# MEASURING AND ASSESSING DISTORTIONS IN COFFEE COMMODITY SYSTEM: THE CASE OF JIMMA, ETHIOPIA

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SCHOOL OF GRADUATE STUDIES

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## DEDICATION

TO MY FATHER YADETA JORBA AND MY MOTHER ZERITU AYANA

AND

MY YOUNGER BROTHER DEJENE YADETA WHOSE MATERIAL AND MORAL ASSISTANCE ENABLED MY ACADEMIC SUCCESS.

## *ABSTRACT*

*The main objective of this study is to measure and assess distortions in coffee commodity system. To meet this end,both cross-sectional and time series data were collected and analyzed. Both dynamic and static analysis indicated that there have been some distortions in coffee commodity system which inhibit coffee producers from maximizing profit from coffee production. The time series analysis revealed that although there is a tendency for farmgate prices to move toward its border prices, the speed of adjustment is very low. High share of coffee in agricultural GDP contributed to this slow adjustment rate by inviting extensive government intervention into the sector. on the other hand overvaluation of the exchange rate and high share of coffee in total export adversely affected the short run transmission of the border price to farmgate price and long run rate of price protection respectively. PAM as a method of quantifying distortions and their effects on private and social profitability uncovered that coffee producers were making a meagre profit in 1988/89 while exporters were receiving high profit. These situations were reversed in 1995/96 owing to the policy reform. Coffee farmers have responded to the increased price (coffee) by planting more coffee,more use of hired labour etc. on the other hand devaluation and removal of subsidies caused the price of imported inputs to increase to unaffordable level. As the result farmers stopped spraying against CBD which might be the cause for insignificant coffee yield difference between the periods before and after there form. Land, labour, extension services and education were investigated to be the important determinants of coffee production in our study area. As to the allocation of these inputs are concerned the farmers of the study area have allocated their land efficiently while labor was not. Shortage of labor and risk aversion behavior of the farmers may result in sub-optimal use this input. Lastly based on the empirical result of the study ,we recommend that the government should make a necessary effort to reduce direct tax from coffee,diversify export, reduce cost of fungicides ,improve labor market and give premium for good quality coffee.*

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# CHAPTER ONE

# 1.0 INTRODUCTION

## 1.1. General

Ethiopia is classified amongst the least developed countries in the world, with a per capita GNP of US $ 120. GDP at constant factor cost in 1994 was estimated at 12,627.2 million birr. The agricultural sector contributed nearly 50.0 per cent to the GDP, followed by Services 38.62 per cent. Manufacturing and industrial sectors together accounted for 11.13 per cent in the same year. The average annual growth rate of GDP between 1985/86-1994/95 was 3.3 per cent. While agricultural growth rate was 1.83 per cent per annum, industrial and manufacturing sectors marked up 3.99 per cent.

The major value added sub-sectors in manufacturing are food and agricultural industries that account for half;followed by textiles and clothing. The heavy industry such as chemicals, machinery equipment together contributes a smaller proportion, implying that the Ethiopian manufacturing sector is dominated by the production of primary consumers' goods.

Ethiopia has experienced a widening gap in its terms of trade, and merchandise imports greatly exceed exports. In 1994 imports amounted to birr 6965.3 million and merchandise exports were worth only 2857.7 million birr. Exports are dominated by agricultural commodities: coffee, hides and skins, pulse etc,(see table-1.1-), while coffee contributes the highest share. Manufactured items, transport, machinery and fuels constitute the major imports.[1]

The Ethiopian economy is predominantly agricultural. Because of Ethiopia's varied agro-ecological zones, the country's agricultural production covers a wide range of crops and its livestock industry is the largest in Africa, and a valuable resource of income for small holders. The main food crops are maize, barely, sorghum teff and wheat, which together account for almost half of total crop production. Coffee, oil seeds, cotton, sugar cane and recently 't' chat'(Cathus edulas) are produced for their commercial importance.

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[1] Data related to Macro-economic indicators are obtained from MOPED.

Agriculture provides income and employment for 85 per cent of the total population. Moreover,the agricultural sector earns over 85 per cent of the foreign exchange income. It is also a potential market for industrial products and an important source of capital and labor to expand others' sectors of the economy.

Despite the importance of agriculture in the national economy, its rate of growth was declining during the last 17 years. Mulat and Dejene (1995), indicated that the rate of growth of this sector was 2.2 per cent on average during the 1960s, but dropped to 0.70 per cent in the 1970s and further declined 0.50 per cent in the 1980s. Crop yields have stagnated at about 1 tone per hectare since the early 1970s, while population growth has been increasing rapidly. Among other things, excessive government interventions, traditional methods of farming, lack of favorable pricing and marketing policies bear much of the responsibilities for the poor performance of the sector.

In recent years, however, attempt has been made by transitional government to raise its growth rate. Some of the policy measures taken by the government were raising producers' price, making the market free and devaluing the national currency (which was persistly overvalued for the several years).

Coffee is the dominant foreign exchange earning export commodity, on which the fate of the Ethiopian economy hinges. Over 60 per cent of the country's foreign exchange is obtained through export of coffee. Nearly a quarter of the population is directly or indirectly engaged in the production, processing and marketing of coffee (MCTD, 1989). Even though not quantified, the multiplier effects of coffee on other sectors of the national economy, such as wholesale and retail trades, banking and insurance, transport sector, etc., is considerable. Besides, coffee has an important position in the social and cultural life of the people. Realizing its various importance, progress in coffee industry can thus, be regarded as one of the factors that stimulate the development of the economy. To this end the extent of policy intervention and market failures in coffee industry and the response of producers to the recent policy reform must be analyzed.

Table 1.1 The Major Agricultural export commodities of Ethiopia (Million Birr) 1983/84-1995/96.

| | Commodities | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| year | Coffee | Hides & Skins | Oil seeds | Pulse | L.animals | Meats product | Fruit &vege | Total |
| 1983/84 | 590.43 | 93.82 | 27.86 | 20.26 | 14.78 | 5.87 | 4.21 | 757.2 |
| 1984/85 | 466.27 | 95.41 | 15.64 | 16.87 | 19.17 | 3.92 | 6.02 | 623.3 |
| 1985/86 | 664.79 | 119.46 | 7.69 | 12.64 | 18.91 | 3.87 | 6.03 | 833.3 |
| 1986/87 | 524.33 | 108.29 | 9.79 | 8.48 | 15.65 | 5.37 | 12.85 | 684.7 |
| 1987/88 | 439.31 | 133.01 | 22.01 | 16.09 | 31.76 | 5.23 | 11.52 | 658.9 |
| 1988/89 | 626.65 | 123.48 | 11.03 | 16.32 | 23.49 | 2.09 | 8.99 | 812.0 |
| 1989/90 | 405.42 | 133.29 | 8.39 | 35.61 | 10.61 | 1.15 | 4.10 | 598.5 |
| 1990/91 | 268.45 | 92.21 | 3.63 | 15.72 | 5.17 | 1.02 | 12.00 | 398.2 |
| 1991/92 | 168.32 | 58.65 | 0.38 | 0.39 | 0.47 | 0.02 | 6.40 | 234.6 |
| 1992/93 | 536.98 | 134.52 | 1.18 | 4.1 | 1.32 | 0.42 | 2.73 | 681.25 |
| 1993/94 | 718.02 | 203.61 | 44.18 | 27.70 | 10.76 | 0.67 | 6.86 | 1,011. |
| 1994/95 | 1799.0 | 373.55 | 56.87 | 103.1 | 7.65 | 6.07 | 18.37 | 2,364. |
| 1995/96 * | 1744.2 | 342.20 | 183.4 | 62.5 | 2.30 | 2.6 | 22.20 | 2,359. |

* estimates
Source: National bank of Ethiopia (1992 annual report and 1995 quartile bulletin)

## 1.2. Statement of the Problem

Even though theory emphasizes the active role of marketing in economic development, the export marketing sub-sectors of Ethiopia has been negatively affected by various policies (overvaluation of exchange rate, low producer's price,etc.). Government intervention in coffee industry was a serious problem to coffee production and marketing especially under the military government. Price regulation kept producer price far below the world market prices. For example one study confirmed that producers receive only 57-61% of F.O.B. Prices, (ULG and Food Study group 1987). This low producer price hampered any improvement that required some investment in the coffee sector. Low coffee producer price

affected productivity by resulting in no incentive to improve coffee production and lack of care and maintenance by farmers of the existing coffee trees.

Although, the Transitional Government of Ethiopia has made an effort to open up the economy through loosening controls in the foreign exchange market (by devaluing the birr), freeing coffee marketing, raising producer price etc., there is still a claim that the benefits of these measures are appropriated by coffee processors and marketers not by producers. The existence of a large number of middlemen and private merchants at different levels (in many cases, with little contribution to coffee marketing in terms of value added) are blamed to lower the price received by producers. This is further confirmed by the absence of upward movement of coffee producer price above the floor price even when world coffee prices increased. The extent of government intervention in coffee sector is still extensive relative to other export crops. For instance direct taxes were lifted from other foreign exchange earning commodities, but coffee producers suffer from different types of taxes of which 'surtax' make the highest share. On other hand the price of imported inputs has increased in response to the effect of devaluation and removal of subsidies, this may negatively affect the use of these inputs to increase coffee yield

### 1.3. Objectives of the study

In broad terms the study intends to analyze distortions in the coffee commodity system and the impact of these distortions on the private and social profitability of coffee production in the study area.

Specifically this study will investigate:

1) how distortions have affected the short run and long run price behavior and the speed of adjustment to the long run equilibrium.
2) the effects of these distortions (policy and market failures) on private and social profitability of coffee production.
3) the possible implications of the reforms on coffee production especially their impact on resource allocation to coffee.
4) the determinants of coffee production

## 1.4. Significance of the study.

With the understanding of the need to improve coffee production measuring and assessing the effect of distortion on the commodity is important. As the bulk of Ethiopian coffee comes from small-scale peasant farms, policies that affect the rural sector will have a direct impact on national coffee production. The study attempts to reveal not only short run but also the long run price behavior of coffee producers. It would also be useful in providing knowledge of what factors explain the variability in producers' price and the extent to which this producer's price adjusts to its long run target (efficient price). Besides pointing out policy and market failures, transfer effects on the private and social profitability of coffee production is believed to help the policy makers, policy analyst and the general public including the agents in the coffee commodity system itself.

The studies also uncover the response of coffee peasant to the reform in terms of resource allocation. Examining the determinants of coffee production would help policy makers to identify appropriate variables for policy actions. Estimation of the allocative efficiency for some inputs in coffee production would also indicate the price responsiveness of the producers to the policy makers.

## 1.5. Hypotheses

Four hypotheses will be tested in this study:
The first hypothesis is that there are distortions in the Ethiopian coffee commodity system. This hypothesis will be tested by means of analyzing divergences between the private and social prices in both the product and factor markets.

The second hypothesis is that private profitability of coffee production is less than the social one. This hypothesis will be tested by the difference between private and social profit as reflected in the Policy Analysis Matrix (PAM).

Third, the economic reform, mainly through its price reform, devaluation and domestic market liberalization, has caused a change in resource allocation in favor of coffee

production. This will be tested by looking at the use of farm inputs and cultural practices before and after reform.

Fourth coffee farmers are allocatively efficient in the use of their farm inputs. This will be examined by equating the marginal values of each inputs to its opportunity cost.

### 1.6. Scope and Limitations of the study

The study confined itself to analyze distortions related to sundried coffee in Jimma zone. It also concentrate on coffee commodity system which will be divide in to farm activity level, processing and transporting level and marketing activity level for the years 1988 /89 (pre form) and 1995/96 (post reform). The study is deficient in estimating current social prices owing to absences of updated national conversion factors and this may overestimate or underestimates the result. Due to lack of appropriate alternative methodology of measuring efficiency in a situation where imperfection of most markets were common, classical profit maximization approach was employed.

### 1.7.Organization of the study

The contents of this study is organized as follows.

Chapter one is the introduction which includes the general situation of the country's economy, statement of the problem, objectives of the study, hypothesis and scope and limitations of the study. Chapter two deals with literature review on the theoretical and empirical studies already done on a similar theme. Theoretical framework of analyzing policy distortions and market failures are also discussed in this chapter. The overview of coffee industry in Ethiopia is discussed in chapter three. Chapter four addresses the methodology and description of the study areas. The empirical results of the study is presented in chapter five. Chapter six is on summary and policy recommendations.

## CHAPTER TWO

### 2.0. Literature and theoretical framework.

### 2.1 Literature review

### 2.1.1. The role of State and Policy in the development Theory.

Many writers have thoroughly discussed the role of the state and policy in the development theory. Over the centuries, starting with the European countries those who were in 'relative economic backwardness' compared with England, which used extensive state intervention to achieve 'great spurts in industrial development'(Geschenkron, 1962), development strategies have assumed many different approaches. Each of these approaches propose a differential balance between the roles attributed to the market, the state and civil organizations. Whereas pre-world war II liberalism and neo-classical development theory (Johnson, 1958) stressed the role of the market. Influential schools of thought that stressed the role of state emerged during the 1960s and 1970s: dependency theory (Cardoso and Failtto, 1969), development economics (Hirschman, 1981), growth with equity (Adelman, 1975), and basic needs (Streeten, 1979).

Exhaustion of import substitutions, industrialization and debt crisis in the 1980s induced a neoliberal critique of these strategies, calling for a descaling of the role of the state and attributing greater influence to market force (Krueger, 1974). In 1990s, as many countries slowly emerge from the debt and adjustment policies, a 'new development economics' is also emerging. Here the key role of market liberalization is well recognized. A scaled down but essential strategic role is assigned to the state and much greater importance is attributed to the developmental role of civil organizations, from the household to the community and to different forms of grassroots organizations and contractual arrangements (Stiglitz, 1985;Bardhan, 1988).

### 2.1.2 Government intervention in agriculture

The origins of interventions in the domestic pricing of agricultural commodities were discussed in depth by Krueger(1992). According to this author interventions in the domestic pricing of agricultural commodities have their historical origins in four sets of circumstances:

> The first is that producers' activities to unite toward a common purpose or purposes. Producers unite to achieve better and lower cost of transport for crops to the market or for inputs to farm sites, lobby for favorable treatment with respect to taxes, credits government investment or influence the government to change other regulations governing the production and distribution of agricultural outputs.
>
> The second circumstance is that the governments' efforts to extract revenue. The revenue motive of government is far stronger in intensifying interventions once instruments and policies are in place than it is initiating them.
> The third one is that consumer oriented pressures to keep food price low. Pressures to keep prices to consumers low have frequently led government to regulate prices, especially for food crops. In many countries these considerations lay behind the initial establishment of government marketing agencies for grains.
> The fourth circumstance is the adjustments to changing external conditions. Under these sets the author discussed that external events have prompted government intervention on many occasions. For example he mentioned the law of protecting wheat in 1931 by Turkish government in response of declined world price, Chile's first law of controlling agricultural price by the same year etc.

Some writers argued that the government intervention is relatively intensive in agriculture than other sectors. Sadoulet,et al (1995) indicated that in both the less and the more developed countries there is no sector of the economy where intervention has been more pervasive than agriculture. The interventions include farm subsidies ( in the more developed countries, usually through price support programs), taxation of agriculture ( in the LDCs through overvalued exchange rates, industrial protectionism, and export taxes), price stabilization interventions (through food stocks and variable levies), food self sufficiency and food security objectives, consumer food subsidies (through cheap food policies) and monopolistic control of markets (through parastatal agencies). In general the dilemma of these interventions and the challenge for policy analysts is that government controls only a few

instruments (e.g. price). But each intervention has a multiplicity of consequences both intended and unintended. These consequences include short and long run allocative efficiency, income distribution and welfare, fiscal and foreign exchange balances,sustainability of resources use and political response (Sadoulet, 1995).

Why have governments intervened so extensive in griculture ?. As Gardner noted'agricultural policy is both ubiquitous and contentious' (Gardner,1987). Because interventions induce a multiplicity of consequences, they are also motivated by a multiplicity of desired effects. Some of these interventions contributed to enhancing efficiency of resource use and hence the aggregate level of income. Others clearly pursue non-efficiency objectives which often will have an efficiency cost (FAO, 1993). However, the policies and objectives of governments have varied for both developed and developing countries.

Mathia(1988) indicates that the main objectives of government intervention in the agricultural sector in developed countries like Canada and U.S.A have been to protect the level and stability of farm incomes with relatively little direct government buying and selling activities in the domestic markets. On the other hand in many developing countries, governments are directly involved in the direct buying and selling activities in the domestic market and market regulation.

The broad objectives of government intervention in marketing activities have been to increase production to attain self-sufficiency levels, increase foreign exchange earnings, secure the provision of minimum food supplies to urban consumers at affordable prices, stabilize producer and consumer prices, provide the government with revenue and maintain political stability (Mathia, 1988, FAO, 1987).

It has been observed that many African Governments have given more emphasis to urban consumer welfare than producer welfare and maintained low food prices which led to the taxation of agriculture and created production and marketing disincentives (Christensen and Witucki, 1982). Trade and exchange rate policies such as overvalued currencies and export controls have made traditional agricultural export less competitive on the world market and hindered local food production by making food imports cheaper.

However, in recent years, many African countries have reformed their agricultural marketing systems. Market liberalization and/or deregulation[2] and currency devaluation are among the major rationale for such reforms toward free market has its root in Adam Smith's thinking that economic agent pursuing their own interest also maximizes society's welfare.

### 2.1.3 Government Intervention visa-vis Profitability.

When government policy intervention in economic activities causes disequilibrium between the actual market and efficiency prices of products and factors in their respective markets it creates distortions. These distortions, result in divergences between private and social values of the products and factors in question (Monke and Pearson, 1989).

There is an evidence that the policy intervention has been distortionary in its operation. Adam Smith, being a proponent of his "Theory of Market Economics" was against intervention of the 18th century government under mercantilism in the market. He said that the independence choices of individual buyers and sellers, expressed in the free market, would bring about the best results without the need of government regulation of production and hence the community would prosper and grow as if an invisible hand were guiding it. In the 19th, century the Chicago school of Economics (the neoclassical economists) supported Smith's argument on the ground that free markets allocate resources and distribute output for maximum efficiency and that under free market system an optimum level of material welfare would be reached; hence government intervention was neither necessary nor desirable.

Henderson and Quandt(1971) in their econometric model of profit maximization under perfect competition, indicated that production is sure to provide maximum total utility within limits of existing resources and technology under perfect competition, where as welfare economics, attempts to maximize social welfare through allocating resources according to society's ethical values. In general costs of government intervention policies are to raise cost of production, reduce productivity aggravate inflation and undermine a nation's position in international trade. Similarly, Zusman(1976) discussed the non - efficiency oriented government

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[2] Market reform in Africa could be viewed as a mixture of both liberalization and deregulation.

interventions. Government interventions is also motivated by objectives other than efficiency. It can be in response to self interested government officials' concern with income consequence of the outcome market forces and efficiency oriented policies. Poverty reduction and income distribution, sustainabilty and inter-generational equity and food and other aspects of securities are an example of non-efficiency interventions.

Tolley et.al. (1983) writing on intervention policy in prices for agricultural products concluded that: 1) the government may receive revenue or suffer a loss depending on whether the price policy is characterized by taxation or subsidization; 2)while price policy can distort the relative price structure among inputs and lead to inefficiencies in production and consumption, tax will depress the domestic prices of the commodity, discourage production and lead to a fall in farm income, and hence a fall in profitability.

Garcia(1983),Montes(1984),and Thomas(1985) have examined the indirect effect of macroeconomics policies on incentives to the agricultural sector. In the study by Thomas, macroeconomic policies are seen to affect agricultural incentives through their impact on the real exchange rate. To measure that impact, the real exchange rate was estimated as a function of a number of variable, including the budget deficit and the terms of trade(where coffee plays an important role). The study found that over the period examined macroeconomics policies(as well as the rise in the price of coffee) led to an appreciation of exchange rate and to a fall in incentives to agriculture.

Jaegar et. al. (1988), writing on the effects of government policy distortions and using an econometric model, concluded that in the majority of countries of sub-Saharan Africa in 1976 and 1983 the agricultural export commodities were taxed 40% and 30% respectively while in 1986 and 1987 they enjoyed 25% and 10% price support programs respectively over and above the world market price. Moreover, Jaegar noted that the exchange rate overvaluation policy in these countries has negated the positive effects of the intervention policies of 1986 and 1987. This is because these policies did not take into account currency overvaluation. Therefore when overvaluation of exchange rates is taken into account the 10% price support becomes a 20% tax on the agricultural export crops.

### 2.1.4. Quantifying Effects of Policy Distortions and Market Failures.

Analysis of supply and demand including calculations of producer and consumer surplus which are done market by market can address questions about the short term impact of price changes on real income. In this approach, foreign exchange earnings government expenditures or revenue, and certain aspects of distributional effects are separately accounted for in each market.

Single market analysis will give the correct effects on budgets, foreign exchange and welfare only if the crop in question is not a substitute or complements in supply or demand for any other goods which is a) taxed or subsidized (in budget analysis) b) traded (in evaluating foreign exchange efforts) or c) subject to any distortion at all either fiscal or from the private economy (in the study of welfare effects). The chance of such a good existing in agriculture is small, thus this method of analysis has a limited use in assessing policy interventions in agriculture.

At the other extreme large computable general equilibrium(CGE) models and mathematical programming models are also limited as operational tools. Both of these methods deal with the inter market connections. For certain purposes such as examining the intervention of a new production technique the methods can be important and appropriate. However both have serious draw backs as tools for policy analysis (Avishay, et. al, 1987). First elaborate models are essentially research tools which take a considerable amount of time and data to construct. Usually they can not be done with in time horizon of operational work. Second their complexity makes the incorporations of institutional detail more difficult(though not impossible).Similarly, changes in the model parameters for sensitivity analysis purpose are difficult to effect. Third and perhaps most important, these models are frequently of such complexity that results are not intuitive certainly not to a policy maker and often not to analyst (Avishay op.cit).

Balassa(1971) suggests that nominal rate of protection as one way of computing effects of government policy distortions in the product market. He defined nominal rate of protection(NRP) as a percentage of domestic price over the world market price. Nominal rate

of protection is greater than one when the policy distortions result in subsidy and it is less one when the policy distortions results in a tax. He also presents another method of showing the effects of policy distortion on economic productive activity. He calls this method Effective rate of protection, "ERP". This rate expresses the margin of protection on value added. By definition therefore, it is a percentage excess of domestic value added owing to the imposition of distortionary measures on the product and its inputs over world market value added.

The effective rate of protection(ERP), expressed in its various forms covers a wider spectrum than the nominal rate of protection does in displaying the effects of policy distortions. This is because the ERP captures both the output and the tradable market prices.

However, the ERP has two obvious draw backs. First, it does not show how the policy distortions may affect the factor markets such as labor and capital markets. Second, it does not provide any place in its framework for the analysis of the effect of market failures on the commodity in question.

Owing to these two drawbacks the ERP is not, therefore, a sufficient method of reflecting the effects of policy distortions and market failures on the profitability of an agricultural activity (Jaegar et al.(1988). Alternative appropriate methods such as PAM and dynamic analysis of price interventions that make use of error correction mechanisms have been suggested instead.

In 1989 Monke and Pearson in the course of searching for another way of analyzing effects of policy intervention in an agricultural activity with reference to profitability and transfers in particular, came up with " Policy Analysis matrix" (PAM). It is fully described in their book "The policy analysis matrix for agricultural Development (1989)".These authors contend that this method is capable of measuring distortions originating not only from policy distortions but also from market failure and market imperfections in the product and factor markets from both private and social points of view. Thus, they assert further that private and social profitability and policy transfers to and from producers can be established and results obtained from PAM can be disaggregated to focus on particular regions, types of farm and or technologies.

Daniel Sellen (1994) points out that PAM is designed to analyze the pattern of incentives at the macro - economic level and to provide quantitative estimates of the impacts of policies of this pattern.

PAM has been applied by many people on different commodity and/ or farming systems in various countries. Monke and Pearson applied their PAM in measuring distortions and their effects on profitability of the Portuguese wheat system and the transfer therein in 1989. They found that the Net protection coefficient on output (NPCO) for entire wheat system was 1.20. While the NPCO and wheat grain was 1.25 in favor of producers and the NPCO on wheat straw was 1.00 which means wheat straw was not protected at all. Furthermore they found that for the wheat system the NPCO on spare parts was 1.22 and on fertilizers was 0.62. This implies that a 22% import tariff was levied on spare parts and that the government treasury subsidized fertilizers by 38% of their actual market prices. The Effective protection coefficient (EPC)for the whole wheat system was found to be 1.63 which implies that the wheat system had value added 63% grater in private price than the value added in the world prices. The private profitability of wheat as a system, was greater than the social profitability of wheat which implies net transfer from the rest of the economy to the wheat system.

Nyoro (1992) applied PAM in assessing the impact of policy distortions on profitability and transfers of the maize system of Kenya for a two year period. The basic policy distortions were that 1) the government would fix prices for Maize (both selling and buying prices); 2) the producer prices was pan-territorially set; 3) the government imposed VAT and duties on agricultural inputs such as diesel, tyres and spare parts; 4) the cost of borrowing was fixed by the government at 21% p.a; while the social cost was only 15% p.a.; 5) the transport costs were also raised to 25% on the road transport, and 10% by rail by taxes and duties.
The study concluded that;

1) profit fluctuations were higher in the controlled market than in the deregulated one, which makes maize production more risky and hence susceptible to being neglected;
2) the faster increase in prices for inputs as compared to producer price decreased profits in maize production;
3) the profitability of maize production was lower than that of competing activities such as wheat and dairy;

4) farmers decreased maize production area either by neglecting it or reallocating some maize area for wheat or pasture;and;

5) more labor intensive production techniques were found less profitable.

Gezahegn and Metselal (1996) applied the PAM method to quantify the impact of macroeconomics policies on private and social profitability wheat production technology (Traditional and Improved) in Ehtiopia. They also attempted to observe similar impact on wheat marketing. However, no clear indication was made to observe the effect of government policies to this as separate PAM was not established for marketing activity. For the technologies under study the authors found that both of them render positive incentives to the producers. This was indicated by positive differences between the market prices and social prices which was also significant under both types of technology. Private profitability of traditional and improved technologies were found to be 1500 and 2200 Birr per hectare respectively. Similarly social profitability under the two scenarios was estimated to be 861 and 1351 Birr per hectare in that order. Considering these result they concluded that the competitiveness of the crop examined indicated that the country has relatively strong comparative advantage in producing it domestically under both scenarios(DRC. = 0.35 and 0.25 for traditional and improved technology respectively).

Social profitability, was less than private profitability which suggests that macro and micro policies would provide farmers with incentives to expand wheat production. Finally they drew a conclusion that improved technologies would contribute to increased efficiency and improved competitiveness.

Some studies have attempted to model the behavioral relationship between the degree of agricultural price intervention and its principal determinants. Using five year interval data for 1955-80 for fifteen industrial and industrializing countries,Honma and Hayami (1986) estimated an equation of the determinant of variation in the nominal protection coefficient. They found that nominal protection rises as agriculture's comparative advantage falls, as the share of agriculture in GDP (or in labor force) falls, and as the international terms of trade between agriculture and manufacturing fall.

In the study of the wheat market in Egypt from 1949 to 1979, Scobie (1981) found that domestic consumer and producer prices rose as the world wheat price rose and fell as import capacity (opening reserves plus receipts of foreign exchange) rose. They also found that an increase in wheat aid shipment led to a fall in the producer price ( relative to the consumer price) and that an increase in food price inflation resulted in higher producer price for wheat ( to expand food supplies).

In a study of the beef market in Brazil from 1947 to 1971 Lattimore and Schuh (1976) found that the level of the export tax was directly related to the rate of inflation(to reduce the price of beef),to the balance of payments position (with higher foreign exchange reserves the government is willing to trade off some beef exports to achieve lower domestic price) and to the international price of beef (to achieve price stabilization).

As to the response of agriculture to policy changes it is primarily addressed in the supply response literature. Because much of agricultural price policy is made on commodity by commodity basis, the supply response literature has concentrated on the short and long run supply responses of individual crops to changes in output and inputs prices. Agricultural export can react to changes in prices and exchange rates much like individual crops: a favorable price increase can increase production at the expense of non-tradable even if aggregate output does not increase (Binswanger, 1989).

Investigation that only includes quantity supplied and price factors for smallholder decision making, was criticized by, Helleiner (1975). He argued that supply responses to change in prices in the agricultural sector do not constitute the entire history of economic response on the part of the smallholder. Acreage, yield, time allocated between agricultural production activities other economic activities, and leisure can also be considered to be responsive to alteration in relative prices.
In general his argument depicts that all production determinants have to be considered in order to observe the responses of smallholders to any changes(policy).

## 2.2. A Theoretical Framework For Analyzing Policy Interventions and Market Failures

In the presence of distortions, agricultural households will fail to maximize profits as suggested by models of perfectly competitive market conditions. This is because these markets are quite often intercepted by distorting policies which cause actual market or private prices to differ from social or efficiency prices while market failures occur whenever monopolies or monopsonies, externalities or inadequate development of institutions that provide competitive services and full information prevent a market from creating efficient allocation of products and factors, [Monke and Pearson, 1989].

Amani Bagachwa *et al.* [1992] points out, government policy intervention is aimed at, inter alia, extracting agricultural surplus from the producers for the development of other sectors of the economy. The author asserts that lower producer prices offered by the government and little investment in supportive infrastructure and extension services and the villagization program as matters of policy resulted in loss of agricultural output.

Ethiopia has exercised several policy instruments on coffee production. These include positive and negative subsidies on some inputs such as fertilizers, chemicals and regulation of the producer price of coffee through exchange rate overvaluation and direct export tax. Other policy instruments may include wage-legislation and credit rationing against coffee farmers. All in all these government policies have some impact on profitability of coffee production. Here we shall make an attempt of theoretically exploring how these policy distortions and market failures affect profitability of an agricultural activity undertaken by households under consideration.

### 2.2.1 Effect of positive subsidy on Profitability

Suppose, considering figure 2.1 there is a positive subsidy in favor of consumers such as a 20 per cent subsidy on fertilizers in favor of coffee producers who therefore are consumers of fertilizers.

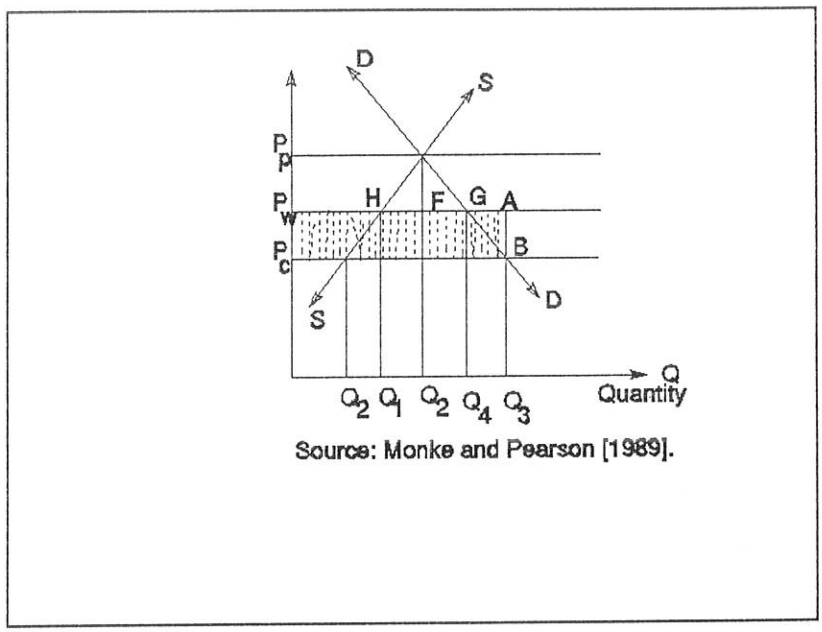



*Figure 2.1: Effects of positive subsidy on profitability*

In this diagram Pp is producer price while Pw designates world price for the commodity in question and pc is the price for consumers of this tradable commodity. Q's imply quantities demanded and supply curves for the commodity we are dealing with.

With a positive subsidy the consumer's price drops from $P_w$ to $P_c$ and consumers will increase their consumption $Q_4$ to $Q_3$. The effect is that more will be available at lower costs. The lower the cost for variable inputs, ceteris paribus, the greater the profit, Monke and Pearson [1989].

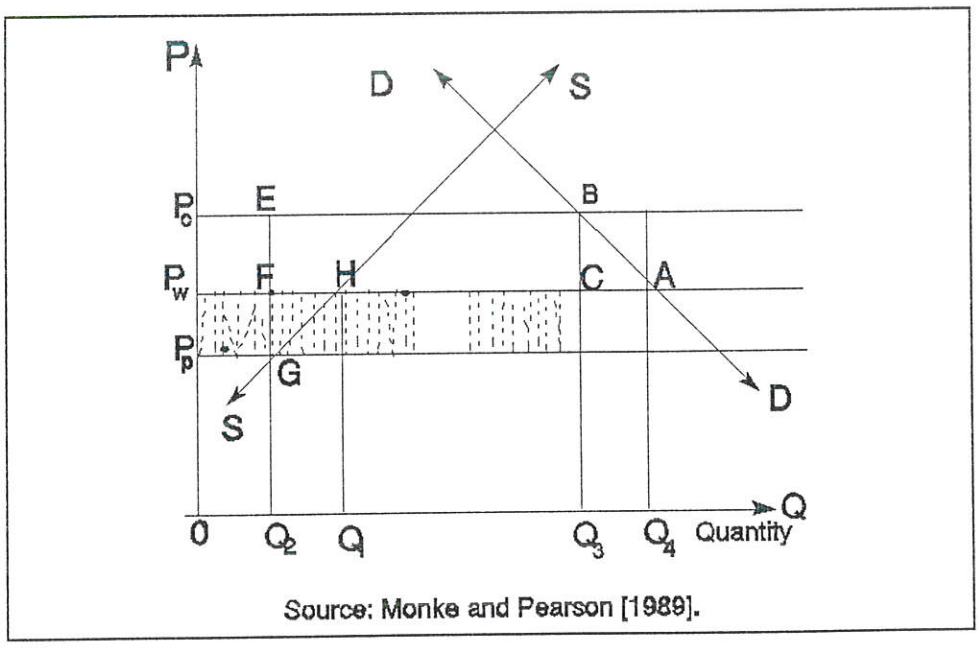
To concretize this analysis let us associate it with the 20% subsidy on fertilizers consumed by agricultural households producing coffee in Ethiopia in 1995/96. Households who applied fertilizers produced 650 kilograms of coffee per hectare while those who did not produced only 450 kilogram of the same,(Kassahun et al, 1990) given that the same production technology was used by these two groups. This implies that the cheaper the fertilizers, other variables held constant, the greater the profit.

Back to figure 2.1, we may conclude that consumers will consume $Q_3$ which is greater than $Q_4$ consumed before subsidy and they will enjoy consumer's surplus equivalent to area

$P_cP_wAB$ which is part and parcel of the profit component. Thus the greater the subsidy the greater the profit.

### 2.2.2 Effect of Negative Subsidy on Profitability

Figure 2.2. illustrates the effect, at theoretical level, of a negative subsidy or tax on profitability of an agricultural activity which uses an input that tax is imposed on. Let us assume that this tax raises the price of this input from its world market price $OP_w$ to the actual market price $OP_c$. This rise in price will lead, normally to a reduction in the amount of the input consumed from $OQ_4$ to $OQ_3$ and to an increase in cost per unit of this input $OP_c$. If $OQ_4$ is the scientifically recommended amount then reducing it will automatically result in a fall of output quantitatively and even qualitatively. If the producer consumes $OQ_3$ amount he/she will have to pay $P_wP_cB_c$ worth of money more than it is socially necessary. Area $P_wP_cBC$ designates a transfer of resources from the producer who uses the taxed input to the Government treasury. Ultimately profits that would be reaped in the absence of this policy instrument are reduced by the amount of this transfer.



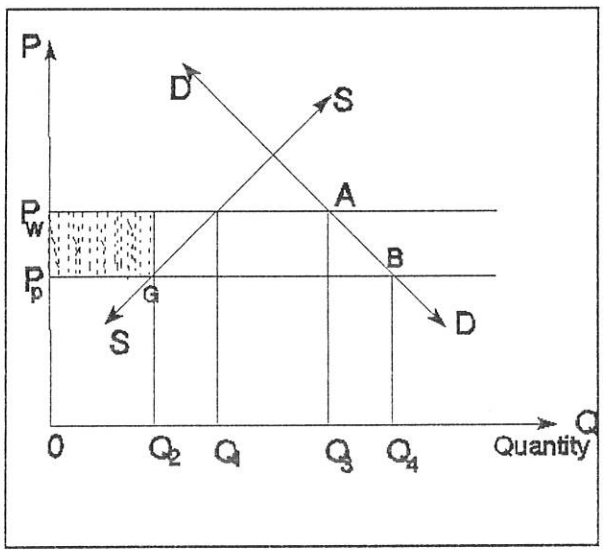

Source: Monke and Pearson [1989].

*Figure 2.2: Effect of Negative Subsidy on profitability.*

Where (i) DD and SS are demand and supply curves respectively, (ii) Q is quantity (iii) P is price.

### 2.2.3 The effect of price fixing below world market price

It may also happen that a government may decide to fix a producer price for an agricultural commodity below the world market price. What may theoretically happen in this case is illuminated in figure 2.3.




Source: Sadoulet et al [1995].

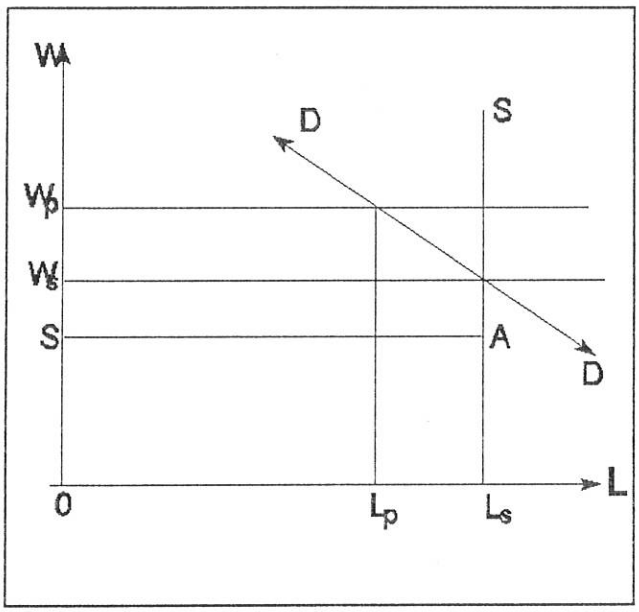
*Figure 2.3 The effect of price fixing below world market price.*

In this figure the producer price Pp is set below world market price Pw. What follows after fixing the producer price at the that level is that the amount to be produced drops from $OQ_3$ to $OQ_4$. The amount of drop will depend on, inter alia, the price elasticity of the commodity in question. All the same the amount $OQ_2$ is sold at a lower price Pp than the world market price $P_w$. In this way the producer is made to lose ($OP_w$-OPp) units of currency per unit of output. The government, de facto, transfers this amount from producers to its treasury.

### 2.2.4. Effects of Wage Legislation

As our agricultural activities involve labor and as governments may also intervene in the labor market via wage legislation, for example, it would be appropriate for us to show first

what may theoretically happen on introducing government policy interventions in the labor market.




*Source: Sadoulet et al [1995]*

*Figure 2.4 Effects of Regulated Wage Rate.*

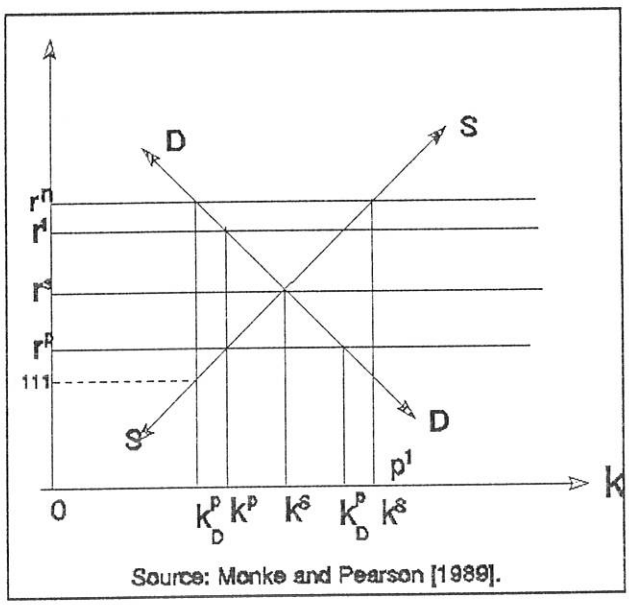
In Figure 2.4 we have along the horizontal axis labor (demanded and supplied) and along the vertical axis there is wage rate. In addition the amount of labor supplied is represented by the supply curve S while the amount of labor demanded is represented by demand curve DD.

The policy instrument to be introduced is the legislation to provide minimum wage for skilled labor. The initial equilibrium is at the point of intersection of the two curves and the equilibrating wage rate $W^s$ is the social value of labor. If the government considers wage rate Ws too low and raises it to $W^p$, of course producers will adopt it in their choice of inputs and use fewer units of labor that will provide a higher marginal value product which is equal to $W^p$. The act of using fewer units of labor by employers will result in decline of total labor demand from $L^s$ to $L^p$ and the income of employed people will increase. Refer to figure 2.4.

Therefore when the minimum wage is set at $W^p$ above $W^s$, labor becomes more costly than it is socially necessary and, as it forms part of costs of production, will reduce the profitability level of the agricultural activity in question.

### 2.2.5 Effect of Controlled Credit Market

Although, as we argued in chapter three, credit market in this country is virtually non-existence as far as agricultural households producing coffee are concerned, we should be amenable to the theoretical workings of a controlled credit market in affecting profitability of agriculture activities.



Source: Monke and Pearson [1989].

*Figure 2.5: The Effect of Interest Rate Control in the Capital Market.*

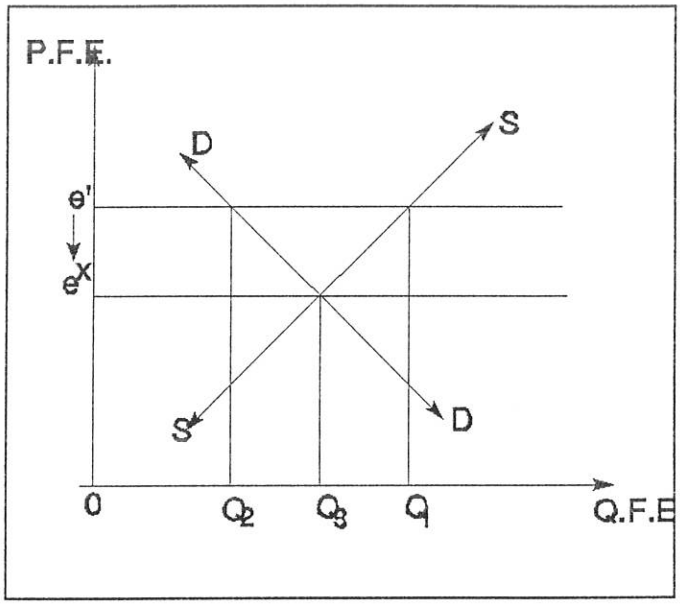
In figure 2.5 we have along the horizontal axis amount of capital K; and along the vertical axis we have interest rate r. While SS and DD are supply and demand curves. In this case the demand for capital reflects the marginal value produce of investment and we have drawn the supply curve with a positive elasticity to show that consumers are ready to reduce consumption level as the reward to savings increases while we have in mind the idea that the domestic supply of capital is provided through savings. From figure 2.5 we can see that the initial equilibrium is represented by interest rate $r^s$ and quantity capital $k^s$. In fact these are the coordinates of point of intersection between supply and demand curves. If there are not any divergences rs represents the social value of capital. If there is legislation of reducing the interest rate from $r^s$ to $r^p$, then more capital will be demanded ($k^p{}_D$) although this will be followed by a reduction in capital supply from ks to $k^p{}_s$ and a subsequent rise in interest rate

from rp to $r^1$.However, the point we would like to stress here is that the lower the price of capital (interest rate) the more the capital will be employed for production. Without going into complicated details of the figure we may immediately deduce that in this situation less capital will be demanded $P^p_D$ although more of it is supplied $k^p_s$. Subsequently again the interest rate will drop to $r^{111}$.

Our relevant conclusion is that policy intervention in the credit markets may have an effect on the profitability of an agricultural activity.

### 2.2.6 Effects of changes in the Foreign Exchange Rate

So far we have demonstrated how policies on the product and factor markets do affects profitability of an agricultural activity such as coffee production carried out by especially small holders. As coffee is a tradable agricultural product it must be linked up with other tradable products in the foreign markets via foreign exchange rates. For example some agricultural households in Ethiopia need to use (imported fertilizers and pesticides) in order to produce coffee. This implies that if the prices of these inputs in terms of foreign currency are higher than they are socially necessary, owing to policy interventions in the foreign exchange market, then coffee producers are likely to reap lower profits from coffee production. If these prices are lower within the same context then more profits are likely to accrue to producers. Here we shall theoretically demonstrate the effects of foreign exchange rate in both cases.




Source: Sadoulet et al [1995]

*Figure 2.6: Effect of overvaluation of Exchange Rate.*

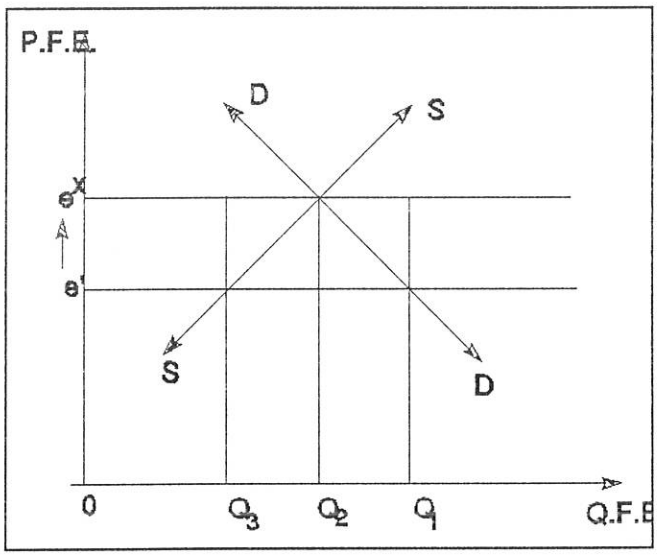
Figure 2.6 illustrates the effect of overvalued exchange rate on the profitability of an agricultural activity. In this figure the quantity of foreign exchange is along the horizontal axis while the price for it or exchange rate is along the vertical axis. The demand DD and supply SS curves represent the demand and supply for the foreign exchange respectively. The supply curve SS designates the amount of foreign currency earned from sales of exports like coffee and it is upward sloping to indicate that as the price for foreign exchange (i.e. the exchange rate) rises, domestic producers of exportable find foreign market opportunities more attractive.

The demand curve DD represents the amount of foreign exchange used to buy imports and it is downward sloping because imports become cheaper in domestic prices as the exchange rate declines, and hence consumers demand increasing amounts of importables.

As we refer to Figure 2.6 we can see that at the initial exchange rate e' there is surplus of foreign exchange ($Q_1$-$Q_2$). In this case domestic producers earn $Q_1$ units of foreign currency but domestic consumers (importers) spend only $Q_2$ units of foreign currency. The difference

($Q_1$ - $Q_2$) unit of foreign currency is kept by the government as foreign exchange reserves. Therefore producers will reduce their supplies of foreign exchange generating exportable until the exchange rate is in equilibrium at $e_x$; Figure 2.6 refers. This implies that when the exchange rate is overvalued exportables fetch less money than the importables cost in domestic currency. We may also deduce that an agricultural activity which produces tradable product, such as coffee, under the situation of overvalued exchange rate will have its profits reduced at the same rate as the rate of overvaluation, Sadoulet et.al(1995).

Another thing that the government may do if there is excess demand for foreign exchange is to devalue its domestic currency against foreign currencies in order to restore the balance between supply and demand for foreign exchange. In this process the domestic currency is make to depreciate relative to other currencies. Let us now investigate the effect of devaluation on profitability of an agricultural activity that is producing an internationally traded product like coffee.




Source: Sadoulet et. al [1995]

*Figure 2.7: Effects of Devaluation.*

The effects of devaluation on profitability of an agricultural activity are shown in Figure 2.7. By looking at this figure we can see that at the initial stage where foreign rate is at e' there is excess demand for foreign exchange ($Q_1$ - $Q_3$). Demand for import is equal to $Q_1$ units of currency while exports are providing or earning only $Q_3$ units of currency.

When devaluation takes place, the world prices in domestic currency are raised by the percentage that the domestic currency is devalued. Local producers, say coffee producers respond to the increased prices by expanding their output of exportable and even other importables. Local consumers may react to these higher prices by reducing demand for these commodities.

We also can see from this figure that import expenditures decline from $Q_1$ to $Q_2$ units of currency and export earnings rise from $Q_3$ to $Q_2$ units of currency. The exchange rate $e^x$ equilibrates demand for and supply of foreign currencies which have been earned through sales of exportable are wanted for importables.

In conclusion we may contend that when there is overvaluation of the exchange rate, devaluation will increase profitability of activities that produce exportable.

### 2.2.7 Market Failures and Their Effects

Policy distortions are not the only factors causing divergencies, failures of product and/or factor markets from functioning properly are another group of causes of price divergencies from the economic ones.

There are three sources of market failures, Monke and Pearson [1989]. These are
i. undeveloped institutions and communication networks;
ii. Externalities, and
iii. Monopolies and Monopsonies.
Concerning the first source, institutions and communication networks are so much undeveloped that competitive services and full information are prohibited from establishing efficient allocation of products and/or factors. Subsequently, prices of goods and services will not reflect their true scarcity values.

Externalities, being costs for which the imposer cannot be charged or benefits for which the provider cannot be compensated, result in divergence between the actual market prices and

the efficiency ones. Examples on externalities are soil erosion, environmental pollution, roads, railways, rivers, points, and irrigation works.

In place where externalitites impose negative outcomes costs of agricultural production will be higher than social ones, whereas agricultural activities which derive benefits from such externalities will be relatively less expensive. Our conclusion is obviously inclined towards saying that externalities have some effect on the profitability of an agricultural activity.

Monopolies and monopsonies, by nature do not operate at the level of prices where marginal costs are equal to marginal revenues. Instead they have the chance of manipulating product and factor markets for their own advantage. Thus, given monopolies and monopsonies actual product and factor prices are likely to deviate from the efficiency prices of the same. This is because monopolies and monopsonies do not operate under the influence of competitive markets.

# CHAPTER THREE

## 3.0 Overview of the Coffee Industry in Ethiopia

### 3.1 Area and Production of Coffee

Ethiopia is considered to be the home of Arabica coffee. The country has very good natural growing conditions for the production of the high quality coffee. Production process of coffee involves the cultivation and maintenance of coffee shrubs and harvesting of coffee berries. Coffee trees come in to production 3-4 years after planting and are in full production at 6-8 years

Though coffee is grown in many parts of the country, the bulk is produced in 5 major coffee producing zones, of which Jimma, Illubabor, Wollega and Hararge are located in Oromia and Sidamo in southern People Nations and Nationalities. According to one survey by the Ministry of Coffee and Tea Development(MCTD), (National coffee survey 1984), these regions accounted for about 85.3 percent of total coffee growing households, 88.0 percent of total land under coffee cultivation and more than 90 percent of the national coffee output in 1983 and 1984.

It is often difficult to find accurate and reliable data regarding area under coffee cultivation and volume of annual coffee output. But area has frequently been estimated to range between 350,000 and 600,000 hectares and annual output between 150,000 and 200,000 tonnes. Coffee area and production survey (1984) by MCTD however estimated that area under coffee to be about 321,048 hectares and production 151,565 tonnes. Coffee is produced predominately by smallholder peasant farmers. No more than 4 percent of the coffee production come from coffee state enterprises such as Teppi, Bebeka, Arbagugu and Limmu.

According to Coffee Improvement Project report of coffee and Tea Authority, coffee production is classified in to four main categories:

a) **Forest Coffee**, which is self sown coffee, with no cultivation, but slashing only once a year to facilitate picking. Typical of Jimma, Ilubabor and Wollega, these naturally wild coffee trees are decreasing due to new settlement and expansion of cultivated areas. The average yield ranges from 350 Kg/ha in Wollega to 400 Kg/ha in Jimma and Illubabor.

b) **Garden Coffee**, which is coffee grown at low densities around the home by domestication of forest coffee, and which is intercropped with food crops. It is mainly found in Sidamo, Hararge and parts of Shewa. The average yield is around 400 kg/ha.

c) **Semi-plantation coffee**, Semi-plantation coffee is coffee planting following traditional management practices. Naturally grown seedlings are used for planting with high densities of 4000 trees/ha in western Ethiopia and 1000-2000 trees/ha.in Sidamo and Hararge.

d) **Plantation coffee**: Modern coffee plantation following recommended cultural practices including row planting, fertilizing, mulching, pruning and regular hoeing.

Coffee husbandry practices vary from region to region depending on the production system outlined above and to a greater extent on the type of producer. As the bulk of coffee is produced by the household sector coffee farming activities are traditional and mostly limited to some planting and weeding.

Coffee trees are often infested by fungi, bacteria and virus in Ethiopia. Among these coffee Berry Disease (CBD) has spread all over the coffee growing regions and caused considerable damage with subsequent loss of up to 20 -30 per cent of the total production per annual (Tefsitwold 1994). Although their effects are not determined yet, there are about 400 types of pests affecting coffee production.

### 3.2. Institutional development in the coffee sector

Although coffee domestication was believed to have been started many years ago its cultivation as means of generating cash began in the early of 19$^{th}$ century (CTDMA, 1978).

According to one evidence (CTDMA,1978) few foreigners and local land lords were engaged in coffee production and trade activities in 1930. Coffee trade to European Countries was first started from Harar through the port of Djibouti. Export of coffee has increased over time and its role in the economy became prominent. Cognizant of the prominent role of coffee in the country's economy, establishment the organization that execute coffee trade and extension activities was found to be important. The first statutory body for coffee was therefore established in 1957 as the National Coffee Board of Ethiopia (NCB), mainly entrusted with the regulatory task of coffee. This board was accountable for the then Ministry of Trade and Industry. Coffee marketing was free and the task of the board was only controlling the quality of coffee so as to keep its standard for export.

In 1975 immediately after the Derg government came to power the free market economy was replaced by the socialist oriented command economy. To facilitate the government intervention in the industry, a department was set up with in NCB to deal with coffee procurement and export. It was named as the Coffee Production and Processing Agency.

The Coffee and Tea Development and Marketing Authority was created in 1977 when tea development and marketing activities was added. The authority was entrusted with the tasks of the improvement of coffee production, harvesting and processing. Further more its functions and duties had been enlarged to include regulatory functions, implementation of international agreements on coffee, internal and external trade in coffee and tea development its extension activities include educating the farmers in the use of improved agricultural practices, harvesting and processing.

The increasing interest of government in controlling the coffee sector resulted in upgrading the authority to a ministerial level. Hence the Ministry of Coffee and Tea development (MCTD) came in to being in 1979 with the incorporation of the coffee state farms and with enlarged roles. MCTD was established with the main objectives of regulating internal and external trade in coffee and tea, implementation of the international coffee agreements; providing extension services, and undertaking coffee inspections. To achieve these objectives, MCTD operates with line departments and through parastatals: the Tea Development Marketing Enterprises (TDE) and the Ethiopia Coffee Marketing Corporation (ECMC).

ECMC was monopoly in purchasing and exporting coffee. In particular it was the only licensed body in exporting washed coffee. On the other hand Coffee Plantation Development Corporation (CPDC) was established subsequent to the nationalization of large commercial coffee farms, and it administers coffee estates and developed new coffee state farms. Smallholder coffee Development activities were organized and managed by a department called the Coffee Development and Project Implementation Department (CDPID). Coffee Improvement Project is the one which gives an important support to some coffee growing areas was organized under this department. This project financed by EEC,has been in operation since 1977. The project was limited to 8 woredas in its first phase and expanded to 15 woredas in the second phase.A third phase now due covers 18 woredas of which 13 are located in Oromia and the rest in Southern People's Nations and Nationalities. The project was initiated in response to the crisis brought by the discovery of CBD in Ethiopia and aimed to provide advice and inputs for the improvement of smallholder coffee production by increasing yields and the reduction of CBD.

In 1991 the centralized command economy was abolished and the transitional government of Ethiopia decentralized power to regions. Regions therefore have established their own administrative set up, including coffee and tea development bureaux. At center, however autonomously the coffee and tea authority, was created in 1994 with major objectives.

- to enhance the growth of the country's coffee and tea production in quality and quality.
- to promote tea and coffee trade
- to encourage the industrial processing of coffee and tea and control their quality.

The authority works in collaboration with the regional bureaux but its main task is toward coffee trade while coffee development activities are the duty of regional bureaux.

### 3.3 Coffee Processing

Most of the Ethiopian coffee is processed in sun dried form. The production of washed coffee is small, which may attributed to low supply of red cherry to washing stations( due to labor demanding of red cherry picking ). Harvesting for sun dried coffee processing consists of stripping or milking-off the cherries, a combination of green, ripe and black altogether. Selective picking is considered uneconomic because the additional labor input is not sufficiently compensated by price premium for quality. Drying is mostly done on the ground, often insufficiently, to a moisture content at which mould and fungi can cause quality deterioration in the period between drying and hulling.

The output of sundried coffee of clean coffee derives from approximately double the weigh of dried cherry (Jenfal). Most of the output of sundried coffee in the country is processed using hullers, while some is processed using mortar and pestle in some parts of the country. The resulting output of hand-pounded coffee is locally known as Marbush (rough hulled) which is used for consumption and sale especially in Hararge zones. But most is delivered to rural hullers in the interior, mostly by man and animal power.

Following receipt of the sun dried cherry at the hullery, precleaning and destoning are carried out before the cherries enter the huller. The hulling operations separates the beans from the dried cherry, preferably without excessive heating or breakage of the beans. The basic raw material required for successful hulling is fully dried cherry of reasonably even size. Under sized cherries are handled through separation and re-processing. The key factor is cherry dryness. If the husk is somewhat brittle, it will separate easily from the beans.

The wet processing (use of pulper and fermentation) was introduced in the 1950s. Processing took place in a variety of washing stations mainly owned by the private sectors. The stations were of traditional design, equipped with diesel powered 3 disc pulper and rotary sieves. No soak tanks or water re- circulation systems were provided but the stations were equipped with skin traps designed to remove at least the coffee pulp from the liquid effluent. For the last 15 years, however there is a drastic change in the shape and design of the washing stations. The recent reforms in coffee marketing further encouraged investors to establish a very

modern pulpers through out the coffee producing zones. Currently a total of 342 hullers and 224 pulpers are operating in the country.Distributional 238 hullers and 83 pulpers are located in Oromia, while 104 hullers and 141 pulpers are in the Southern Peoples Nations and Nationalities.

### 3.4. Coffee Marketing structure

Since the 1960's three distinct periods can be considered with respect to the marketing structure. During the imperial government (until 1974), the structure was market based. Coffee was bought by traders at various levels of the marketing chain, some of which would reach terminal market at Dire Dawa and Addis Ababa, where auctions in which exporters participated took place.

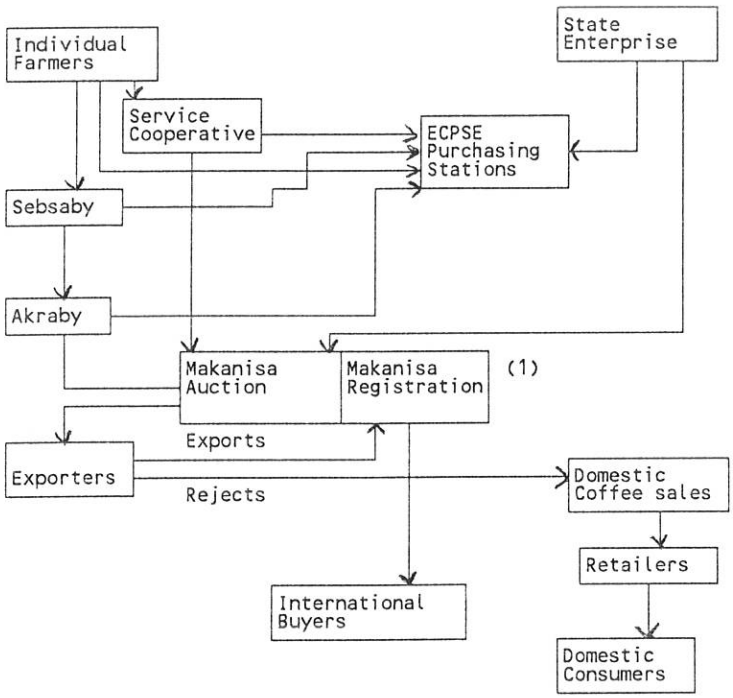
After the 1974, the Military Government took control over coffee markets at all levels. Private traders were condoned, but were severely constrained via price controls at all level of marketing chain. A government agency: The Ethiopian Coffee Marketing Corporation (ECMC) took on substantial responsibilities in the marketing of coffee and soon controlled more than 80 percent of the officially handled supplies. Private traders could not freely sell coffee in the domestic markets.

The Transitional Government of Ethiopia reversed most of these measures. Coffee marketing has been freed. The monopolistic nature of Ethiopian Coffee Marketing corporation collapsed and instead another two parastatals, the Ethiopian Coffee Purchase and Sales Enterprise (ECPSE) (which is limited to domestic operation) and the Ethiopian coffee Export Enterprise have been established, which would operate competitively with other private traders. Coffee traders can sell and buy as they wish even though licences are still required and are relatively expensive. The detail existing coffee marketing structure is discussed below.

The coffee marketing channels in Ethiopia are illustrated for sundried coffee and washed coffee in figure 3.4a and 3.4b. As it is indicated individual producers can either sell their coffee to service cooperatives, Ethiopian Coffee Purchase and Sale enterprises (ECPSE) or to private traders but not authorized to bring to auction centers. However, the state enterprise

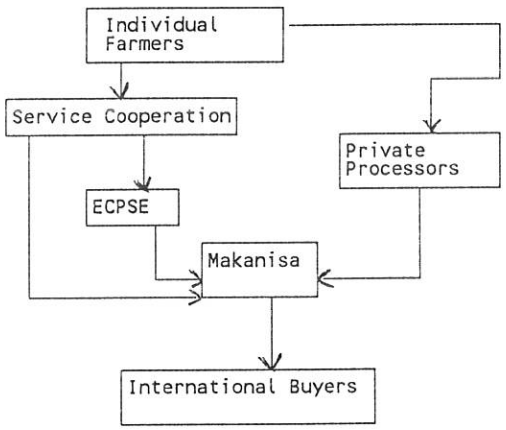
can sell to ECPSE or even direct to the central market. Marketing of washed coffee (figure 3.4b) is channelled through service cooperatives individual traders (private traders) and ECPSE. High volume of washed coffee market is mainly undertaken by the Ethiopian Coffee Sale and Purchase Enterprise, which has already established large number of purchasing stations at the different parts of the country. Involvement of the private sectors in washed coffee processing at a moment is encouraging which is expected to create competitive atmosphere and raise price for producers.

Figure 3.4a: **Market Structure-Sun dried Coffee**




(1) Hararge Coffee goes to Dire Dawa, not to Addis/ Makanisa

**Figure 3.4b: Market structure of washed coffee**

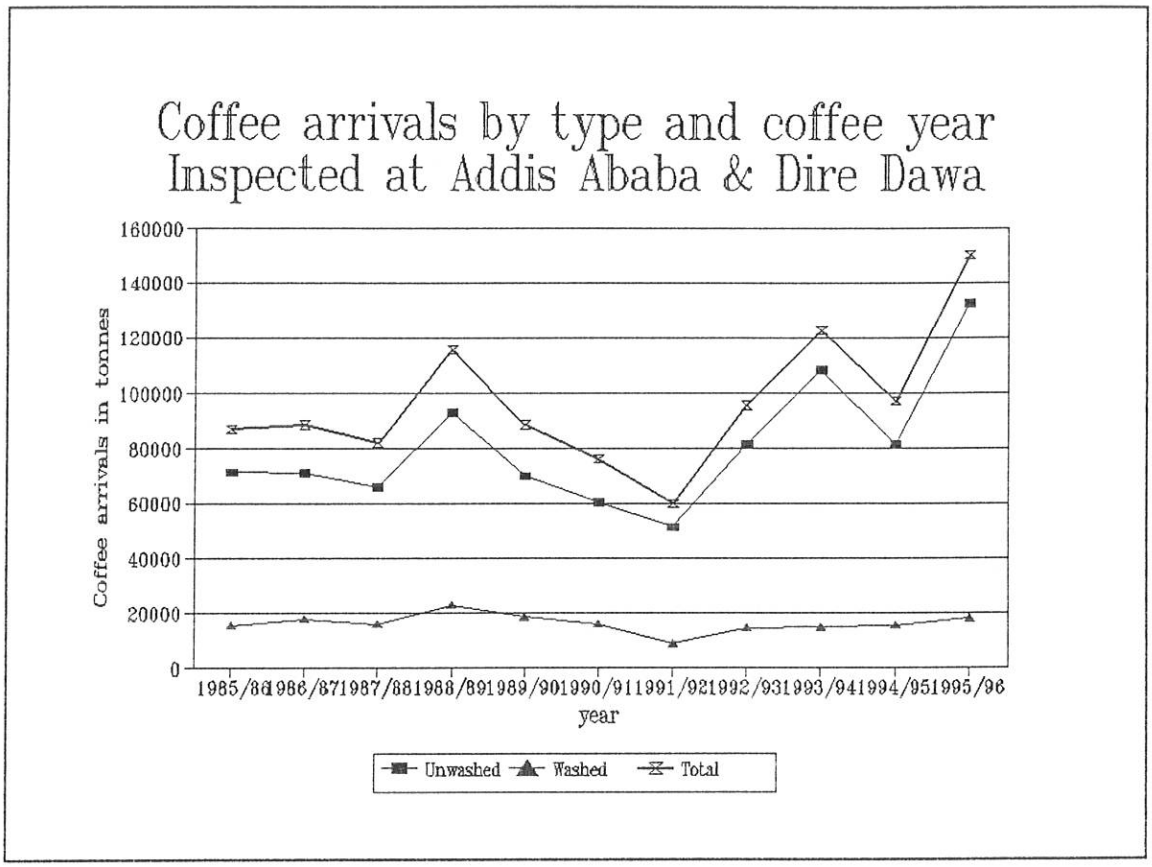


In principle a great number of marketing agents are required for perfect competition and hence to increase the marketing efficiency. In this regard different marketing agents are operating in coffee industry of the country. Producers may sell their coffee to Ethiopian Coffee Purchase and Selling Enterprise, service cooperatives or to sebsabies(local coffee collectors). Sebsabies are licensed to operate at certain market points only and are not authorized to purchase in different areas. They are in fact not permitted to store coffee for more than 3 days but must sell all coffee immediately to an akraby (coffee delivers to central market) licensed to operate within the woredas. Akrabies are authorized to store coffee and sell either to ECPSE or at auction at terminal markets. Presently more than 5000 licensed sebsabies and about 2000 licensed akrabies distributed through coffee growing zones.

The "terminal markets" are "auctions" at Addis Ababa, and for Hararghe coffee at Dire Dawa, where coffee delivered by akrabies allocated to exporters. In Addis the auction held at makanisa and at Dire Dawa it is held in a room in the coffee and tea authority offices in the center of the town. All exporters participate in the process of coffee auctioning. These exporters then buy coffee at auction and again the process of hulling (removing the parchment) and caring would take place at their processing plant. Almost all exporters own coffee processing plant, those who do not posses processing machine use the Kaffa Coffee processing and grading enterprise which is currently operates autonomously as enterprise and give service to any interested exporters with fair price.

All coffee arriving in Addis Ababa and Dire Dawa is inspected and registered by inspectors of the Coffee and Tea Authority Trade Control Department. In Addis Ababa this is done at makanisa for sundried coffee and kaffa1 for washed coffee. Total volume of coffee arriving at Addis Ababa and Dire Dawa for past ten years is shown in the figure 3.4c. The figure indicates that coffee arrivals at the central market were relatively high in 1988/89,1993/94 and 1995/96 with 115502,123046 and 150339 metric tones respectively. Good harvest has contributed for high arrival in the former year, while in the later two years price reforms switched coffee from illegal trade to official channels. The lowest figure (60257 tonnes) in 1991/92 attributed to instability created in the country when derg was overthrown.

Figure 3.4c: Coffee Arrivals(1985/86-19995/96)




Export marketing was dominated by ECMC during the derg regime (currently named as ECEE). For example in addition to holding the monopoly of washed coffee marketing it also in 1987/88 sold 92 per cent Ethiopian sundried coffee exports. However, presently the increasing participation of private exporters is keeping down the monopoly nature of Ethiopian Coffee exporting enterprise. In last year for instance private exporters exports more than half of the total exports.

At the moment about 62 private exporters are engaged in coffee exporting activities. This figure was 13 six years ago. Total exports by exporters are shown in table 3.4.1. The contribution of the private sector increased from a total of 5906 tonnes in 1986/87 to 56001 tonnes in 1995/96.

**Table 3.4.1: Volume of Coffee Exports by exporters (1985/86-1995/96)**

| | Quantity of Coffee Exports in tonnes by exporters | | | |
|---|---|---|---|---|
| Coffee year | E C E E | Private exporters | Total | % of exports by private |
| 1985/86 | 66162 | 7028 | 73190 | 9.60 |
| 1986/87 | 67505 | 5906 | 73411 | 8.75 |
| 1987/88 | 76123 | 6976 | 83099 | 8.40 |
| 1988/89 | 76017 | 8005 | 84022 | 10.50 |
| 1989/90 | 71714 | 11216 | 82930 | 13.52 |
| 1990/91 | 42978 | 7989 | 50967 | 15.67 |
| 1991/92 | 31355 | 8765 | 40120 | 21.85 |
| 1992/93 | 50444 | 19166 | 69610 | 27.53 |
| 1993/94 | 42513 | 37407 | 79920 | 46.81 |
| 1994/95 | 48163 | 31081 | 79244 | 39.22 |
| 1995/96 | 50638 | 56001 | 106639 | 52.51 |

Source: coffee and Tea Authority

The share of Ethiopia in the world coffee market remain very small about 2% (table 3.4.2),thus the country is a price taker. Since the country heavily relies on coffee export for foreign exchange earnings, the international coffee price instability highly affects the performance of the country's economy.

**Table 3.4.2 : Ethiopia's Share in World Coffee Trade under International Coffee Agreement ( tonnes).**

| Year (1) | Exports of all members to all destinations (2) | Exports of Ethiopia to all destinations (3) | (3) as % of (2) |
|---|---|---|---|
| 1984/85 | 4136640 | 68963 | 1.7 |
| 1985/86 | 4132740 | 73190 | 1.8 |
| 1986/87 | 4383360 | 73412 | 1.7 |
| 187/88 | 4730560 | 83099 | 2.2 |
| 1988/89 | 4302600 | 84022 | 2.0 |
| 1989/90 | 4870260 | 82930 | 1.7 |
| 1990/91 | 4458720 | 50967 | 1.1 |
| 1991/92 | 4668300 | 40120 | 0.9 |
| 1992/93 | 4670700 | 69610 | 1.5 |
| 1993/94 | 4317600 | 79920 | 1.9 |
| 1994/95 | 3904077 | 79244 | 2.0 |
| 1995/96 | 4302371 | 106639 | 2.5 |

Source: Coffee and Tea Development Authority.

## 3.5. Some Government Macro-Economic policy related to Coffee Industry.

### 3.5.1 Coffee Pricing Policy

The evolution of coffee prices in Ethiopia is assessed since the beginning of the 1960s. During the imperial regime pricing was free but prices were not systematically recorded. However, during the Derg regime and upto one year after its fall coffee marketing was controlled by government and there were two stages of price determination which mainly involved the calculation of taxes and marketing costs (ULG & Food Study Group,1987).

Initially, surtax was calculated on average price quotations of the New York market for the Brazilian Santos4. This method was found to be inappropriate since the sales price of Ethiopia coffee was less than the price of Santos4. Subsequently, the base for the calculation of local price was changed to the average price of the 28 preceding (to be used for the following 28

days) of the composite price pursuant to the International coffee agreement of 1976. Again the International Coffee Organization (ICO) composite price was found to be different from the world price of the Ethiopian coffee. Starting from 1990,the base for coffee surtax and the auction price calculation was changed to the price quotations of daily sales of Jimma 5 at F.O.B. price. Clearing costs, transport, bank and insurance charges, taxes and exporter's margin were deducted from F.O.B. price of coffee sales at Assab to arrive at the auction price.

The second stage in the formation of the producer price started from the determination of the auction price discussed above. Costs and profits of the intermediaries are deducted from the auction price to arrive at the producer price. For washed coffee, fixed purchase price of red cherry had been set annually with a price premium for higher qualities.

Starting from 1992/93, the TGE has introduced the minimum producer floor price for sundried coffee with variations between regions as indicated below.

**Table 3.5.1: Producers' price of sundried coffee (unwashed).**

| Regions | Producers price(birr/kg) |
|---|---|
| Jimma | 4.20 |
| Illubabor | 4.20 |
| Wallaga | 7.00 |
| Sidamo | 6.50 |
| Hararghe | 9.10 |

Source: CTDA, Planning and Programming Department.

This system is still operating and according to the Ethiopian coffee purchase and Sales Enterprise(ECPSE) the announced floor prices should be maintained and marketers have to compete above that price in their procurement activities.

### 3.5.2. Subsidization and Taxation

As regards subsidization policy, this has been rather remarkable with respect to fertilizers and spraying chemical for coffee. This policy had an end effect of reducing production costs and hence, ceteris paribus, increasing producer's profits. However excessive subsidy might make producers dependent on government and increase government budget deficit.

Teshome (1972) indicated that the government used to impose export tax on coffee starting from early 1950's. The active government participation in the international marketing of Ethiopia coffee beginning in 1975 had increased taxation on coffee export. Cess (coffee board fees) and surtax on coffee export have commenced to operate since 1976.

Under existing legislation pertaining to taxation of the coffee sector in Ethiopia the following taxes are levied on coffee exports.

1. Export duty, this is a flat rate specific duty of 150 Birr per tonne,levied on all coffee exporters
2. Cess tax (coffee board fees). This is another flat-rate specific tax of 50 birr per tonne levied on export. Originally this cess tax was established to cover the administrative cost of the then established Coffee Board of Ethiopia. The original rate was 3 birr per quintal and later it was increased to 5 birr per quintal. Nowadays it generates more than 5 million Birr to the government revenue annually which is about one per cent of FOB price.
3. Transaction tax, this is an ad-valorem tax on the turn over of coffee exporters currently levied at the rate of 2 percent of sales
4. Surtax: The surtax is the major important tax. This is a variable rate specific tax on all coffee exports collected by Customs and Excise Departments of the Ministry of Finance. Initially the base for determination of the surtax was Brazilian santos4. However, there had been a great difference between price of Ethiopian coffee and Santos4 thus the International Coffee Organization indicator price was preferred and used as base for surtax determination.

The rate of surtax application and its schedule prior 1989 was shown in appendix I. Again this taxation system was revised in 1990 and FOB price of Jimma 5 has been used. Here the rate of surtax was somewhat lowered by freeing tax for lower price upto 50 cents/lb as indicated in appendix II

Of course the revised surtax calculation has improved the producer's price. For example assuming that the ICO indicator and Jimma5 have got equal price say 120 cents per pound. In former surtax calculation the government receive a total of $21+100+60=181$ birr per quintal while in later case only $12.5+25+40=77.5$ birr per quintal goes to government treasury. Hence the differences contributed to increase producers price. The share of tax in unit value of export has been discussed by Stefan.D.et al ,(1994). They indicated that coffee taxes measured as a percentage of the unit export value price was nearly a quarter between 1970/71 and 1975/76, rising to 44 percent in the latter half of the 1970's and 40 percent between 1981/82 and 1985/86, with declining World prices, the rates dropped to about 25 per cent between 1986/87 and 1989/90. The further decline in world prices and the starting of gradual economic reforms brought the tax rate down to about 4 per cent in 1990/91 and 1991/92.

### 3.5.3 Financial market

It appears logical that with the existence of efficient and non-rationing financial markets farmers may have their final constraints relaxed through borrowing final capital from financial institutions. The interaction between agricultural and financial sectors may lead to increase in the marginal productivity. But the relationship between agricultural households and the financial institutions in this country has been weak. Direct lending to farm households is generally negligible. For example, the share of agricultural loan disbursal from agricultural and industrial development Bank to the private sector (households) was almost negligible until 1988/89 when the private sectors share become about 1 percent of the total agricultural loan disbursements (Itana,1994),Informal lending with high interest rate is thus the only source of finance for peasant households.

This bank has been lending money mainly to public enterprise and cooperatives. For instance in the 1980s about 92 per cent of its loans were issued to public enterprise and cooperatives. In case of coffee sub-sector households under Coffee Improvement Project (CIP) had access to credit. This project was involved in purchasing and distributing small farm tools, sprayers, fertilizers etc. to CIP areas on credit basis at official interest rate. However, these facilities were not available in the rest of coffee growing woredas. Presently even the project had stopped the provision of these services and there are no credit facilities in any of the coffee growing woredas.

### 3.5.4 Land Market

During the imperial regime, land was freely marketed. The coffee areas were dominantly owned by big landlords. The 1974 revolution and subsequent proclamations nationalized land in the country and provided the peasants with user right over land they cultivate. Land marketing was legally prohibited and it became the property of the government. At the moment there is no clear rural land policy but land remains the government property according to the new constitution.

### 3.5.5. Exchange rate

The Ethiopian exchange rate was characterized by persistent overvaluation of the birr against the US$ Dollar for several periods until the recent reforms (1992). Table 3.5.2 supports this claim. The immediate consequence of the overvalued exchange rate is a decline in terms of trade on the part of exports such as coffee.

Heavy taxes disrupted the incentive structure of coffee producers. By looking at Table 3.5.2, we can notice that the period between 1984/85 and 1991/92 is associated with very high rates of exchange rate overvaluation.

Devaluation came into force in the 1992/93. At the beginning the Birr was devalued by 58.6 percent(from US$ 1 : Birr 2.07 to US$1: Birr 5). Then after the rate has been determined by

auction which took place bi-weekly and lately weekly. The latest rate is 1:6.41(US$:BIRR). Coffee producers are expected to benefit from this substantial devaluation of the birr.

**Table 3.5.2: The official, Parallel Exchange rates and Premium in Ethiopia.**

| Year (G.C.) | Official rate Birr/US dollar | Parallel rate Birr/US dollar | Premium (%) |
|---|---|---|---|
| 1971/72 | 2.30 | 2.71 | 17.83 |
| 1972/73 | 2.07 | 2.93 | 41.55 |
| 1973/74 | 2.07 | 3.20 | 54.59 |
| 1974/75 | 2.07 | 3.48 | 68.12 |
| 1975/76 | 2.07 | 4.08 | 97.10 |
| 1976/77 | 2.07 | 4.25 | 105.31 |
| 1977/78 | 2.07 | 3.70 | 78.74 |
| 1978/79 | 2.07 | 3.58 | 72.95 |
| 1979/80 | 2.07 | 2.86 | 38.16 |
| 1980/81 | 2.07 | 3.03 | 46.37 |
| 1981/82 | 2.07 | 3.11 | 50.24 |
| 1982/83 | 2.07 | 3.50 | 69.08 |
| 1983/84 | 2.07 | 3.76 | 81.64 |
| 1984/85 | 2.07 | 4.74 | 128.98 |
| 1985/86 | 2.07 | 4.10 | 98.07 |
| 1986/87 | 2.07 | 4.30 | 107.73 |
| 1987/88 | 2.07 | 5.90 | 185.02 |
| 1988/89 | 2.07 | 6.10 | 194.68 |
| 1989/90 | 2.07 | 6.00 | 189.85 |
| 1990/91 | 2.07 | 6.10 | 194.68 |
| 1991/92 | 2.07 | 7.30 | 252.65 |
| 1992/93 | 5.00 | 7.50 | 50.00 |

Source: Cowitt(various years), World Currency Year Book Series.

# CHAPTER FOUR

## 4.0. Methodology and Descriptions of the study areas

### 4.1. Methods of the Analysis

At the first place a dynamic approach of analyzing government price intervention will be applied. In this case dynamic error correction model which makes the use of producers' price of coffee as a function of border price(in absence of direct intervention) will be employed. Second a Policy Analysis Matrix (PAM) (static approach) will be adopted to measure the efficiency effects of the government intervention on the coffee commodity system.

Finally, the impact of the policy reform such as increased price, devaluation,etc. on resource allocation of the coffee producers will be investigated. Coffee production function for the year 1995/96 will be estimated and test for allocative efficiency of the major farm inputs will be made.

#### 4.1.1. A dynamic approach of analyzing price intervention

Here a dynamic error-correction model of government price intervention will be developed provided that coffee farmgate price is the function its border price (in absence of direct intervention) and the two are cointegrated. This type of method that uses endogenized parameters is known as the variable coefficient approach developed by Schiff M. et a l., (1992).

$$\text{Let } Lpf_t = \log(pf_t) \quad \ldots\ldots(1)$$

$$Lps_t = \log(ps_t) \quad \ldots\ldots(2)$$

Where $pf_t$ is the producer price of coffee,and $ps_t$ is the border producer price of coffee (farmgate price in the absence of direct interventions).

Assuming that policy makers determine $pf_t$, according to the decision rule.

$$\Delta LPf_t = \alpha + \beta\Delta Lps_t + \delta(pf_{t-1} - \gamma Lps_{t-1}).....(3)$$

Where $\Delta Lpf_t = Lpf_t - Lpf_{t-1}$, the same holds true for $\Delta Lps_t$

Three distinct sets of forces affect $\Delta Lpf_t$ in any period.

1) The short run transmissions from changes in international prices ($\Delta Lps_t$) to changes in domestic prices ($\Delta Lpf_t$) we expected $\beta$ to be positive, and assuming that the short run price stabilization is an objective of policy intervention, we expect it to be smaller than 1($0<\beta<1$).

2) The second force is the long-run target rate i.e. the long run relationship that policy makers want to maintain between the domestic price $Lpf_t$ and the foreign price $Lps_t$ so that $Lpft=\gamma Lps_t$. If $\gamma=1$,then $Lpf_t=Lps_t$ in the long run there is no intervention. In our case since coffee export was taxed we would expect $\gamma$ to be smaller than 1.

3) Whenever $Lpf_{t-1}$ is above its long run target ($\gamma Lps_{t-1}$),we would expect a down ward adjustment in the price at time t or an upward adjustment when it is below its target to reduce the gap between the domestic price and its long run target. We expect the coefficient $\delta$ to be negative and lies between -1 and 0.

Thus $\beta$ measures the degree of short run transmission from world price to domestic price, $\gamma$ measures the long run target protection rate and $\delta$ measures the speed of adjustment to the long run target price.

Next we include some economic variables affecting the three parameters $\beta$,$\gamma$ and $\delta$. The size of coffee export as measured by the share of coffee exports in total exports (SHAXX) is positively related to the long target rate of direct taxation (or is negatively related to the long target rate of direct protection).

Thus $\gamma=\gamma_o+\gamma_1$ **SHAXX where,**$\gamma_o>0,\gamma_1<0,\gamma>0$.....(4)

Second we postulate that moving the domestic producer price towards its long term target price involves costs (in terms of resource reallocation changes in income and wealth distribution) and that these costs are directly related to the size of the sector. We use the

share of coffee in agricultural GDP (SHAXY) as the relevant variable affecting adjustment costs. The higher the share the lower the speed of adjustment.

Thus we have $\delta = \delta_0 (1+\delta 1 SHAXY)$, where $\delta_0 < 0$, $\delta 1 < 0$, $\delta < 0$.

Third we postulate that the degree of short run transmission of changes in international prices to domestic prices is inversely related to the degree of government control in the economy. If intervention are extensive we may expect macro-economic policy to be less responsive to international shocks and domestic coffee price is less responsive to foreign price. As measure of general degree of intervention we use the degree of exchange rate distortions. Therefore,

$$\beta = \beta_0 [(1+\beta_1(E^*/E_0-1))], \beta_0 > 0, \beta_1 < 0, \beta > 0 \quad \ldots\ldots\ldots\ldots(6)$$

Where $E^*$ is the equilibrium exchange rate(exchange rate determined by market force), $E_0$ is the official exchange rate, and $E^*/E_0-1$ is the degree of exchange rate distortions ( the deviation of official exchange rate from its equilibrium level).Then from equations 3-6 we have:

$$\Delta Lpf_t = \alpha+\beta_0[(1+\beta_1(E^*/E_0-1))]\Delta Lps_t+\delta_0(1+\delta 1 SHAXY)[Lpf_{t-1}-(\gamma_0+\gamma_1 SHAXX)Lps_{t-1} + e_t$$

$e_t$ refers to stochastic term

Where parameters are expected to have the following sign. $\alpha = 0$, $\beta_0 > 0$, $\beta_1 < 0$, $\beta > 0$, $\delta_0 < 0$, $\delta_1 < 0$, $\delta < 0$, $\gamma_0 > 0$, $\gamma_1 < 0$, $\gamma > 0$.

### 4.1.2. Policy analysis matrix approach.

PAM is a consistency framework which enables measurement of the efficiency effects of government intervention on producer, consumer and the economy at different stages of a vertical commodity chain( FAO, 1993).

The cornerstone of PAM, as discussed by Monke et al. (1989), is the concept of economic profit. Profit is defined as the difference between revenues and costs the value of outputs

minus all costs of inputs. When calculated at the observed market prices the result is termed as "private profit". The definition of private profit is embodied in the first row of PAM A-B-C=D as shown below.

Table 4.1: The Policy Analysis Matrix.

| | Revenues | Input costs | | |
|---|---|---|---|---|
| | | Tradable commodities | Primary domestic Factors | Profits |
| Market value (private price) | A | B | C | D |
| Efficiency value (social price) | E | F | G | H |
| Effects of Divergence (Transfers) | I | J | K | L |

The letter A is used to represent the value of revenues at market prices. The costs of inputs are divided into two categories. One is the cost of tradable inputs ( letter B in table 4.1) which is the market value of inputs available in world market.

The second category of input costs are primary domestic factor costs denoted by the letter C in PAM. Primary domestic factors are land, labor and capital. Domestic factors are treated separately from tradable inputs because they usually are available only in domestic markets.

The second and third rows of PAM are concerned with sorting out the influences of divergences on the private markets values of outputs and inputs. The second row shows what private costs and returns would be without divergences. The values of outputs and inputs are measured at their opportunity costs or social (efficiency) values. E (table 4.1) represents the efficiency value of output and F and G denote the efficiency value of tradable inputs and domestic factors respectively. The letter H represents excess profits at efficiency prices (social profits) and shows the potential (as opposed to actual) competitiveness of the activity.

The difference between private market values and social (efficiency) values is defined as the net effect of each divergence. These values make up the third row of PAM and can be evaluated for each categories of revenue (I), costs (J and K), and profits (L).

In our case PAM is used to measure the effect of policy distortions and market failure on profitability of coffee, at levels of production, processing and marketing. Two time period will be considered in order to capture the influences of structural adjustment programs implemented in Ethiopia, 1988/89 as a pre-reform year and 1995/96 as a post-reform year.

### 4.1.3. Analysis of the impact of policy reform on the use of farm inputs and cultural practices.

Here simple t-statistic will be applied to test the significance differences between the mean values of variables such as coffee holding size, hired labor, fungicides application, etc for the two periods (before and after the reform).

Finally test for allocative efficiencies of the major farm inputs will be made based on cross-sectional data of 1995/96.This is believed to indicate the responsiveness of the coffee producers to change in price i.e if they are allocatively efficient a positive response to price is expected and if not the reform or removal of distortions may have limited effect on coffee production. To do this the following production function is specified.

Theories related to production efficiency and productive uses of resources as well as various applied econometric researches form a basis for using production function as an appropriate techniques of analyzing efficiency in peasant agriculture. Therefore production function techniques was used by assuming each farm considered has the set of all feasible combinations of input and output from which the farm can choose.This can be described by a production function as:

$$Y = f(X_1, X_2; \ldots\ldots X_n) \quad \text{(i)}$$

Where Y is the quantity of output and $X_i$ is quantity of inputs used in the production process of the crop. Cobb-Douglass form of the production function is used most widely in many

empirical studies for identifying the determinants of production and their productivity in agricultural sector.

In fact this specification is characterized by some limitations:

1) The Allen-Uzawa partial elasticity of substitution is restricted to unity(unitary elasticity substitution among inputs).
2) The factor share of output is assumed to be constant (Constant elasticity substitution throughout input output ranges).

However, the neo-classical production function, the Cobb-Douglass form of the following specifications is popular among researcher dealing with efficiency in production and productivity of resources in agriculture.

$$Y=f(X_1.....,X_n)=A\prod_{i=1}^{n} x_i^{a_i}. \qquad (ii)$$

where Y is output, $X_i$ is input , $A>0$, $0<a_i<1$ and $a_1+a_2+..+a_n = 1$

Many authors state that this algebraic model of the production function is mostly used in empirical exercises because of its theoretical fitness to agricultural data and its inherent computational advantage, such as ease of estimation and simplicity in interpretation and more importantly due to its appropriateness in depicting the relationship between input and output.

The functional form of production function selected for the purpose of this study is that of Cobb-Douglass which is specified in equation (ii). It will empirically be estimated using ordinary least square(OLS) methods by transforming it into log linear form and including all determinants of coffee production. All coefficients are expected to have positive sign.

Given the output price denoted as $p_y$ and the price of $i_{th}$ inputs as $px_i$ then allocative efficiency can be derived by equating marginal value product of each inputs to their respective price.

From equation (ii) we have

$$\frac{\partial Y}{\partial x_i} = a_i\frac{Y}{X_i} = Mppx_i \ (marginal\ physical\ product\ of\ inputs)$$

Where Y is coffee output, $X_i$ is the $i_{th}$ input and $a_i$ is the production elasticity associated with resource i, other factors of production being held constant, then allocative efficiency can be determined as:

$$a_i \frac{Y}{X_i} P_y = P_{x_i}$$

## 4.2. Sample Selection and Data Collection Techniques

In principle, the method of collecting information required embraces either the use of sampling of the part of the population or complete enumeration of the whole population. In most empirical studies like the case study under consideration, concentrating on sample representative of a population is often desired.

Two woredas were selected from Jimma zone based on area under coffee, the amount of coffee produced and their accessibility. These are Gomma and Manna. The two woredas have similarity in agro-ecological characteristic, thus minimizing variations in coffee production that could arise from the variations in factors like climate, terrain, soil fertility and so on.

In a sample survey, the determination of the sample frame is very important in order to generate the basic sample units. In other words, the determination of the universe of the sample frame necessitates the definition of the boundary in which the survey can be conducted with a given time and financial resources. Equally important is the sub-division of the material to be sampled in the sample units. The basic sample units in this case are individual peasant farm households who grow coffee mainly as a cash crop, while coffee growing woredas provided the basis for sample frame. It is obvious that factors like time cost and other major constraints would make it difficult the coverage of the farm scattered over the larger areas by the survey of this type. Thus taking in to consideration the desire for relative accuracy and convince of the survey such as reduction of excessive traveling and subjecting the field work to proper supervision the total ten peasants Association (PAs) in the areas would be adequate to provide a good coverage. Hence the study was limited to ten randomly selected PAs in two selected woredas.

As to the selections of individual farm household since farmers in these areas are organized into PAs their lists were easily available with the help of development agents in the area. Thus the name of coffee growing households were obtained from the records of respective peasant associations.

Once areas and boundaries that the study covers are defined information to be collected and sampling units are decided the determination of the type of the sample employed is important. The sample design used in this study, therefore, was simple random sampling.

After listing the names of all coffee growing peasant associations with the help of respective extension officers in all areas, the PAs on which the study concentrates were randomly selected in each woredas. Similarly coffee farming households were randomly selected for an interview from the list of the names of coffee growing farmers in each of the peasants Association selected.

After deciding the frame and design of the sample as well as the sample units, the proportion of the material that should be included in the sample must be determined. In determining the proportion of the sample units, two important factors to be considered are total cost of the survey and the precision of the main estimates to the size of the sample. Therefore, the size and the precision obtained are directly related. The smaller the sample units employed the more accurate will be the result. In other words, the larger the size of the sample the smaller will be the sampling error, i.e. the greater the precision of the estimates, but the higher will be the cost. Any survey should also be designed, therefore, to provide estimates with minimum sampling errors when the total cost is fixed.

Hence, after considering some practical and theoretical methods of determination of sample size as well as taking into account, factors like cost required for carrying out the survey, speed and convenience needed for the field work a total of 100 coffee households were selected for the study. The most important point is the extent of sampling error in selecting a 100 households.

The following formula was adapted from Gorsh et al (1996) to address this issue.

$$e=\sqrt{1-(\frac{n}{N})}\sqrt{\frac{p(1-p)}{n}}$$

where e= standard sampling error

n=sample size which was 100 in our case.

N=Total population,total number of households in two woredas for our purpose (52,707).

p=Success or failure for each population to be included in the sample (50%).

Inserting these variables into the formula gives e = 0.0499.

Thus the sampling error is only 5 percent which is an acceptable level by standard statistical theory. Hence, the sample is fair representative of the population. The sample size so determined is given in the following table.

Table 4.2. Distribution of Selected Sample Household

| Woreda | Name of Sample PA | Number of total household | Number of Sample household |
|---|---|---|---|
| Gomma | Koye Tupa | 512 | 10 |
| | Chedero suse | 980 | 11 |
| | Omo Gurgude | 1060 | 12 |
| | Kesso itti | 776 | 11 |
| | Yachi Tule | 456 | 10 |
| Manna | Afeta | 587 | 11 |
| | Haro | 503 | 10 |
| | Buko | 310 | 10 |
| | Dawa | 579 | 10 |
| | G.Jimmate | 482 | 10 |
| | 10 | 6245 | 100 |

The study relies on data gathered from both primary and secondary sources. Data sources to establish the relative importance of coffee industry in the Ethiopia economy were both published and un published materials of government institutions like Central Statistical Authority, National Bank of Ethiopia, and coffee and Tea Development Authority. Historical data for time series analysis is obtained from Coffee and Tea Development Authority specific to Jimma sundied coffee. Others like transportation cost, taxes etc were from Ethiopian Coffee Purchase and Sale Enterprise and customs and excise department.

Though the problems of lack of accurate data on input-output due to reluctance of farmers to give correct figures fearing taxes and other government obligations are inevitable every effort was made to convince the sample farmers that the purpose of the research is purely academic. Interview was conducted using the questionnaire that has been designed and administered to each individual farmer selected. A pilot survey was conducted to check the

relevant of the designed questionnaire by taking a sample of 5 individual farmers and 2 group discussions. After carrying out the pre-test the questionnaire was re-organized by including some relevant and excluding irrelevant ones.

Enumerators who speak oromo language were employed to carry out the interview after they were trained by the researcher on how to fill the questionnaire.

### 4.3. Descriptions of the study area

The study is undertaken in Jimma zone, one of the 12 zones of Oromia. The area is selected because of several reasons. First the majority of the woredas in the zone are known to be major coffee producers in the country. Coffee is the mainstay of the livelihood of the peasants of the area. Second Jimma is one of the areas identified to as the origin of coffee arabica. Hence the long history of coffee cultivation in the zone is considered as desirable for the study. Third agro-ecological conditions of Jimma are believed to be similar to the other coffee growing areas of the South Western Ethiopia. The results of this study may well apply to these areas.

According to the population census of 1994;90 per cent of the population in Jimma is engaged in agricultural and related activities. Jimma has an area of 60436 hectare with population density of 150 persons per sq km. It is found in the south-Western part of the country bordering with Shewa in the East, Wellega in the North, Southern People's Nation and Nationalities in the South, and Illubabor in the West. It belongs to the high rainfall zones of the country. Hence, a significant part of the region has agro-ecological characteristics suitable for agricultural production.

According to available information, smallholder and mixed farming is the typical mode of production in the zone. Different cereal crops, are grown by peasants largely for own subsistence needs and major crops produced include maize, sorghum, teff and root crops. Crop production is virtually rained and is heavily reliant on family labor. Traditional methods of production are also dominantly practiced with a limited use of modern inputs.

A considerable part of the zone is suitable for coffee production. Jimma is therefore, one of the most important zones in coffee production. It accounts for 20.6 percents of the nation's coffee growing household and supplies more than 22.5 per cent of total coffee arrival to central market for export.

According to the information from the zonal coffee trade control section, coffee markets in the zone is carried out both through official and unofficial channels, the later offering relatively higher prices for producers. Though the official market is currently dominant, the unofficial outlet is expected to grow if the official price tends to decline.

Although coffee is grown in most parts of the zone, it is heavily cultivated in 8 woredas, Manna, Gomma, Kossa, Limmu Saka, Sakka Chokorsa, Gerra, Kersa, and Dedo. They are the major source of the largest volume of marketable supply of coffee in the zone. Out of the indicated coffee woredas, Manna and Gomma accounts for about 60 percent of the coffee production in the zone.

Garden coffee followed by forest coffee are the main form of coffee production in zone. Although areas under forest coffee is gradually decreasing due to new settlements and expansion of cultivated areas, it is still found in the most coffee growing woredas.

Peasant coffee farms are characterized by unpatterned space and free growth of coffee trees which are likely to create difficulties in performing some coffee activities like picking and spraying chemicals toward off pest and control coffee Berry Disease (CBD). Traditional coffee production techniques are dominantly practised and access to modern coffee production inputs and improved production practices are limited to the majority of coffee farmers in the zone. Coffee marketed in the zone is both washed and sundried. There are 57 pulpers operating in the zone of which 27 are owned by the service cooperative and 6 belongs to private investors,while the rests are owned by coffee plantation development enterprise . Hulling of sun dried coffee is carried out by Ethiopia Coffee Purchase and Sales Enterprise and private hullers with 21 and 49 hullers respectively.

The agricultural development bureau of the oromia region has been carrying out some development activities to improve coffee production of the area. The bureau has been

educating farmers to adopt improved production methods by displaying modern techniques of coffee production like mulching, fertilizing, spraying, chemicals, stumping, planting CBD resistant cultivars and soon. To carry the task of improving coffee production, the bureau operates coffee improvement activities. Four of the eighteen Coffee Improvement Project Area (CIPAS) in the country are found in the zone. There are Gomma, Kossa 1, Kossal 2 and Manna.

Coffee Improvement Project extends its services for more than 40,000 demarcated farmers to improve coffee production in 206 peasant associations found in the four CIP woredas. Although coffee improvement project areas receive considerable emphasis, the Oromia agricultural development bureau also carries out some other coffee development activities in other high coffee producing and non-coffee improvement project woredas. The bureau extends supporting services like extension, seedling for planting new coffee varieties, pruning etc. through its Regular Extension Program. But farmers in non-project woredas do not have easy and adequate accesses to these important services as farmers in project areas. This is mainly due to very limited resources committed to the non-project areas relative to project ones.

## 4.4 Some General characteristics of the Sampled Area

### 4.4.1 Personal and household characteristics

The sampled households have a total 544 members with average and standard deviation of 5.44 and 1.2 person per household respectively. The average of the sample farmers is 45 years with standard deviation of 14 years. Age distribution is shown in table 9. From the total households members, 46 per cent are male and 54 percent are female. The majority of the respondents are muslim amounted to 78 percent while the balance belong to Christian.

**Table 4.4.1a: Age distribution of the sample household**

| age group | Head of the household | | Age group | Family members | |
|---|---|---|---|---|---|
| | No. | % | | No. | % |
| <30 | 17 | 17 | <10 | 168 | 31 |
| 31-40 | 34 | 34 | 10-18 | 120 | 22 |
| 41-50 | 16 | 16 | 19-60 | 234 | 43 |
| 51-60 | 14 | 14 | >60 | 22 | 4 |
| 61-70 | 18 | 18 | | | |
| >70 | 1 | 1 | | | |
| Total | 100 | 100 | | 544 | 100 |

As to occupation, farming is sole main activity of the sampled farmers . However, the proportion of farmers engaged in trade, handicraft and off-farm wage as the secondary occupations was 1.5, 1.5 and 7 per cent respectively. Regarding educational level, about 41 percents of the household heads are literate while 59 per cent are illiterate. Among the total household members 59 per cent are illiterate while 41 per cent are literate (Table 4.4.1b).

**Table 4.4.1b: Educational level of sample households**

| Education level | Household heads | | Household member | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Illiterate | 41 | 41 | 321 | 59 |
| Read & write | 31 | 31 | 9 | 21 |
| 1-6 grade | 13 | 13 | 171 | 31 |
| >7 grade | 14 | 14 | 43 | 18 |
| Total | 100 | 100 | 544 | 100 |

### 4.4.2. Farm Characteristics

The size of total holdings of the total sampled farmers amounted to 133.47 hectare with an average and standard deviation of 1.33 hectare and 0.71 respectively (table 4.4.2). This total holding includes cultivated land, fallow land, homestead etc. Area of land used for crops cultivation ( perennial of annual crops) amounted to 114 hectare.

Table 4.4.2: Total land cultivated of the sample farmers

| Total holdings(ha.) | Farmers | | Cultivated area | Farmers | |
|---|---|---|---|---|---|
| | No. | % | | No. | % |
| <0.5 | 9 | 9 | <0.5 | 22 | 22 |
| >0.5≤1.0 | 29 | 29 | >0.5≤1.0 | 45 | 45 |
| >1.0≤1.5 | 35 | 35 | >1.0≤1.5 | 13 | 13 |
| >1.5≤2.0 | 12 | 12 | >1.5≤2.0 | 12 | 12 |
| >2.0≤2.5 | 9 | 9 | >2.0≤2.5 | 3 | 3 |
| >2.5≤3.0 | 2 | 2 | >2.5≤3.0 | 3 | 3 |
| >3.0 | 4 | 4 | >3.0 | 2 | 2 |
| Total | 100 | 100 | | 100 | 100 |

Besides cultivating perennial crops and annual crops the sample farmers keeps livestock for drought power generation, wealth accumulation means of subsistence etc. Most of the respondents do not own oxen. For instance from the total sampled farmers 32 per cent do not have ox, while 32 per cent, 22 per cent and 6 per cent possess one, two and three oxen in that order.

Those who did not own oxen overcome the problem through different mechanism such as using share cropping (46%), borrow oxen (34%) and hand tools (20%). Makenjo (cooperation between two farmers who owned single ox) is a common mechanism for farmers who own single ox.

### 4.4.3 Coffee area, yield & production of sample farmers

The sampled farmers grow coffee on a total of 62.65 ha with an average & standard deviation of 0.63 & 0.49 ha per household respectively.

Table 4.4.3a: Coffee area in hectare by sample farmers

| Coffee area(ha.) | Respondents | |
|---|---|---|
| | No. | % |
| $<0.25$ | 26 | 26 |
| $>0.25 \leq 0.50$ | 39 | 39 |
| $>0.50 \leq 0.75$ | 14 | 14 |
| $>0.75 \leq 1.00$ | 11 | 11 |
| $>1.00$ | 10 | 10 |
| Total | 100 | 100 |

An average coffee yield per hectare for our sample farmers is estimated at 4.52 quintal with standard deviation of 2.96 quintal(table 4.4.3b). This result is comparable with similar studies made by Kassahun et al (1990) and Yoseph (1994). They obtained 4.33 and 4.16 quintals respectively

Coffee production in sampled area is mainly a function of area under matured coffee, labor (family + hired) and capital (farm tool & implements). Accordingly, a total of 267.66 quintal of coffee ( clean equivalent) is produced by all sampled farmers with average & standard deviation of 2.70 & 2.13 quintals respectively. The distribution of coffee produced by respondents are shown below (table 4.4.3c ).

Table 4.4.3b: Distribution of coffee yield by sample farmers

| Coffee yield(qt/ha) | Respondents | |
|---|---|---|
| | No. | % |
| <1.0 | 3 | 3 |
| >1.0≤2.0 | 5 | 5 |
| >2.0 ≤ 3.0 | 7 | 7 |
| >3.0 ≤ 4.0 | 17 | 17 |
| >4.0 ≤ 5.0 | 41 | 41 |
| >5.0 ≤ 6.0 | 14 | 14 |
| >6.0 | 13 | 13 |
| Total | 100 | 100 |

Table 4.4.3c: Distribution of total coffee output by sampled farmers

| Production(quintal) | Respondents | |
|---|---|---|
| | No. | % |
| <1.0 | 7 | 7 |
| >1.0≤2.0 | 4 | 4 |
| >2.0 ≤ 3.0 | 26 | 26 |
| >3.0 ≤ 4.0 | 11 | 11 |
| >4.0 ≤ 5.0 | 4 | 4 |
| >5.0 ≤ 6.0 | 3 | 3 |
| >6.0 ≤7.0 | 2 | 2 |
| >7.0 | 5 | 5 |
| Total | 100 | 100 |

### 4.4.4 Coffee Marketing

The coffee producers in sampled area sell their coffee either in red-cherry form or in sun-dried one. As to red-cherry farmers harvested a ripen red- coffee cherry and sell to the

respective private or service cooperative pulplers at fixed price. Price of red-cherry would be fixed by the Coffee & Tea Authority annually, for instance it was 2.25 birr per kg in 1995/96 and 1.50 in 1996/97. Picking of red-cherries is found to be time consuming hence most farmers prefer selling their coffee in sun- dried form. Minimum price for sundried coffee was established at 4.20 birr per kg in sampled area.

### 4.4.5 Coffee consumption

Domestic coffee consumption is claimed to be very high in Ethiopia which almost believed to be half of the total production. This survey support this assertion. On farm consumption of coffee is quite significant in the survey area. On average each household prepares coffee twice a day. A single coffee preparation consumes one "sini" of coffee (12 Sini estimated to be one kilogram). All respondent stated that even if the price of coffee is high, their consumption pattern is unlikely to change. They are unwilling to divert part of their consumption to the market.

**Table 4.4.5: On farm coffee consumption**

| Frequency of coffee preparation | Amount per one preparation(sini) | No.of respondent | Consumption per year(kg) |
|---|---|---|---|
| 1 | 2 | 10 | 60.83 |
| 2 | 1 | 41 | 60.83 |
| 3 | 1 | 49 | 91.25 |
| Average | 1.33 | | 75.66 |

# CHAPTER FIVE

## 5.0 Discussion of the results

## 5.1 Dynamic analysis of Government policy intervention in Coffee commodity

### 5.1.1 Variables

The following structural, and policy variables and border prices are believed to determine the producer prices of coffee.

**$Lpf_t$** = logarithms of farmgate price for sundired coffee at constant 1970 price.

**$Lps_t$** = logarthims of farmgate border price for sundried coffee (farmgate price in the absence of direct intervention) at constant 1970 price

**SHAXX** = Share of coffee in total exports

**SHAXY** = Share of coffee in total agricultural GDP

**Edisto**= Exchange rate distortions. It is a deviation of exchange rate from its equilibrium[3]

Data for 30 years (1966-1995) for each of the above variables were used and tests for properties of time series variables were made as follows.

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[3] Equilibrium exchange rate was computed using purchasing power parity approach (PPP) formulated as:

$$e^* = e_o \frac{p^d / po^d}{p^s / po^s}$$

where $e_o$ is official exchange rate,$p^d$ is national CPI,$p_s$ is CPI of major trading partner countries. Subscript o indicates value at base year(1970).

### 5.1.2: Test of Stationarity

Non-stationarity of time series has always been regarded as problem in economic analysis. Estimation results based on non-stationary time series may give rise to spurious regression, uninterpretable student t-values and other statistic. Besides, goodness of fit measures($R^2$) which are too high and DW which is too low in general make regression result extremely difficult to evaluate. Thus testing the stationarity of a series is important before any sensible regression analysis can be performed. The stationarity of a given series can be tested through several methods, however, Dickey Fuller(DF) and Augmented Dickey Fuller(ADF) are the most common used tests. The two uses similar procedure, however DF assumes a white noise process for the error terms, while ADF uses lagged left hand side variables as additional explanatory variable to approximate the autocorrelation. The null hypothesis ($H_o$) in both methods assume non stationarity of a variable while the alternative consider stationarity. Following these methods, stationarity test for each of the variables under consideration are summarized in table 5.1a below.

Table 5.1a: Unit root tests for statonarity of variables at level.

| Variables | DF | | ADF(1) | |
|---|---|---|---|---|
| | Without trend | With trend | Without trend | With trend |
| $Lpf_t$ | -1.57 (-2.96) | -2.41 (-3.57) | -1.31 (-2.96) | -2.28 (-3.56) |
| $Lps_t$ | -1.08 (-2.95) | -2.02 (-3.56) | -1.27 (-2.95) | -2.52 (-3.57) |
| SHAXX | -2.21 (-2.95) | -2.17 (-3.57) | -2.38 (-2.95) | -2.34 (-3.56) |
| SHAXY | -2.52 (-2.96) | -2.77 (-3.56) | -2.63 (-2.96) | -2.85 (-3.56) |
| EDISTO | -2.84 (-2.96) | -3.17 (-3.56) | -1.90 (-2.97) | -1.87 (-3.56) |

95% critical values in brackets

According to DF and ADF if the critical value is greater than the calculated value the series is non stationary. Table 5.1a shows that in both methods of testing procedures and in absence or in presence of deterministic trend for each variable the critical values are significantly negative. Hence, the null hypothesis which is in favor of non-stationary is accepted in all variables. Therefore all variables grows over time ( non-stationary) in level forms.

If a given variable has got a unit root (non-stationary) the process of differencing would bring that variable into stationary. The number of differencings that make a particular variable stationary is termed as integration order. Tests for order of integration is therefore indicates how many times a variable be differenced to be stationary. Accordingly we applied the first difference on all specified variables and summarized the results in table 5.1b.

Table 5.1b: Test for order of integration

| Variables | DF | | ADF(1) | |
|---|---|---|---|---|
| | Without trend | With trend | Without trend | With trend |
| $\Delta Lpf_t$ | -6.11 (-2.96) | -6.09 (-3.57) | -4.54 (-2.97) | -4.60 (-3.56) |
| $\Delta Lps_t$ | -4.88 (-2.97) | -4.84 (-3.56) | -3.81 (-2.96) | -3.77 (-3.56) |
| ΔSHAXX | -5.48 (-2.96) | -5.38 (-3.57) | -3.88 (-2.96) | -3.83 (3.57) |
| ΔSHAXY | -6.08 (-2.95) | -6.01 (-3.56) | -4.19 (-2.96) | -4.13 (-3.56) |
| ΔEdisto | -8.53 (-2.96) | -8.50 (-3.56) | -5.27 (-2.96) | -5.33 (-3.56) |

95% critical values in brackets.

Contrary to table 5.1a both DF and ADF(1)(table 5.1b) rejected the null hypothesis since the critical values are less the calculated one in all variables. This indicates the variables are stationary at first difference hence they are integrated of order one (I(1)). Under such conditions since the variables exhibits constant mean, variances and their autocovariances are independent of time, sensible regression can be performed for short run analysis. Economists however,are interested in the log run behavior of given variables. The concept of cointegration thus developed when a linear combination of integrated variables results in a lower order of integration (Engle and Granger (1987)).

### 5.1.3: Test for Cointegration

Although there is a similarity between the test for cointegration and unit roots, these tests are not identical. Tests for unit roots are performed on univariate time series. In contrast, cointegration deals with the relationship among group of variables where each has a unit root. The intuition behind test for cointegration is that for variables to form a meaningful

long run relationship, they must share a common stochastic trend in the long run. Otherwise they would be drifting away from each other as time elapses. Therefore, to build econometric models which makes sense in long run, we have to test if the interested variables form cointegrating relations. Once we have done that, modeling can be done as usual and standard techniques for inferences can be used. In our case,the interest was to test if variables $\mathbf{Lpf_t}$ and $\mathbf{Lps_t}$ has a long run relationship . Thus using Engle and Granger two-step procedure,we first run $\mathbf{Lpf_t = a + \gamma Lps_t + e_t}$ ,where $\gamma = \gamma_0 + \gamma_1 \mathbf{SHAXX}$ then the residuals from this regression were saved and tested as follows.

Table 5.1c Unit root test for variable $e_t$ (residuals)

| statistic | Sample | Observations | Without trend | With trend |
|---|---|---|---|---|
| DF | 1966 1995 | 30 | -5.71 (-2.96) | -5.67 (-3.56) |
| ADF(1) | 1967 1995 | 29 | -4.93 (-2.97) | -4.85 (-3.57) |

According to Engle and Granger procedure the residuals obtained from integrated variables must be stationary ,if such variables have the long run relations. Similarly $e_t$ as indicated in table 5.1c found to be stationary,confirming the log-run relationship between $Lpf_t$ and $Lps_t$.

### 5.1.4. Error correction model

The fact that variables are cointegrated implies that there is some adjustment process which prevents the error in the long run relationship to become larger and larger. In other words if variables are cointegrated,they can be represented by error correction models. Hence the error correction representation of our variables looks the following:

$$\Delta \mathbf{Lpf_t} = \alpha + \beta \Delta \mathbf{Lps_t} + \delta(\mathbf{Lpf_{t-1}} - \gamma \mathbf{Lps_{t-1}}) + \theta \mathbf{d} + \mathbf{U_t}$$

**Where** $\beta = \beta_0 (1 + \beta_1 \mathbf{Edisto})$

$\delta = \delta_0(1 + \delta_1 \mathbf{SHAXY})$

$\gamma = \gamma_0 + \gamma_1 \mathbf{SHAXX}$

**d** = market dummy to capture the effect of market liberalization and it takes 1 for free market and 0 for controlled market.

$\mathbf{U_t}$ = Error term

### 5.1.5. Result and Interpretations

Using Micro-fit3 and applying ordinary least squares the following estimation was obtained.

$$\Delta Lpf_t = -0.03 + 0.82\,(1 - 0.74\,Edisto)\,\Delta Lps_t - 0.25\,(1 - 3.70\,SHAXY)\,\{Lpf_{t-1} - (1.01 - 0.10\,SHAXX)\}\,Lps_{t-1} + 0.38\,d$$

The parameters and t-values of the above estimation are as follows.

| **Parameters** | $\alpha$ | $\beta_0$ | $\beta_1$ | $\delta_0$ | $\delta_1$ | $\gamma_0$ | $\gamma_1$ | $\theta$ |
|---|---|---|---|---|---|---|---|---|
| **Estimates** | **-0.03** | **0.82** | **-0.74** | **- 0.25** | **3.70** | **1.01** | **-0.10** | **0.38** |
| **t-values** | **-1.04** | **11.70** | **-2.11** | **-2.22** | **2.37** | **17.33** | **-2.14** | **6.46** |

With corrected $R^2$=0.86 ,and D.W =2.09.

All parameters of interest have the expected sign and are significant at the 5 percent level or better. The constant term $\alpha$ is not significantly different from 0,so the model is consistent with stable domestic price in steady state. This follows from the fact that in a steady state situation where $Lpf_t = \gamma Lps_t$ and $\Delta Lps_t = 0$, $\Delta Lpf_t$ is also equal to zero which implies that $\alpha$=0. Thus,the proportional change in the producers price in any period t ($\Delta Lpf_t$) is the result of a short run transmission from the changes in the international price ($\Delta Lps_t$) and of an error correction term from the previous period where the "error"consist of the deviation of the price from its long run target.

The degree of fitness of our model is explained by the value of $R^2$. It shows that 86 percent of the variations in the dependent variable is explained by the explanatory variables included in the model. It is very high considering that the equation was estimated in the first difference rather than in level of the variables. This suggest that the dynamic specification is satisfactory. **D.W = 2.09** shows that the error term exhibit a white noise process indicating no problem of autocorrelation.

Cumulative sum of recursive residuals (CUSUM) and cumulative sum of recursive residuals squares (CUSUMSQ) are used for parameter stability test. Accordingly, no structural break

is observed so that the specified parameters are stable. Hence coefficients are consistent for any policy recommendations.

The result show a negative sign for coefficients $\gamma_1$, $\delta_1$, and $\beta_1$ while the market dummy(d) has got positive sign. Each of these variables has the following implications.

The negative sign for $\gamma_1$ indicates a negative relation between the protection rate and the share of coffee in total exports. In other word as the share of coffee in total export increases the degree of direct intervention will also increase (decrease the protection rate). This shows high dependence of Government on coffee for its foreign exchange earnings through direct tax.

The long run relationship between $\mathbf{Lpf_t}$ and $\mathbf{Lps_t}$ can derived from:

$$\mathbf{Lpf_t} = (\gamma_o + \gamma_1 \mathbf{SHAXX})\ \mathbf{Lps_t}$$

The average share of coffee in total export (SHAXX) is 55 percent over the periods under study. Plugging this value in above equation yields:

$\mathbf{Lpf_t} = (1.01\text{-}(0.10 \times 0.55))\mathbf{Lps_t} = 0.955\mathbf{Lps_t}$. Since $\mathbf{Lpf_t}$ and $\mathbf{Lps_t}$ are logarithms we have

$$\mathbf{pf_t} = (\mathbf{ps_t})^{0.955}\ .$$

The average level for $ps_t$ is about 265,implying an average level for $pf_t$ of about 206. The average long run rate of direct coffee taxation is therefore 22 percent. This shows that government has strongly intervened in the coffee sector over the years of the study. This heavy tax affect the production incentives by making the crop less attractive than other crops. Low incentives for producers might lead to low coffee supply to the official market. This might be the case for low coffee export performance which oscillated around a mean of about 70,000 metric tonnes per annum for several years,whereas total coffee production ranged between 150,000 and 180,000 metric tonnes.

If estimated values are substituted for the coefficients $\gamma_0$ and $\gamma_1$ in the long-term target rate of protection,we see that when coffee's share in total export is 10 percent,$\gamma=1$ and there is no long run intervention. But when coffee share is above 10 percent,it is taxed and when it is below 10 percent it is protected. On other hand,if we see the value for $\gamma_0$ it is not significantly different from 1.If we assume that it is equal to 1,then coffee is taxed as long

as its share in total export is positive. When the share reaches zero,there is no intervention and when the share is negative the export become import and is protected.

The speed of adjustment to long-run target price depends on the value of $\delta$. This ($\delta$) is appeared to be negatively related to the share of coffee in total agricultural GDP (**SHAXY**). The higher the share of coffee in agricultural GDP,the lower the speed of adjustment to equilibrium price.

From our empirical analysis the value for $\delta$ is equal to

**- 0.10 = (-0.25(1-3.70 SHAXY) =(-0.25(1-(3.70 x0.16))=-0.10**

This low value for $\delta$ indicates slow adjustment processes i.e on average the price (farmgate) at time t is corrected for about one-tenth of its deviation from its target value($ps_t$) at t-1. In other words, without incurring high adjustment costs, it will take a longer time for the government to remove all direct taxes from coffee .

As for the parameter $\beta$,it measures how much the change in border prices is transmitted to domestic prices in the short run. From table of parameter estimations it follows that overvaluation of the exchange rate(Edisto) is negatively related to the degree of short run transmission of border price to domestic price. The more overvalued the exchange rate the lower the degree of transmission of the international price of coffee to the producers in the short run.

Over the periods of our study ,the exchange rate was overvalued by 37 percent. Substituting this value in the $\beta=\beta_0(1+\beta_1$**Edisto**$)$ gives $\beta$ = **0.82(1+(-0.74 x0.37))=0.60**. An average overvaluation of exchange by 37 percents reduced $\beta$ from 0.82 to 0.60. This means that in the absence of any exchange rate misalignment 82 percent of the variations in the border price of coffee export would be transmitted to the domestic producers price in the short run. But 37 percent deviations(overvaluation) of exchange rate from its equilibrium reduced it to 60 percent. Price stability, however, increased from 18 percent to 40 percent.

Finally interesting indication of the free market in improving the producers price is observed from the coefficient of market dummy. This is plausible since free market promotes competition which increase market efficiency and hence rise the producers price.

## 5.2. Policy Analysis Matrix Approach of Analyzing Policy intervention in Coffee Commodity system.

In previous section our dynamic model explained the evolution of price intervention as a function of changes in the structural and policy variables and change in border prices. Reforms related to these policy variables (exchange rate) would therefore influence the degree of interventions. In this section we try to point out the extent of policy distortions and market failures taking into account the effect of policy reform on coffee commodity.

Two periods 1988/89 (as pre-reform) and 1995/96 (as post-reform) are considered for the analysis. The extent to which the reform reduced government intervention in the coffee commodity system can be measured by the directions and magnitudes of transfers. Policy Analysis Matrix(PAM) was used to compare the level of distortions in coffee farms during the two periods.

The PAM is designed to analyses market distortions and policy intervention in terms of their effects on a vertical commodity system. A vertical system in our case follows a coffee commodity from its initial production on the farm through the primary procurement, processing and marketing stages. Separate PAM was constructed for each levels.In order to construct these matrices we analyzed the data available in our inventory budget shown on appendices III through VIII. The result is shown in table 5.2. On the basis of this table, the quantitative exposition of the transfer effects was performed.

Government policy distortions and market failure may have four kinds of transfer effects on an agricultural commodity system. These are (i) output transfers, (ii) tradeable input transfers, (iii)factor transfer, and (iv) net transfers [Monke and pearson,1989]. The analysis of these transfers relating coffee commodity system is addressed below.

### 5.2.1. Quantifying Transfer Effects at Farm Level

#### 5.2.1.1. Output transfers

From the PAM in table 5.2(a) it is evident that there is a divergence between the private and social values of a quintal of coffee produced. The producers received Birr 205 instead of Birr

733 per quintal in the absence of any distortions. This divergence implies a transfer of the value of output (birr 528) from the coffee producers to the government treasury through a 72 per cent tax . This shows coffee output was highly taxed in the year 1988/89 since the private prices were by far below social prices. An overvalued exchange rate a direct government tax on coffee export and monopolistic nature of coffee state marketing corporation (ECMC) might account for this result.

In 1995/96 owing to a 29 percent tax on coffee output, farmers earned birr 875 per quintal of coffee,compared to Birr 1239 in absence of this tax. The amount of transfer out of the farmers was estimated to birr 364 per a quintal of coffee produced.

The extent of distortions when compared to the 1988/89 were relatively reduced . The effect of the policy reform which reduced indirect taxations (devaluation and market liberalization) reduced the divergence.

**Table 5.2a: Policy Analysis Matrix for coffee production 1988/89 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of factors | Profits |
|---|---|---|---|---|
| Private prices | 205.00 | 57.15 | 134.71 | 13.14 |
| Social prices | 733.00 | 142.87 | 155.42 | 434.71 |
| Divergence effects(transfers) | -528.00 | -85.72 | -20.71 | -421.57 |

**Table 5.2b: Policy Analysis Matrix for coffee production 1995/96 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of factors | Profits |
|---|---|---|---|---|
| Private prices | 875.00 | 4.55 | 350.58 | 519.87 |
| Social prices | 1239.00 | 5.46 | 382.35 | 851.19 |
| Divergence effects(transfers) | -364 | -0.91 | -31.77 | -331.32 |

### 5.2.1.2 Tradable-Input transfers

By referring to table 5.2(a) one can observe that in 1988/89 coffee producers of the study area enjoyed a subsidy of 60 percent on their tradable input cost of producing a quintal of

coffee. The subsidy was on supplying fungicides (daconil) to coffee producers to control the coffee berry disease. This entails a transfer of 85.72 birr from the government treasury to the farmers. In 1995/96, however subsidies were lifted from all inputs (except fertilizer) owing to the free market oriented policy of the country. The observed subsidy was on seedling cost through fertilizer use in coffee nursery.

Positive input transfers from the government to the farmer is an indicator of incentives to producers. However it should not be considered in isolation from other factors, such as producer price, inflation, price of other competing products, transaction and information costs, marketing structure, foreign exchange rate, interest rate and transport net work, just to mention a few. This is because these factors, when unfavorable, may water down this incentive. This was the case during the pre-reform where lower producer price and over-valuation of exchange rate off-set the benefit that would be accrued from the subsidy on the tradable inputs.

#### 5.2.1.3 Factor Transfers

Factor costs in coffee production mainly refers to labor (wage), cost of farm implements and land. In Ethiopia since land belongs to the state it has no private prices, however, the social price of land in this study is determined by the social value of the alternative crops that can be grown on it. Maize is considered as the best next alternative crop to coffee and used for land valuation (see appendix IX). For social valuation of labor and farm implements national conversion factors were used.

Although the government did not directly intervene in the factor market at farm level, endogenous distortions such as imperfect market for factors and macro-economic policy such as trade policy (protection of domestic industrial production) are believed to cause divergence of the private factor prices from their efficiency prices. Accordingly in 1988/89 and 1995/96 there were an implicit[4] subsidy on factor cost amounted to 20.71 and 17.54 birr per quintal of coffee production respectively. Labor and farm implements were implicitly taxed.

[4] Implicit taxes and subsidies are any transfers which do not have direct revenue effects on the government budget (Agricultural price policy,FAO (1992)).

However, the implicit subsidy on value of land outweighed the implicit tax, hence, in net terms factors were subsidized.

### 5.2.1.4 Net Transfers or Profit Transfers

The measure of net transfer, a principal result of the PAM approach are illustrated in PAM table 5.2(a)( b) on the intersection of the last row and column of the matrices.

In 1988/89 the net transfer of 421.57 birr per a quintal was the output transfer 528 less tradeable input transfer (85.72) less the factor transfer (20.71). It was also the difference between private profit (13.14) and social one (434.71). All of the transfers except the transfers from labor were more or less the result of distorting policies, not market failures. The net transfer was negative indicating that the government was taxing the coffee producers and hence net transfer, was to ward government treasury. This large magnitude of net transfers indicates considerable long term government effort would be required to permit the economy to operate efficiently.

The extent to which private profits fall below social profits is measured by profitability coefficient (PC). Thus PC= 13.14/434.71 =0.03 indicating that policy transfers and market failure had distorted private profits to remain only 3 per cent of social profit. On the other hand the level of transfers from divergences as a proportion of the undistorted value of the coffee producers revenue is measured by transfers ratio to producers (TRP). It is the ratio of the net transfers to the social value of revenues.

$$TRP = -421.57/733 = -0.58.$$

This result implies that the divergence almost entirely caused by government policy distortions, had decreased the gross revenue of the coffee producers by 58 percent in 1988/89.

In 1995/96, however, the net transfer decreased as the gap between private profit and social profit was minimized (table 5.2b). The net transfers in this particular year amounted to birr -344.45 indicating government policies distortions and market failure was still taxing the

producers. Profitability coefficient (PC) and Transfer ratio to producers (TRP) were estimated to be 0.60 and -0.29 respectively. This result indicated that policy distortions and market failures limited the private profit to 40 percent below the social profit and the gross revenue of the coffee producers decreased by about one-third.

When the two periods are compared the private profit which was only 3 percent of the social in 1988/89 increased to 60 percent in 1995/96. Similarly distortions decreased the gross revenue of coffee growers by more than half in 1988/89 compared to one-third in 1995/96. The extent of distortion was very high in pre-reform years.

### 5.2.2 Transfer Effects at processing and Transporting level

#### 5.2.2.1 Output Transfers

In 1988/89 coffee processors sold a quintal of coffee bean to the marketing agent at birr 265. Under efficient price however they would sell the same amount at 815 birr (see table 5.2c). Therefore the transfers out of processors amounted to birr 550.

**Table 5.2c: Policy Analysis Matrix for coffee processing and transporting 1988/89 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of domestic resources | Profits |
|---|---|---|---|---|
| Private prices | 265.00 | 226.18 | 28.42 | 10.40 |
| Social prices | 815.00 | 741.68 | 38.46 | 34.86 |
| Divergence effects(transfers) | -550.00 | -515.50 | -10.04 | -24.46 |

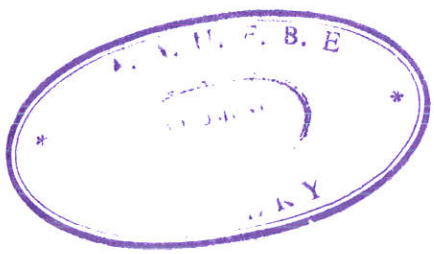

**Table 5.2d: Policy Analysis Matrix for coffee processing and transporting 1995/96 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of domestic resources | Profits |
|---|---|---|---|---|
| Private prices | 1083.89 | 906.67 | 110.21 | 67.01 |
| Social prices | 1266.49 | 1062.45 | 103.96 | 100.08 |
| Divergence effects(transfers) | -182.60 | -155.78 | 6.25 | -33.07 |

In 1995/96 the level of output transfers amounted to 182.60 birr per a quintal of coffee processing. In this year the coffee processors and transporters sold a quintal of coffee at birr 1083.89. Under efficient market price they would have sold the same amount at birr 1266.49 (see table 5.2d). Coffee marketing was relatively efficient in 1995/96 since the efficiency loss was less than the loss in 1988/89.

### 5.2.2.2 Tradable and factor inputs transfers

As shown in table 5.2 c & d the directions of tradables input transfers were similar for both periods. The processors paid 216.18 and 906.67 birr in the actual market for tradable inputs in 1988/89 and 1995/96 respectively. They could have paid birr 741.68 and 1062.45 in the absence of any distortions in that order. The divergences indicate an implicit subsidies for processors which was relatively low in the latter year.

In 1988/89 the coffee processors paid 28.42 birr instead of 38.46 birr for factors required for processing and transporting a quintal of coffee. The divergence of 10.04 birr spent on factor purchase, indicates a factor transfer from the treasury to processors in the form of implicit subsidies on factor inputs ( See table 5.2c).

In 1995/96 the processors paid 6.25 birr per quintal more than it was socially necessary for factors required to process and transport to central market one quintal of coffee beans. The private costs of factors were 110.21 birr, while the social costs were only 103.96 birr.

Therefore the difference between these two amount gave a factor transfer of 6.25 birr in the form of implicit taxation ( See table 5.2d).

### 5.2.2.3 Net Transfers or Profit Transfers

In 1988/89 the coffee processors and transporters earned normal profit of 10.40 birr. Under efficient price conditions they would have earned more profit, 34.86 birr per quintal. Hence the prevalence of government intervention and market failures resulted in net transfers of 24.46 birr out of the processors.

In 1995/96 at private price the coffee processors received a profit of 67.01 birr per one quintal of coffee. They would have earned a profit of 100.08 birr per the same amount under the condition of efficient market price.

The profitability coefficients in 1988/89 showed that market failures and government intervention in coffee sector limited the private profit to one-third of social profit. However,owing to less distortions in 1995/96, private profits increased to two-third of the social profit.

### 5.2.3 Transfer Effects at Export Marketing Level

### 5.2.3.1 Output Transfers

In 1988/89 at private price the exporters earned 552 birr from a quintal of coffee bean sold at FOB Assab. Had it not been for a policy induced distortions they would have received 934 birr per quintal. Hence tax on coffee exporters created a transfers of output from exporter to government treasury (see table 5.2E).
In 1995/96 the divergence between private (actual) price and social (potential) was 105 birr. Since the social value exceeded the private one (see table 5.2F), exporters were taxed and the transfers went to government treasury.

**Table 5.2e : Policy Analysis Matrix for coffee export marketing 1988/89 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of domestic resources | Profits |
|---|---|---|---|---|
| Private prices | 552.00. | 276.20 | 254.80 | 21.00 |
| Social prices | 934.00 | 831.91 | 70.15 | 31.94 |
| Divergence effects(transfers) | -382.00 | -555.71 | 184.65 | -10.94 |

**Table 5.2f : Policy Analysis Matrix for coffee export marketing 1995/96 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of domestic resources | Profits |
|---|---|---|---|---|
| Private prices | 1437.00 | 1102.95 | 234.24 | 99.81 |
| Social prices | 1542.00 | 1295.31 | 143.84 | 102.85 |
| Divergence effects(transfers) | -105.00 | -192.36 | 90.40 | -3.04 |

### 5.2.3.2 Tradable and factor Transfers

In 1989/89 the marketing agent (exporter) under efficiency prices would have paid 831.91 birr for tradable inputs required to market a quintal of coffee . Owing to government policy distortions, however, the exporters paid only 276.20 for these tradable inputs. Thus the gap between private and social value of inputs termed as tradable transfers moved to the exporters.

Similarly in 1995/96 tradable transfers amounted 192.36 birr went to the coffee exporters. Factor transfers out of the exporters, mainly related to cost of labor, capital and others, amounted to 184.65 and 90.40 birr for the years 1988/89 and 1995/96 respectively.

### 5.2.3.3 Net Transfers or Profit Transfers

The government policy distortions which influenced the marketing activity led to a profit of 21.00 and 99.81 birr per a quintal of coffee for exporters in the years 1988/89 and 1995/96 respectively. Under the conditions of no policy distortions the exporters would have received birr 31.94 and 102.85 profits for the years 1988/89 and 1995/96 respectively. Net profit of 10.94 and 3.04 birr were therefore transferred to government treasury. The profitability coefficient of 0.67 and 0.97 for the years 1988/89 and 1995/96 indicated that the extent of policy distortion was low in the latter period.

## 5.2.4. Transfer effects and indicator of comparative advantage in coffee commodity system.

In order to measure the comparative advantage of coffee production at national level a PAM that consists of each activities must be constructed . Such PAM is derived from aggregation of revenues and costs across the representative activities. Accordingly PAM for coffee commodity system was established for the two periods, taking care of double counting while aggregating of revenues and costs.

Table 5.2.4 indicated that the directions of transfers were similar in both periods. The magnitude of the transfer effects in 1988/89 were however very high relative to that of 1995/96. Output transfer from coffee system to the rest of the economy was amounted to 380 birr/qt in 1988/89,but this was reduced to 105 birr per quintal in 1995/96.

With regard to tradable inputs,in 1988/89 the coffee commodity system enjoyed tradable inputs transfers of about 91 birr per quintal from the other sectors of the economy. In 1995/96 this commodity system received a tradable input transfers of about 9 birr only . As for domestic resource cost transfers about 154 birr per producing a quintal coffee output was transferred from the coffee system to the rest the economy,while it was reduced to about 66 birr in 1995/96.

Finally, the profitability coefficients for the two periods would help us to compare the extent of inefficiency created by distortions in coffee commodity system. Accordingly the

profitability coefficient(pc=0.11) in 1988/89 indicated that the private profits of coffee commodity system was only one-tenth of its social profit. This coefficient was about 0.81 in 1995/96 which indicate that the private profit was four-fifth of the social profits. From these coefficients one can easily deduce that the extent of policy distortions and market failures were serious in 1988/89 than in 1995/96. Thus these distortions had suppressed the efficiency of coffee system more in the former period.

This being the case we are now in a position to compute domestic resource cost ratio(DRC) for each period and compare the comparative advantage of producing coffee domestically. Whether it is efficient for a country to produce a commodity as opposed to importing it depends on the opportunity cost of domestic production relative to the value added it creates in foreign currency.

The DRC is therefore the ratio of the cost in domestic resources and nontradable inputs (valued at their shadow prices) of producing the commodity domestically to the net foreign exchange earned from the commodity.

**Table 5.2.4a Policy Analysis Matrix for coffee commodity system 1988/89 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of doms.resources | Profits |
|---|---|---|---|---|
| Private prices | 552.00 | 77.53 | 417.93 | 56.54 |
| Social prices | 934.00 | 168.46 | 264.03 | 501.51 |
| Divergence effects(transfers) | -382.00 | -90.93 | 153.90 | -444.97 |

**Table 5.2.4b Policy Analysis Matrix for coffee commodity system 1995/96 in birr per quintal.**

| | Revenues | Cost of tradables | Cost of doms.resources | Profits |
|---|---|---|---|---|
| Private prices | 1437.00 | 38.28 | 696.14 | 702.58 |
| Social prices | 1542.00 | 46.73 | 630.15 | 865.12 |
| Divergence effects(transfers) | -105.00 | -8.45 | 65.99 | -162.54 |

Applying this method on the results obtained in table 5.2.4,we obtained DRC of 0.34 and 0.42 for 1988/89 and 1995/96 respectively. In both periods DRC were less than one implying domestic coffee production has a comparative advantage since a dollar's worth of domestic resources when utilized in coffee commodity system produces more than one dollar of foreign exchange.In other words the opportunity cost of domestic resources used in producing coffee is less than the foreign exchange earned.

When we compare the magnitude of DRCs in both periods it was relatively greater in 1995/96 which might be attributed to increased costs of the domestic resources (mainly labor) in response to the policy reform.

In general if the policy maker's main concern is to maximize allocative efficiency, the coffee production should be expanded upto the point where DRC=1.

## 5.3. Use of some important inputs before and after the price reform.

The comparative analysis of coffee profitability before and after policy reform was made in detail in section 5.2. The discussion result indicated that the extent of policy distortions and market failures were significantly reduced after policy reform and enhanced coffee profitability. Currency devaluation,market liberalization and creation of conducive environment for private investments are some of the contents of the reform. Attracted by

As to the number of coffee seedlings ,this seems to be captured by analysis of coffee area,but the possibility of filling in and replacing old coffee on the same land called for treating it separately. With this regard coffee growers have responded to policy change by planting more seedlings as opposed to the pre-reform period.

Another important input in coffee cultivations is labor. Both family and hired labor are mainly the source for labor supply in coffee cultivation. As indicated in the table the use of hired labor was significantly increased after the price reform. The increased price of coffee as the result of devaluation increased revenue that the farmer receive from coffee and increased profit as discussed in PAM. This profit effect therefore induced increased hired labor use.

Slashing,hoeing and cultivating are some of the major cultural practices in coffee production which play a great role to raise coffee output in short run. We included the frequency of these practices in our analysis and found that they significantly increased in response to the policy reform. This show that the increased price has encouraged coffee growers to give more attention to their crop.

The overall effect of the above discussed farm inputs and cultural practices are eventually expected to raise the productivity of coffee. The finding however indicated that there was no significant difference between the coffee yields before and after reform. This is indicated by insignificant t-ratio of the mean value difference for coffee yields in the two periods.

The prevalence of Coffee Berry Disease(CBD) and failure of using chemicals against the disease were blamed to be the major cause for the stagnation of coffee productivity. Spraying against CBD decreased sharply after the reform as indicated by the negative significant t-ratio. According to the information obtained from coffee growers and Coffee and Tea Authority the supply of chemicals against CBD were distributed either free or at high rate of subsidy (upto 60%) in the period before the reform. Right after the structural adjustment program was implemented the subsidy was removed and price adjustment was left to the market. The removal of subsidy coupled with devaluation extremely increased the price of the fungicides. Irrespective of the recommended rate(4.4 kg/ha./round) only 2% of the sample farmers used fungicides indicating that the present price level is not affordable

almost by all farmers. The cost of using the recommended amount of fungicides is indicated in table 5.3.2. As shown in the table, the total cost of spraying against CBD per hectare amounted to birr 2,432.488 in 1995/96 . This was only birr 367.88 in 1988/89 (table 5.3.2). Under the existing high price of fungicides it is unlikely that the coffee farmers able to control CBD and save output loss caused by the disease.

**Table 5.3.2 : Cost of spraying against CBD**

| Components | 1988/89 | 1995/96 |
|---|---|---|
| Recommended application(kg/ha/round) | 4.4 | 4.4 |
| Number of rounds | 6 | 6 |
| Annual rate of application (kg/ha/annum) | 26.4 | 26.4 |
| Unit cost (birr/kg)[5] | 9.20 | 82.67 |
| Annual cost fungicides(birr/kg) | 242.88 | 2182.488 |
| Labor requirement<br>-Buying and transporting chemicals -Transporting water (4 manday/ha/round)<br>-Spraying(4 manday/ha/round)<br>Total labor | <br>2<br>24<br>24<br>50 | <br>2<br>24<br>24<br>50 |
| Labor cost | 125 | 250 |
| Total cash and labor cost (birr)[6] | 367.88 | 2432.488 |

## 5.4. The allocative efficiency of farmers.

### 5.4.1 Definitions and measurement of variables used.

**1.0 Dependent variable**

Coffee output(Y): Physical quantity of clean coffee measured in kilogrames. It includes total sum of coffee sold,consumed,kept for future sale consumption,given to others as gift and paid for hired labor

**2.0 Explanatory variables**

Size of coffee land(X1): Total holding size of coffee cultivation by farmers less area covered by young and unproductive coffee trees. It was measured in hectare.

5 Daconil (recommended fungicides)
6 cost of sprayer is not included

Labor(X2): It was measured in manday and include all labor used for management of matured coffee trees,and harvesting.Allowance was made for female,aged and child labor

Capital(X3): Farm tools and implements used in coffee production as capital. The annual cost of each (in birr) based on their purchased price and life time was used for valuation.

Proxy for experience(X4): Years since farmers has started his own cultivation was take as a proxy for experience.

Education (d1) : Dummy=1,if the farmers read and write, 0 otherwise

Extension exposure(d2): Dummy=1, if the farmer was regularly exposed to extension services , 0 otherwise.

### 5.4.2 Determinants of coffee production.

Ordinary least square estimation method was applied on Cobb-douglas production function of log-linear form and the result is shown in the table below.

**Table 5.4.2 Regression result of coffee production function**

| Variables | Coefficients | t-ratios |
|---|---|---|
| land(X1) | 0.4802 | 11.27* |
| Labor(X2) | 0.2203 | 5.30* |
| Capital(X3) | 0.0385 | 1.04 |
| Experience(X4) | 0.091 | 2.26** |
| Education(d1) | 0.0859 | 1.77*** |
| Extension(d2) | 0.2336 | 5.90* |
| Constant | 3.740 | 9.75 |
| $R^2$ | 0.72 | |

* significant at 1% level of risk

** significant at 5% level of risk

*** significant at 10% level of risk

All diagnostics tests are undertaken using the LM version of Micro-fit3 computer program. Heteroscedasticity is detected and corrected using white's heteroscedasticity correction method.

All variables included in the regression equation have the expected signs. The goodness of fit of a regression is assessed by its coefficient of determination $R^2$. The closer the value of $R^2$ to unity the better is the fit and vice versa. The observed $R^2(=0.72)$ of the estimated regression indicated that the estimated production function was appropriate model for depicting input output relationships of coffee farms. It implies all the specified independent variables together explained 72 per cent of the variations in coffee output.

All variables included in the estimation are significant at 5 per cent or better probability level except capital and education. The level of significance for education tends to 10 per cent, while capital is not significant even at this level.

The concept of elasticities and marginal changes are important to interpret the estimates. The coefficients of land, labor, capital and experience(proxy) are the elasticities of output with respect to these inputs, while the coefficients of dummies give marginal products of the variables. The elasticities show a percentage increase or decrease as the result of one per cent increase or decrease the use of resources. The coefficients of the dummies indicate the percentage increase to a unit change in the use of resources.

The size of coffee land and labor are the most important variables in our estimation results. The magnitudes of the coefficients of these inputs are relatively higher than of other variables indicating their importance in coffee production. Land under matured coffee and total labor used have got coefficients of 0.4802 and 0.2203 in the estimated regression respectively. This means that a one per cent increase in the size of coffee land would increase output by 0.48 per cent, while the same percentage increase in labor use would increase coffee output

by 0.22 per cent. Coffee output is thus highly associated with the size of land under productive coffee trees followed by labor inputs.

The estimates for the elasticities of capital, which embraces the value of farm tools and implements are very small and statistically insignificant. This shows that the variation in coffee production is not influenced by this input. Positive sign of this inputs indicate the importance of capital in coffee production, while its insignificant denotes undercapitalized nature of the coffee sector. Hence the current use of simple and traditional handtools may result in no growth of coffee output.

Farming experience is positively and significantly related to coffee output. This indicates as farmers stayed longer in coffee cultivation they would develop better cultural practices (learning by doing) which contribute to raising output.

The coefficient of farmers education is positive and significant at 10 per cent probability level. This shows that there is output variation between educated and non educated farmers. The important of education is not negligible since educated farmers may quickly react to new techniques of production and extension services.

Finally the coefficient of agricultural extension services in the regression shows that the exposure of the farmers to extension services has a substantial and statistically significant positive effect on output. Consolidated coffee extension services would therefore have a potential to raise the productivity of the crop.

The results of the regression estimates for the sample farms would lead to the conclusion that size of coffee land, labor, extension services and education are the most important

determinants of coffee production. Measures aimed at influencing these variables would have a positive impact on productivity and production of coffee under the existing technology.

### 5.4.3. Allocative efficiency of some important variables

Under the classical assumption of profit maximization allocative efficiency (price efficiency) can be computed from estimated production function given output and factor prices.

A knowledge of average physical product(APP),marginal physical product(MPP) and the elasticities of output with respect to each inputs is helpful to arrive at the measures for improving allocative efficiency.

Elasticities are the ratio of marginal to average values of the related variables. Marginal physical product of an input therefore can be obtained by multiplying the APP with elasticity coefficient of the input to measure the productivities of the resources employed.

To test resource use efficiency marginal values of product(MVP) of inputs are always computed and compared with the respective factor costs. For our purpose,only the MVPs of land and labor were computed because of the relative importance of these inputs in coffee cultivation.

To calculate MVPs, average farmgate price received by farmers was used since it is believed to affect the behavior and decision of peasant coffee farmers. The average price of 8.75 birr per kgms of clean coffee was used for this purpose.

In Ethiopia land has no rental value, it is neither sold nor bought and hence bears no market value. This doesn't, however, imply that the use of land is without cost. It uses can take the form of opportunity cost of growing the best next crop in the study areas. With the help of survey we found that maize is the most crop cultivated in the area and its yield per hectare ranges between 12 and 14 quintals. Taking the average and applying the maize import parity price (see appendix IX) the price of land was as assumed to be birr 1723 per hectare per annum.

As for labor, on average, the rural wage was birr 5 per manday and converted to shadow wage using regional specific conversion factors. This shadow wage rate was 3.75 birr per man day.

The APP, MPP, MVP and marginal value products to input price ratios calculated using the data and the production are given in table 5.4.1.

**Table 5.4.1: Average, marginal products and measures of allocative efficiency**

| | Land(ha) | Labor(Md.) | output(Kg) |
|---|---|---|---|
| APP per ha. | 452 | 2.52 | |
| MPP per ha. | 216.96 | .55 | |
| Geometric mean | .502 | 91 | 219 |
| MVP | 1832 | 4.63 | |
| MC | 1723 | 3.75 | |
| MPP opportunity cost ratios | 1.06 | 1.25 | |

The results of the study show that the APP per hectare was 452 kg. This is Comparable with similar result obtained by Kassahun, et.al (1990) which was 433 kg.

The productivity of labor indicated by APP per mandays amounted to 2.38 kg. An investigation of the marginal physical product of the input under consideration revealed that the MPP of land and labor were 216.96 and 0.55 kgs respectively. This means that an increase in the size of land under coffee by one hectare, ceteris paribus, would result in an increase of coffee output by 216.96 kg. On the other hand one extra manday of labor employed by the sample farms would increase coffee output by 0.55 kgs.

This being the case our main focus in this section is to measure the allocative efficiency for the farmers with respect to land labor resources. The estimated marginal value of using land for coffee production was found to be nearly equal to the value of crop forgone(maize). This clearly indicated that land was allocated to its best alternative in our sample area. On the other hand, the marginal opportunity cost ratios for this input also indicated that land was more or less utilized efficiently, since the ratio was not significantly different from one.

For labor, the findings indicated that the marginal values of labor was greater than the wage rate. The MVP of labor was birr 4.63 per additional mandays as against the shadow wage rate of birr 3.75 per manday. Increasing labor would therefore lead to maximum production of coffee. The marginal value input price ratios for this input show that it was not allocated efficiently. This is reflected in the divergence of the ratios from unity. The implication of this analysis is that too little labor was used in the process of coffee production.

Below optimal usage of labor may be attributed to two factors. The first may be related to labor shortage which is mainly due to market failure while the second factor can be the risk aversion behavior of farmers. Coffee cultivation demands much labor at time of slashing and harvesting. During these peak periods wage rate would increase. At time of weeding farmers hesitate to hire more labor at high wage because of CBD, the effect of which is only known after flowering. Thus production risk may be one factor that limit the required labor usage in coffee production. During harvesting , all farmers may be prepared to hire labor even at high wage rate since the workers can be paid in kind (coffee) or farmers can sell red cherry coffee to pay them . The problem at this season is shortage of labor. There is no well developed labor market in the sample area. A Few migrants from the Northern Ethiopia come to this area and serve as hired labor. But they are not enough to meet demand. Shortage of labor therefore,forces farmers not to operate at optimum level.

The measurement of efficiency would help us judge whether the removals of price distortions increase coffee output. Accordingly further reduction of price distortions could result in more allocation of land for coffee, hence increase output. On the other hand reduction of price distortions alone may not increase the use of labor. Measures to develop factor markets, particularly labor market are necessary. This implies the importance of other non price factors in process of coffee production.

# CHAPTER SIX

## 6.0. Summary, policy recommendations and suggestions for further research.

### 6.1 Summary Results

Both dynamic and static analysis of our study have confirmed that there are distortions in the coffee industry. The dynamic analysis indicated that coffee producers in the sample area on average suffered from 59 per cent of total taxation on output price during the period 1966-1995. Direct taxation amounted 22 per cent while the rest (37 per cent) was attributed to indirect taxation (currency overvaluation). The model clearly showed that the share of coffee in total export(SHAXX) and in agricultural GDP(SHAXY) and exchange rate distortion were the most important factors in the determination of coffee farmgate price. The share of coffee in the total export was negatively related to long run protection rate (positively to taxation rate). This means that as share of coffee in total export rises the degree of government intervention (to secure revenue) also increases through direct tax, resulting in lower producer prices. The model revealed that this particular crop continued to be taxed as long as its share in total export exceeds 10 per cent.

The findings indicated there is a tendency for farmgate price and long run target price to drift together. The coefficient of error correction $\delta$ which measures the speed of price adjustment to its long run target was found to depend on the share of coffee in agricultural GDP. The derived value for $\delta$ was -0.10 indicating that on average the price at time t is corrected for about one-tenth of its deviation from its target value at t-1. This result showed that it takes longer time for coffee to adjust to its long run target price under the existing taxation system.

The short run transmission of border price to farmgate price was negatively related to the degree of exchange rate overvaluation. In the absence of exchange rate misalignment our model indicated that about 82 per cent of variations in border price would be transmitted to producer prices in the short run. Overvaluation of exchange rate by about 37 per cent, however, reduced the variations to 60 per cent during the period under consideration. Eventually market dummy which was believed to capture the effects of market liberalization appeared to affect changes in coffee producers price positively and significantly.

Along with long run government interventions in the sector the study also attempted to analyze policy distortions and market failure in the coffee production,processing and marketing of the study area. These distortions are assessed with the help of Policy Analysis Matrices(PAM). The years 1988/89 (pre-reform) nd 1995/96 (post reform) were considered for the analysis. The result indicated that there are distortions in coffee industry during these two years , however its extent reduced in the post reform year. At farm level, on average, there was a 72 per cent of tax on producer price and 60 per cent subsidy on tradable inputs of coffee production in 1988/89. Factor inputs were subsidized by as much as 13 per cent.

In 1995/96 the total tax on output price was 29 per cent of the border price. The rate of taxation was reduced by 59 per cent when compared with the pre-reform period. Subsidies on tradable inputs and factor costs were observed to be only 6 and 8 per cent respectively. The directions of transfers in processing and marketing activities were also similar to that of farm levels except for domestic resources at the marketing level. Exporters were implicitly taxed in the use of domestic resources in both periods.

When private profitability is compared with social profitability of coffee production,it can be observed that on average private profitability was very far below social profitability in 1988/89. But the extent of divergence between private and social profitability was narrowed in the year 1995/96 owing to the policy reform. Comparison between the profitability of each stages indicated (irrespective of low profits for all levels), the exporters received better profits than farmers and processors in 1988/89. However, in 1995/96 farmers secured high profits than exporters and processors. This shows coffee farmers have benefitted more from the policy reform than traders and processors.

Computed values of DRCs for coffee commodity system for the two years were by far less than one, indicating the comparative advantage of producing coffee domestically than importing it.

Having looked at the policy distortions and market failures,the analysis then focussed on the response of farmers to policy changes. The result showed that coffee producers of the study area have responded to the reform by increasing coffee plots, more planting of seedlings, use of more hired labor and frequent weeding.

Concerning spraying against CBD, the survey indicated that almost all sample farmers stopped the practice because of extremely high prices of fungicides. The reform (mainly removal of subsidy and devaluation) contributed to the high price. As to the coffee yield, significance difference was not observed between pre and post reform years in spite of increased use of hired labor and more cultural practices. This might be due to the output loss owing to incidence of CBD.

Finally attempt was made to analyze allocative efficiencies of input use in the sample area. The ratio of marginal value of product to marginal cost indicated that land was efficiently allocated while labor was not. Shortage of labor and/or risk aversion behavior of the farmers may explain the un optimal use of labor.

### 6.2 Policy recommendations

In light of the findings, the following recommendations may be given. First although the extent of total taxation on coffee output were reduced following the policy reform (mainly indirect taxation), there is still high degree of direct taxation. This level of taxes (surtax) should be reduced to minimize disincetive structure of production.

Second, given significant share of revenue obtained from the coffee sectors ( further supported by the dynamic model), it is unlikely that the government would make considerable reduction of taxes unless there exists alternative means of obtaining revenue. Thus, diversification (export crops) may be the sole alternatives in this agricultural led growth economy which inturn opens an option for reduction of taxes levied on coffee but securing the revenue for governments.

Third the incidence of CBD signifies a serious threat to coffee production. To alleviate this problem ways and means must be sought to reduce the cost of fungicides in the short run. In the long run, the distribution of CBD resistant seedlings must be given more weight. A close relationship between extension and research should be facilitated so that long lasting solutions for eradicating CBD may be obtained.

Fourth, although labor markets are under developed , it is often observed that some laborer from neighboring regions moved to this area particularly at harvesting time. However, the supply of labor is not enough relative to the amount demanded because of poor mobility of labor among regions. Thus, improving the dissemination of information on labor and related market may alleviate the prevailing labor shortage which have direct impact on change in production.

Five the existing minimum coffee price of the survey area makes no distinction between good and bad quality coffee, no premium for good quality. Giving premium price for quality can encourage good quality coffee production.

### 6.3 Implications for further research

Our study includes only one major coffee producing region and sundried coffee: we feel that results may be different and more convincing if all coffee growing regions are involved. Thus there is a need for further research on assessing and measuring distortions in the coffee productions that entails a wider regional spectrum.

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# APPENDICES

## Appendix I Formulation of surtax rate prior 1989

| ICO Composite Indicator | Surtax Levied |
|---|---|
| 0-29 us cents/1b | zero |
| 30-50 us cents/1b | 1 birr/quintal/cents |
| 50-100 us cents/1b | 2 birr/qt/cents |
| Over 100 us cents/1b | 3 birr/qt/cents |

**Appendix II: Current surtax rate**

| Jimma 5 FOB Price | Surtax levied |
|---|---|
| 0-50 us cents/1b | Zero |
| 51-75 us cents/1b | 0.50/quintal/cents |
| 76-100 us cents/1b | 1.00/quintal/cents |
| 101-125 us cents/1b | 2.00/quintal/cents |
| 125-150 us cents/1b | 3.00/quintal/cents |
| Over 150 us cents/1b | 4.00/quintal/cents |

**Appendix III: Farm Inventory budget for coffee production (1988/89)**

| | unit per hectare | private price(birr) | Social prices(birr) |
|---|---|---|---|
| Average yield | 425 kg | 2.05 | 7.33 |
| Total Revenue | | 871.25 | 3115.5 |
| Variable costs<br>-Fungicides(daconil) | 26.4 kg | 242.88 | 614.38 |
| Farm implements. | | 82.50 | 117.50 |
| -Sprayer | 1 | 24 | 28 |
| -Slasher | 2 | 10 | 20 |
| -Spade hoe | 2 | 6 | 12 |
| -Pronged hoe | 2 | 10 | 20 |
| -Sickles | 2 | 5 | 10 |
| -Sacks | 4 | 20 | 20 |
| -Baskets | 5 | 7.5 | 7.5 |
| Land | 1 ha. | 0 | 706.00 |
| Labour | 196 Mds* | 490.00 | 343.00 |
| -Slashing | 25 Mds | 62.50 | 43.75 |
| -Hoeing | 30 Mds | 175.00 | 52.50 |
| -Picking | 141 Mds | 352.50 | 246.75 |

*=mandays

**Appendix IV: Farm Inventory budget for coffee production (1995/96)**

| | unit/hectare | private price(birr) | Social prices(birr) |
|---|---|---|---|
| Average yield | 452 kg | 8.75 | 12.39 |
| Total Revenue | | 3955.00 | 5600.00 |
| Establishment cost [1] | | 218.70 | 163.55 |
| -Seedling Cost of which | | | |
| -Tradables | | 20.58 | 24.70 |
| -Labour | | 13.36 | 9.35 |
| -Equipment | | 1.61 | 1.29 |
| Labour cost (clearing,digging etc) | | 183.15 | 128.21 |
| Coffee management. | | | |
| Labour | 253 | 1265 | 886.00 |
| -slashing | 42 | 210.00 | 147.00 |
| -Hoeing | 60 | 300.00 | 210.00 |
| -Picking | 151 | 755.00 | 529.00 |
| Farm implements.[2] & materials | | 121.50 | 117.50 |
| -Slasher | 2 | 24.98 | 19.98 |
| -Spade hoe | 2 | 28.14 | 22.21 |
| -Pronged hoe | 2 | 19.72 | 15.78 |
| -Sickles | 2 | 11.66 | 9.33 |
| -Sacks | 5 | 25.00 | 25.00 |
| -Baskets | 6 | 12.00 | 12.00 |
| Land [3] | 1 ha. | 0 | 1723.00 |

Source: survey results.

[1]. Establishment cost refers to the annualized investment cost on coffee where the cost of one year is considered here.
[2] The cost of farm implements are calculated based on the formula:

$$A = \frac{(1+i)^n \times i}{(1+i)^n - 1}$$

Where A is annualized cost of implements,p is the initial cost of farm implements,i is interest rate and n is the expected life time of the implements.

**Appendix V: Inventory budget for coffee processing and transporting (1988/89)**

| | Unit | Private prices (birr) | Social prices (birr) |
|---|---|---|---|
| Total revenue | birr/quintal | 265.00 | 815.00 |
| coffee purchase | 1 quintal | 217.00 | 733.00 |
| Processing costs | | | |
| -fuel & Lubricant | birr/quintal | 4.00 | 4.80 |
| -maintenance & depreciation | | 3.00 | 2.25 |
| Labour cost | | | |
| -skilled | | 2.00 | 2.06 |
| -unskilled | | 4.00 | 2.80 |
| sacks | | 1.50 | 1.20 |
| Other costs | | | |
| -Municipal tax | birr/quintal | 2.00 | 0.00 |
| -financial charges | | 4.00 | 5.60 |
| -transport to terminal market* | | 11.50 | 8.63 |
| -Weight loss | | 5.60 | 19.80 |

*It includes 45% tradables 15% labour and 40% capital costs.

Source:Column 3 obtained from Coffee and Tea Authority.

Column 4 calculated based on conversion factors and Border prices obtained from customs and excise department (for tradable commodities).

**Appendix VI Inventory budget for coffee processing and transporting (1995/96)**

| | Unit | Private prices (birr) | Social prices (birr) |
|---|---|---|---|
| Total revenue | birr/quintal | 1083.89 | 1266.49 |
| coffee purchase | 1 quintal | 892.00 | 1050.00 |
| Processing costs | | | |
| -fuel & Lubricant | birr/quintal | 4.12 | 4.53 |
| -maintenance & depreciation | | 2.99 | 2.24 |
| Labour cost | | | |
| -skilled | | 21.46 | 22.10 |
| -unskilled | | 5.00 | 3.50 |
| sacks and string | | 2.41 | 1.98 |
| Other costs | | | |
| -Municipal tax | birr/quintal | 2.90 | 0.00 |
| -financial charges | | 29.41 | 29.41 |
| -transport to terminal market* | | | |
| -Weight loss | | 23.45 | 17.60 |
| -handling cost | | 21.68 | 25.33 |
| -overhead costs | | 4.64 | 3.48 |
| | | 6.82 | 6.24 |

* It includes 45% tradables 15% labour and 40% capital costs.

Source : Column 3 obtained from Ethiopian Coffee Sale and Purchase Enterprise.

Column 4 calculated based on conversion factors obtained from MOPED and Border prices obtained from customs and excise department(for tradable commodities).

**Appendix VII Inventory budget for coffee Export marketing (1988/89)**

| | Unit | Private prices (birr) | Social prices (birr) |
|---|---|---|---|
| Total revenue | birr/quintal | 552.00 | 934.00 |
| coffee purchase<br>Bags and twines | 1 quintal<br>birr/quintal | 265.00<br>4.00 | 815.00<br>4.00 |
| Cleaning costs | birr/quintal | 6.00 | 8.75 |
| Cleaning loss | birr/quintal | 5.00 | 23.35 |
| Handling cost | birr/quintal | 5.00 | 3.75 |
| Transport to Assab* | birr/quintal | 12.00 | 18.40 |
| Administration cost(labour) | birr/quintal | 2.00 | 2.06 |
| Financial charges and Insurance | birr/quintal | 18.00 | 24.00 |
| Overhead costs | birr/quintal | 3.00 | 2.75 |
| Taxes.<br>-surtax<br>-duty and cess tax<br>-Transaction tax | birr/quintal | 211.00<br>184.00<br>20.00<br>7.00 | 0.00<br>0.00<br>0.00<br>0.00 |

* It includes 45% tradables 15% labour and 40% capital costs.

Source: Column 3 obtained from Ethiopian Coffee Export Enterprise.
Column 4 calculated based on conversion factors obtained from MOPED and Border prices obtained from customs and excise department(for tradable commodities).

**Appendix VIII: Inventory budget for coffee Export marketing (1995/96)**

| | Unit | Private prices (birr) | Social prices (birr) |
|---|---|---|---|
| Total revenue | birr/quintal | 1437.00 | 1542.00 |
| coffee purchase<br>Bags and twines | 1 quintal<br>birr/quintal | 1083.89<br>5.00 | 1266.4<br>5.00 |
| Cleaning costs<br>-fuel & Lubricant<br>-maintenance & depreciation<br>-Labour cost(unskilled) | <br><br><br>birr/quintal | <br>11.40<br>12.50<br>14.10 | <br>12.54<br>9.38<br>9.17 |
| Cleaning loss | birr/quintal | 27.00 | 30.84 |
| Handling cost | birr/quintal | 10.00 | 8.00 |
| Transport to Assab* | birr/quintal | 17.00 | 18.40 |
| Administration cost(labour) | birr/quintal | 11.00 | 11.33 |
| Financial charges and Insurance | birr/quintal | 46.22 | 40.82 |
| Overhead costs | birr/quintal | 18.00 | 16.47 |
| Taxes.<br>-surtax<br>-duty and cess tax<br>-Transaction tax | <br><br>birr/quintal | 91.07<br>43.50<br>20.00<br>27.57 | 0.00<br>0.00<br>0.00<br>0.00 |

* It includes 45% tradables 15% labour and 40% capital costs.

Source: Column 3 obtained from Ethiopian Coffee Export Enterprise.
Column 4 calculated based on conversion factors obtained from MOPED and Border prices obtained from customs and excise department(for tradable commodities).

**Appendix IX: Economic farmgate price of maize**

| | Price of maize in US dollar per tonne | |
|---|---|---|
| | 1988 | 1995 |
| US No.2 yellow FOB gulf port | 88 | 134 |
| Freight and insurance | 45 | 45 |
| Imported maize cif Assab | 133 | 170 |
| Equilibrium exchange rate | (Us$1=EB3.50) | (US$1=EB6.79) |
| Imported maize cif Assab (EB/tonne) | 466 | 1215 |
| Port charges | 60 | 75 |
| Transport to Addis including insurance | 170 | 180 |
| Storage and handling | 12 | 15 |
| Value at Addis Ababa | 708 | 1485 |
| Less transport from(surplus cereal region) | 120 | 160 |
| Economic value at farm gate | 588 | 1325 |

Source: ULG Consultant,food study group adjusted for exchange rate overvaluation.

## DECLARATION

I, the undersigned, declare that this is my own original work and has not been presented in any university. All sources of materials for this thesis have been fully acknowledged.

Name : Taye Yadeta

Signature : 

Date : June 3, 1997.