ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

Liberalization and Productivity of the Ethiopian Tax System

Girma Berhe

July 2006

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By
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A Thesis Presented to the School Of Graduate Studies in Partial Fulfillment of the Requirements for Masters of Science in Economics (Economic Policy Analysis)

July 2006

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DEDICATION

This work is dedicated to my mother Birhan Woldemariam and my father Berhe Araya.

Acknowledgements

I am greatly indebted to my father Ato Berhe Araya and my mother W/ro Birhan Woldemariam for my entire educational career up until this. They, together with my brothers and sisters, deserve the most of all gratitude.

I would like to extend my heart-felt appreciation to my advisor Isaac Paul (Dr.) for his timely and constructive comments on this work.

My profound gratitude must go on record to Kinfe G/Her, Hadush Tesfa, Tekle Bekele, Bereket G/Medhin and Bahran Asrat who have amply shown to me that their commitment for my own betterment is unbounded. With out the moral and the financial support of these great friends my hope of undertaking this study would have been very inconceivable.

Thanks are also due to my good friends Mulubrhan Amare, Muauz Amare Mulugeta Abay and Moges G/Yohannes for their benign and kind friendship together with their unceasing cooperation on this work and throughout the two years of this program.

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Abstract

This study looks in to the productivity of the tax system in Ethiopia and the effects of the 1990s liberalization reforms on it using a quantified approach. Results of econometric regression have shown that the tax system in Ethiopia is inelastic. This result would mean that the tax system in Ethiopia has not been able to generate the potential level of revenues from the level of national income in the country with out adjustment of tax rates. The tax system is found to be inelastic mainly due to inelastic base to income responses in most of the tax regimes.

The look in to the effects of the liberalization reforms has shown that most of the major tax categories have not felt impact while the overall tax system appears to be slightly positively affected. This improvement could be due to the improvement in one major tax category namely, business income tax, from the five categories considered in this study and to potential improvements elsewhere.

Most of the major tax categories together with the overall tax system have shown that they possess a buoyancy coefficient that exceeds their respective elasticity coefficients. Moreover, the tax buoyancies in most cases are found to be slightly positively affected by the above-mentioned reforms.

The major recommendation of this study is that the attempt to improve the productivity of the tax system in Ethiopia should give greater emphasis to the issue of tax base to income elasticity improvement.

CHAPTER ONE

INTRODUCTION

1.1 Statement of the Problem

As almost every one agrees, Ethiopia is one of the poorest countries, if not the poorest of the poor, in the world. As such one of the most pressing needs of this country is the issue of how to score an economic growth. In relation to this, a hard reality of countries like Ethiopia is that the need to achieve economic growth concomitantly brings the requirement of growing spending by governments in areas that are deemed to be very crucial for growth; such areas are like infrastructure, education and health. The requirement for public spending will obviously demand its means of financing. When we think of financing public spending usually what comes first to our view will be public revenue whose major source is tax. Therefore, the need for economic growth could be very well understood to end up at the need for growing tax revenue.

However, Ethiopia, being one of the poor countries, is characterized by a predominantly subsistence economy which makes it not an easy ride to achieve the level of tax revenue that its development need requires. In fact, this is quite a common feature of many developing countries that Teera (2002) tells us that many developing countries to date face difficulty in raising tax revenue to the level required for promotion of economic growth. The reality in Ethiopia is not different in that delving in to the public finance records of the country shows that there has been almost a consistent surplus of expenditures over revenues for a sufficiently long period of time which starts since the time of the overthrow of the imperial regime in 1974 (Teshome, 1993).

To show how significant the fiscal deficit (excess of government expenditure over domestic revenues) of this country has been; observation of the era of the socialist regime (1974/75-1990/91) indicates that government expenditure, as a percent of GDP in 1975 was 21.7 percent; it grew to 25.9 percent in 1981 and reached 41.9 percent in 1989 (Teshome, 1993); while total domestic revenue of the government as a ratio of total government expenditure was floundering at 66.59 percent for the period 1975-1991(Teshome, 1993). Moreover, the fact of fiscal deficit continued to hold even after the fall of this regime as we see that public spending for the period 1992-1996 was 24.8 percent of GDP and for the period 1999-2001 rose sharply to 33.21 due to the Ethiopia -Eritrea war. For the period 2000-2005, it was 34.25 percent. But government domestic revenue during the latter two respective periods was only 31.22 and 22.34% percent of GDP.[1]

The serious issue of concern here is that budget deficit for a country is not a welcome phenomenon particularly if it is found to be growing over time. This is because it can cause economic instability which in turn may retard investment, lead to inflation and increase balance of payments (BOP) deficit, depending on the way the deficits are financed (Bird and Zolt, 2003). This concern, thus, brings to the fore the question of what to do in order to abolish or reduce the fiscal deficit. One possible response to this question will be enhancement of the capacity to generate revenue from domestic sources.

Once we raise the issue of domestic revenue enhancement, it can be understood that one of the most important sources of domestic revenue is tax revenue. Therefore, it may need enhancements of its own. In fact in Ethiopia, just like, many poor countries, tax revenue is the most important source of domestic revenue. In support of this mention can be made of the fact that tax revenue as

[1] Figures are computed based on data from Ministry of Finance and Economic Development (MoFED) given in annex I

a proportion of total revenue for Ethiopia for the periods 1974/75-1991/92 and 1992/93-2004/05 was 61.54 percent and 71.6 percent respectively.[2]

Nonetheless, the performance of Ethiopia's tax structure is reported to be poor. In corroboration of this, many studies have shown that the tax system is generally neither efficient nor effective (Teshome, 1993; Wegene, 1983; Chole, 1983; Zelalem, 1998). That is the system lacks the desirable properties of having income elasticity equal to or greater than unity. Such property ensures that revenue growth keeps pace with that of GDP with out frequent discretionary changes. Weak performance of a tax system can be generally attributed to tax evasion, low compliance resulting mainly from inefficient tax administration, corruption and high tax rates (Ariyo, 1997). In fact, several prior studies on the tax system of Ethiopia have argued that the causes for its weakness are erosion of the tax base through evasions and marked deterioration in tax administration which further compounded the problem (Teshome, 1993; Zelalem, 1998).

Most of the developing countries, started to undertake a wave of economic reforms that are known as the structural adjustment programs (SAPs). These reforms were undertaken, mainly during the early 1990's under the auspices of the IMF and World Bank. One of the most important objectives of these reforms in most of the reforming countries is reduction of the public deficits that these countries were languishing in.

These reforms included, among others, liberalization of the domestic economy, which essentially proposed the reduction in the production involvement of the state and reduction in the degree of protection of the domestic market.

[2] Figures are computed based on data given in Annex I

One of the developing countries, which accepted the liberalization reforms under the SAPs, was Ethiopia. Because of this, it will not be judged naïve if one expects that the tax system of the country might have felt the effect of these reforms. The thesis, here, is an attempt to see the effect of these reforms on the revenue productivity of the Ethiopian tax system in addition to the assessment of the productivity of the tax system.

1.2 Objectives of the Study

Taking note of Ethiopia's comprehensive economic reform of the early 1990's the general objective of this thesis is to look in to the productivity of the tax system and see what impact the reforms of liberalization have on the productivity of the system. Specific objectives are:

1. determining the built in elasticity of the major tax regimes and the over all tax system of the country for the period 1974/5-2004/05. To this end tax buoyancies and/or elasticities will be estimated for the major tax categories and the over all tax system.
2. assessing the effect of the economic reforms of the 1990's on the productivity of major tax categories and the over all tax system by comparing buoyancies and elasticities with and with out the reforms.
3. recommending appropriate policy measures.

1.3 Hypotheses

This thesis is up to test two hypotheses.

Hypothesis 1: Ethiopia's tax system had been income inelastic. That is, it had not been able to ensure that revenue keeps pace with changes in GDP with out frequent discretionary measures.

This hypothesis is a result of many studies that had been undertaken in several LDCs including Ethiopia whose findings conformed to the hypothesis.

Hypothesis 2: the trade liberalization reforms have had a positive effect on the revenue productivity of Ethiopia's tax system i.e. they have contributed to its improvement.

This hypothesis is a result of the observation that the share of domestic revenue as percentage of government expenditure had been growing for the period after the reforms.

1.4 Methodology and Sources of Data

Models developed to measure buoyancy and elasticity of tax with respect to its base and the base in turn to income will be used to see how the over all tax system of Ethiopia and major tax categories performed before and after liberalization. Particularly, the log form of the model which states tax revenue is an exponential function of GDP will be used. That is, the basic model to be used is given as follows (Mansfield, 1972):

$$T = \alpha Y^{\beta} \varepsilon \quad \ldots\ldots (1)$$

Where Y = GDP, α is a constant and β is the marginal rate of taxation and ε is an error term.

The logarithmic form of equation (1) above will be

$$\text{Ln } T = \text{Ln } \alpha_o + \alpha_1 \ln GDP + \varepsilon_t \quad \ldots\ldots (2)$$

Where T = the revenue

α_1 = Buoyancy (elasticity) of the tax system.

To this end, respective equations based on theory will be stated for the over all tax system and the major tax categories which will all be estimated using the ordinary least squares (OLS) method.

Based on the result of the models comparison of elasticity (buoyancy) coefficients with and with out consideration of the liberalization dummy will be the approach followed to show the effect of liberalization.

The data used for this study are time series data on Ethiopia's tax revenues and their respective bases including GDP. The required data for this study have been collected from the National Bank of Ethiopia and the Ministry of Finance and Economic Development (MoFED).

Since the data to be used are time series data, it will be reasonable to expect that there could be a problem of non stationarity of data. As a result of this expectation, a need for undertaking test of stationarity of data arises. Therefore, the test of non stationarity of data i.e. tests for unit roots will be made using the Augmented – Dickey Fuller (ADF) tests.

1.5 Significance of the Study

There are many studies that are conducted with a view to show the effects of trade liberalization on various economic and even social issues. But there have not been such studies that attempted to show what effect there was on Ethiopia's tax system due to the reforms. This thesis attempts to make a contribution in this line of researching. Not only that, this study could be help full in the extension of the quantitative studies on the overall revenue productivity of the tax system for it covers the time up until 2004/05.

Moreover, the outputs of the thesis will be quite useful in showing which individual tax category (s) is with the greatest potential source(s) of tax revenue in relative terms and which individual tax regime (s) are with the least potential from the point of view of reforming the system. Besides, the thesis can also provide some insights with regard to how far cans the tax systems go in the direction of generating tax revenue.

1.6 Limitations of the Study

The study could suffer from lack of appropriate data with sufficient quality. For instance, the legal base for personal income taxes, usually the wage bill may not be exhaustive to include all employees of particularly the private sector in which we have a huge sector usually referred to as the underground economy. This also extends doubt in to the precision of data on GDP and its components. But at most effort is exerted to obtain the best possible representative figures from the source authorities.

CHAPTER TWO

MACROECONOMIC PERFORMANCE AND REVIEW OF THE TAX STRUCTURE IN ETHIOPIA[3]

2.1 Macroeconomic Performance

2.1.1 Structure of the Economy and Trends in GDP

The discussion of the Ethiopian economy will obviously demand investigation of almost all of the economic indicators together with the trends in their movement. But, the discussion here will be made based on some major economic variables.

A look in to the structure of the Ethiopian economy reveals that it is dominated by the agricultural sector. This is true for about 50% of the GDP comes from this sector, which also provides livelihood for about 85 percent of the population. Not only that, this same sector is a source of around 90 percent of the foreign exchange earning in the country. The industrial sector, on its part, takes a share of only 12% in GDP and the balance is accounted for by the services sector. This could show that there has been almost no structural transformation of the economy.

The predominance of agriculture in the Ethiopian economy has its own unwelcome repercussions. One important repercussion is that the economy has been easily affected by fluctuations of the agricultural sector mainly due to changes in weather conditions. This is accentuated by the fact that even with in the sector there is a huge predominance of the subsistence form of agriculture, which is almost under the full control of nature. In addition to this, the fact that the sector has the highest share of export earning of which one product, namely, coffee takes on average 60 percent of total export earning further compounds the problem of

3 Figures used through out this chapter but whose sources are not specified are author's computations based on data from MoFED, given in annex 1.

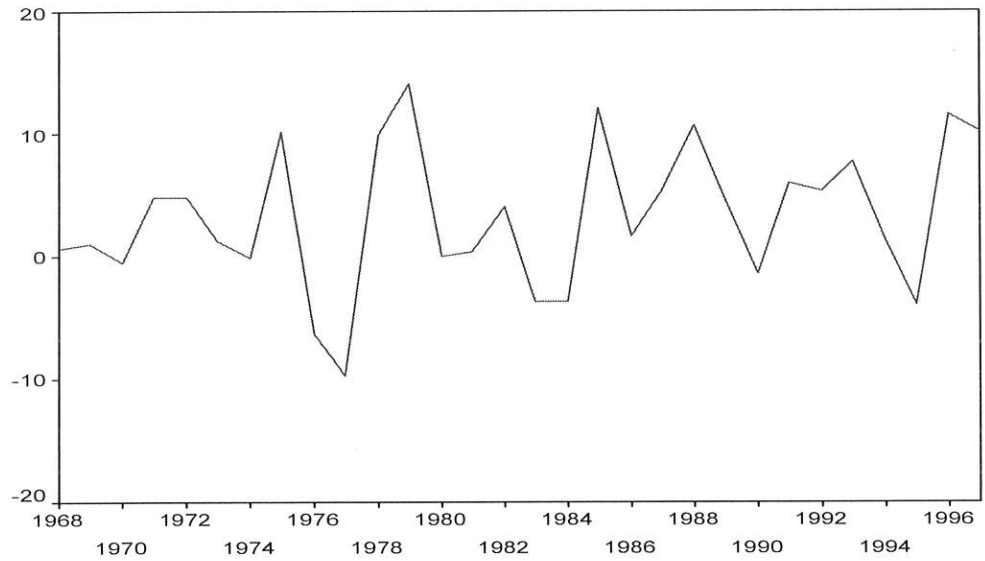
fluctuation through out the economy. This holds true because foreign exchange is one of the most important items for every sector of the economy. Moreover, the blame for the disappointing economic growth performance of Ethiopia in the last several decades had been laid on the poor performance of this sector. This blame is quite palatable for it had been seen on frequent occasions that this sector was languishing amid the misfortunes of cyclical droughts and famine.

With regard to the performance of the overall and the major sectors of the economy during the sample period (1974/75-2004/05), attempt will be made to look at it from the point of view of contrasting the two regimes of this period. The regimes are the socialist regime (1974/75-1991) and the post 1991 regime.

During the socialist regime, the overall performance of the economy had been very weak. This becomes clear when we see that, during this time, growth of real GDP was, on average, 1.9 percent per annum. This economic growth in the face of a 2.6 percent per annum growth of population meant that per capita income had been decreasing on average by 0.7 percent per annum (Befikadu et. al, 2001).

For the post 1991 period the economy has been growing at an average growth of 5.04 percent per year. Thus, during this period there has been a 2.6 percent per year growth in per capita income (Jonse, 2002). But this growth had not been smooth if some one is to make an annual review. Rather, the economy continued still to depend heavily on agriculture so much so that for the year 1998/99 when there was a severe drought, the economy scored a negative rate of economic growth with a magnitude of 1.2 percent (Zekarias, 2003). Growth of the economy over the entire sample period can better be shown by figure 2.1 below.

Figure 2.1 Growth in real GDP (years are in E.C.)



Based on data from MoFED

Generally, at this point what can be said is that the paradigm shift of the politico-economic out look of the post 1991 government toward a market oriented and liberalized system, from that of the pro socialist regime that existed before, appears to have brought about positive outcomes on the economy. But the issue of how much positive outcome should have been attained looks to be quite debatable.

2.1.2 Saving and Investment

During the Socialist regime Gross Domestic Saving (GDS) was only 8.4 percent of GDP. The rate of growth in saving had been, on average, 9.6 percent per annum. This growth, however, had been subject to a sizable fluctuation ranging from a high of 12.5 percent in 1987/88 to a low of 3.4 percent in 1990/91 (Jonse, 2002).

In the post 1991 period there has been a modest progress in the saving rate of the country. This can be corroborated by the fact that the average share of GDS in GDP for the period 1992/93 - 2004/05 was 11.4 percent. This may be due to the wave of reforms that the country initiated with the advent of the new regime that encouraged private sector business and put a rein on unproductive government spending.

The investment profile for the period 1975 - 1991 shows predominance of public sector investment and generally unsatisfactory trend. During this period the ratio of total investments to GDP was on average 14.3 percent. Concerning growth, the rate reached a high of 14.6 percent, which nonetheless, fell down to a negative rate during the last years of the regime (Jonse, 2002). Moreover, the ratio of total investment to GDP was not commensurate with that of GDS for it averaged about 12.5 percent while that of the GDS was around 8.4 percent for the entire 17 years of the regime.

The trend in investment has shown an improvement for the post 1991 period. During this time the share of investment to GDP has increased to an average of 19 percent. But still there has not been a significant movement in the direction of reducing the gap between investments and saving for the average share of the GDS for this period is found to be 11.4 percent, which is less than the above-mentioned investment to GDP ratio. The trend in the domestic saving and investment can better be shown by figure 2.2 on the following page.

Figure 2.2 Trends in shares of investments and savings to GDP (years are in E.C.).

Based on data from MoFED

The public- private investment composition has shown an improvement in favour of private investment during the post 1991 period. During this period private sector investment as a percentage of real GDP has increased from an average share of 7.2 percent during the previous regime to an average share of 9 percent while the growth in this sector has, on average, increased to 14.5 percent per annum.

2.1.3 Fiscal Performance

The investigation of fiscal policy during the sample period will relate tax revenue with government expenditure from which the hope is that an insight in to whether tax revenue has

been managing to cover expenditures or not will be found. Toward this end, the following table is developed based on which the discussion of fiscal performance will be carried out

Table 2.1 Average shares of revenue and tax revenue in GDP together with average annual growth rates.

Period	**Total domestic Revenue**		**Tax revenue**	
	Share in GDP	Annual growth	Ratio in GDP	Annual growth
1974/75-1990/91	17.3%	2.2%	12.8%	1.5%
1991/1992-2004/05	15.2%	4.8%	11.6%	2.9%

Based on data from MoFED given in Annex I

From table 2.1 we see that the share of revenue in GDP was too low for the 1974/75-1990/91 period with an average share of only 17.3 percent and its average annual growth was a mere 2.2 percent. For the post 1991 period the share of revenue in GDP has declined to 15.2 percent, which could be due to the lagging growth in revenue compared to the growth in GDP.

Government expenditure on its part, as table 2.2 below shows, had a share of 20.1 percent in GDP- for the 1981/82- 1990/91 period with an average annual growth of 1.6 percent. The average share of recurrent and capital expenditures during this period was 14.2 and 5.9 respectively with average annual growth of 1.1% and 4.2% respectively. For the post 1991 period the share of total expenditure has increased to 23.4 percent while its average annual growth has increased to 2.2 percent. This expansion in government expenditure can be explained by the increase in government investments in the social and development sectors. In agreement with this, we find

that the average share of capital expenditure for this period has increased to 7.5% from that of the previous period's 5.9 percent. But there has also been an increase in recurrent expenditure from 14.2 percent in the pervious period to 15.5 percent during this period, which could be partly caused by the positive relation between expansion in capital expenditure and recurrent expenditure.

Table 2.2 Average share of government expenditure per GDP and annual growth rates

Period	Total government expenditure		Recurrent Expenditure		Capital Expenditure	
	Share in GDP	Annual growth rate	Share in GDP	Annual growth rate	Share in GDP	Annual growth rate
1981/82-1990/91	20.1%	1.6%	14.2%	1.1%	5.9%	4.2%
1991/92-2004/05	23.4%	2.2%	15.5%	1.7%	7.5%	6.6%

Based on data from MoFED given in Annex I

The Above two tables show that there has been a consistent excess of government expenditure over total of domestic revenues. That is, the country has been living with the problem of budget deficit almost for all the years in the sample period. But comparison of the magnitude of the deficit between the two periods shows that the size was about 2.8 percent of GDP for the former period while it becomes 8.2 for the latter. This could be explained by the expansion of public sector investment in development and social sectors and inclusion of the period of the Ethiopia-Eritrea war (1998-2000) for the latter in which there was a marked increase in government expenditure. More over, if one is to make a comparison between tax revenue of the country with its expenditure it will be starkly manifest that the tax performance of the country has been terribly

far behind the pace that it should have assumed given the size of GDP and government expenditure.

2.1.4 Monetary Policy

Economic theory postulates that monetary policy can be used by a country in order to maintain a viable financial sector in the economy and to control inflation. Ethiopia, too, has not been an exception in the use of this policy as an instrument. But, this does not mean that the politico-economic perspective behind its specific form remained the same. Rather, there had been almost a radical shift of perspective from the socialist regime to the post 1991 regime.

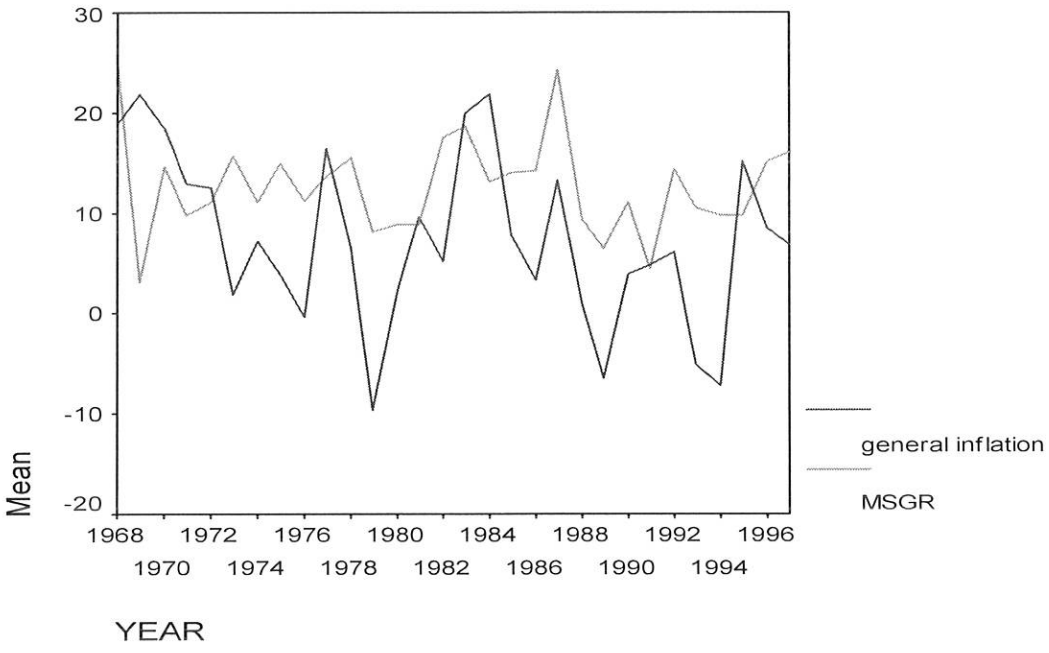
The former regime, in tandem with its socialist perspective, preferred to follow a policy of direct control on prices and money. Moreover, it went on nationalization of financial institutions and adopted a policy of fixed, mostly discriminatory, interest rate policy. In addition to this, there had also been a fixed exchange rate policy, which gave priority to the public sector. There was also a credit allocation policy that discouraged the private sector for it was discriminatory against it.

The Period after 1991 showed that reforms were introduced in this sector, which, by and large, aimed at encouraging the private sector by employing monetary policy that will bring about the desired outcome also by enabling to have a stable macro-economic environment. Towards this end, money supply was made to grow at a rate that is in consonance with the growth in inflation, the economy and the balance of payments. Besides, the private sector was to be given a priority status in access to credit. Probably as a result of these reforms the share of the private sector in credit as a percentage of real GDP has increased from an average of 8.9 percent for the period 1974/75- 1990/91 to an average of 21 percent for the period 1991/92-2004/05. But one should

mention the situation during the period of the Ethiopia-Eritrea war in which there was a violation of the tight monetary policy of the country. That is, during this period there had been a marked increase in money supply where both M_1 and M_2 surged upward by 14.9 and 14.4 percent respectively (Jonse, 2002).

Finally, one issue could be of special interest with regard to monetary policy. This is the observation that the level of inflation in the country has not shown a rise or fall in response to money supply in the country. This observation can be shown, quite interestingly, by diagram 2.3 below.

Figure 2.3 Growth in money supply and general inflation (years are in E.C)



Based on data from National Bank of Ethiopia (NBE)

The diagram shows that there is no predictable relationship in the trends of money supply and inflation. With regard to this, some studies like, (Befikadu et.al 2001) argue that inflation responds highly to agricultural produce justifying that in poor societies like Ethiopia expenses on food account for the highest share that is more than 50% of household expenditure.

2.1.5. The Balance Of Payments

Balance of payments, according to Salvatore (1990) is a record of all economic transactions between residents of one country and the rest of the world during a given time period, usually a calendar year. The transactions are commonly divided in to two major sections (balances). These are the current accounts balance and the capital accounts balance. The two sections are distinguished as the former records income flows while the latter records variation in assets and liabilities (Mannur, 1985).

In the current accounts balance there are two major subsections. These are the visible (trade) balance which records revenue and expense flows for exports and imports of goods, and the invisible balance that records flows in expenses and revenues for export and import of services by a country. For the purpose of this study only the visible balance of the current accounts balance will be treated.

Overall trade balance for the period 1974/75-2004/05

Ethiopia's exports have remained to be primarily agricultural products over the entire sample period where few products like coffee, hides and skins, oil seeds and pulses take the lion's share. In the same way, its imports have also remained to be mainly industrial products that are mostly capital goods like different machinery and some industrial inputs. Not only that, one product

namely coffee has taken a share of about 50% of exports for a long period of time which made Ethiopian exports to be excessively prone to fluctuations in earnings in response to the price and quantity of coffee exported. This, however, is not to deny the recent tremendous decline in the share of this commodity from the total export of the country.

An over time review of the trade balance in Ethiopia during the sample period reveals that exports in the period 1974/75-1990/91 grew at a rate of 3.3 percent per annum while imports grew at a rate of 6.8 percent per annum. Over this period, there had been a growth in trade deficit that amounted about 7.3 percent, on average. While for the period 1991/92-2004/05 export recorded an average growth of 15.6 percent per annum, while imports grew by 18.9 percent per annum. During this period, the trade deficit has been growing by an average rate of 43.5 percent. The situation with regard to the trade balance can better be shown by figure2.4 below.

Figure 2.4 Share of exports and imports per GDP (years are in E.C)

Based on data from MoFED

The trade deficit during the socialist regime could be explained by the so called import substitution policy that the regime was pursuing together with the policy of discouraging the private sector that might have contributed a lot for the improvement of export earnings. On the other hand, the growth in trade deficit for the post 1991 period can be attributed to the ever increasing volume of imports that have remained to be strategic items in development ventures, both for the public and private sectors.

2.2 Review of the Ethiopian Tax Structure

Although the history of fiscal policy in Ethiopia could be dragged back to the time after the end of the Italian occupation, this review is concerned only to the sample period focusing, by and large, on changes that affected tax rates. This will be carried out by looking in to changes in individual tax components that are believed to be significant sources of government revenue. The modes-operandi here will stick to the usual grouping of taxes in to direct and indirect taxes.

2.2.1 Direct Taxes

Direct taxes are defined as taxes collected form incomes and are taxes the burden of which falls on the legal taxpayers. The major direct taxes in Ethiopia are personal income tax, business income tax and agricultural income tax.

A. Personal Income Tax

The first promulgation concerning this category of tax, during the sample period (1974/5-2004/5), was the one issued by the socialist government as the income tax amendment proclamation number 15 of 1978. This proclamation decreed that income of birr 50 and less per month would be exempted from paying tax and instituted progressive rates ranging form 10% for

income gap of [51, 250] Birr per month to 85% on a monthly income exceeding Birr 3750. Moreover, in line with the government's disposition towards socialism, it provided incentives for the development of cooperative societies. Such incentives included tax exemptions for members of urban cooperatives whose income falls short of Birr 500.

This law was replaced by proclamation No 30 of 1992 of the transitional government of Ethiopia. This law raised the tax exempted monthly income to Birr 105 and revised all the rates down wards so much so that the highest tax rate was reduced to 50 percent from 85% hitherto. Again this proclamation was repealed by proclamation No 107 of 1994 that allowed exemption on monthly income of up to birr 120 and reduced the rate on upper income down to 40 percent. An amendment, which decreed a tax of 35% on the income of any organization, was passed in 1996. Once more, there were some amendments in 1998, which included the income of members and secretaries of boards of public enterprises in to the personal income tax schedule. Finally, in 2002 proclamation No/2002 promulgated a revision of the rates on this tax schedule such that the tax exempted income level was raised to Birr 150 per month and the maximum tax rate to be paid would be 35% on income exceeding Birr 5000 per month.

This tax in Ethiopia does not incorporate exemption on consideration like marital status and is collected on the basis of "pay-as-you earn" from gross monthly income.

B. Business Income Taxes

This tax, for the first time in the sample period, was affected by proclamation No 155 of 1978 which kept the separation of organizations and persons in the same fashion as earlier laws that made a distinction between organizations and persons in such a way that the former are any

government or privately owned judicial persons or associations that undertake business activity excluding cooperative societies. According to this law, organizations were required to pay 50% of their taxable income while the rates on persons were progressive ranging form 10 percent on annual incomes of up to Birr 300 to 89 percent on annual incomes that exceed Birr 36,000.

Moreover, this law demanded collection of a 10% tax on incomes from chance winnings and lottery and incomes from services rendered abroad while incomes from dividends to share holders were required to pay 25 percent and income from royalties should pay 40 percent. This tax was collected from gross income less expense incurred in earning income and depreciation of fixed assets.

The 1978 decree was amended in 1990 by decree No 18 of 1990 that altered rates on persons down wards so much so that the highest rate was made 59 percent and tax on dividends was reduced to 10 percent. This tax law was once more replaced by proclamation No. 286/2002 that made its structure the same with that of personal income tax. As such, it declared that annual income of up to Birr 1800 is exempted from paying taxes and the highest tax to be paid in this schedule will be 35 percent on an annual income that exceeds Birr 60,000.

C. Agricultural Income Tax

During the sample period, the first promulgation that affected agricultural income tax was proclamation No 77 of 1976 which subsequently was amended by proclamation No 152 of 1978. These laws made agricultural income tax progressive in the range of birr 10% on incomes up to Birr 600 per annum and the rates on additional incomes varied from a low of 10 percent to a high of 89 percent on incomes exceeding Birr 36,000 per annum.

This tax schedule has become under the full jurisdiction of regional states since the establishment of the federal democratic republic of Ethiopia (FDRE) in 1994. As a result, there has not been any common agricultural income tax structure for Ethiopia since this year. However, the tax structure of the regional states on this income category is more or less similar to the earlier proclamations of Ethiopia before FDRE.

2.2.2 Indirect Taxes

Indirect taxes are taxes whose burdens can be transferred form the legal taxpayers to others, usually consumers, by way of commodity prices. In Ethiopia there are many varieties of indirect taxes. But for the purpose of this study, only domestic indirect taxes and foreign trade taxes will be reviewed. This selection is mad because these taxes are the major ones in terms of contribution to tax revenue.

A. Domestic Indirect Taxes

Although there are many sub items under this tax category, the major ones are excise taxes, transaction and turnover taxes and sales tax (or Value added tax since 2002).

The main tax laws decreed before the change of regime in 1991 that affected this tax category were proclamations No 114 of 1977, No162 of 1978 and No. 160 of 1979. Of all these proclamations (amendments), only the amendment in 1978 affected some specific rates.

After the fall of the socialist regime, proclamation No.68 and 122 of 1993 were introduced. From these proclamations, Proc. No.68 altered many of the previous specific rates to ad-valorem rates while proclamation No. 122 changed all excise taxes to ad-valorem and also increased the

number of affected commodities from 12 to 117 by including previously excluded items. This proclamation decreed that a minimum of 10 percent tax should be collected on items like textiles and a maximum of 150 percent should be collected on items like pure alcohol. Once more, there was some adjustment on the rates of this tax category by proclamation No. 149 of 1999. Finally, this tax was affected by proclamation No.307/2002, which kept the minimum 10 percent tax on those items, listed in proclamation 149/1999. However, this proclamation reduced the maximum rate on alcohol down to 75 percent while stating the maximum excise tax rate to be paid will be 100 percent on items like perfumes and toilet waters and transport vehicles of 1800 cc and above.

With regard to sales tax, in the period after 1991 it was proclamation No. 228/2001 that adjusted the rates between a minimum of 5 percent and a maximum of 15 percent. Finally this tax group was totally replaced by the Value added tax proclamation of 2002 which decreed a 15 percent tax on the value of sold items to be collected by businesses whose annual sales volume is more than Birr 500,000. This proclamation, moreover, instituted a collection of a turn over tax in the range of 2 percent on goods sold locally and 10 percent on those that are not eligible to value added tax.

B. Foreign Trade Taxes

Foreign trade taxes are taxes that are levied on the activities of import and export hence usually import taxes and export taxes are raised in relation to foreign trade taxes. The review here is concerned only with import duties.

Import duties

The first proclamation, in the sample period, which affected import duties, was the customs duty reform of 1976. This reform primarily classified commodity schedules according to the Brussels

Tariff Nomenclature (BTN) and the standard International Trade Classification (S.I.T.C). The scheduling constituted both specific and ad-valorem rates. As per this adjustment, the tariff rates were made to range form a minimum of 5 percent on import of goods that are judged to be necessity to a maximum of 125 percent on goods that are deemed luxury. This reform also allowed duty free import of goods such as fertilizers and free imports by some entities like religious bodies. Moreover, this law incorporated a limit of qualified imports i.e. the quota system on some selected goods with an aim of domestic industry protection and trade deficit reduction. There were also some amendments in 1979, which affected the import duties on some items.

The trade liberalization reform, which the country adopted since 1992, made the revision of laws that covered the taxation of foreign trade. In agreement with the nexus of liberalization the reforms focused on the reduction of import tariffs. Thus, the 1993 proclamation of customs tariff regulation No 122 reduced the previous tariff range of 5 to 230 percent down to a range of 5 to 80 percent, which further was revised by regulation No 2 of 1996 that reduced the highest tariff rate to 60 percent.

CHAPTER THREE

REVIEW OF LITERATURE

Many countries of the so-called developing world started to adopt a wave of reforms under the sponsorship of the World Bank (WB) and the International Monetary Fund (IMF). These reforms were commonly known as the structural adjustment programs (SAPs). One of the major issues that prompted the adoption of these reforms was the severe budgetary deficit that these countries were languishing in during the reform period i.e. the 1990s (Barbone and Marchety, 1999).

These reforms have had wide ranging effects on the economies of these countries of which one potential area to be affected would be the productivity of tax systems. What follows would then be a review of literature in relation to tax system productivity focusing on reforms and their effects.

3.1 Theoretical Frame Work for the Analysis of Tax System Productivity

Tax revenue may grow as a result of two factors. These are; one, the rules or rates of tax can be changed to raise more revenue from the same base; two, the base on which the tax is collected may grow. The growth of tax in response to GDP can, thus, be decomposed in to two components; namely the automatic growth as the base on which the tax is charged grows in relation to GDP and the growth resulting from discretionary changes in tax rates and rules. The combined effect is known as the buoyancy of a tax (Bird and Zolt, 2003). There fore, buoyancy coefficient of say 1.4 would imply that for every 1% increase in GDP, revenue from the tax had, on average, grown by 1.4%. The effect of automatic growth alone abstracting from discretionary

changes is known as the elasticity of tax. Accordingly, an elasticity coefficient of 1.4 would imply that for every 1% increase in GDP, revenue from tax would have grown by 1.4% if the rules and rates of the tax had remained unchanged (Ariyo, 1997).

As a measure of productivity of any tax system usually it is desirable that the revenue growth of a tax keeps pace with that of GDP with out frequent discretionary changes having to be made to its rate and structure. This would mean that the tax elasticity coefficient must be equal to or greater than one (Suliman, 2002). As such a productive tax system is one that possesses a buoyancy (elasticity) coefficient, which is not less than one (Kussi, 1998).

Conventionally, the elasticity of total tax revenue in relation to income has been presented in aggregate models as a single number. But it is more realistic to visualize the over all tax elasticity as a weighted average of the sum of the elasticities of individual taxes that respond in diverse ways to changes in income. This implies that an evaluation of the over all tax elasticity must commence with an examination of the individual tax elasticities (Mansfield, 1972).

3.1.1 Definition of Tax Elasticity

Mansfield (1972) defined tax elasticities in the following manner

a) elasticity of total tax revenue to income $E_{TY} = \frac{\Delta Tt}{\Delta Y} \cdot \frac{Y}{Tt}$

b) elasticity of Kth individual tax to income $E_{T_kY} = \frac{\Delta Tk}{\Delta Y} \cdot \frac{Y}{Tt}$

c) elasticity of Kth individual tax to base $E_{Tk}B_k = \frac{\Delta Tk}{\Delta Bk} \cdot \frac{Bk}{Tk}$

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c) elasticity of Kth individual tax to base $E_{Tk}B_k = \frac{\Delta Tk}{\Delta Bk} \cdot \frac{Bk}{Tk}$

d) elasticity of K[th] individual base to income $E_{B_kY} = \frac{\Delta Bk}{\Delta Y} \cdot \frac{Y}{Bk}$

Where

T_t = total tax revenue

T_k = revenue from the K[th] tax

Y = income (GDP)

B_k = base of K[th] tax

Δ = the discrete change in the variable associated with it.

From the definition of elasticity it follows then that in a system of 'n' taxes:

$$E_{TkY} = \frac{T_1}{T_t}\left(\frac{\Delta T1}{\Delta Y} \cdot \frac{Y}{T_1}\right) + \ldots + \frac{T_k}{T_t}\left(\frac{\Delta T_k}{\Delta Y} \cdot \frac{Y}{T_k}\right) + \ldots \frac{T_n}{T_t}\left(\frac{\Delta T_n}{\Delta Y} \cdot \frac{Y}{T_n}\right) \quad \ldots\ldots\ldots\ldots\ldots (1)$$

The elasticity of any individual tax may be decomposed in to the product of the elasticity of the tax to its base and the elasticity of the base to income

$$E_{T_k Y} = \left(\frac{\Delta T}{\Delta Bk}, \frac{B_k}{T_k}\right)\left(\frac{\Delta Bk}{\Delta Y}, \frac{\Delta Y}{Bk}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (.2)$$

Combining equations (1) and (2), yields

$$E_{T_{tY}} = \frac{T_1}{T_t}\left[\left(\frac{\Delta T_1}{\Delta B_1} \cdot \frac{B_1}{T_1}\right)\left(\frac{\Delta B_1}{\Delta Y}, \frac{Y}{B_1}\right)\right] + \ldots + \frac{T_k}{T_t}\left[\left(\frac{\Delta T_k}{\Delta B_k} \cdot \frac{B_k}{T_k}\right)\left(\frac{\Delta B_k}{\Delta Y} \cdot \frac{Y}{B_k}\right)\right] \quad \ldots\ldots\ldots (3)$$
$$+ \ldots + \frac{T_n}{T_t}\left[\left(\frac{\Delta T_n}{\Delta B_n} \cdot \frac{B_n}{T_n}\right)\left(\frac{\Delta B_n}{\Delta Y} \cdot \frac{Y}{B_n}\right)\right]$$

Equation (3) shows that the elasticity of total revenue with respect to income in a system of 'n' taxes depends on the product of the elasticity of tax to base and base to income for each individual tax, weighted by the importance of each tax in the overall tax system.

3.1.2 Estimating Tax Elasticities

In the estimation of tax elaticities, tax buoyancy and tax elasticity are to be computed. As defined previously, tax buoyancy measures the responsiveness of tax revenue to changes in income or output with no attempt to control for discretionary changes in tax policy. The traditional way to estimate the elasticity of a particular tax 'k' employs the following model (Osoro, 1993 pp. 12)

$$T_k = \alpha_k y^{B_K} \varepsilon_k \quad \text{.......} (4)$$

Then logarithmic transformation of this model yields

$$LnT_k = \ln \alpha_k + \beta_k \ln Y + \varepsilon_k \quad \text{.......} (5)$$

Where T is tax revenue, Y is GDP, and ε_t is a stochastic disturbance term for the K^{th} tax system.

Estimation of equation (5) will provide an estimate of tax buoyancy because it measures the percentage response in the left hand side for a one percent change in the right hand side explaining variable(s). This is because of the fact that the equation is a double log equation.

In cases where there have been no discretionary changes during the concerned period, both tax buoyancy and tax elasticity will be the same. Therefore, in such a case the elasticity, sometimes known as the "built-in-flexibility", of the tax system which seeks to relate the percentage change

in tax revenue to a percentage change in the tax base with given tax structure can be estimated using equations (4) and (5) (Sen, 2001).

However, since legislative changes in the tax structure alter this relationship from time to time, direct measurement of tax elasticity from a historical revenue series becomes problematic (Osoro, 1993). The problem becomes even more complex if the tax base itself is not precisely measurable or if such data are not available and recourse has to be taken to using proxy measures. This is in fact a very common problem, as most analytical studies on tax responsiveness tend to deal with broad categories of taxes, which are aggregates of a wide variety of tax rates applied to different tax bases (Osoro, 1993).

In reference to these problems Sen (2001) states that either the time series data on tax revenues need to be adjusted to eliminate the effects of discretionary tax measures or a suitable estimation methodology has to be adopted. However, this does not mean that combination of the two is impossible. The most appropriate method would clearly depend up on the availability, nature and reliability of information on tax revenues, frequency of discretionary changes in the tax structure and tax bases (Sen, 2001). Over the years, four approaches have been used. These are[4]

a) proportional adjustment
b) constant rate structure
c) divisia index, and
d) econometric method

These approaches are to be discussed below.

[4] The discussion of this is mainly based on Sen, 2001 "Notes on the Estimation of Tax Elasticities."

A. The Proportional Adjustment (PA) Method

This approach was first developed by Prest (1962) to clean revenue series off discretionary effects. But a comparable method was used earlier by Sahota (1961). This method of computing tax elasticities involves a three-step process. In the first step, a preliminary series of adjusted tax yields is obtained by subtracting the budgetary estimates of the effects of discretionary tax changes from the actual yield. In the second step, this preliminary series is further adjusted to exclude the continuing impact of each discretionary change on all future years tax yields by multiplying by the ratio of the previous year's adjusted figure to the actual tax receipt. It can be shown that this procedure involves a factor sequence, each element of which represents the effect of the automatic component of tax changes in earlier years. In the third step, the resulting series of 'cleaned' tax yields is then regressed on some measure of the tax base to obtain the necessary elasticity values.

This procedure can be specified more precisely using notations in the following manner (Sen, 2001, pp 4)

Let:

AT_i = The adjusted or cleaned tax yield in year i

T_i = The actual tax yield in year i

D_i = Budget estimate of the yield arising out of discretionary tax changes in year i

In the reference year '0' the year whose tax structure is to be used as the basis for building up the adjusted series, the adjusted tax yield is set at the actual

$$AT_0 = T_0 \quad \ldots\ldots (6)$$

For the following year

$$AT_1 = T_1 - D_1 \quad \ldots\ldots (7)$$

Since AT_0 is equal to T_0 (from 6), no further adjustment is needed. In every subsequent year, however, the non-discretionary component of tax receipts has to be adjusted in the following way:

$$AT_j = (T_j - D_j)\frac{AT_j - 1}{T_j - 1} \qquad \forall \ j = 2 \ldots n \quad \ldots\ldots (8)$$

Through sequential substitution, it can be shown that equation (8) can be rewritten as;

$$AT_j = AT_j \prod_{j=2}^{j} \left(\frac{T_j - D_j}{T_j - 1} \right) \qquad \forall \ j = 2 \ldots n \quad \ldots\ldots (9)$$

This is essentially the Mansfield equation for proportional adjustment data cleaning

This procedure, however, has many problems. Some of the problems are

i. Estimates of the revenue impact of discretionary changes are made based on annual budget speeches. These estimates however, are of an ex-ante type and ex-post revision of the initial estimate is not provided. That means there are no means of checking the accuracy of the estimates (Byrne, 1983)

ii. The method assumes that changes in individual tax system result directly in an exogenous change in its tax revenue, but do not affect its own and other individuals tax bases endogenously. This assumption is theoretically not supported and no studies have shown its empirical validity. (Belassa 1989); Mansfield (1972); (Giliani, 1986)

iii. Most importantly this approach of data cleaning yields a series that is systematically biased and will therefore lead to biased elasticity estimates. The bias may be shown as follows (Sen, 2001)

Consider a simple tax function

$$T_t = t_t B_t \quad \ldots\ldots (10)$$

Where t_t is tax rate at time t and B_t is tax base at time t.

The ideal adjusted series for estimating the elasticity of the tax function will be:

$$AT_t = t_o B_t \qquad \forall \ t=0\ldots n \quad \ldots\ldots (11)$$

It is assumed that discretionary changes in the tax rate Δt are known with certainty and the only uncertainty is on the base. Then, the tax authorities provide the budgetary estimate of the discretionary changes in the tax rate by multiplying the change in the tax rate with an estimate of the base $\left(B_t^e\right)$ for the coming fiscal year. Thus:

$$D_t = \Delta t_t B_t^e \quad \ldots\ldots (12)$$

Using equation (12), the second term of the proportionally adjusted series is;

$$AT_t = T_1 - D_1 = t_1 B_1 - \Delta t_1 B_1^e \quad \ldots\ldots (13)$$

Since there is no uncertainty regarding the tax rate,

$$t_1 = t_o + \Delta t_1 \quad \ldots\ldots (14)$$

Substituting equation (14) in to equation (13) yields

$$AT_1 = t_o B_1 + \Delta t_1 \left(B_1 - B_1^e\right) \quad \ldots\ldots (15)$$

From 15, it can be seen that a discrepancy between the ideal series given by equation 11 and the proportionally adjusted series appears from the second term itself, which arises from any difference between the tax base estimated at the beginning of the year and the actual. The problem gets further compounded in every subsequent year as the proportional adjustments are made. The argument here is that successive adjustments will introduce biases, which will not be random.

B. Constant Rate Structure

The constant rate structure method involves the generation of a simulated tax revenue series based on the effective tax rate for a given reference year and estimates of the tax base for subsequent years. This method is the most accurate given that both the tax and its base are defined narrowly enough to permit application of the reference year rates to later year tax bases with a certain degree of confidence (P.Sen,2001) and (Choudhry, 1975).

Once the data is found in this way, a constant rate-base series, which represents hypothetical yields under a system assumed to remain unchanged, during the period under review, is constructed using the following formula.

$$T_i = \sum_{i=o}^{n} (R_{io})(B_i) \quad \text{...} \quad (16)$$

Where; T_i = historical time series data (HTSD) adjusted for discretionary changes in year i (i=1…t)

(R_{io}) = base year tax rate on the ith income bracket

n = number of income brackets

B_{it} = reported tax base in the i^{th} income bracket in year t

C. Divisia Index

This method was first used by Choudhry (1979) to measure the impact of technology on the productivity of labour. The method when used in the assessment of tax elasticities introduces time trends as a proxy for discretionary tax measures (DTMS) in the tax revenue and tax base functions and estimates tax elasticity directly from historical time series tax data (Kussi, 1998). The approach as outline in (Kussi, 1998, pp 28) starts with the following function.

$$LogD(n) = \log\{T(n)/T(0)\} - \sum_{i=i}^{k} B_i \log\{B_i(n)/B_i(0)\} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (17)$$

Where log D(n) is the index of discretionary tax measures i.e. the divisia index.

To obtain the estimates of elasticity, the divisia index is adjusted by the following formula;

$$E_t = Z_t - \log D(n)/Log\{B(n)/B(0)\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (18)$$

Where E_t = tax elasticity.

Z_t =tax buoyancy (obtained by regressing actual tax revenue on GDP using logarithmic form equations).

Log D (n) = divisia index of the discretionary tax revenue.

Log{B(n)/B(0)} = index of automatic growth of the proxy tax base.

This method is least demanding in terms of data requirement for it relies mainly on actual tax collection and tax base measures that are fairly at aggregate levels (Sen, 2001). However, this

approach has its weaknesses in that the formula derived to estimate tax elasticity is a line integral while in practical application the discrete version is used. Thus, this may cause bias in the estimate of the revenue impact of discretionary changes (Kussi, 1998).

D. The Econometric Approach

This approach uses dummy variables to capture discretionary changes in tax rates and tax structures (Kussi, 1998).

This method is outlined in (Ibid, pp 29) as under.

$$Log(T)_t = B_o + B_1 \log(B)_t + \sum^{n}_{i=1} B_{2i} D_i + U_t \ldots\ldots\ldots\ldots\ldots (19)$$

Where; T= tax revenue.

B= tax base.

D_i= dummy variable (simple or mixed) as proxy for the i^{th} DTM taken during the period under review.

B_1= tax elasticity.

This method has its strength in that its requirement in data is not that difficult (Sen, 2001). But the tax elasticity estimate obtained using this approach may not be precise and its use becomes very difficult in cases where DTMs are very frequent for the possibility of facing the problem of multi-co linearity increases in such cases (Ariyo, 1997).

3.2 Empirical Literature

Most of the empirical studies in relation to the topic at hand are found to focus only on the issue of productivity of tax systems. The list of such studies on developing countries includes (Ariyo, 1997); (Sahota, 1961) ;(Chipeta, 2002); (Mansfield, 1972); (Byrene, 1983); (Khan, 1973); (Kussi, 1998); (Thirsk, 1995); (Fjeldstad and Rakner, 2003); (Bird and Zolt, 2003); (Teera, 2002) ; (Osoro, 1993) and (Suliman, 2002).

Ariyo estimated buoyancy and elasticity of the Nigerian tax system for the period 1970-90 using the dummy variable (DV) method to estimate the elasticity of the tax system. In this way, this study showed that the Nigerian tax system had been, overall, satisfactory. However, the study also stated that there was wide variation in the level of productivity by tax source. The explanation given for this referred to the problem of administrative laxity on non-oil taxes particularly during the period of the oil boom.

Sahota, on his part, studied the performance of the Indian tax system for the period 1948-58. This study used the proportional adjustment method to estimate elasticity of the system. Results of the study showed that the Indian tax system was inelastic, the causes of which were found to be a defective tax structure and wide spread tax evasion. Chipeta, on the other hand, studied the tax yield in Malawi in relation to the size of the underground economy, which he called the second economy. This study showed that the tax system had contributed to the expansion of the second economy from which no tax was collected. The study by Mansfield estimated the buoyancy and elasticity of the tax system for Paraguay in the period 1962-70. He used the PA and DV methods to estimate elasticity of the tax system in Paraguay. The finding of this study was that the system exhibited expansion of bases, which, however, were dumped by weak

administration and sizable degree of tax evasion. Byrene studied elasticities of the major tax types of Zambia to their respective bases for the period 1967-77. The study found out that the tax types, except import duties, were elastic. The attributed reason, for this outcome, was the growth of the industrial and services sector during the period of the study.

The common feature of all the studies mentioned above is that all have attempted to show how productive are the respective tax systems that they attempted to analyze.

Some studies such as Kussi, (1997) Thirsk, (1995) Osoro (1993) and Suliman (2002) have attempted to show what happened to the productivity of tax systems due to reforms.

Kussi tries to show the effect of tax reforms of 1983 on the revenue productivity of the tax system in Ghana. To this end, two separate regressions for the pre-reform period (1970-82) and the reform period (1983-1993) were fitted for some major tax types. It was found out that there was a progress of both buoyancy and elasticity for personal income tax, company income tax, sales tax and import tax. The study attributed the improvements to growth in GDP and general improvement of the tax administration. This study on the other hand showed that there was a fall in buoyancy and elasticity for excise duty whose cause was stated to be abolition of all excise duties on products other than beverages and tobacco in 1987 and the successive reduction in the duty rates of the affected goods. Osoro, on his part, did the same for the Tanzanian tax system taking the period 1969-90 and concluded that the series of tax reforms in the 1980s had not brought much change in the productivity of the over all tax system in Tanzania. The study by Thirsk took eight developing countries on which a comparative analysis of process and substance

of tax reforms was carried out. The result of the study showed that most of them had different motives for reform and also different achievements out of the reforms.

Suliman tried to show the impact of trade liberalization reforms of 1992 on the revenue mobilization and stability of the Sudanese tax system. The study employed the dummy variable method and estimated two separate regressions for the major tax categories. That is one regression for the pre-liberalization period (1970-91) and another for the reform period (1992-2002). This study found out that the Sudanese tax system remained to have a buoyancy and elasticity that are less than unity. It was also shown that tax to income elasticity was low and declining for import duties and excise taxes over the review periods from which the study concluded that these two taxes are broad based. Moreover, this study showed that tariff reduction did not lead to reduction in revenue from this tax the cause of which was stated to be expansion of the import base.

Coming to the review of studies undertaken for Ethiopia in relation to the topic at hand, first we find out that they are few and second almost all focused on two issues. These are the study of whether the overall tax system is productive or not - (Teame, 1985); (Zelalem, 1998); (Wegene, 1983); (Chole, 1987); - or how productive is the tax structure of a specific tax category- (Teshome, 1979) and (Kifle, 1982).

Teame studied the over all productivity of the tax system for the period 1968-83 and found out that the system had a buoyancy greater than unity but an elasticity which is less than one from which the conclusion was that the tax system was unstable and inflexible. This study employed the CRS and DV techniques of estimating tax elasticity. Zelalem studied the productivity of the

Ethiopian tax system for the period 1961 -1998.This study estimated the buoyancy and elasticity of the overall and major individual tax categories by using the method of divisia index. The results of this study showed that the Ethiopian tax system was inefficient for most of the coefficients were found to be less than one. The explanation given for the low productivity of the tax system was that the system suffered from the problems of weak administration and extensive tax evasion.

The study by Wegene showed that for the period 1975-81 tax reforms had enabled an increase in tax collection. This study employed the constant rate of adjustment method to estimate elasticity of the tax system. Like wise, the study by Eshetu compared tax productivity in the pre revolution, post revolution periods of Ethiopia, and found out that there was certain improvement in the tax collection of the government in post revolution Ethiopia. The study by Teshome, (1979) showed that coffee export tax in Ethiopia was inelastic while study of agricultural tax share in capital formation by Kifle showed that tax collected from this category was very small.

Generally, we see that the empirical studies undertaken thus far for developing countries, particularly for Ethiopia, bothered little or no to see what followed on the productivity of the tax system in these countries due to the economic reforms of the 1990s. One of the most important components of the reforms was liberalization of trade. This reform should be expected to have a bearing on revenue productivity of a country since it directly affects export and import taxes and indirectly may affect other sources too. This, therefore, provides the impetus for this study and as such the study tries to see in to the possible effects of Ethiopia's liberalization reforms of the 1990s on the revenue productivity of the overall and major tax regimes tax systems.

CHAPTER - FOUR

MODEL SPECIFICATION AND METHODOLOGY

The analysis in this study will begin with the evaluation of the over all productivity of the Ethiopian tax system during the review period (1974/5-2004/05) and then will proceed to evaluate the major tax components in the same way.

The model to be employed will be basically a log linear form of Mansfield's (1972) tax as a function of GDP exponential equation which is given as under

$$T = \alpha\, y^{\beta}\, \varepsilon_t \quad \ldots\ldots (1)$$

Where α is a constant, y is is income (GDP), β is the marginal rate of taxation and ε is an error term. From this equation we derive the following log linear equation:

$$\ln T = \ln \alpha + \beta \ln y_t + \varepsilon_t \quad \ldots\ldots (2)$$

Based on equation 2 β is defined as tax buoyancy (elasticity).

This thesis will employ varieties of equation (2) to determine the buoyancy and elasticity of the Ethiopian tax system and its major components; namely personal income tax, business income tax, agricultural income tax, domestic indirect taxes and import taxes.

With regard to the issue of controlling the effect of discretionary tax measures (DTMs) in determining elasticity of the tax system the dummy variable method, as discussed in the literature, will be used.

Then, what comes next will be discussion of model specification and method of estimation together with ways of data property investigation. The pattern will be that first the model will be specified by disaggregating it in to two blocks to be followed by the investigation of data property.

4.1 Model Specification

As mentioned earlier, total tax revenue is decomposed in to five major components. These are: -

i) Personal income tax; which is tax collected from compensation to labour.

ii) Business income tax; which is tax collected on profit from businesses.

iii) Agricultural income tax; which is tax collected from income of agricultural activities.

iv) Domestic indirect taxes; which include excise and sales /VAT/TOT tax on local products and transaction tax on local products.

v) Import duties; which are taxes collected on imports.

Prior studies in similar areas to this topic had established the fact that finding a clearly understandable legal tax base in Ethiopia is very difficult if not impossible (Zelalem, 1998). This is found to be true for this study too. As a result, proxy bases will be employed in a manner that is found to be theoretically justifiable. The proxy bases to be used are: labour compensation or the wage bill for personal income tax, the share of industry in GDP for business income tax,

share of agriculture in GDP for agricultural income tax, private consumption for domestic indirect taxes and total import for import tax. This kind of proxy base selection is not different from that which is commonly used in such studies for sub-Saharan Africa (Osoro, 1993); (Kussi, 1998); (Suliman, 2002).

4.1.1 Individual Tax Revenue Equations Block

Each tax revenue component is taken to be a function of its base including dummies to control DTMs, and another dummy to account for the 1992-liberalization reforms. That is, the equation for each of the components will be

$$\ln T_i = \alpha_{i0} + \alpha_{i1} \ln(X_i)_t + \sum_{n=1}^{n} \alpha_{i3} D_i + \alpha_{i4} D_L + \varepsilon_t \quad \text{.....(3)}$$

Where: in X_i

i = p, refers to Personal income tax.

= b, refers to business income tax.

= a, refers to agricultural income tax.

= d, refers to domestic indirect tax.

= m, refers to import tax.

X_{it}, = tax base of the i^{th} tax.

D_i, = dummy for the i^{th} tax DTMs.

D_L = dummy for the liberalization reforms.

4.1.2 Individual Tax Base Equations Block

It has been stated that tax elasticity is the product of the tax to its base elasticity and the base to income elasticity. Thus, there will be a need to have equations that relate the base of an individual tax to income (GDP). In what follows, the attempt is to develop such equations.

a. Personal Income Tax to Base Function

The wage bill is taken to be the proxy base of personal income tax. This thesis does not take in to account the amount of the tax collected from the non-public sector. This is due to unavailability of organized data on it and for its contribution is not known with dependable precision.

This base is taken to be a function of GDP and the effect of liberalization is to be captured by a dummy. That is;

$$\ln X_{pt} = \alpha_{p0} + \alpha_{p1} \ln GDP_t + \alpha_{p2} D_L + \varepsilon_{pt} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where;

α_{p1} = elasticity the wage bill with respect to GDP

α_{p2} = coefficient of the liberalization dummy (D_L)

ε_p = the error term assumed to be normal

b. Business Income Tax Base Function

The share of industry in GDP, which is the proxy base of this tax is supposed to be a function of GDP, and the effect of liberalization is to be captured by a dummy. That is;

$$\ln X_{bt} = \ln\alpha_{b0} + \alpha_{b1}\ln GDP_t + \alpha_{b2}D_L + \varepsilon_{bt} \quad \ldots\ldots (5)$$

Where;

α_{b1}=the elasticity of share of industry with respect to GDP

α_{b2} =coefficient of the liberalization dummy

ε_{bt} = the error term assumed to be normal

c. Agricultural Income Tax Base Function

The share of agriculture in GDP (Xa), which is the proxy base of this tax, is taken to be a function of GDP, the effect of liberalization is to be captured by a dummy. That is;

$$\ln X_{at} = \alpha_{a0} + \alpha_{a1}\ln GDP_t + \alpha_{a2}D_L + \varepsilon_{at} \quad \ldots\ldots (6)$$

Where;

α_{a1} = elasticity of the share of agriculture with respect to GDP

α_{a2} = coefficient of the dummy

ε_{at} = the error term assumed to be normal

d. Domestic Indirect Tax Base Function

The proxy base for domestic indirect taxes is taken to be private consumption. This proxy base is a function of disposable income (Y_d) which is GDP less total direct taxes (the sum of, namely, personal income tax, business income tax and agricultural income tax)

That is;

$$\ln X_{dt} = \ln \alpha_{d0} + \alpha_{d1} \ln y_{dt} + \alpha_{d2} D_L + \varepsilon_{dt} \quad \text{..... (7)}$$

Where

α_{d1} = elasticity of domestic private function with respect to GDP

α_{d2} = coefficient of the dummy

ε_{dt} = the error term assumed to be normal

e. Import Tax Base Function

The proxy base of import taxes is taken to be total value of imports. Import is also stated to be a function of national income (GDP); the liberalization effect is to be captured by the dummy. That is,

$$l \ln X_{mt=} \ln \alpha_{m0} + \alpha_{m1} \ln GDP_t + \alpha_{m2} D_L + \varepsilon_{mt} \quad \text{..... (8)}$$

Where

α_{m1} = elasticity of total imports with respect to GDP

α_{m2} = coefficient of the dummy

ε_{mt} = the error term assumed to be normal

Then, estimation, using OLS, will be made for each of the above tax to base and base to income functions. This will be done, first with out the dummy for liberalization and second including the liberalization dummy. Then after, it is believed that the effect of the liberalization reform on the

productivity of the tax system can be seen through the coefficient of the liberalization dummy on each tax category and over all tax elasticities.

4.2 The Data

The data for this thesis are time series for the period 1974/75 – 2004/05. There is, however, one important precaution that needs to be taken for regressions that employ time series data. This precaution is the need to become aware of the possibility of spurious correlation which means that there exists only a correlated time trend rather than a meaning full economic relation ship (Badawi, 2003). Thus a combination of various series that contain time trend or are non-stationery may lead to spurious correlation. Non-stationarity has a severe implication in time series data for the reason that such data are highly susceptible to autocorrelation. This entails that fitting regression equation by regressing one non stationary variable on another is very likely to result in good looking regression results which are totally spurious (Mukherjee et. al, 1998).

There fore, one has to test whether the time series are stationary or not. Concerning the test of non-stationarity the most widely used tests are the Dickey Fuller (DF) test and the Augmented Dickey Fuller (ADF) test. These tests are used to test the null hypothesis that the series contains a unit root i.e., is non-stationary against the alternative hypothesis of stationarity.

4.2.1 Test for Unit Roots

The discussion of the test for unit root is made primarily based on Patterson (2000), which starts by building the following model.

$$\Delta y_t = \mu + \gamma T + \beta y_{t-1} + \sum_{i=1}^{i=k} \lambda_i \Delta y_{t-1} + u_t \qquad (9)$$

Where y_t is the variable in question, T is is a time trend, and u_t is a random variable assumed to be white noise. Then the lag length k is selected using Akaike Information Criteria (AIC) and the Schwarth Bayesian Criterion (SBC). The two criteria produce the same lag length. The main purpose of test equation (9) is to estimate the ADF statistic in order to test for the null hypothesis of non stationarity against the alternative hypothesis of stationarity. We essentially test H0: β=0 against H1: β<1(β in absolute value). The joint hypothesis β= γ=0 is also tested using the F-test. Then acceptance of β=0 and rejection of β= γ=0 imply that the series is not stationary with a significant trend. Significance of the trend variable may also be tested using individual t-statistic. This procedure will result in four possible outcomes: non stationary with a significant trend, non stationary with insignificant trend, stationary with a significant trend and stationary with insignificant trend. But for a regression in logarithmic form, like this study, inclusion of trend is not recommended (Harris, 1995)

Then after, we run the following model for those variables found to be non stationary with insignificant trend and those found to be stationary with insignificant trend.

$$\Delta y_t = \mu + \beta y_{t-1} + \sum_{i=1}^{i=k} \lambda_i \Delta y_{t-1} + u_t \qquad (10)$$

The only difference between (9) and (10) is that in the later the trend variable is dropped

The problem of non-stationarity could be resolved by differencing the variables, though this would lead to loss of long-run properties of data. Besides, if the economic series are co integrated

they may be combined in levels. Non stationary economic series are said to be cointegrated if they can be transformed in to a single series that exhibits stationarity (Patterson, 2000). Identifying the order of integration of each series i.e., running test of stationarity that decides the number of times a series should be differenced to achieve stationarity, precedes cointegration discussion. A series that is differenced "d" times to achieve stationarity is said to be integrated of order d or I (d).

If two series are I (1), then there may be a β such that $\varepsilon_t = y_{t-\beta X_t}$ is I (0). That is, if the two series are both I (1), then this parallel difference between them might be stable around a fixed mean. The implication would be that the series are drifting together at roughly the same rate. Two series that satisfy this requirement are said to be co integrated and the vector (1- β) or any multiple of it is a cointegrating vector (Green, 1997).

4.2.2 Test for Cointegration

The test for cointegration proceeds after establishing the order of integration of each series using the DF or ADF tests. The test of cointegration is needed to identify whether a linear combination of the series has a lower order of integration than any of the series in the combination. As such, this test will help describe existence of equilibrium (stationary) relationship among two or more time series each of which may be non stationary (Patterson, 2000).

Two methods of testing cointegration are widely used in time series econometric regressions. These are the Johanson methodology, which is recommended for multi varite regressions, and the

Engel- granger (EG) procedure (Badawi, 2003). This study employs the EG procedure for the regression models are basically bi-varite.

4.2.2.1 Testing For Cointegration: The Engle-Granger (1987) Procedure

The EG test actually tests non cointegration. For this purpose, the initial step is assessing the order of integration of each series. Then if the assumption is that each series is consistent with the hypothesis that it is I (1), the necessary condition for the regression $y_t = \psi_1 + \psi_2 X_t + \varepsilon_t$ to be a cointegrating regression is met. This condition is that the regression is balanced in the dominant time series properties of y_t and X_t. The next step is to assess the properties of ε_t. Then if ε_t is I(1) the regression is not consistent with the hypothesis that it is a cointegrating regression, whereas, if ε_t is I (0) the regression will be a cointegrating regression (Patterson, 2000). However, ε_t is not observable. Therefore, this test will be based on an estimator of ε_t ($\hat{\varepsilon}_t$).

The estimated ε_t will be obtained from the estimation of the following model.

$$y_t = \hat{\psi}_1 + \hat{\psi}_2 x_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (11)$$

The regression in (11) is referred to as the EG regression in levels of the I (1) variables.

The residuals obtained from the above regression will, then, be assessed to see whether they are consistent with an I (1) process. The test for a unit root can be undertaken here, which will be analogous to the DF test based on the following regression.

$$\varepsilon_t = \zeta_1 \varepsilon_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (12)$$

From (12) $\zeta_1 = 1$ indicates non cointegration and $-1 < \zeta_1 < 1$ indicates cointegration. A convenient reformulation of (12) can be obtained by subtracting ε_{t-1} from both sides, which yields

$$\Delta \hat{\varepsilon}_t = \gamma \hat{\varepsilon}_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (13)$$

Where $\gamma = \zeta_1 - 1$. This can be augmented in the same way as the Dickey- Fuller regression is augmented by including p lagged values of $\Delta\hat{\varepsilon}_{t-1}$ to insure that the estimated u_t are free from serial correlation. In this case the maintained regression becomes;

$$\Delta \varepsilon_t = \gamma \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta \hat{\varepsilon}_{t-1} \quad \ldots\ldots\ldots\ldots\ldots (14)$$

The above (14) is referred to as the cointegrating ADF (p) regression. In both (13) and (14) the test statistic is the estimated t- statistic on γ, denoted τ_γ.

4.2.3 The Error Correction Model (ECM)

Dynamic modeling of economic variables can capture short -run behavior of the variables. But when there is long-run relationship among variables, an error correction model (ECM) needs to be formulated in order to show both the dynamic and long run interaction among the variables.

Two or more variables that are not stationary in levels may have a stationary linear combination, which indicates that the variables are cointegrated. The presence of cointegration in turn implies that there is an error correction representation, which captures the possibility that any deviations from the equilibrium point will get back to its long-run path. As such the ECM will show both the short-run and long run behavior of the system.

The ECM can be constructed from a cointegrated system by incorporating both changes and levels of variables so that all elements are stationary. Therefore, the ECM actually enables the estimation, forecasting and testing of a cointegrated system (Patterson, 2000)

The ECM to be adopted for this study is formulated as follows.

$$\Delta y_t = \sum_{i=1}^{k} \phi_i \Delta y_{t-1} + \sum_{i=1}^{k} \beta_i (\Delta x_j)_{t-1} + \gamma \hat{\varepsilon}_{t-1} + u_t \quad \ldots\ldots\ldots\ldots (15)$$

Where Δy_t is the first difference of the explained variables in each model, $(x_j)_{t-1}$ (is the first difference of the explanatory variables (j=1…n; n= number of variables in each respective model), $\hat{\varepsilon}_{t-1}$ is the error correction term and are the residuals from the cointegrating regression models.

The above formulation assumes that there is only one cointegrating vector, the endogenous variables are identified in the long-run analysis and the error terms ε_t and u_t are white noise.

CHAPTER FIVE

TIME SERIES EXAMINATION AND EMPIRICAL RESULTS

5.1 Time Series Examination

Estimation of the parameters of the models in this study has employed time series data for the period 1974/75-2004/05. In the model, the first six equations provide the over all and individual tax to base (tax revenue equations) while the next five equations provide the individual tax to base equations also included are the estimated equations on the buoyancy of the overall and individual taxes. The parameter estimates in each equation were found running ordinary least squares (OLS) on each equation. This estimation has shown that the parameters have the correct sign and a palatable magnitude.

Assessment of the overall significance of the model and the goodness of fit of the predicted values is made using the F-statistic, coefficient of determination and residual sum of squares. In every equation except the ECM the residual sum of squares are found to be very small, the F-statistics indicate that there is a good fit at 1% level of significance and the R bar squared of the equations shows that the regressors explain more than 90% of variations in the dependent variables.

The formal test of the time series data to be used in each model was made using the ADF test with a constant but no trend as discussed in the previous chapter. The results of this test for unit roots are summarized in table 5.1 on the next page.

Table 5.1: Test for unit roots (ADF test)

Variable in levels	k	ADF	Inference	Variables in difference	k	ADF	Inference
LtTAX	0	0.4384	Not Stationary	DLTTAX	0	-3.425*	Stationary
				DLPIT	1	-3.080*	"
LPIT	0	-0.8940	"	DLBIT	2	-3.671*	"
LBIT	0	-1.976	"	DLAIT	0	-8.101**	"
LAIT	0	-3.638	"	DLDIT	0	-4.89**	"
LDIT	0	-1.107	"	DLIMT	0	-4.938**	"
LIMT	0	0.7234	"	DLNGDP	0	-5.097**	"
LNGDP	0	0.7054	"	DLWBILL	0	-3.117*	"
LWILL	0	-0.9617	"	DLSoIND	0	-3.817**	"
LSOLND	0	-1.108	"	DLSoAGRI	0	-5.088**	"
LSOAGRI	0	-0.7232	"	DLPRCON	0	-5.275**	"
LPRCON	0	0.4958	"	DLIMPORT	0	-4.651**	"
LIMPORT	0	0.9633	"				

*(**) show 5% (1%) levels of significance

After the check for stationarity what follows must be the test for co integration. This test is undertaken using the EG two stage procedure as discussed in the previous chapter. The test for cointegration shows that the series on y_t and x_t are cointegrated. The results of this test are summarized in table 5.2 on the next page.

Table 5.2: Test for cointegration (ADF tests on residuals of the various models)

No	Models	ADF	I(d)
1	T.tax	-6.252**	0
2	PIT	-2.940**	0
3	BIT	-6.488**	0
4	AIT	-10.87**	0
5	DIT	-7.903**	0
6	IMT	-11.23**	0
7	W BILL	-5.306**	0
8	SoIND	-9.468**	0
9	SoAGRI	-6.592**	0
10	PRCON	-11.76**	0
11	IMPORT	-11.46**	0

*(**) show 5(1) % levels of significance respectively

5.2 Empirical Results

The regression is carried out first with out including the liberalization dummy and then incorporating the liberalization dummy both in the elasticity and in buoyancy equations. The results are summarized in tables 5.3 and 5.4 on the next pages. [5]

[5] **N.B** DP1978, DP1992, DP2002, DB1978, DB1992, DB2002, DAIT1992, DD1978, DD1993, DIM1976 and DIM1993 refer to dummies for tax rate affecting reforms in personal income tax, business income tax, agricultural income tax, domestic indirect taxes and import taxes, respectively.

Table 5.3: Econometric regression results on tax buoyancies and elasticities excluding liberalization dummy (D_L)[6]

I Tax elasticities (Tax to base)

Regressors	LnTp	LnTb	LnTa	LnTd	LnTm
Constant	-8.826 (-7.6)	-13.61 (-9.98)	-28.47 (-2.70)	-3.645 (-3.50)	-1.07 (-2.81)
LnXp	1.70 (0.15)				
LnXb		2.69 (13.3)			
LnXa			3.748 (3.05)		
LnXd				1.02 (4.46)	
LnXm					0.911 (17.5)
DP1978	0.415 (4.05)				
DP1992	-0.267 (-2.35)				
DP2002	0.407 (4.07)				
DBT1978		0.384 (2.58)			
DBT1990		0.408 (4.43)			
DBT2002		-2.266 (-1.77)			
DD1978				0.474 (4.46)	
DD1993				-0.442 (-2.96)	
DD2002				0.21 (1.00)	
DIM1976					-0.043 (-0.572)
DIM1992					0.21 (1.95)
DAIT1992			-0.432 (-1.00)		
$R^{>2}$	0.975	0.963	0. 935	0.96	0.983
RSS	0.516	1.054	13.63	0.623	0.579
DW	1.04	1.6	1.12	1.26	1.73
F( )	256.4	171.5	7.863	157.4	545.8

Figures in parentheses are t- values

[6] Econometric tests like normality, specification (RESET) for regression results on elasticities are e to be found in annex II tables A and B.

II Tax elasticities (base to income)

Regressors	LnXp	LnXb	LnXa	LnXd	LnXm
Constant	2.368 (11.0)	3.741 (11.6)	6.643 (33.5)	-0.229 (-1.97)	-5.812 (-12.1)
LnNGDP	0.592 (27.3)	0.346 (10.8)	0.207 (10.4)		1.42 (29.5)
LnYd				0.998 (110)	
$R^{>2}$	0.96	0.799	0.79	0.98	0.96
RSS	0.238	0.525	0.199	0.041	1.17
DW	0.56	0.33	1.25	1.14	0.46
F( )	746.4	115.9	108.6	7258	869.5

Figure in parentheses are t- values

III Tax buoyancies

Regressor	LnT	LnTp	LnTb	LnTa	LnTd	LnTm
Constant	-2.64 (-6.03)	-4.89 (-8.35)	-5.62 (-6.15)	-3.22 (-2.08)	-2.59 (-4.89)	-7.38 (-13.9)
LnNGDP	1.06 (24.1)	1.05 (17.8)	1.19 (13.0)	0.72 (4.65)		1.4 (26.3)
LnYd					0.91 (17.7)	
$R^{>2}$	0.962	0.916	0.85	0.83	0.91	0.95
RSS	0.972	1.751	4.24	12.19	1.33	1.43
DW	0.455	0.19	0.29	1.37	0.38	0.69
F( )	579.1	316.5	168.4	21.3	312	692.3

Figure in parentheses are t- values

Table 5.4 Econometric regression results on tax elasticities and buoyancies incorporating the liberalization dummy (D_L)

I Tax to base elasticities

Regressor	LnTp	LnTb	LnTa	LnTd	LnTm
Constant	8.826 (7.45)	-13.94 (-9.49)	28.47 (2.65)	-5.35 (-5.09)	-1.072 (-2.76)
LnXp	1.702 (10.9)				
LnXb		2.743 (12.5)			
LnXa			3.748 (3.00)		
LnXd				1.223 (10.1)	
LnXm					0.91 (17.1)
DP1978	0.415 (3.97)				
DP1992	0.266 (-2.3)				
DP2002	0.406 (3.99)				
DB1978		0.366 (2.40)			
DB1992		0.488 (3.14)			
DB2002		0.267 (1.76)			
DD1978				0.379 (3.93)	
DD1993				-0.193 (-1.28)	
DD2002				0.052 (0.487)	
DIM1976					-0.043 (-0.561)
DIM1992					0.210 (1.91)
DAIT1992			-0.432 (-0.98)		
D_L	0.000	0.11 (2.31)	0.000	-0.513 (-3.15)	0.000
$R^{>2}$	0.97	0.96	0.36	0.97	0.98
RSS					0.579
DW	1.04	1.76	1.12	1.14	1.73
F( )	197.2	134.5	5.055	171	394.2

Figures in parenthesis are t-values.

II Base to income elasticities

Regressor	LnXp	LnXb	LnXa	LnXd	LnXm
Constant	2.148 (4.64)	1.571 (3.05)	6.798 (16.0)	0.571 (3.11)	-6.52 (-6.38)
LnNGDP	0.616 (12.4)	0.580 (10.5)	0.190 (4.18)		1.497 (13.7)
LNYd				0.911 (4.95)	
D_L	0.0404 (0.542)	0.393 (4.71)	0.416 (0.68)	0.146 (4.95)	-0.129 (-0.787)
$R^{>2}$	0.96	0.88	0.79	0.99	0.96
RSS	0.235	0.292	0.198	0.037	1.148
DW	0.63	0.84	1.28	1.67	0.44
F( )	364.2	111.5	52.83	6581	429.3

Figure in parentheses are t- values

III Tax buoyancies

Regressor	LnT	LnTp	LnTb	LnTa	LnTd	LnTm
constant	-5.89 (-9.37)	-8.98 (-9.91)	-11.32 (-7.36)	-12.62 (-4.76)	-6.27 (-8.29)	-6.98 (-6.12)
lnNGDP	1.41 (20.9)	1.49 (15.4)	1.81 (11.0)	1.70 (6.15)		1.36 (11.1)
LnYd					1.32 (16.3)	
D_L	0.59 (5.88	-0.749 (-5.12)	-1.04 (-4.21)	-1.72 (-4.02)	-0.687 (-5.64)	0.073 (0.694)
$R^{>2}$	0.97	0.95	0.91	0.64	0.96	0.96
RSS	0.435	0.903	2.60	7.73	0.625	1.429
DW	1.03	0.99	0.79	1.16	0.69	0.72
F( )	648.1		141.5	24.55	337.9	336.2

Figures in parentheses are t- values

5.3 Analyses of Elasticities

From the discussion in sections 5.1 and 5.2 it is possible to note that the test for unit roots has established stationarity of the series. This will enable regression of the different taxes on their respective bases and the bases in turn on national income (GDP) with out the danger of having spurious regressions. Not only this, test of cointegration has also established that the regressor variables (X_t) and regressand variables (Y_t) have an I(0) combination i.e. they are cointegrated. This means that the regression of the respective dependent variables (Y_t) on their corresponding regressors (X_t) gives a long run equilibrium relation between the variables.

Moreover, in order to capture the short run dynamics an error correction model (ECM) specification has been made which has indicated a sufficient adjustment of the lagged error term (ε_{t-1}) with the correct coefficient sign (negative)[7]. The coefficients of the lagged error term were found to be statistically different from zero at the 99% level of probability in most of the regressions. However, the ECM specification has not shown statistically significant relations between the regressand and the regressor variables in most of the models. This would mean that the short run relation between the different taxes and their respective bases together with the bases to national income (GDP) is found to yield statistically insignificant coefficients. What follows then will be discussion of the long-run equilibrium results on buoyancies and elasticities.

One of the major objectives of this study as stated in chapter one is looking in to the possible effect of the 1990s liberalization reforms on the tax system of the country. To ward this end, the

[7] The results of the ECM are given in table 5.7 at the end of this chapter.

pattern of discussion will be such that elasticity coefficients from regressions that do not take account of liberalization will be collected. These elasticity coefficients will be compared with their corresponding values found from regressions that take account of liberalization with one dummy (D_L). This pattern is followed both in the tax to base and base to income regressions. The expectation here is that the possible impact of liberalization on the over all and sub-tax groups will be observed on the buoyancy and elasticity coefficient comparisons between the two cases; namely, regressions with out liberalization dummy (D_L) and with liberalization dummy (D_L). One may propose that two different regressions should be fitted i.e. one for the period before liberalization and another for the period since liberalization. This kind of modes-operandi is acceptable should the dummy for liberalization come out to be statistically significant. But such a method is not chosen in this study for the reason that the period since liberalization is only fourteen years, which will be very short from the point of view of time series regression. In fact, Johansson (1995) has argued that time series regressions need to use data on not less than thirty-one years if the frequency is annual.

The regression results yield elasticity and buoyancy coefficients that are all found to be statistically different from zero at the 99% level of probability. The coefficients are summarized in table 5.5 below.

Table 5.5: Over all buoyancies and elasticities

S.N	Description	Buoyancy		Elasticity	
		WODL	WDL	WODL	WDL
1	Total tax (T)	1.06	1.41	0.96	1.08
2	Personal Income Tax (Tp)	1.05	1.49	1.003	1.003
3	Business Income Tax (Tb)	1.19	1.81	0.93	1.41
4	Agricultural Income Tax (Ta)	0.72	1.74	0.79	0.79
5	Domestic Indirect Taxes (Ta)	0.91	1.32	1.03	1.01
6	Import Taxes (Tm)	1.40	1.35	1.29	1.29

WODL= with out liberalization dummy (D_L)

WDL= with liberalization dummy (D_L)

For the sample period (1974/75-2004/05) the results of regressions with out D_L show that the over all tax system is inelastic. The elasticity coefficient is reported to be only 0.96. On the other hand the over all tax buoyancy is found to be meagerly buoyant with a coefficient of only 1.06.This result shows that the revenue generating capacity of the Ethiopian tax system has been growing below the growth in national income. This result does not differ from the findings of prior similar studies like (Zelalem, 1998); (Teame, 1995); and (Teshome, 1979).

Regressions incorporating the liberalization dummy (D_L) on their part show that the over all tax system becomes slightly elastic with a coefficient of 1.08 and its buoyancy improves as the coefficient increases to 1.41. Therefore, the effect of liberalization on both elasticity and buoyancy of the over all tax system is found to be positive. This result supports the hypothesis of this study presented in chapter one. However, the magnitude of the effect on the elasticity of the overall tax system is found to be very marginal which suggests that the wide ranging reforms with in the paradigm of liberalization have not had perceptible effect on the productivity of the over all tax system of Ethiopia.

Investigation of the individual major taxes, on its part, shows that personal income tax is found to be more or less unitarily elastic (with a coefficient of 1.003) while, business income taxes and agricultural income tax are found to be inelastic with coefficients of 0.93 and 0.79 respectively. Domestic indirect taxes and import taxes on the other hand are found to be elastic with coefficients of 1.03 and 1.29 respectively. These elasticity coefficients indicate that productivity of the major tax categories too has not been that satisfactory.

The inclusion of the liberalization dummy in these regressions showed that the resulting coefficients of the dummy possess a statistically significant coefficient only in the business income tax and domestic indirect taxes regressions while in the rest its coefficients have turned out to be statistically insignificant. As a result, the effect of liberalization appears to be restricted only to two of the five tax groups considered in this study. In relation to this, it is shown that elasticity for business income taxes has improved from 0.93 to 1.41 while that of domestic indirect taxes has decreased from 1.03 to 1.01.

The discussion so far has been based on the overall tax elasticities. However, this may not be very much illuminating since it conceals the two components of elasticity in tax systems namely the tax to base and the base to income elasticities.

5.4 Decomposed Analysis

The decomposition refers to the estimation of tax to base and base to income (GDP) elasticities for the five major tax groups. The following table summarizes the results.

Table 5.6: Tax to base and base to income elasticities

S.N	Description	Tax to base elasticity		Base to income elasticity	
		WODL	WDL	WODL	WDL
1	Personal income Tax (Tp)	1.702	1.702++	0.592	0.592++
2	Business income Tax (Tb)	2.692	2.43	0.346	0.58
3	Agricultural income Tax (Ta)	3.748	3.748++	0.207	0.207++
4	Domestic indirect Taxes (Td)	1.03	1.22	0.998	0.947
5	Import Taxes (Tm)	0.91	0.91++	1.42	1.42++

++= coefficient of liberalization dummy found statistically not different from zero

The results given in table 5.4 above show that all tax groups except import taxes have a tax to base elasticity coefficient, which exceeds unity. However, the bases to income elasticities are found to be inelastic for all taxes except import taxes.

The discussion of the results with regard to each of the above-mentioned tax categories will follow based on the above tables 5.5 and 5.6.

Personal Income Tax (Tp)

The share of this tax category from the total tax revenue is found out to be 9.8%*. The over all elasticity of this tax is shown to be 1.003 both with and with out the liberalization dummy. This elasticity coefficient makes personal income taxes in Ethiopia elastic over the sample period. But when we decompose this over all elasticity we find out that the tax to base elasticity of this tax is quite commendable for it is well above unity (about 1.7). Nonetheless, the remarkable tax to base elasticity is severely dumped by the base to income elasticity which is found out to be only 0.59. This means that the base for this tax is growing at a rate which is far below the proportional growth in GDP. The relatively high tax to base elasticity should not come as a surprise for this tax group is a tax in which compliance is the highest in Ethiopia and its rates are not to be judged low.

The inclusion of liberalization dummy was expected to have a negative effect on this tax since there was a reduction in public sector work force due to this reform. However, the dummy is found out to have a statistically insignificant coefficient. This could be acceptable when we

* The shares are computed from table A in annex I.

observe that there has been a visible expansion of the wage bill for public employment even after the start of liberalization. This happened because there has been expansion in employment in social development sectors like education health and infrastructure.

Business Income Tax (Tb)

This tax category is found out to have a share of about 20% in total tax revenues. The over all elasticity of this tax category is found out to be 0.94, which is less than unity which makes this tax category inelastic. The decomposition of this coefficient of elasticity shows that the tax to base elasticity is surprisingly found out to be very high (about 2.7); while the base to income elasticity is found to be very low (about 0.35). The very high tax to base elasticity is quite odd for taxes colleted in this category are often alleged to suffer from the problems of tax evasion and relatively low compliance. But the low base to income elasticity may not be odd since growth in the industrial sector, which is used as a proxy base for this tax, has not been satisfactory.

The inclusion of the liberalization dummy in to the regression for this tax category has shown that the elasticity of this tax group is affected by liberalization. The effect is such that the over all elasticity has improved from that of being inelastic (0.93) to that of being elastic (1.41). This improvement of elasticity has come due to the increase in the base to income elasticity of this tax from about 0.35 to about 0.58. The tax to base elasticity on the other and has declined from about 2.7 to about 2.4. This result may give ground to the allegation that this tax category exhibits low compliance since it is shown that in the face of improvement in the base to income elasticity there is a decline in the tax to base elasticity.

Agricultural Income Tax (Ta)

This tax category takes a share of only 2.3% of total tax revenues. This is pretty strange when one recalls that agriculture takes a share of almost half of the GDP in the country. But it may be argued that the type of agriculture is predominantly subsistence from which tax collection cannot be as large as it can be aspired from the view of the sector's share in GDP. However a share of only 2.3 percent is still extremely small.

The over all elasticity of this tax category is found out to be 0.79, which is very inelastic. The decomposition of this elasticity coefficient shows that the tax to base elasticity is surprisingly high (about 3.8) while the base to income elasticity is too low (about 0.21). This result may show that the elasticity coefficient for this tax category suffers a structural weakness in that its base to income elasticity is extremely low.

The inclusion of the liberalization dummy showed that liberalization does not have a statistically significant impact on the productivity of this tax category. This result held true both for the tax to base and the base to income elasticities. This out come may not be hard to swallow for the effect of liberalization on agriculture itself has not been proved to be as direct as it is on the other sectors like industry and trade.

Domestic Indirect Taxes

This tax category contributes about 27 percent of the total tax revenue over the sample period. The over all elasticity of this tax category is found out to be 1.03, which makes it slightly elastic. The decomposition of this elasticity shows that the tax to base elasticity is found to be 1.03 while the tax to base elasticity is found out to be about unity (0.998). Thus, this tax category has got

coefficients of elasticity which can be judged 'healthy' for its tax to base response is elastic and its base to income response is nearly proportional with growth in national income.

The inclusion of the liberalization dummy has shown that it has an improving effect on the tax to base elasticity from 1.03 to 1.22. But the effect on the base to income elasticity is found out to be that of slightly decreasing it from about unity (0.998) to somewhat less than unity (about0.95). As a result of this, the overall elasticity of this tax category is found out to be 1.01, which is slightly less than that with out D_L which was about 1.03.

Import Taxes (Tm)

This tax category contributes about 29 percent of the total tax revenue during the sample period. This shows that this tax category is the most important source of tax revenue. The over all elasticity of this tax category is found out to be 1.29, which makes it quite elastic. The decomposition of this elasticity showed that the tax to base elasticity is only 0.91 while the base to income elasticity is found to be 1.41. This results show that this tax category has an inelastic tax to base coefficient. This can be due to the common practices of exemptions on many sorts of imports, using of specific instead of ad-valorem tax rates and also the policy of import substitution, which was the strategy of the regime between 1974/75-2004/05.

The inclusion of the liberalization dummy has shown that liberalization has no statistically significant impact both on the tax to base and base to income elasticities hence on the over all elasticity too. This result may be difficult to accept due to the expectation that foreign trade, mostly imports, is arguably the number one candidate to be affected by liberalization. However,

import volume in Ethiopia has not shown the required responses to the measures of liberalization for it has kept on increasing. There have also been major adjustments in the rates and exemptions that could have blurred the potential effect of liberalization.

Generally, the above discussion has shown that mostly the tax categories have an elastic tax to base coefficients except for imports. This result is quite different from the assertions of previous similar studies (Zelalem, 1998); (Teame, 1995) and (Teshome, 1979). Moreover, the bases to income elasticities are also found to be less than one almost in all tax categories. This will make attempts to affect the productivity of the overall tax system and that of the major tax categories very difficult. This is true for the reason that enhancing the productivity of a tax system whose base to income elasticity is found be inelastic depends on factors that are beyond government control. The point here is that the ailing part of the tax system (the base to income elasticity) is mainly linked to the structure of the economy rather than administrative and policy issues.

Finally, the comparison of buoyancies with elasticities has shown that all taxes but agricultural income tax and domestic indirect taxes have a buoyancy coefficient that exceeds elasticity coefficients. This indicates that discretionary tax measures (DTMs) have been important in generating tax revenues over the sample period. The finding that the buoyancy coefficients for agricultural income tax and domestic indirect taxes is less than the elasticity coefficients may indicate that the contribution of discretionary tax measures on tax return from this source has not been significant. A look at the effect of liberalization on the buoyancy and elasticity for these tax categories shows that that of agricultural income tax remains the same while that of domestic indirect taxes changes in a manner that yields a buoyancy coefficient which exceeds the elasticity coefficient.

Table 5.7 Error correction model results

I. Tax to base Elasticities.

Regressor	ΔlnTp	ΔlnTb	ΔLnTa	ΔLnTd	ΔLnTm
$\ln\Delta(Tp)_{t-1}$	0.442 (2.60)				
$\ln\Delta(Xp)_{t-1}$	0.021 (0.093)				
$\ln\Delta(Tb)_{t-1}$		0.372 (2.38)			
$\ln\Delta(Xb)_{t-1}$		0.005 (0.012)			
$\ln\Delta(Ta)_{t-1}$			-0.216 (-1.09)		
$\ln\Delta(Xa)_{t-1}$			-0.806 (-0.544)		
$\ln\Delta(Td)_{t-1}$				0.005 (0.032)	
$\ln\Delta(Xd)_{t-1}$				-0.223 (-1.06)	
$\ln\Delta(Tm)_{t-1}$					0.045 (0.242)
$\ln\Delta(Xm)_{t-1}$					0.254 (0.47)
ε_{t-1}	-0.161 (-1.48)	-0.662 (-3.67)	-0.528 (-2.26)	-0.665 (-4.93)	-0.639 (-2.12)
$R^{>2}$	0.506	0.59	0. 633	0.794	0.807
RSS	0.107	0.403	11.567	0.258	0.741
DW	1.78	2.26	2.08	1.47	1.66
F( )	4.22	12.03	4.232	8.126	3.683

Figures in parentheses are t- value

II. Base to income

Regressor	ΔlnXp	ΔlnXb	ΔlnXa	ΔlnXd	ΔlnXm
Constant	0.039 (2.48)	0.043 (2.07	-0.024 (-1.10)	0.082 (2.82)	0.089 (1.93)
$\Delta\ln(Xp)_{t-1}$	0.61 (3.75)				
$\Delta\ln(Xb)_{t-1}$		0.422 (2.38)			
$\Delta\ln(Xa)_{t-1}$			0.277 (0.183)		
$\Delta\ln(Xd)_{t-1}$				-0.023 (-0.043)	
$\Delta\ln(Xm)_{t-1}$					0.0034 (0.227)
$\Delta\ln(GDP)_{t-1}$	-0.244 (-1.58)	-0.269 (-1.21)	0.403 (1.85)		0.423 (0.747)
$\Delta(Yd)_{t-1}$				0.056 (0.34)	
ε_{t-1}	-0.418 (-3.45)	-0.308 (-2.85)	-0.838) (-3.85)	-0.4001 (0.23)	-0.267 (-1.62)
$R^{>2}$	0.799	0.602	0.503	0.526	0.717
RSS	0.524	0.123	0.129	0.238	0.593
DW	1.75	1.97	1.82	1.95	1.95
F( )	6.579	3.604	8.461	0.219	1.769

Figures in parentheses are t- value

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

One of the major issues of concern for the adoption by Ethiopia of the so called structural adjustment programs which encompassed liberalization of the economy as an important component was the issue of soaring budget deficit in the country. One way to redress the issue of budget deficit is arguably enhancing the capacity of the economy to generate revenues. This disposition will lead to the issue of improving the productivity of the tax system in the country since tax revenues are the major source of domestic revenues.

This study was prompted by the twin adjectives of looking in to the overall productivity of the Ethiopian tax system and the impact of liberalization on the tax system by means of estimating tax elasticities and buoyancies. With this frame of out look the study has come out with the following major conclusions.

The tax system is found to have low productivity for it is shown to be inelastic. This shows that an increase in national income of the country has not been able to translate itself in to an increase of tax revenues with out an adjustment of tax rates. Not only that the major tax components are also found out to be unproductive. This holds true since business income tax and agricultural income tax are found to be inelastic while personal income tax and domestic indirect taxes are found to be nearly unitary elastic. Import tax is found out to be the only tax category, which appears to have an elastic system.

The low tax elasticity of the individual tax categories is found out to be mainly due to a very low base to income elasticities.

The quest for the effect of liberalization on the productivity of the tax system has shown that there appears to be a slight improvement in the productivity of the overall tax system and business income taxes only while import taxes and agricultural income taxes appear to have felt no effect of the reforms. Domestic indirect taxes on their part have shown a slight decline in productivity for the elasticity coefficient has reported a slight decline.

Generally, the productivity of the Ethiopian tax system is found out to be still unproductive since the over all coefficient of elasticity is reported to be inelastic (0.96) with out consideration of the reforms and nearly unitary elastic (1.08) when the reforms are brought in to consideration.

6.2 Policy Recommendations

The findings of this study portend the following policy suggestions with regard to the components of the tax system through which the overall tax system can be affected.

- Personal income tax is found out to have elastic coefficient for tax to base (1.7) but an inelastic base to income coefficient (0.59). Therefore, attempts to improve the productivity of this tax system should aim at improving the base to income elasticity. This could be attained mainly by incorporating the non-public sector employment income in to the tax net and by improving the administration of this tax.

- Business income tax has shown a commendable tax to base elasticity while its base to income elasticity is found to be highly inelastic (about 0.35). This may show that the change in the income from this sector is not accounted for when national income is

changing. Thus, attempts should focus at enhancing the capability to incorporate business activities that are not accounted for tax purposes in to the tax net for this tax category. Moreover, the positive effect of liberalization on the elasticity of this tax category shows that generating tax revenues from this sector has been better since the period of reforms. This entails that keeping up the tenets of the reforms could further enhance the productivity of this tax regime.

- Agricultural income tax is found out to have the lowest elasticity coefficient particularly with regard to base to income elasticity. This result tallies with the overall assessment that agriculture has been performing badly in the sample period except for the last three or so years. Thus, improvement of the productivity of this tax could largely depend on improvement of the performance of agriculture. However, there should be a careful note of the fact that decentralization of this tax to the regional states makes it pretty difficult to propose a policy solution that could serve all the regions right.

- Domestic indirect taxes have shown that the overall productivity is somewhat commensurate with growth in GDP. The tax to base and base to income elasticity is found to be almost equal (1.2 and about 1.0 respectively). Thus, if improvement is to be hankered in this tax regime, efforts should aim at the improvement of both taxes to base elasticity and base to income elasticities. But it may not be judged far off the mark if one argues, based on the analysis of the decomposed elasticity coefficients, that greater focus should be on that of improving the tax to base elasticity since this appears to be the simpler to do. Moreover, the elasticity is found to be slightly negatively affected by the

liberalization reforms. This may call for reassessment of measures taken that might have direct effect on tax revenue form this source.

- Import taxes have shown quite an encouraging overall elasticity. This tax regime is reported to have shown no response to the reforms of liberalization. This is a little confusing when one observes that there have been fairly many reductions in tariffs and also the devaluation of the domestic currency following these reforms which altogether must be expected to have negatively affected the amount of tax from this source. Nonetheless, efforts with regard to this tax schedule must aim at improving the capability of imports to respond to reforms in the desired manner. This may bring about the need to look in to the overall export led strategy of the country if other economic considerations too, like the rise in cost of imports due to a variety of reasons, make it worthwhile.

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ANNEXES

Annex I : Data used in this study (Figures on raw data are in millions of Birr)

TABLE A: Data on Tax Revenue (source: MoFED)

YEAR	T. TAX	PIT	BIT	AIT	DIT	IMT
1974/75	592.6	55.8	74.3	10.4	200.7	172.6
1975/76	615.4	55.4	76.5	9.7	183.5	171.4
1976/77	859.6	58.7	98.0	18.7	188.2	243.6
1977/78	945.0	65.8	104.1	18.2	199.2	238.2
1978/79	1147.1	95.7	117.4	48.7	268.9	333.6
1979/80	1298.4	119.0	161.5	51.3	373.6	247.2
1980/81	1362.5	128.3	210.8	99.7	399.4	285.4
1981/82	1436.2	136.7	326.2	50.3	403.7	277.1
1982/83	1558.1	153.5	344.7	52.6	447.6	302.4
1983/84	1731.4	171.4	384.5	48.6	506.3	310.4
1984/85	1677.4	186.1	416.5	41.9	527.0	289.5
1985/86	1876.2	203.4	467.9	46.9	555.9	291.3
1986/87	2092.3	226.5	582.1	50.0	623.9	408.5
1987/88	2317.7	244.3	662.1	57.0	720.4	437.8
1988/89	2371.0	270.3	683.9	61.5	784.5	360.2
1989/90	2159.2	280.9	553.4	54.2	759.4	418.2
1990/91	2053.5	267.7	449.8	54.7	757.8	443.4
1991/92	1618.3	269.1	386.7	3.5	534.5	410.8
1992/93	2205.7	277.0	366.5	48.8	746.0	703.5
1993/94	3076.4	283.7	557.7	53.6	834.1	1250.6
1994/95	3878.6	307.6	851.4	68.4	945.4	1420.1
1995/96	4723.6	337.4	1222.3	82.5	1155.6	1694.5
1996/97	5358.8	375.3	1262.1	99.6	1291.6	2025.1
1997/98	5292.2	439.0	1045.0	107.6	1188.7	2051.0
1998/99	5535.8	515.5	1155.0	112.8	1207.9	2155.7
1999/2000	6343.4	584.2	1361.5	117.7	1442.3	2393.9
2000/01	7451.5	691.8	1462.5	119.7	1381.1	3230.6
2001/02	7925.9	760.0	1678.9	130.2	1498.1	3280.2
2002/03	8243.0	833.0	1639.0	72.0	1668.0	3564.0
2003/04	9932	937	2037	116	2150	4109
2004/05	12264.0	1132.0	1714.0	150.0	2588	5746

Legend **T TAX =Total tax**

PIT= Personal income tax

BIT=[Business income tax

AIT=Agricultural income tax
DIT=Domestic indirect taxes
IMT=Import taxes

TABLE B: Data on Tax bases (source: MoFED)

YEAR	NGDP	W.BILL	SoIND.	SoAGRI	PRCON	IMPORT
1974/75	6427.8	1796	833.2	5083.6	5071	864.4
1975/76	6874.2	1945	781.3	5124.7	5385.2	834.6
1976/77	7872.8	1987	803.9	5144.8	6348.2	1077.5
1977/78	8308.3	2088.4	778.8	5162.6	6752.1	1296.3
1978/79	9286.5	2234.1	892.1	5208.7	7463	1395.4
1979/80	9865.4	2297.7	978.7	5449.2	7920.4	1784.6
1980/81	10079	2361.8	1011.8	5384.8	7886.5	1675.5
1981/82	10635.8	2540.4	1097.6	5189.7	8374.9	1833.2
1982/83	11775.4	2550.2	1162.3	5895.3	9157.8	1855.9
1983/84	10987.6	2754.3	1231.8	5155.9	8192.3	2125
1984/85	13026.5	3303.2	1284.8	4079	10661.2	2082.8
1985/86	13575.2	3654.5	1369.2	4732.6	10261	2326.3
1986/87	14391	3796	1478.6	5620.4	11036.1	2338.4
1987/88	14970.5	3820.9	1422.5	5465	10396.1	2398.4
1988/89	15742.1	3295.2	1327.8	5521.3	11281.1	2292.3
1989/90	16825.7	3164.6	1265.3	5814.4	12258.2	2060.3
1990/91	19195.3	3379	1024.1	6114.9	15369.2	2398.2
1991/92	20792	4113	951.3	5947.6	18059	2223.4
1992/93	26671.4	4516	1221.9	6308.3	22358.5	4520.5
1993/94	28328.9	4726	1307	6078	23747.5	6090.5
1994/95	33885	5076	1412.5	6284	27346.7	7950
1995/96	37937.6	5301	1488.9	7206.2	31045.3	8721.5
1996/97	41465.1	5426.9	1530.6	7453.9	33743.8	10584.7
1997/98	44840.3	5892	1566.6	6620.6	35122.6	11341.2
1998/99	48803.2	6337	1700.9	6873.5	38631.6	14101.5
1999/2000	53189.7	7025	1731.3	7024.7	40041.3	15969.3
2000/01	54262.5	7124.5	1821.4	7831.1	41946.5	16193.6
2001/02	51493.2	7174.4	1864	7651	38961.4	17709.5
2002/03	55702.1	7224.6	1943.4	6687	40825.3	20136.8
2003/04	68997	7275	2080.6	7953.8	53768.2	27333.9
2004/05	79114.9	7276.1	2228.6	9154.8	62465.1	33728.7

Legend **Legend**

NGDP= Nominal GDP

W.BILL= wage bill

SoIND= Share of industry

SoIND= Share of industry
SoAGRI= share of agriculture
PRCON=Private consumption
IMPORT=value of imports

TABLE C: Data for Macro Economic Performance (source: MoFED)

YEAR	Im/GDP	EXPORT	EX/GDP	INVST	i/GDP	PINV
1974/75	0.1344784	638.5	0.099334	859.6	0.133732	659.91
1975/76	0.1214105	710.5	0.103357	755.5	0.109904	515.48
1976/77	0.1368636	785	0.09971	831.7	0.105642	545.79
1977/78	0.1560247	809.1	0.097385	808.7	0.097336	539.69
1978/79	0.1502611	881.1	0.09488	1036.3	0.111592	711.08
1979/80	0.1808948	1130.4	0.114582	1266.3	0.128358	884.98
1980/81	0.1662367	1072.4	0.106399	1366.8	0.135609	939.30
1981/82	0.1723613	1007.2	0.094699	1456.6	0.136953	788.88
1982/83	0.1576082	1064.9	0.090434	1435.7	0.121924	295.03
1983/84	0.1933998	1164.9	0.10602	1850.7	0.168435	958.68
1984/85	0.1598895	1057.1	0.08115	1394	0.107013	276.68
1985/86	0.171364	1271.7	0.093678	2225.6	0.163946	903.23
1986/87	0.1624904	1186.8	0.082468	2244.7	0.155979	947.46
1987/88	0.1602084	1205.4	0.080518	3060.5	0.204435	1678.96
1988/89	0.1456159	1422.8	0.090382	2269.2	0.144148	447.87
1989/90	0.1224496	1295	0.076966	2100.5	0.124839	727.54
1990/91	0.1249368	1062.2	0.055336	1996.4	0.104005	830.89
1991/92	0.1069354	937.5	0.045089	1911.1	0.091915	989.41
1992/93	0.1694887	2222.5	0.083329	3792.1	0.142179	2117.00
1993/94	0.2149925	3223	0.113771	4293.7	0.151566	1780.84
1994/95	0.2346171	4898.1	0.144551	5569	0.16435	2623.96
1995/96	0.2298907	4969.7	0.130997	6404.4	0.168814	2142.13
1996/97	0.2552677	6730.6	0.16232	7049.1	0.170001	3064.92
1997/98	0.2529243	7116.9	0.158717	7690.6	0.171511	3726.91
1998/99	0.2889462	6878	0.140933	8268.1	0.169417	4078.39
1999/2000	0.3002329	8017.6	0.150736	8431.8	0.158523	5059.17
2000/01	0.2984308	7981.5	0.147091	9646	0.177765	4935.02
2001/02	0.3439192	8027.4	0.155892	10613.5	0.206115	4881.72
2002/03	0.3615088	9777.9	0.175539	11674.9	0.209595	6155.30
2003/04	0.3961607	12916.6	0.187205	14593.6	0.211511	6825.82
2004/05	0.4263255	15578.8	0.196914	18242	0.230576	7213.74

Legend

Legend
Im/GDP= Import per GDP
Export=value of exports
Ex/GDP= Exports per GDP
INVST=total investment
i/GDP=Investment per GDP
PINV=private investment

TABLE D: Data on Investment, saving revenue and expenditure. (source: MoFED)

YEAR	GINV	GDS	GDS/GDP	T.Revenue	C.exp	rec. exp	T.Exp
1974/75	199.67	633.7	0.098587386	711.4	NA	NA	NA
1975/76	240.00	631.4	0.091850688	781.0	,,	,,	,,
1976/77	285.91	593.2	0.075348034	1011.3	,,	,,	,,
1977/78	269.03	321.6	0.03870828	1187.2	,,	,,	,,
1978/79	325.25	522	0.056210628	1382.0	,,	,,	,,
1979/80	381.33	612.1	0.062045127	1567.4	,,	,,	,,
1980/81	427.54	763.7	0.075771406	1757.0	,,	,,	,,
1981/82	667.77	630.6	0.059290321	1876.5	,,	,,	,,
1982/83	1140.67	644.7	0.054749732	2174.5	,,	,,	,,
1983/84	892.01	890.6	0.081055007	2293.8	443.3	1678.8	2122.1
1984/85	1117.34	368.3	0.028273136	2323.2	505	1776.5	2281.5
1985/86	1322.40	1171.1	0.086267606	2806.0	715	1914.7	2629.7
1986/87	1297.19	1093.1	0.075957195	2926.0	1245.3	2540.8	3786.1
1987/88	1381.55	1867.5	0.124745332	3467.4	933	2236	3169
1988/89	1821.36	1399.8	0.088920792	3898.9	1187	2636.4	3823.4
1989/90	1372.95	1335.2	0.079354797	3142.6	1471.8	2590.4	4062.2
1990/91	1165.49	660.4	0.034404255	2706.5	1383.1	2620	4003.1
1991/92	921.69	625.2	0.030069257	2207.9	1401.4	3419.5	4820.9
1992/93	1675.10	1494.1	0.056018807	3150.6	1939.6	3786.2	5725.8
1993/94	2512.86	1426.2	0.050344348	3938.8	1440.1	3842.9	5283
1994/95	2945.16	2517.1	0.074283606	5912.6	1214.1	3640.1	4854.2
1995/96	4262.27	2652.6	0.069920079	6966.3	951.8	3253.6	4205.4
1996/97	3984.16	3195	0.07705275	7885.7	1784.9	3434.5	5219.4
1997/98	3963.66	3466.3	0.077303229	8381.2	2694.3	4399.5	7093.8
1998/99	4189.71	1044.6	0.021404334	9557.5	3156.5	5215.5	8372
1999/2000	3372.64	480.1	0.009026184	9332.6	3562.6	5582.2	9144.8
2000/01	4710.64	1433.9	0.026425248	10198.6	4264.5	5750.4	10014.9
2001/02	5728.27	931.4	0.018087825	10408.6	3608.3	7190.5	10798.8
2002/03	5952.53	1316.6	0.023636452	11148.7	4144.2	10533.1	14677.3
2003/04	7561.53	176.3	0.002555184	12542	3855.1	13676.5	17531.6
2004/05	9260.86	92.1	0.00116413	15466.0	5296	10441.2	15737.2

Table E: Data on money supply and general inflation. (source: National Bank of Ethiopia)

YEAR	Yd	MS	Growth in MS	ginf
1974/75	6086.6	1139.40		4.7
1975/76	6549.1	1421.80	24.78	18.9
1976/77	7509.2	1467.90	3.24	21.9
1977/78	7921	1682.20	14.60	18.6
1978/79	8755.8	1848.00	9.86	13.0
1979/80	9160	2053.20	11.10	12.5
1980/81	9240.8	2377.60	15.80	1.9
1981/82	9718.9	2643.70	11.19	7.3
1982/83	10777	3040.60	15.01	3.9
1983/84	9876.8	3383.70	11.28	-0.3
1984/85	11855	3849.00	13.75	16.4
1985/86	12301.1	4448.30	15.57	6.5
1986/87	12908.5	4808.70	8.10	-9.6
1987/88	13286.7	5238.70	8.94	2.3
1988/89	13941.9	5704.40	8.89	9.6
1989/90	15177.8	6708.20	17.60	5.2
1990/91	17665.3	7962.20	18.69	20.0
1991/92	19598.2	9011.00	13.17	21.9
1992/93	25233.1	10272.22	14.00	7.7
1993/94	26599.8	11730.10	14.19	3.3
1994/95	31712.2	14584.24	24.33	13.4
1995/96	35139.8	15969.25	9.50	0.9
1996/97	38436.5	17002.91	6.47	-6.4
1997/98	42060	18902.15	11.17	3.9
1998/99	45812	19732.08	4.39	4.8
1999/2000	49684	22583.29	14.45	6.2
2000/01	50607.4	24961.66	10.53	-5.2
2001/02	47426	27392.17	9.74	-7.2
2002/03	51490.1	30090.06	9.85	15.1
2003/04	63757	34655.87	15.17	8.6
2004/05	73530.9	40211.75	16.03	6.8

Legend for tables D and E
GINV= government investment
GDS= gross domestic saving
T.Revenue= total revenue
C.exp= capital expenditure
Rec. exp. =recurrent expenditure
Texp. = total expenditure
Yd=disposable income
MS = money supply
ginf= general inflation

Annex II

ECONOMETRIC TEST SUMMARIES FOR COINTEGRATION REGRESSION RESULTS ON ELASTICITIES

TABLE A: Tax to base Elasticities

Test	Tp		Tb		Ta		Td		Tm	
	WODL	WDL	WODL	WDL	WODL	WDL	WODL	WDL	WODL	WDL
Normality Chi^2	1.05 (0.59)	1.05 (0.59)	0.080 (0.96)	0.080 (0.96)	5.06 (0.05)	7.47 (0.084)	5.47 (0.064)	5.47 (0.064)	0.31 (0.85)	0.31 (0.85)
Hetro F( )	2.39 (0.074)	2.39 (0.074)	0.78 (0.58)	0.78 (0.58)	1.74 (0.18)	1.41 (0.26)	1.41 (0.26)	0.84 (0.51)	0.84 (0.51)	0.84 (0.51)
Hetro X F( )	1.39 (0.27)	1.39 (0.27)	0.70 (0.69)	2.05 (0.12)	2.05 (0.12)	1.72 (0.17)	1.72 (0.17)	1.72 (0.17)	0.65 (0.69)	0.65 (0.69)
RESET F( )	1.03 (0.32)	1.03 (0.32)	2.08 (0.16)	2.08 (0.16)	0.45 (0.51)	0.45 (0.51)	0.094 (0.78)	0.094 (0.78)	3.04 (0.093)	3.04 (0.093)

TABLE B: Base to income elasticities

Test	Tp		Tb		Ta		Td		Tm	
	WODL	WDL	WODL	WDL	WODL	WDL	WODL	WDL	WODL	WDL
Normality Chi^2	3.26 (0.20)	5.79 (0.055)	0.01 (0.95)	12.09 (0.002)	10.81 (0.0045)	10.3 (0.066)	0.44 (0.80)	0.73 (0.867)	0.73 (0.867)	11.5 (0.003)
Hetro F( )	2.57 (0.77)	0.27 (0.77)	4.05 (0.03	2.5 (0.085)	0.023 (0.97)	0.36 (0.78)	3.22 (0.055)	0.53 0.67)	1.29 (0.29)	0.97 (0.42)
Hetro X F( )	2.49 (0.07)	0.27 (0.77)	4.04 (0.029)	3.54 (0.021)	0.023 (0.97)	0.26 (0.89)	3.22 (0.055)	0.84 (0.51)	1.29 (0.29)	0.94) (0.001)
RESET F( )	6.86 (0.014)	7.06 (0.129)	0.045 (0.83)	0.46 (0.50)	6.46 (0.016)	6.05 (0.021)	2.86 (0.103)	3.45 (0.074)	1.74 (0.061)	1.15 (0.057)

Figures in parenthesis are p values.

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all source of materials used for the thesis have been duly acknowledged.

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