursive least squares to equations (5.7) and (5.9) over successive time periods, increasing the sample period by one additional observation for each estimation, the recursive least square coefficients, the scaled recursive Chow test statistics and one step-ahead residuals are obtained using the PcGIVE econometrics computer package. The plots are presented as Fig. 12, Fig. 13, and Fig. 14 below. The graphs of one-step ahead residuals are bordered by plus or minus two standard deviations from the zero mean and points outside this region are either outliers or are associated with structural breaks (see Charemza and Deadman, 1992:70). Similarly, the plots of the recursive least squares coefficients across time are bounded by plus or minus twice their recursively estimated standard errors. The break point Chow statistics are plotted against 5% F-critical value which under the null hypothesis that there has been no structural change in the model between periods t-1 and t should be less than one. Values greater than one imply that the null hypothesis of no structural break between periods t-1 and t would be rejected at 5%.

Fig.12: One-Step Ahead Recursive Residuals and Break-Point Chow Statistics for Equations (5.7) and (5.9)

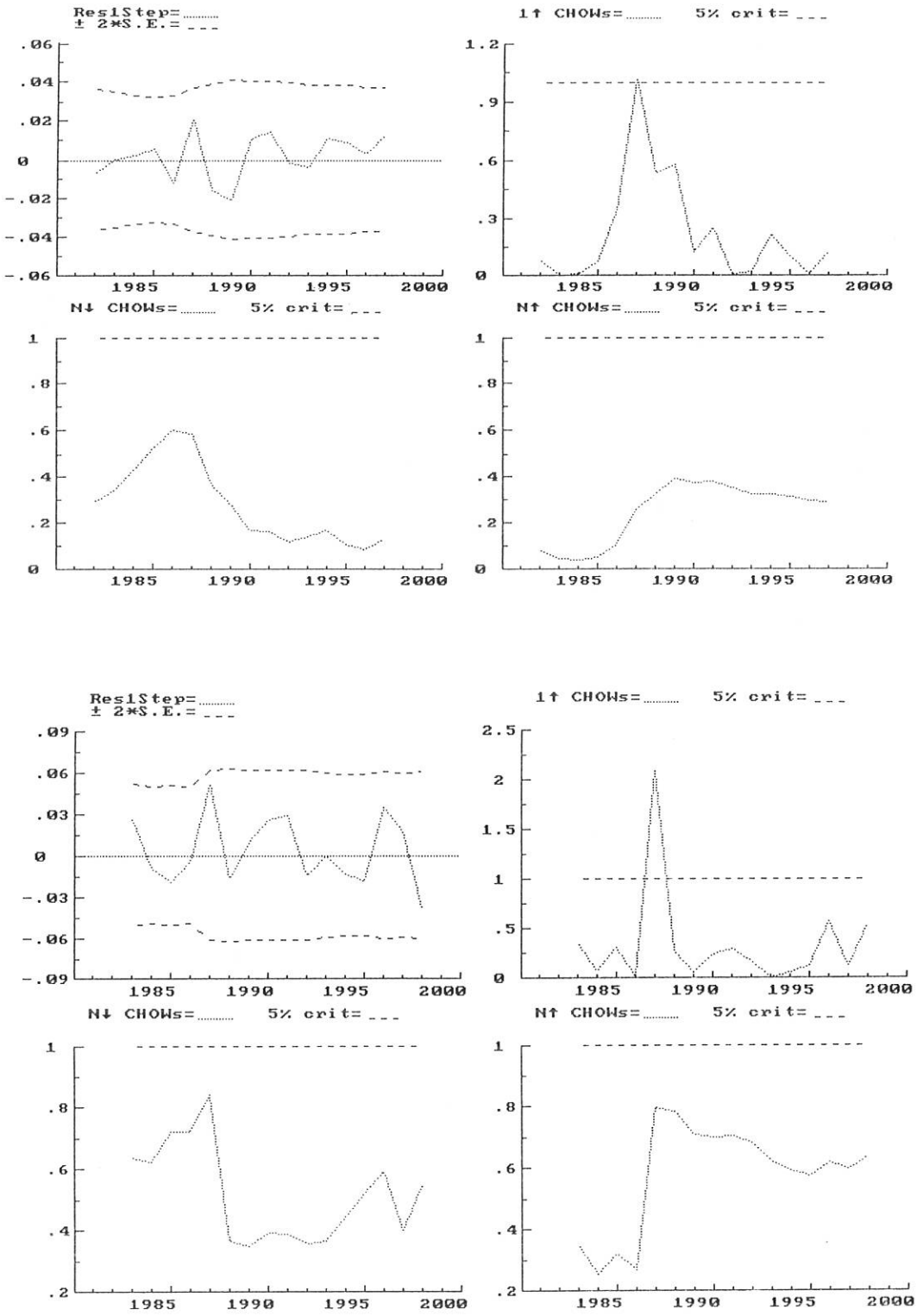


Fig.13: Recursive Coefficients for Equation (5.7)

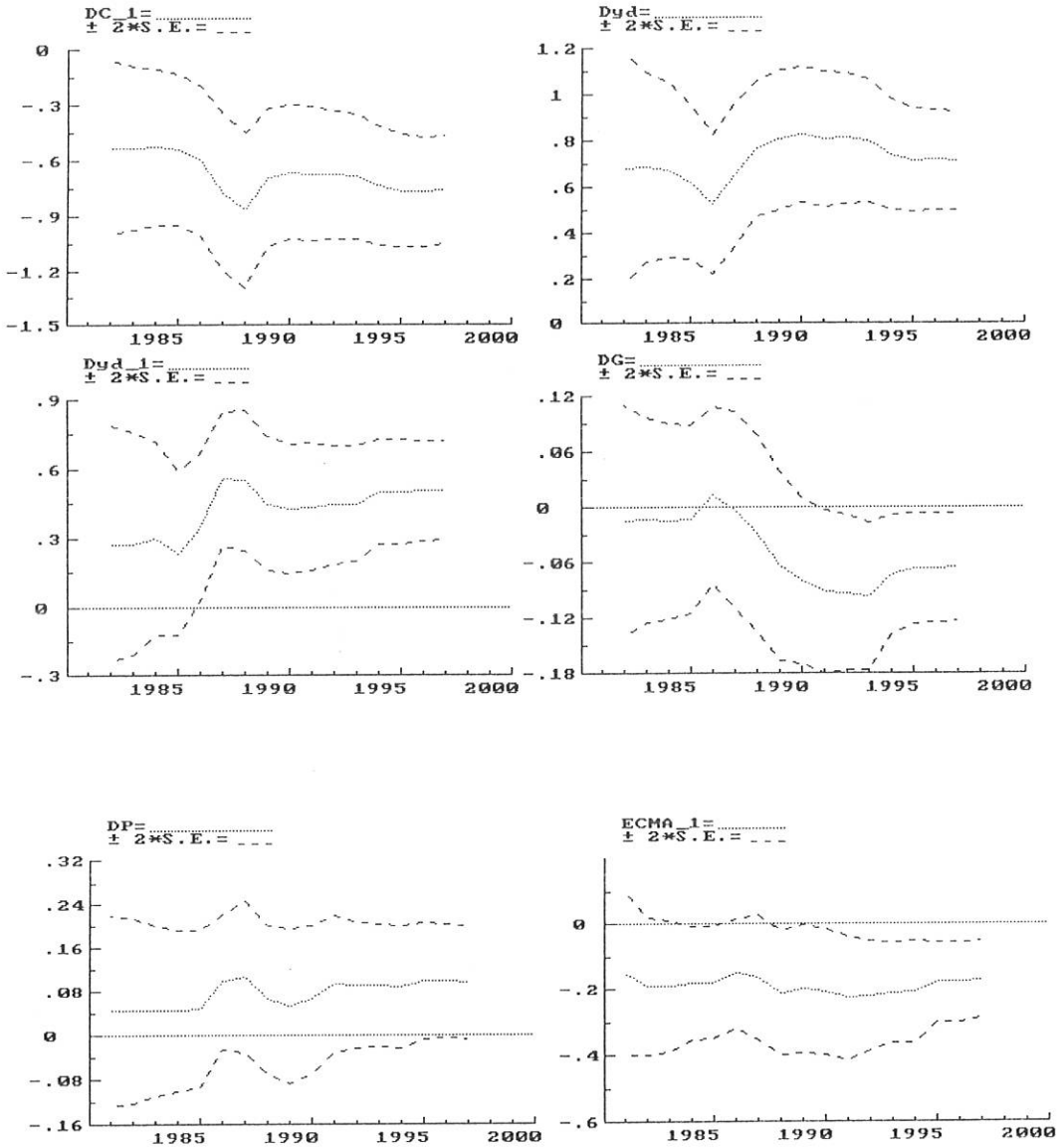
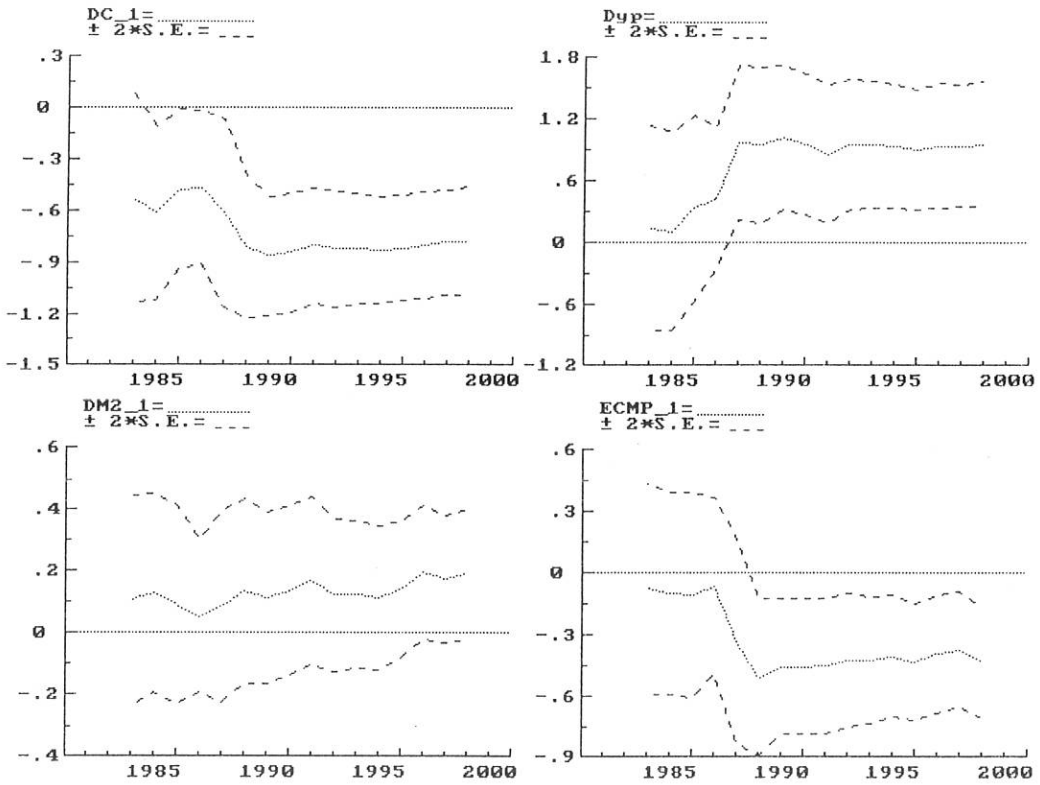


Fig.14: Recursive Coefficients for Equation (5.9)



As it can clearly be seen from the plots, the estimated coefficients lie within the two bands defined by plus or minus twice the recursively estimated standard errors for both equations. The recursive residuals as well do not cross the two bands. The break point Chow statistics lies well within the 5% critical value for absolute income specification (equation (5.7)) while the value of one step ahead Chow statistics lies outside the critical value in 1987 for permanent income specification. But this is likely to be an outlier rather than structural change in the parameters. Since permanent income is computed as the weighted moving average of the past three years, the effect of the drought during 1984 and 1985 is reflected in the estimated permanent income for 1987. Overall, the tests indicate that the parameters have remained stable in the face of changing government policies.

CHAPTER SIX

SUMMARY AND CONCLUSION

6.1. Summary of the Results

The analysis in this study establishes the shortrun and longrun relationship between private consumption expenditure and the four main macroeconomic variables income, government spending, broad money and inflation. An attempt is also made to capture the shortrun effects of drought and major changes in the overall government policies (using dummy variables) on private consumption. Knowledge of this relationship is supposed to help in understanding the major factors that have been responsible for the low saving performance of the Ethiopian economy in the past and whether it is possible to influence private consumption behaviour manipulating these variables.

It is now widely accepted that the relationship between time-series macroeconomic aggregates should not be estimated using the traditional Ordinary Least Squares technique since most of these variables contain some sort of trend. For trended variables OLS estimation fails to reflect the actual relationship which will be dominated by the common trends in the variables. The first task in the analysis was, therefore, to test whether the time series variables of interest are trended (have a unit root) using the augmented Dickey-Fuller, ADF, test. As expected all variables are found to be nonstationary at levels while their first differences are stationary.

One of the recently developed powerful methods used to estimate the relationship between the first-difference stationary processes is the Johansen's maximum likelihood method. Applying this method to two alternative consumption functions, implied by the absolute income

and permanent income hypotheses, the reduced forms of the possible longrun structural relationships are estimated. The actual longrun relationship can either be the same as the estimated reduced forms or any linear combination of the reduced forms. But the relative magnitudes and signs of the longrun elasticities can be deduced from the estimated reduced forms.

Although the individual variables included in the equations are nonstationary, they are found to have unique longrun linear combination that is stationary. The estimated reduced form elasticities are also seen to have theoretically anticipated signs. For all the reduced form elasticities, the hypothesis that each individual variable is insignificant in the longrun specification is rejected using the likelihood ratio statistics that have asymptotic χ^2 distributions. The views held by the extreme versions of the absolute income and permanent income hypotheses were also rejected using similar test statistics, i.e. in both specifications, the hypothesis that consumption is solely explained by income is rejected. But the proportionality of consumption to income is not rejected in the case of absolute income specification.

Government spending is seen to have a negative influence on private consumption indicating that the transfer of resources from the private sector to the government has remained much more important than the return supplementary effects of government services. The extent of liquidity in the economy, captured by the developments in broad money, is found to have a positive influence on the longrun consumption behaviour. Since all the variables including the broad money were deflated, the positive effect of the developments in broad money on private consumption may not be due to the illusory effect coming through inflated nominal income. It may rather be reflecting the effect of developments in the financial wealth of the private sector in the form of cash or other liquid assets that can readily be used to finance consumption. The

effect of changes in the price level is found to be positive while theoretically it is indeterminate. This is the case when the effect of change in prices on the cost of borrowing (real interest rate) is stronger than its effect on the real purchasing power of current and expected income.

Taking one period lag of the difference between the actual value of consumption and its value predicted by the estimated longrun linear combination as a proxy for the past disequilibrium, the shortrun error correction models corresponding to the long run equations are estimated. The inclusion of the lag of the linear combination is meant to capture the behaviour of consumption along the path of adjustment towards its longrun equilibrium. Thus, by estimating error correction models, information is obtained regarding both the short term interaction between consumption and its determinants and the speed of adjustment towards the longrun level. Short term interactions are represented by the coefficients of the first differences of the explanatory variables.

The estimation results for the error correction representations have shown some variation in the two alternative specifications for private consumption. The results for the absolute income specification are more or less consistent with the corresponding longrun estimation results except that the coefficient of the monetary variable is found to be statistically insignificant. The speed of adjustment coefficient from the error-correction representation is almost equal to the corresponding adjustment coefficient obtained in the longrun estimation. But in the case of permanent income specification the adjustment coefficient from the shortrun error correction specification is large compared to the corresponding term in the longrun estimation. It can be due to the relatively smooth income path in permanent income specification in which case adjustment towards the longrun equilibrium can be faster. In both specifications, however, private consumption is found to be highly sensitive to income, be it actual current income or

anticipated income. For the latter, the shortrun relationship is almost proportional as the permanent income hypothesis predicts. The coefficients of government spending and inflation are not statistically significant in the shortrun permanent income specification while they are significant with signs consistent with the longrun estimation in the case of absolute income error correction specification. The dummy variables introduced to account for the effect of major droughts and changes in government are also significant in both specifications. The significance of the dummy for drought reflects the dependence of private consumption on current income which might be due to the prevalence of borrowing constraints and weak wealth status of the private sector.

Finally, the two parsimonious error correction representations are tested for parameter stability. Results from application of alternative tests indicated that the parameters of the estimated models were in fact stable over the sample period although some major policy changes have occurred. But it is worth mentioning that one major outlier occurred in 1987 (can be due to the lagged effect of drought in the preceding years) which the permanent income specification could not sufficiently explain. Hence predictions using this specification should be made cautiously taking the possible effect of that outlier into consideration.

6.2 Conclusion

The fact that sustained economic growth can only be achieved through domestic resource mobilisation makes the study of private consumption, and thus saving behaviour, crucial to macroeconomic policy analysis. Issues related to private consumption behaviour are important not only from the perspective of longrun economic growth but also for the shortrun welfare implications of the related economic policies. That is why an attempt is made here to

estimate two general consumption functions for Ethiopia so that the reader can have at least some basic understanding about the major driving forces behind aggregate consumption behaviour.

Specifically concentrating on the major macroeconomic aggregates, therefore, the study tried to explain the observed fluctuations in private consumption. From the brief review of the trends in the major macroeconomic parameters in the third chapter, using descriptive and graphic illustrations, and econometric analysis in the fifth chapter, it is observed that private consumption is highly influenced by the fluctuations in the rest of macroeconomic aggregates. The two models specified for econometric estimation are based on the Keynesian absolute income hypothesis and the permanent income hypothesis. For empirical estimation of the latter, anticipated permanent income is estimated assuming adaptive expectations formulating behaviour. In both specifications, however, private consumption is found to be highly responsive to the income variable, both in the shortrun and longrun.

From the economic policy perspective, however, it is the sensitivity of private consumption to variables like government spending, money supply and interest rate, that is more interesting. Since all these variables are included in the models and found to be significant in influencing private consumption, some important policy inferences can be drawn from the results of empirical estimation. The effect of real interest rate is indirectly captured by the inflation rate the effect of which is found to be significantly positive. The positive effect of inflation on consumption implies the negative effect of the real interest rate that can be important instrument to mobilise domestic savings. The significant negative influence of government spending, on the other hand, indicates some crowding out effect of the government on the private sector. There is also evidence that expansionary monetary policy

will tend to encourage private consumption. This reflects the effect of liquidity situation on consumption decisions of the private sector. Additional evidence of the importance of liquidity constraints is observed by the significant negative impact of drought on private consumption. The implication is that the expansion of financial institutions and borrowing facilities can help to minimize the effect of temporary shocks on consumption /saving of the private sector.

Overall, the parameters of the estimated models are found to be stable over time which means reliable predictions can be made using these models. Comparing the specifications developed from absolute income hypothesis and permanent income hypothesis, however, more acceptable results could be obtained using the former than the latter in terms of both explanatory power and diagnostic adequacy. But this cannot be conclusive since the permanent income model developed here is very crude and simple which may not fully capture the actual expectations formulating behaviour.

Finally, it should be noted that analysis of private consumption undertaken in this study is mainly based on the influence of the major macroeconomic aggregates. Due to the data intensive nature of the methodology selected, it was not possible to build and test more comprehensive models of private consumption, i.e. with limited number of observations, it is inappropriate to undertake multivariate co-integration analysis incorporating large number of variables. One variable that could have been important in explaining private consumption is the dependency ratio for which reliable time-series data is not available. Hence consumption models that seek to incorporate the effect of dependency ratio should be estimated using cross sectional household level data and it would be interesting to extend the study in that direction.

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APPENDIX -1

year	PC/GDP	DS/GDP	GCF/GDP	RM2/GDP	RGC/GDP	CPI	DC	DCPS
1961	81.01	17.09	15.38	9.21	6.57	96.7	126	99
1962	80.99	16.89	16.18	9.84	6.73	99.1	131	120
1963	79.53	16.40	16.16	9.94	8.29	100.00	173	127
1964	78.26	18.20	16.86	11.01	8.38	115.4	212	158
1965	76.92	18.91	16.93	11.48	9.14	127.9	239	170
1966	78.15	16.33	18.00	11.70	9.50	128.00	270	207
1967	77.46	18.00	18.29	11.26	9.16	127.8	320	220
1968	77.19	18.65	17.89	11.77	9.04	127.3	384	260
1969	78.44	17.31	17.08	12.81	8.70	136.5	444	298
1970	78.68	17.21	14.67	12.35	8.55	145.7	524	387
1971	80.06	15.29	15.03	11.90	8.43	138.2	557	419
1972	78.21	16.75	16.23	13.72	9.22	139.5	594	444
1973	75.66	20.66	14.52	16.89	9.25	159.7	604	473
1974	76.25	20.04	12.63	17.61	9.09	170.1	635	545
1975	79.04	11.59	13.40	19.39	11.38	208.7	837	464
1976	77.71	11.66	10.90	20.25	12.50	254.9	1047	467
1977	80.13	7.78	10.50	20.85	12.21	291.6	1355	568
1978	80.55	3.00	9.65	22.20	14.79	338.4	1840	732
1979	80.01	5.25	11.11	22.60	12.52	353.5	2368	880
1980	80.24	5.69	12.83	22.25	13.10	375.2	2785	875
1981	78.25	7.58	13.56	24.19	14.32	391.6	3079	1005
1982	78.74	5.93	13.70	25.28	15.89	394.6	3565	1064
1983	77.77	5.47	12.19	27.16	17.28	427.8	4118	988
1984	74.56	8.10	16.84	31.39	17.47	509.4	4514	870
1985	81.84	2.83	10.70	30.66	15.33	459.4	4900	861
1986	75.59	8.63	16.39	32.91	15.79	448.3	5379	943
1987	76.69	7.60	15.60	33.03	15.72	480.00	5981	1224
1988	69.44	12.47	20.44	35.34	18.08	517.6	6629	1272
1989	71.66	8.89	14.42	38.42	19.44	544.2	7510	1254
1990	72.85	7.94	12.48	42.60	19.21	658.3	8960	1194
1991	80.07	3.44	10.40	43.69	16.49	816.4	9840	1184
1992	86.86	3.01	9.19	46.89	10.14	845.3	11203	1450
1993	83.83	5.60	14.22	40.13	10.57	845.00	11875	2865
1994	83.83	5.03	15.16	47.32	11.14	909.4	12897	3618
1995	82.46	6.69	16.44	43.10	10.85	949.9	14361	5336
1996	82.48	6.56	19.10	42.10	10.96	945.00	17119	8243
1997	80.64	8.30	19.10	40.77	11.06	951.00	19256	10112
1998	79.72	8.98	20.19	38.27	11.30	na	21210	11897

Note:PC=real private consumption. DS= gross domestic saving.
GCF=real gross capital formation. RM2=deflated broad money
RGC=real government consumption. CPI=consumer price index forAddis A aba. DCPS = total domestic credit to the private sector. DC= total domestic credit All the ratios and CPI are Multiplied by 100.

Source: MEDAC for PC/GDP, DS/GDP, GCF/GDP and RGC/GDP;
National Bank of Ethiopia fo r RM2, CPI, DCPS and DC.

APPENDIX-2

Year	G/GDP	R/GDP	BD/GDP	TR/R	TOT	EDS/GDP	DEF
1961	7.492	6.739	0.752	81.064	-	0.074	0.562
1962	8.491	7.298	1.261	80.630	-	0.122	0.559
1963	9.629	7.084	2.545	84.049	-	0.246	0.561
1964	9.118	10.719	1.329	88.870	-	0.252	0.580
1965	10.903	8.098	2.805	88.713	-	0.291	0.589
1966	11.895	8.346	3.549	87.008	129.800	0.258	0.609
1967	11.775	8.827	2.947	83.725	129.500	0.606	0.620
1968	12.160	8.652	3.508	81.778	112.700	0.632	0.638
1969	11.233	8.586	2.647	81.919	117.800	0.676	0.651
1970	11.291	8.282	3.009	86.646	141.300	0.550	0.685
1971	11.542	8.518	3.023	87.361	119.700	0.528	0.695
1972	12.186	8.976	3.210	87.568	126.100	0.492	0.666
1973	12.318	9.566	2.742	86.983	124.309	0.464	0.681
1974	12.064	9.589	2.463	86.895	111.533	0.391	0.746
1975	16.347	11.091	5.256	82.884	103.522	0.399	0.740
1976	17.323	11.270	6.051	78.528	135.083	0.403	0.783
1977	16.972	12.764	4.206	84.642	162.845	0.381	0.865
1978	20.241	14.162	6.079	79.083	133.287	0.328	0.929
1979	19.791	14.816	4.974	82.959	123.757	0.298	0.964
1980	21.659	15.880	5.779	82.820	100.000	0.313	0.981
1981	22.784	17.426	5.353	77.534	70.718	0.305	1.000
1982	24.912	17.645	7.267	76.539	77.072	0.354	1.047
1983	32.336	18.466	13.870	71.652	76.105	0.360	1.077
1984	29.105	20.877	8.228	75.483	87.776	0.510	1.034
1985	30.128	17.835	12.293	72.203	82.182	0.539	1.384
1986	30.432	20.671	9.761	66.865	122.445	0.747	1.309
1987	28.747	20.331	8.416	71.513	69.061	1.053	1.216
1988	33.400	22.718	10.682	68.151	71.064	1.503	1.259
1989	37.558	24.767	12.790	60.812	89.019	1.471	1.324
1990	31.911	18.677	13.234	68.698	74.033	0.618	1.373
1991	25.595	14.099	11.496	75.875	73.895	0.527	1.644
1992	20.474	10.619	9.854	73.293	115.124	0.543	1.889
1993	19.892	11.965	7.928	69.118	89.434	0.779	2.137
1994	25.425	13.904	11.521	78.106	72.514	0.903	2.190
1995	26.171	17.455	8.716	65.616	82.528	1.208	2.486
1996	24.927	18.362	6.565	67.807	77.003	1.502	2.508

Note: G = total government expenditure,R = total government revenue, BD=budget deficit,TR=total government tax revenue,TOT = terms of trade, DEF = GDP deflator. All the ratios are multiplied by 100.

Source: Ministry of Finance for G/GDP, R/GDP, BD/GDP, TR/R and EDS/GDP; World Bank for TOT and MEDAC for DEF.

DECLARATION

The thesis is my own original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

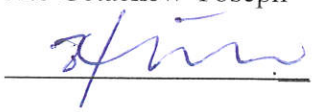
Declared by

Solomon Tesfay

June 19, 1999

Confirmed by

Ato Getachew Yoseph



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