Agricultural Growth and Poverty Reduction in Ethiopia

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Abstract

This study investigates the agricultural growth-poverty relationships at the national and household levels. First the study uses results generated from participatory assessments conducted in two farm systems to characterize the agriculture system and identify linkages between agricultural growth and poverty situation. Seven channels are identified through which agricultural growth is likely to reduce poverty in the country. Then attempt is made to quantify the effects of various channels by which the agricultural sector and the growth of that sector are likely to affect poverty levels. The seven channels identified work through the market and non-market mechanisms involving four major transmission mechanisms: Food, income, price and employment. Here, particular emphasis and detailed investigation is made on the first two transmission mechanisms - food and income.

The same results are also used to determine variables that affect household consumption in rural areas. The information is used to construct household consumption model, which is subsequently used to estimate poverty levels under different scenarios, using the FGT poverty functions. Rural household model based on regression methods is used, therefore, to measure the impact of agricultural growth (or decline) on consumption first and then the latter on poverty measures. The macro and sectoral analyses are based on forty-year time-series national account data. Various elasticities of growth to poverty reduction are estimated at the national and household levels using two approaches each involving a two-stage analysis. The first approach used tries to estimate agricultural growth elasticity of poverty indirectly from overall GDP growth elasticity of poverty and the sectoral growth elasticity of GDP growth. The idea of this approach is by the author as he has not come across any study that has used similar approach. In the second approach, a two-stage analysis is used to arrive at the growth requirement by estimating first the determinants of welfare (household consumption expenditure) and estimating the poverty impact of a certain growth using the relationship between expenditure and poverty incidence.

At the National Level

Poverty depends on average income level and extent of inequality. Hence, agricultural growth affects poverty in so far as this affects at least one of these two factors. Note, however, that growth by itself may not affect poverty status depending on whether it is broad-based or allows the poor to participate.

The macro level assessment explores long-term linkages between growth rates in agriculture and overall GDP thereby discerning impact of agricultural growth in determining national income level. Accordingly, a forty-year time-series data has indicated that the trend in performance of the overall economy and the growth in agriculture sector are highly correlated. In spite of relatively higher growth rates in other sectors of the economy, overall GDP growth rate has been low in line with poor performance registered in agriculture. See Chart 1 that shows more or less identical pattern in trends of agriculture and GDP percapita value added growth rates.

Average growth rates in agricultural percapita value added have been negative under the past two and current regimes. Hence, agicultural percapita value added has declined by about 1 percent during the past forty years. Therefore, GDP percapita has more or less remained the

same during this period, with little effect made by the remaining sectors, which grew relatively at higher levels.

Through time, the contribution of agriculture in the overall GDP and in employment levels has declined continuously. The sector accounted about 68.6, 55.9 and 48.7 percent of GDP during the Imperial, Derg and current (EPRDF) regimes. Employment shares of agriculture were 88.6, 89.3 and 79.6 during the respective periods. Agriculture remains, however, the principal source of income and employment for the majority of the population in the country.

In contrast, the other services sector, which is dominated by administration and defense activities, has shown a rapid increase in relative weight of importance to GDP. It is shown that the contribution of agriculture to overall GDP growth has declined from about 39 percent during the Imperial period to about 22 percent under the current government; whereas, the contribution of other services has increased from 21 percent to 44 percent during the same period. Given the stagnant share of industry in GDP, the long-term trend of the performance of the economy does not seem to be healthy.

A simple regression analysis is made to quantify the linkage between agricultural and GDP growth rates in terms of elasticities. According to the estimation result, a 1 percent growth in agriculture would lead to a 0.32 percent growth in GDP. The fact that other sectoral elasticities of growth with respect to GDP are lower than this indicates that agriculture is the predominant sector in determining income at the national level.

Growth elasticity of poverty: Poverty incidence depends on real per capita (or per adult)) income (or expenditure), poverty line and income inequality. Using a formula based on this relationship and based on parameters derived from an econometric equation fitted by Ali (1998), Befkadu (2002) estimated the growth elasticity of poverty in Ethiopia to be -0.76. Given the agricultural growth elasticity of GDP growth estimated here 0.32, it follows that ***a 1 percent increase in agricultural production would lead to 0.24 percent decline in poverty incidence.*** Although this seems to be on the low side, it should be noted that the reduction in poverty is at national level, which indicates that the elasticity of poverty to agricultural growth would be higher if only rural poverty is considered.

Currently, in Ethiopia, there are only two data points that provide poverty incidence and percapita levels at the same time – 1995/96 and 1999/00. Assuming that poverty incidence in the given years is affected by percapita income in the previous year of each, the growth elasticity of of poverty will become –0.25, which is again on the low side. In fact, taking average growth rates for the past five years before the respective data points indicate that on average per capita income has declined, whereas the available poverty estimates show a decline in poverty. This will give a positive elasticity, which is unlikely to be true. Note, however, that the poverty estimates provided for the year 1999/00 by the government are highly challenged by different stakeholders including the government's own qualitative assessment which indicated that poverty has been increasing during same period. As this is also supported by the analyses made at the household level using macro trends, it is advisable to take caution in accepting the 1999/00 official poverty figures.

Sources of national income: Based on the 1995/96 household income, consumption and expenditure (HHICE) survey data, the levels of income from different sources are estimated at the national, rural and urban levels. The results generated indicate that agriculture accounts the major source of income (40.5%) for the population at large. In terms of significance, its importance is double than that of income obtained from wages and salaries.

Obviously, the importance of agriculture as source of income increases for the population living in rural areas. 72 percent of rural income comes from engagement in agricultural enterprise. In contrast, 53.2 percent of urban income is generated from non-agricultural enterprise. Even for urban dwellers, agriculture constitutes a source of about 4 percent of their income.

At the Household Level

First and foremost, the benefits of agricultural growth directly accrue to rural farm households. Agricultural households are the main form of economic organization in Ethiopia. Rural households depict, however, complex behavioral patterns and characteristics.   Most can be described as subsistence farmers given that they produce mainly for consumption. However, the majority are likely to purchase some of their food items from the market and, as such, are categorized, therefore, as semi-commercial with those households that deliberately partially produce with the intention of selling at the market. Households also purchase some of their inputs but also provide some from their own resources.

Simulation approach

Using the 1995/96 household income, consumption and expenditure survey (HHICE) data, first a rural household consumption model is estimated and then the model is used to predict different consumption levels and consequent poverty incidences based on different scenarios of agricultural growth levels. The purpose here is to illustrate the impact of agricultural growth on poverty using estimated parameters of determinants of per adult household consumption expenditure and the relationship of this welfare indicator with poverty incidence functions.

Using estimated parameters in the consumption model and directly applying the national poverty line, which is estimated based on the same data set, the base simulation has provided a poverty incidence of 40.2 percent in rural areas with 11.2 and 24.9 poverty gap and severity respectively.

Poverty by year 2000

Assumption 1.

Given the actual and base simulation poverty measures for the year 1995/96, attempt is made here to estimate poverty levels in five-year after the base year. The percentage change in percapita value added of agricultural production is assumed to reflect the same percentage change in consumption per capita (adult). During this period percapita agricultural production has declined, on average, by –3.4 percent annually. In other words, percapita agricultural value added has declined by about 15.9 percent during the five-year period. Hence, per adult deflated consumption expenditure is also assumed to have declined by the same level. If we assume, income distribution has remained the same during this period, the application of the same poverty line in real terms, has provided poverty estimates for the year 2000/01 as follows: Poverty incidence = 63.6 percent and a poverty gap of .22[♦].

Such rapid increase in poverty level goes very well with the general perception of the public as expressed during the PRSP consultation. A similar level of poverty was estimated based on survey data that was collected in selected rural areas in the country by the Economics Department of the Addis Ababa University.   Hence, while consumption expenditure and, therefore, agricultural value added per capita declined by 16 percent, poverty incidence has increased by 58 percent, implying agricultural growth elasticity of poverty -3.62, which is very high.

[♦] Note that, annual inflation based on CPI has been on average 2.64 during the five-year period, which means the poverty line has to be increased by 13.9 percent. The poverty line in 2000 becomes, therefore, 1224 birr.

Assumption 2

Given that the majority of farmers are subsistence farmers who are not affected by market price as such, we can assume that inflation level was zero, which provides: A poverty incidence of 53.7 percent and poverty gap of .063. Still, poverty incidence has increased by about 34 percent, providing agricultural growth elasticity of poverty to be -2.12.

Assumption 3

If we assume for the moment that what is to be applied as a trend indicator beginning from 1995/96 is the long-term trend, which is a decline in agricultural value added per capita by 1.61 percent, and assuming further that inflation remains constant, consumption per adult expenditure in rural areas will decline by about 7.8 percent in the first five year period. This provides a poverty incidence of 46.5 percent and a poverty gap of .137.

Poverty still has increased (by 15.7 percent) with this relatively better long-term trend in agricultural value added percapita growth. In this case, agricultural growth poverty elasticity becomes -0.98, or almost equal percentage change in opposite direction. *So, it is likely that at least or as a minimum a one percentage increase in agricultural per capita value added will result into a one percent decline in poverty level.*

Long-term trends

As was mentioned earlier, we have two points in time concerning actual trend in poverty situation in the country: 1995/96 and 1999/00. The poverty incidence levels in these two periods are 45.5 and 44.2 respectively. These indicators are used to forecast and simulate different scenarios under conditions of with and without improvement in the performance of the agriculture sector.

Trend extrapolation

The trend analysis indicates that by 2020 the poverty incidence will be 39 percent. The implied average declining rate (annual reduction) is 3%. This trend is based on five-year period laps. Annual based trend analysis also provides similar result. Using actual growth rate between the two periods and extrapolating to 2020 provides a poverty incidence of 39.4 percent. The average annual reduction rate is 2.9 percent.

The simple forecasting exercise, which is made on positive trend in poverty incidence the government has claimed, demonstrates that Ethiopia needs to undergo fundamental change in productivity levels to meet the millennium goals, if they were to be achievable. Simple forecasting and alternative growth scenarios are further made using the simulation approach below.

Simulation exercise

Based on *long-term actual trend* in agricultural percapita value added, a simulation is made to estimate poverty levels by the year 2015. Inflation level is assumed to remain constant concerning the poverty line, which is taken as fixed and that there will be no change in income distribution. Based on this assumption, poverty measures simulated for the year 2015 are as follows: Poverty incidence 65.2 percent and poverty gap of .229.

Indeed, about two-third of the rural population will be in absolute poverty by 2015 if past performance of the sector continues unchanged, i.e., an increase in poverty incidence by 62 percent. During the same period, based on long-term trend of agricultural percapita decline by 1.6 percent, the overall reduction in per adult consumption expenditure during the fifteen-year period is 27.7 percent. In the face of such mounting challenge, the realization of the millennium goals in Ethiopia is unlikely.

An alternative *best scenario simulation* is also made using the last five- year trends of agricultural growth before 1995/96. Agriculture value added per capita was growing at .04 percent (i.e., the agriculture sector growing by 3.04 percent & assuming population was growing by 3 percent). So, by 2015, consumption expenditure per adult could be assumed to increase by 8.3 percent. This will provide the following poverty estimates: A poverty incidence of 34.3 percent and poverty gap of .09.

Hence, in this case, it is made possible to reduce poverty level by 2015 by 15 percent. Consumption expenditure per adult has increased by 8.3 percent during the same period. So, agricultural elasticity of poverty growth would be –1.8. This indicates that even minimal positive growth in agricultural per capita value added, poverty level could be reduced.

In conclusion, the study clearly shows that the performance of agriculture determines the trend in overall percapita income and employment situation in the country. The fact that GDP percapita has shown no improvement over such long period is mainly the result of poor performance in the agriculture sector. The welfare of the people has also shown a declining trend in line with weakening of the agriculture sector. Analyses of determinants of welfare in rural area have indicated that family size, asset ownership (land, animals, radio) and access to services and infrastructure are key factors.

Simulation estimates indicate that current poverty level is much higher than officially indicated. The different simulation estimates made under different scenarios have also clearly indicated that unless the declining trend of the sector achievement is arrested and reversed, poverty situation in the country will rapidly aggravate as a result of which, say, by 2015, close to about two-third of the population will be in absolute poverty. At the same time, it is shown that with little improvement in agricultural productivity, the trend in worsening poverty could be reversed and poverty could be actually reduced substantially by 2015. The different elasticities of agricultural growth to poverty reduction estimated in the study are relatively very high indicating the great potential the sector has to reduce poverty in the country. So, fundamental change is needed to improve productivity in the agricultural sector.

This is especially called for considering the fact that the industrial base of the economy has shown little improvement, which is probably negatively affected by the weak agricultural sector among other factors. The service sector is gaining increasing significance and it has surpassed the contribution of agriculture to GDP in the last three years. This is a worrisome trend given that it cannot be sustainable in the long term.

The overall facts detect the need for addressing the constraints faced by the agriculture sector as top development priority. Even though the government pursues an Agriculture Development led Industrialization Strategy, the fact that no gain was made so far, while the weakening of the sector seems to have accelerated in recent years, point the existence of problems that have yet to be addressed.

Some possible areas that need careful consideration include revisiting policy to help arrest declining trend in agricultural value added percapita and create dynamism in the sector; given rising frequency and severity of famine, growing population pressure and scarcity of land, which led to growing landlessness, top priority need to be given to resolving the food insecurity issue by introducing a new land tenure system; parallel to improving productivity in rural areas, measures to create conducive market environment need to be implemented; considering that farmers are suffering from fertilizer use and slumping price, some form of protection and subsidy to farmers need to be considered; and finally given the scattered settlement in rural areas, carefully planned voluntary villagization and settlement programs need to be implemented.

1. INTRODUCTION

Ethiopia is basically a rural society with only a small percentage (15 percent) of the population living in the capital city, secondary cities and small urban towns in different regions of the country. Moreover, the outskirts of so-called urban centers and their surrounding areas are commonly rural. The livelihood of the population in rural areas is mainly based on agriculture – typically mixed farming.

In terms of economic development, Ethiopia is one of the least developed and therefore the poorest country in the world. The latest World Bank rankings of GNP per capita put Ethiopia 206th and last, with income per head of only US $ 100 in 1999, compared to the sub-Saharan Africa (SSA) average of US $ 500 (World Bank, 2000).

Poverty in Ethiopia is, therefore, widespread and deep-rooted and constitutes the priority development challenge in the country. Currently it is estimated that about 47.5% of the population is under the national poverty line. About 90 percent of the population would fall under poverty line if the international poverty line of a dollar a day per person is used.

It follows therefore poverty in the country is mainly a rural phenomenon and a reflection of the underdeveloped nature of the agriculture sector. Typically, agriculture is characterized by small holder and subsistence farming which is highly dependent on rainfall. The urban livelihood is also highly dependent on the rural economy and as such small farm constitutes the life support mechanism of the country.   Understanding poverty in the country necessitates therefore knowledge about farm economy in the country.

Although small scale subsistence farming is the dominant feature there are however great diversities and characteristics of different farm systems that operate under this domain. It is possible to categorize the different systems, however, into different sub groups such as Cereal growing, Enset, Pastoral, Subsistence and Cash Crop producing farm systems.

In this study attempt is made to explore the role and externalities of improvement in agricultural production under the existing systems for poverty reduction in the country. The study attempted to specify and measure the different channels under which agricultural growth impacts on poverty. The channels can be broadly divided as those operating and non-operating through the market mechanism.

The paper is outlined into eight major chapters, which are consequently arranged to provide first background and characteristics of the agricultural system in Ethiopia, discuss the various channels through which poverty is affected, provide estimation of these channels and finally identify key conditions that affect size of impact of agricultural growth and based on which conclusions and policy recommendations are provided.

1.1   Background

Agriculture constitutes the principal source of income and employment for the majority of the population. Greater proportion of the foreign exchange the country earns also comes from this sector. The sector accounted about 68.6% of GDP during the Imperial period and about 56% during the last regime. The dominance of the sector has continued during the last decade and currently it stands at 43%.   It is also the leading sector in terms of providing employment in the country. According to the 1984 and 1994 population and housing censuses, about 89 percent of the population were engaged in agricultural activities.

Efforts to estimate the consequences of agricultural policies are often confounded by complex behavioral patters and characteristics of households in semi-commercialized, rural economies

(Singh, et al.). Most agricultural households in Ethiopia, for example, mainly produce for own consumption but also for sale, which can have many purposes – saving, procuring food or non-food items and tax or loan repayment. These households purchase some of their inputs (ex., fertilizer) and provide some (such as family labor) from their own resources. Any change in the policies governing agricultural activities will therefore affect not only production, but also consumption and labor supply.

Poverty in Ethiopia cannot also be analyzed without looking at the larger context of the rural nature of the country, drought disaster, environmental degradation, rapid population growth and general structural features of the economy. The country faces chronic food deficit as a result of which about 5 million people annually depend on food aid.

The broad outline of the government strategy for reducing poverty in Ethiopia as described in the PRSP document comprises the following elements: An agriculture-development led industrialization (ADLI), continuing implementing economic reform programs, civil service and judicial reforms, decentralization and capacity building. The – agriculture development led industrialization – strategy (ADLI) comprises the umbrella development strategy for the country. Ethiopia provides an interesting case study considering the ADLI strategy, small-scale agriculture based economy and the recent agricultural products price slumping and the associated factors and aftereffects.

This strategy revolves around making the small-agricultural farmer the engine of growth. It is argued that what the average farmer needs to kick start the growth process is access to combined provision of land, skill, and capital (GOE, IPRSP, 2000). The smallholder farming family is made, therefore, the focus of economic development with a massive agricultural extension (focused on provision of improved seeds and fertilizer) and credit scheme, and expansion of primary education, primary health care, rural water supply and rural roads.

In Ethiopia land is also under state ownership and neither farmers can sell their plot of land nor private investors can purchase land from rural dwellers. With these policy and institutional background, the trends and dynamics of agricultural growth and poverty reduction in Ethiopia are interesting to investigate.

1.2 Study Approaches

First at the macro level, the relationship between the performance of the agriculture sector and the overall economy is explored using long-term time-series data. Here, the relative contribution of agriculture as compared to other sectors is also investigated.

To determine linkages with poverty at the national level, first the GDP growth elasticity of poverty is determined and consequently the agricultural growth elasticity of poverty is calculated using agricultural growth elasticity of GDP determined earlier. In this way, the contribution of the agriculture sector to poverty reduction at the national level is estimated indirectly. In addition, the direct agricultural elasticity of poverty reduction is determined using three stage approaches, which sequentially linked determinants of income to household expenditure level and using the Foster, Greer and Thorbeck P-α measures, household expenditure levels are linked to poverty measures.

The identification of the main channels through which agricultural growth impacts poverty is highly dependent on the system of agriculture being considered. That is why a broad characterization of the agriculture system is made in the paper before identification of possible channels through which agricultural growth impacts poverty. In Ethiopia, agriculture is mainly subsistence farming with huge unemployment and underemployment and operates under a system of public ownership of land. The channels identified in the study are based therefore with this framework in mind.

Moreover, to capture fully the roles and externalities of agricultural growth in poverty reduction, an understanding of the microeconomic behavior of agricultural households is necessary. It is essential to know the determinants of poverty, what factors determine the level of farm production and households consumption and the supply of labor. The agricultural household model is applied here given that the advantage that such models capture both the production and consumption behavior of farm households. The model assumes that households are price-takers and is therefore recursive.

A deterministic model cannot be applied to Ethiopian case where agricultural production is subject to considerable uncertainty. Yields highly depend on weather conditions that can be predicted with only a limited degree of accuracy. Wellbeing is defined in terms of households' consumption expenditure level. Nutritional intake level is also used as an alternative measure of living standard of households. How resources are allocated within a household also determine the level of impact on poverty arising from increase in household income. Intra-household distribution of income is not, however, the subject of this study.

Note that earlier plan to investigate agricultural growth-poverty linkages using time series data sets has failed because of lack of access to the 1999/00 household income, consumption and expenditure survey. Subject to access to this data set, this work will be extended accordingly.

2. THE MACRO ECONOMY AND THE AGRICULTURE SECTOR

2.1 Long-term Relationships

Agriculture is the basis of the national economy. It continues to be the dominant sector in spite of the fact that the contribution of the sector in the GDP has been continuously declining over the past four decades. The share of agriculture in GDP on average was 69%, 56% and 49% during the Imperial, Derge and EPRDF periods respectively (see Table 2.1.1).

Table 2.1.1   Forty Year Relationship between Agriculture and GDP

	GDP	Agri.	Share of Agri.	Population	GDP percapita	Agri. percapita
Imperial	6560.7	4463.5	68.6	27.3	238.9	194.9
Derg	9515.5	5289.2	55.9	39.3	242.9	160.6
EPRDF	14,214.7	6837.6	48.7	58.5	241.6	136.9

Overall the agriculture sector grew annually only by 1.89 percent on average during the last forty years (1962 – 2002) (see Table 2.1.2). The sector grew annually on average by 2.1, 1.5 and 2.2 percent during respectively the Imperial, Derge and EPRDF periods. As a result the percapita agricultural value added has actually declined by 0.9 percent (see Table 2.1.3).

Table 2.1.2   Forty Year Summary of Economic Performance

	Imperial	Derg	EPRDF	Overall
Agriculture	2.14	1.53	2.21	1.89
Industry	7.53	1.35	6.19	4.46
Dist. Services	8.27	1.26	6.84	4.81
Other Services	7.29	4.97	7.39	6.30
GDP	3.80	1.89	4.50	3.15

The performance of the remaining sectors in relative terms was much better than the agriculture sector. Industry, distributive services and other services on average grew by 4.46, 4.81 and 6.3 percent annually during the last four decades. Although at very low levels, these sectors have also registered positive growth in terms of per capita value added. GDP percapita in general grew only be 0.58 percent during this long period, showing poor performance of the economy over an extended period.

Table 2.1.3 Forty Year Summary of Economic Performance – in percapita terms

	Imperial	Derg	EPRDF	Overall
GDP percapita	1.49	-0.67	1.57	0.58
Agriculture percapita	-0.04	-1.25	-1.36	-0.93
Indus. percapita	4.4	-2.1	1.56	0.80

It can be concluded from Table 2.1.4 that the poor performance of the overall economy is mainly due to the poor performance of the agriculture sector. Similar pattern of growth rates under the different regimes is observable between GDP and the agriculture sector. Coupled with relatively higher population growth rates, the sector registered negative percapita growth rates under all the past three regimes.

Table 2.1.4   Forty Year Relationship between Agriculture and GDP – Growth Rates

	GDP	Agri.	Population	GDP percapita	Agri. percapita
Imperial	3.80	2.14	2.3	1.49	-0.04
Derg	1.89	1.53	2.6	-0.67	-1.25
EPRDF	4.50	2.21	2.9	1.57	-1.36

The share of the various sectors in GDP over different periods in the past is shown in Table 2.1.5. The decline in share of agriculture in the overall economy does not show, however, structural transformation that usually happens when industrialization occurs. The share of industry has actually declined during the past decade as similar decline was observed in the agriculture sector. These declines were compensated by a rapid increase in other services sector, which is dominated by public administration and defense. So, the long-term trend of the performance of the economy does not seem to be healthy.

Table 2.1.5 Sectoral Percentage Shares in GDP

	Imperial	Derge	EPRDF
Agriculture	68.6	55.9	48.7
Industry	9.1	11.4	10.6
D. Services	11.4	14.3	14.1
O. Services	10.9	18.4	26.6
	100.0	100.0	100.0

2.2 Contribution to DGP

Another look at the relative importance of the various sectors in the economy is provided through their relative contribution to GDP growth. As is shown in Table 2.2.1, the contribution of agriculture to overall GDP growth has declined from about 39 percent during the Imperial period to about 22 percent under the current government. Whereas, the contribution of other services has increased from 21 percent to 44 percent during the same period. Hence, in terms of importance to growth performance, other services contribute more than the contribution by the agriculture sector.

Table 2.2.1   Contribution to GDP Growth

	Imperial	Derge	EPRDF
Agriculture	38.9%	38.5%	22.2%
Industry	17.0%	6.5%	13.6%
Dist. Servi	23.5%	4.9%	20.5%
Other Ser	20.6%	50.2%	43.8%
	100.0%	100.0%	100.0%

Trends in average annual growth rates of percapita value added of the different sectors indicate that GDP percapita value added is highly correlated with agricultural value added than other sectors (see annex Charts 2.2.1 and 2.2.2). Analysis of 50 year national account data has clearly indicated, therefore, the close relationship between the overall performance of the economy and the performance of the agricultural sector.

A simple regression[*] analysis was made to quantify the linkage between agricultural and GDP growth rates in terms of elasticities. The results are summarized in Table 2.2.2. According to the estimation result, a 1 percent growth in agriculture would lead to a 0.32 percent growth in GDP. The fact that other sectoral elasticities of growth with respect to GDP are lower than this indicates that agriculture is the predominant sector in determining income at the national level.

Table 2.2.2 Sectoral Elasticities of GDP growth

	ß	avg	ε
Agriculture	.525	1.89	0.32
Industry		4.46	
Distributive Services	.125	4.81	0.19
Other Services	.229	6.3	0.46

Growth in agricultural value added is, therefore, the most determining factor of real GDP percapita growth in Ethiopia. During the two regimes, for example, inspite of positive real percapita growth rates in the non-agricultural sectors, GDP percapita registered a negative growth in line with the growth in agriculture percapita.

2.3 Contribution to Employment

Similarly, agriculture is the predominant sector that contributes to employment in the country. Its contribution to employment has declined, however, from 87% in 1984 to about 80 percent in

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[*] Growth in GDP is modeled as a function of growth in agriculture, industry, distributive and other services.

1999, according to the 1999 national labour Force Survey (CSA). This is in line with the decline in the agricultural share of the GDP; whereas, the other sectors show an in increase in their respective share of employment (See Table 2.3.1).

Table 2.3.1 Employment Share of Major Sectors

Sector	Year		
	1984	**1994**	**1999**
Agriculture & Allied	88.6%	89.3%	79.6%
Industry and Trade	5.8%	6.4%	15.1%
Distributive Services	0.5%	0.7%	0.9%
Other Services	5.1%	3.6%	4.4%
Overall the Economy	100%	100%	100%

Source: based on data from the 1984 and 1994 Population Censuses

Note that the share of agriculture more or less remained the same for about a decade between 1984 and 1994 but declined significantly in the years after. A breakdown of the industrial sector indicates much of the employment (about 10% in 1999 as compared to 4% in 1984) is in wholesale, retail trade & catering (Fantu, 2003). It seems that a shift of employment has occurred from agriculture to trade.

Other studies have also clearly demonstrated the critical role of the agriculture sector in determining the income level of the people. For example, between 1974 and 1990, GDP grew at annual average rate of 1.9%, which in conjunction with a population growth rate of 2.7% led to a decline of in per capita income of 0.8% per annum. The major cause of this disastrous performance was stagnation in the agriculture sector, which grew only by 0.7% or a full 29% below the growth rate of population. In other words food production per capita fell by 2% (Eshetu Chole, The Dismal Economy).

3. CHARACTERIZING THE AGRICULTURAL SYSTEM

An understanding of life in rural setting and the specific features and structures of the agriculture system therein is necessary to comprehend the poverty impact of agricultural growth. The vast majority of the poor in Ethiopia reside in rural areas, where the incidence and intensity of poverty is also higher than urban centers in the country.

Life in rural setting, from the economic point of view, is backward. Rural households tend to be less nurtured, less healthy and less educated. They also experience poorer service delivery, lower access to infrastructure and limited employment opportunities. Settlement in rural areas is typically scattered without any form of structure as observed by an outsider. Hence, the rural poor are widely dispersed.

Livelihood is highly dependent on the natural environment. However, the rural poor commonly possess multiple sources of income from agriculture, rural non-farm employment and transfers. A significant share of economic activity in rural areas is devoted to the production of basic commodities, especially staple foods, for which the income elasticity of demand is low.

While agriculture is the primary source of livelihood, there are other non-farm activities that support various households and communities, which necessitates the need to look at interactions and inter-linkages while assessing the impacts of agricultural growth on poverty. The government is almost the sole provider of infrastructure and other services to the rural economy.

3.1 Farming Systems and Characteristics

Various categories of agricultural households exist in Ethiopia: subsistence farmers, landless laborers, cash crop farmers, fisher folk, pastorals, etc. Among these groups, the predominant one is subsistence farming. In purely subsistence farmers, the decisions about production, consumption and labor supply are made simultaneously. However, most rural households can be considered as semi-commercialized in the sense that they purchase some food (ex. salt, oil) and non-food (ex. fertilizer, tools) items from the market and also exchange some of their produce to cover their demands from the market.

A participatory assessment was conducted for this study in two major farm systems in the country: cereal and enset producing farm communities.

Adda Woreda (Cereal producing District)

The district is a cereal producing area under which four villages were sampled and focus group discussions were held. The discussions were held with various groups including the young, old aged, women and students. Most of the group members are usually engaged in agricultural activity with few of them as occasional daily laborer such as stone molding, which is available near to one of the villages.

In the villages selected, there seems to be no appreciable division of labour between men and women. However, men, who are the main agricultural decision-makers in the area, basically dominate ploughing activities. This includes bringing fertilizer to farmland, ploughing, sowing weeding, harvesting and threshing, and selling grains. Other home-based duties include fencing, house building, preparing small well to store dung, which are usually the responsibility of men.

Women are predominantly involved in hand weeding, grain transporting, preparing threshing-floors, looking after garden of vegetables and crops, milking cows, fetching water and straw, and storing dung in wells. Women are also engaged in threshing and sawing. During spare time, all members of the households are involved in home maintenance and fencing activity including children who spend their day time in school. Other activities by women include preparation of agricultural tools such as "mofer" and "kenber" and poultry. In some areas like Kejima women undertake weeding in farmland and plant vegetables such as pepper, carrot and potato in their compound. In addition, women prepare food for all the household members.

Regarding infrastructure, a primary school is available within 1 km distance. However, only about half of the households reported that they send their children to school. If a student completes a primary school, the chance of continuing education is minimal as secondary schools are not normally available in surrounding areas. This could be a factor that prohibits children from joining school in the first place. But the predominant reason for not joining school lies in children engagement in farm activities. The school leaver in some case return to farming activities as a head household and only few of them (about 20 percent) travel to nearby city to get a job as a factory worker or daily laborer. A health facility is also available within 1 km distance in the sampled villages, except one village, which is about 30 km away from any type of health facility.

Market places provide access to cereal products, domestic livestock (hens, sheep, and goats) and other commodities such as coffee, spice, pepper, onions, and fruits that are used for home consumption. At least, there will be one a weekly market within 1 km distance. Major products brought by most community members are cereals (maize, sorghum, barely, teff, wheat, etc.). Others bring coffee, oil, vegetables, etc.

Communities in the district make their production and consumption decisions simultaneously. They know when to sell, hold stock reserve for the year and decide on consumption level. Proportionally, households satisfy their own consumption need from their own produce for about 7-8 months during a year.

Due to shortage of land, the young generations are forced to seek off-farm employment, which however is rarely available. Only the lucky few get a chance to work in factories, available in surrounding areas. Some are engaged in trade activities by collecting/buying grain from farmers and selling the grain in the market. Other commonly undertaken off-farm activities include carpentry, factory job, stone molding, local drink business and tree cutting. The proportion of young people who are engaged in off-farm activities comprise about one fourth and the rest are engaged in agricultural activities.

The relatively well to do households hire farm labor consisting mostly villagers or migrants. The young from poor households also get employed by the well to do farmers especially during harvesting period. About two to three laborers are employed in a given well to do farm household. About one-fifth of the households have reported that they ear income through such type of employment. There is also an arrangement where a given poor household sends one of its female child to the rich one to assist in home based as well as field duty such as herding. The payment for the service is made either in terms of money or some portion of the harvest.

Income and consumption

Given that Ethiopian agriculture is characterized by small holder farming, growth in the sector means possible increases in consumption and/or savings of the small farmer. A rise in either of the two comprises a rise in income (either cash or imputed or both). In case of purely subsistence farm households, where there is no access to trade, a household can consume only what it produces and must rely exclusively on its own labor. A large part of agriculture, however, is made up of semi-commercial farms in which some inputs are purchased and some outputs are sold.

According to the participatory discussions, rural household expenditure is mainly spent on purchasing item from the market, covering cost of fertilizer, paying taxes, and contribution to "Idir" (a local saving association). Ability to harvest cereal products is strongly determined by the availability of rainfall. So in time of above normal production households engage themselves in oxen fattening (for rich households) and poultry. The well to do household members are also involved in oxen fattening and poultry activities. They mostly sell the oxen in the market during religious holidays. The cows are used for milking purpose, which in turn complements home consumption and the income of the household from selling the milk. Sheep and goats are also kept for home consumption and may be sold in the market, if needed.

The major problem that most of the community members face is the increasing amount of money that they are required to pay for purchase of fertilizer. Every time they are forced to pay more money for fertilizer. This is mainly due to gradual deterioration of the quality of the land as a result of which it needs more and more fertilizer. Since the quality of land is said to be continuously deteriorating they are forced to buy more and more fertilizer. The district is also adversely affected by shortage of water supply. Hence it is not feasible to think of irrigation project in the short run.

Hence, shortage of rainfall constitutes a formidable challenge to farmers. Given that grains such as lentils, chickpea, bean and cereal products are strongly dependent on rainfall, in case of shortage of rainfall, only the flowers part of the plants grow which are not, however, consumable. Shortage of rainfall will result, therefore, into a short fall in production and households will be forced to consume their reserves, which are stored mainly as seeds and for selling purposes. If the reserve is not available or exhausted household members migrate to nearby places to seek daily labor employment.

There is no much of saving exercised in terms of financial assets mainly due to lack of cash income. They are more likely to store their own produce rather than selling it and depositing finance generated in the bank. The saving behavior of households is reflected in terms of reserving seeds for the next planting season. So, in the time of good yield, farmers save some

portion of their seeds for the next period plantation. However, the majority farmers usually don't save for the next period; rather they borrow seed from those who have got many seeds. When farmers face crop failures due to shortage of rainfall or pests, they sell their cattle and buy seeds from remote areas.

Checha wereda (Enset producing district)

Similar focus group discussions were held in four villages of this district. Again, most members are engaged in agricultural activity and only few are engaged in carpentry, pottery, trade and daily labor activities. In the district, there is a clear division of labour between men and women. Women are normally engaged in various activities beginning from collecting woods and bringing water and then preparing food for the whole household members. They are mainly engaged in processing Enset to edible form, i.e. Kocho. The process is time consuming, which includes extraction of enset's edible substances, burying in the ground for fermenting, which has to be put for several weeks, and preparing Kocho. Enset can be stored for several years.

Men are responsible for preparing the farmland (clearing and tilling soil), planting and transporting enset and other crops. They are also engaged in making a hollow for coffee and chat plantation and harvesting upon maturity. Enset is multiplied, planted and replanted by men while women do the harvesting. Since most of the children go to school, they help their parents mainly during weekend by looking after the cattle and in transplanting the enset plantation. The farming activities require daily monitoring, intensive cultivation and putting manure at the early stage of development. The greatest advantage of growing Enset is that it can easily grow with minimum care and survives at times of rainfall shortage. Most of the male labor is required in early stage of Enset plantation and female at later stages of development. In general, Enset does not need much attention once it has grown and transplanted. The Enset plantation takes 6-7 years to mature, so every time they have to prepare new plantation on a yearly basis.

Types of wage employment activity available to the community include carpentry, thatching, local drink making, pottery, food-for-work activities by NGO (CRS, Catholic Relief service), and daily labor on farmland. The payment to labor service could be in cash or in kind. Labor is abundant in the community but the employed labor in some case may come from other areas. Job opportunity outside the community especially in big towns is available mostly to teenagers who engage themselves in selling second-hand cloth and shoe shining & repairing.   Those who finish secondary school usually resume farm activities or migrate to towns to engage themselves mostly in self-employing activities. The daily labor employment opportunity in most cases is related to agriculture. In such cases the type of work done by the wage labor includes land preparation and harvesting. Most of the households (approximately 7/10) hire labor to work on their farmland. Household also hire labor on contractual basis.

Educational facility is available within the distance of 45 minutes walking time for most of the communities, which in some cases, however, is as far as 1-2 hours walking distance. According to the participants, almost every household, more than 80 percent, send their children to the nearby school. The value of education is very much appreciated in the community. Health facility is also available at least within 1 hour walking distance.

Income and consumption

Households basically spend their income on food and non-food items. In most cases, the non-food component includes payment for land tax and fertilizer expense. These expenses take significant portions of their income. Occasionally, they spend however on cloth, detergents, household goods and social ceremonies and religious holidays.

The households' consumption pattern usually combines own produce with market purchase. The amount that households harvest enset hardly meets their consumption needs throughout the

year. Hence, they are usually obliged to engage in non-farm activities such as wage labor. They also produce coffee, chat and to some extent enset for the purpose of selling in the market. So, major income sources include sale of chat, coffee, enset, fruits and eucalyptus tree. When they earn above normal income, they usually spend it on housing maintenance, cloth, social ceremonies and purchase of domestic livestock such as goats and hens for consumption purposes. Most of the group members claimed, however, that because of small and fixed land holding size, they are not able to produce surplus as such. Land is so scarce in the area that farmers use their land to grow enset and other plants such as maize, tomato, and cabbage, which are planted, especially in rainy season. During shortage of income, young adult members migrate to town to find short-term employment.

Summary Impressions of Livelihood in Rural Areas
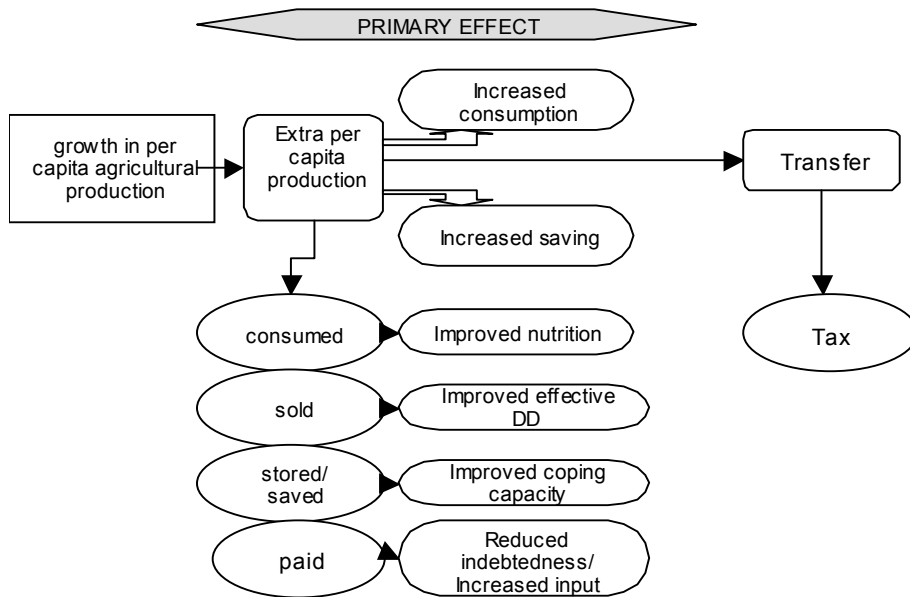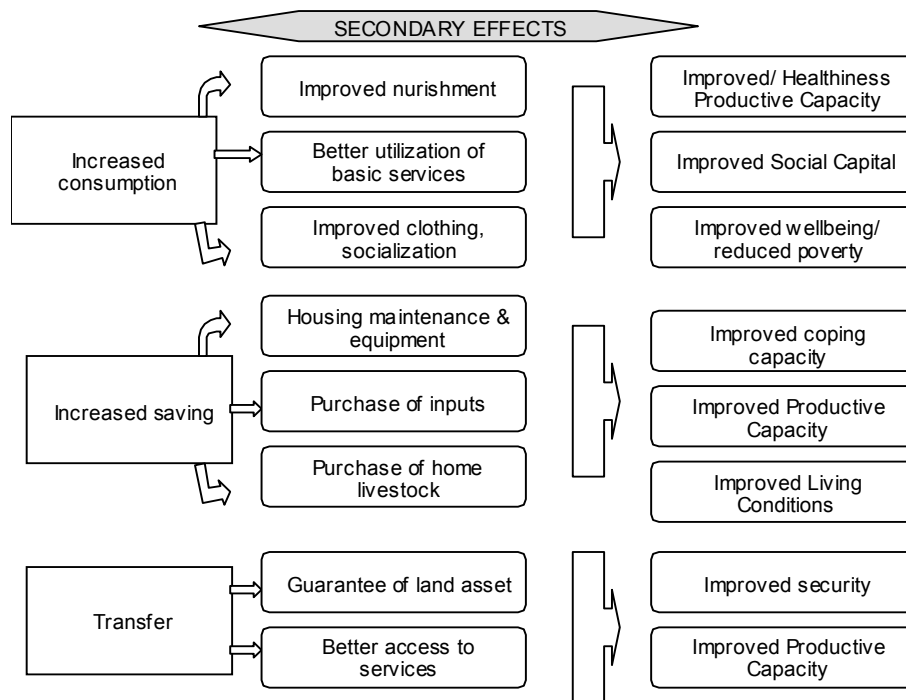
The livelihood for rural households usually constitutes crop production and livestock rearing. But nowadays, according to informants, labor sales and petty trade are also becoming important income sources.

3.2 Channels Affecting Poverty

First of all, it should be noted that the degree of poverty depends upon the average level of income and the extent of inequality in income distribution (see, for example, Kakwani, 1993). Hence, agricultural growth affects poverty in so far as it affects average level of income and inequality.

As was mentioned earlier, in truly subsistence farm households, production, consumption and labor supply decisions are made simultaneously. A large part of agriculture, however, is made up of semi-commercial farms in which some inputs are purchased and some outputs are sold. In the latter case, producer, consumer, and labor supply decisions are no longer made simultaneously.

As was mentioned at the beginning, the identification of the main channels through which agricultural growth impacts poverty is highly dependent on the system of agriculture being considered. For a person who has in mind a highly privatized and large-scale commercialized agriculture, the benefits of growth are mainly conceived from the recipients' end. In this perspective, wage differentials and movement of labour among different sectors and between rural and urban areas also get precedence as the most direct transmission mechanisms. The picture one envisages under small-scale, subsistence and public land holding system could be substantially different, however.

In Ethiopia, agriculture is mainly subsistence farming with huge unemployment and underemployment and operates under a system of public ownership of land. The channels identified in this study are based therefore with this framework in mind. In other words, the most direct benefit of agricultural growth is improvement in welfare of the small-holder assuming price will not decline due to shortage of effective demand. The labour market consequence is primarily

envisaged in terms of more labor absorption within the rural areas with little impact on rural wage rate in the short term. Since the agriculture sector is unlikely to attract labour from other sectors and urban areas under such a system, the general equilibrium effect through the increase of unskilled labour wage rate in urban areas need not be automatic.

The effect of higher agriculture output leading to lower food prices should also be seen from two angels: the producers and consumers. In the case of Ethiopia, given that the producers are mainly small farmers, a reduction in food prices could increase poverty among the rural poor rather than decrease it.   As the recent experience of agricultural produces' prices slumping has indicated, an increase in smallholders' income need not necessarily follow an agricultural growth. The urban poor is likely to benefit from a reduction in food prices mainly through higher real wage rate the effect of which could be dampened however by traders and brokers profit margins.

The benefits to the urban poor could also come through expanding economic activity comprising mainly increased volume of trade but also aftereffect processing activities which augment the demand for labour (both in formal and informal self-employment endeavors). The positive effect of agricultural growth on employment also occurs in rural areas. In Ethiopia, seasonal labour demand associated with harvesting periods for coffee, teff and other grains is common. Hence, an increase in agricultural productivity is likely to increase the demand for labour thereby benefiting rural unskilled laborers.

The poverty reducing impact of agricultural growth through its effects on non-farm production and consumption activities is an interesting area to investigate. The following points are considered in examining this channel:

- Agro-processing industries in Ethiopia are at their embryo and infancy stages dampening the potential impact on poverty reduction of an agricultural growth.

- Lack of infrastructure and isolation of rural communities from the rest of the country and markets.

- The potential release of extra labour from households augmenting the opportunity to engage in non-farm activities.

- The immediate possible effect of increased production and trade in non-food items such as clothing, footwear, etc.

- Increased opportunity for improved utilization of health and education services.   And second-round effect of this on enhancing agricultural growth.

Agricultural growth helps to reduce poverty therefore in at least seven main channels: First, it provides those households engaged in agricultural activities with increased level of production thereby increasing their access to food. Secondly, higher output could be converted into higher income, assuming price would remain constant, which would then increase households' access to non-food basic requirements.   Poor entitlement or purchasing capacity is a key constraint that makes households vulnerable to famine.

In Amhara region of the country, for example, grain production in 1999/2000 was 20% in excess of consumption needs.   Yet 2.8 million people in Amhara (representing 17% of the region's population) became locked into famine zones and faced risk according to FAO.   Whereas Amhara's grain surpluses were in excess of 500,000 tons, its relief food needs have been tagged by international community as close to 300,000 tons.

Thirdly, growth in agricultural produce is likely to reduce the cost of food for non-agricultural poor communities both in rural and urban areas (through increase in real wages). Fourthly, it provides an increased opportunity for poor people to be engaged in productive and trade activities and earn income, i.e., as producers of petty items, labourers, brokers, traders of food items and

suppliers of basic non-food commodities. It is known, for example, that a decline in the performance of the agriculture sector results into urban wages collapse and drives unemployed seasonal farm workers and the landless peasants into abysmal poverty. Fifthly, it can lead to increased employment opportunities in rural areas, although the potential of this in Ethiopia is limited because of small holder farming dominance.

Sixthly, it leads to increased government income through taxation and possibly increased foreign exchange earning through export. The financial resources generated out of growth taxation can be used to finance government pro-poor services. Finally, it creates spillover effects on social capital and other sectors of the economy. Some of the market failures and other external factors that could prevent the effective contribution of agricultural growth to poverty reduction include:

a) The rural-sector in Ethiopia is largely non-monitized. Rural communities livelihood, on relative terms, is less dependent on the market system. As a result, an increase in level of agricultural production may not effectively translate into an increase in rural households income. *(It is likely that an increase more than the normal average production level could simply be stored with reduced motive for production in the next season).*

b) Besides absence of market, sporadic tiny open-field markets characterize rural settings. The goods available in these markets are limited constraining the choice farm households have for consumption. For example, iodized salt may simply be inexistent leading to Vitamin A deficiency and consequently to blindness – a major feature of poverty in Ethiopia.

c) Institutions and regulations governing a market system are more or less absent in rural areas. The availability of banks and associated functions (saving, credit, checking account, etc.), salary/wage employment, trade/investment/finance bureaus (licensing, tax,) is limited

d) The impact farm improvement has on the expansion of non-farm activities is likely to be limited. Subsistence life style and farming together with poor knowledge and other constraining variables desired and normally expected clothing, footwear, food processing, etc. may not mushroom as expected following agricultural boom.

e) Rural communities are usually isolated societies who have weak linkage with the rest of the country due to absence of infrastructure such as roads, communication and transport – i.e., barriers to connection with outside markets. Limited opportunities, poor access to commodities, less pressure from competition, etc. work against incentives and motivation for sustaining agricultural growth and continuous improvement in welfare situation.

f) Lack of effective and sufficient urban food demand also undermines the poverty reducing outcomes of agricultural growth in rural areas. This was remarkably witnessed in recent period in Ethiopia where agricultural products prices slumped down following an increase in agricultural production which were not however matched by commensurate increase in food demand.

g) The impact of agricultural growth on urban poverty is undermined by monopoly of agricultural traders and brokers, undue tariffs and taxes, etc. which make significant differences between farm-gate prices and retail prices. The poor in urban areas also cannot afford to purchase agricultural produce in bulk, which exposes them to further loses. However, the urban poor is destined to benefit from lower food prices.

h) Finally, the pattern of growth whether it is broad based or not and initial inequality conditions matter in determining the impact of growth on poverty.

4. THE ROLES OF AGRICULTURE TO RURAL FARM SOCIETIES

First and foremost, the benefits of agricultural growth directly accrue to rural farm households. As was discussed earlier, agricultural households are the main form of economic organization in Ethiopia. Most can be described as subsistence farmers given that they produce mainly for consumption. Hence, they are characterized both as consumers and producers. Even these farmers, however, are likely to purchase some of their food items (such as salt, oil, kerosene, etc.) from the market. They are categorized therefore as semi commercial with those households who partially produce with the intention of selling at the market.

An agricultural household model is a model that provides a framework for analyzing household behaviors integrating consumption, production and labor (and therefore leisure) decisions. Here a unitary and recursive household model is used because it fits well into the familiar consumer choice framework. Moreover, the collective household mode could not be applied because of lack of detailed data on the distribution of resources among members of household. The available data is at household level.

4.1 Agricultural Growth Elasticity of Poverty

Two approaches are used here to estimate the agricultural growth elasticity of poverty. First, the growth elasticity of poverty is determined and then using the agriculture elasticity of growth, the growth rate in agriculture is estimated indirectly.   In the second approach, a two-stage analysis is used to arrive at the growth requirement by estimating first the determinants of welfare (household consumption expenditure) and estimating the poverty impact of a certain growth using the relationship between expenditure and poverty incidence.

Note that there is a general agreement that growth is an important and necessary factor for poverty reduction. Growth by itself however is not sufficient unless it is broad-based and allows the poor or low-income group to participate in the process.

First approach

Poverty incidence depends on real per capita (per adult) income (expenditure), poverty line and income inequality.   Hence, it is possible to start with a generalized form of poverty function (in (Ali, 1998), ECA (1999)) as given in equation below:

$$Po = P (\mu, z, m)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

Where, Po is index of poverty, μ is mean per capita income, z is the poverty line, m is measure of income inequality.

Total differentiation of the poverty function provides the following formula:

$$\partial P = \frac{\partial P}{\partial \mu} d\mu + \frac{\partial P}{\partial z} dz + \frac{\partial P}{\partial m} + \frac{\partial P}{\partial m} dm \ldots\ldots\ldots\ldots\ldots\text{(2)}$$

Since P is homogeneous of degree zero with respect to μ and z, by Euler's theorem, we will have:

$$\frac{\partial P}{\partial z} dz + \frac{\partial P}{d\mu} d\mu = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(3)}$$

$$dz = -\frac{\partial z}{\partial \mu}d\mu \quad \text{given that} \quad \frac{dz}{d\mu} = \frac{\partial z}{\partial \mu} \quad \text{.............(4)}$$

Hence,

$$\partial P = \frac{\partial P}{\partial \mu}d\mu - \frac{\partial P}{\partial \mu}\frac{\mu}{z}dz + \frac{\partial P}{\partial m}dm \quad \text{.....................................(5)}$$

Growth rate in P is given by:

$$\frac{dP}{P} = \frac{\partial P}{\partial \mu}\frac{\mu}{P}\frac{d\mu}{\mu} - \frac{\partial P}{\partial \mu}\frac{\mu}{P}\frac{d\mu}{dz}\frac{z}{\mu}\frac{dz}{z} + \frac{\partial P}{\partial m}\frac{m}{P}\frac{dm}{m} \quad \text{....................(6)}$$

$$= \frac{\partial P}{\partial \mu}\frac{\mu}{P}\frac{d\mu}{\mu} - \frac{\partial P}{\partial \mu}\frac{\mu}{P}\frac{\partial z}{\partial \mu}\frac{\mu}{z}\frac{\partial \mu}{\partial z}\frac{z}{\mu}d\mu + \frac{\partial P}{\partial m}\frac{m}{P}\frac{dm}{m}$$

$$= \eta \frac{d\mu}{\mu} - \eta(\varepsilon)(\delta)d\mu + v\frac{dm}{m} \quad \text{...(7)}$$

where

$$\eta = \frac{\partial P}{\partial \mu}\frac{\mu}{P}$$

$$\varepsilon = \frac{\partial z}{\partial \mu}\frac{\mu}{z}$$

and $\delta = \frac{\partial \mu}{\partial z}\frac{z}{\mu}$

Using the above formula and based on parameters derived from an econometric equation fitted by Ali (1998), the growth elasticity of poverty in Ethiopia is estimated to be 0.76 based on a related formula (Befkadu, et al (2002).

Given the earlier estimate that the agricultural elasticity of GDP growth is 0.32, it follows that a 1 percent increase in agricultural production would lead to 0.24 percent decline in poverty incidence. Although this seems to be on the low side, it should be noted that the reduction in poverty is at national level, which indicates that the elasticity of poverty to agricultural growth would be higher if only rural poverty is considered. If for the moment we assume, poverty line and income inequality remain the same, then poverty incidence will be determined by the growth in per capita income.

In Ethiopia, currently, there are, however, only two data points that provide poverty incidence and percapita levels at the same time – 1995/96 and 1999/00. Taking average growth rates for the past five years before the respective data points indicate that on average per capita income has declined, whereas the available poverty estimates show a decline in poverty. This will give a positive elasticity, which is unlikely to be true. Hence, it is assumed that poverty incidence in the

given years is affected by percapita income levels in the previous years, which provided a growth elasticity of poverty –0.25.

Note that the poverty estimates provided for the year 1999/00 by the government are highly challenged by different stakeholders, mainly the civil society. The government own quantitative assessment made for the same period has also clearly indicated that poverty has been increasing between 1995/96 and 1999/00. As this is also supported by macro national data, it is advisable, therefore, to take caution in accepting the 1999/00 official poverty figures and elasticities calculated based on this information.

The Second Approach

The second approach initially considered a three-stage analysis, which for lack of time and data, however, settled for a two-stage analysis by integrating the first model into the second one.

1st stage: Determining Income: Houshold's income as a function of yield, labour input and land.

2nd stage: Determining Consumption Expenditure (Demand)

Household's expenditure as a function of income, prices and saving and other household welfare determining variables such as household size, asset base and access to infrastructures.

3rd stage: Determining the Expenditure elasticity of Poverty Incidence

Poverty is a function of expenditure, poverty line and income inequality. At the household level, it is possible therefore to estimate the expenditure elasticity of poverty by regressing poverty on expenditure, assuming constant poverty line in real terms and that income distribution remains the same. The models are developed in subsequent sections.

4.2 Different Scenario Analyses and Simulation Estimates

As was mentioned earlier, we have two points in time concerning actual trend in poverty situation in the country: 1995/96 and 1999/00. The poverty incidence levels in these two periods are 45.5 and 44.2 respectively. These indicators are used to forecast and simulate different scenarios under conditions of with and without improvement in the performance of the agriculture sector.

Simple forecasting

Trend:
The trend analysis indicates that by 2020 the poverty incidence will be 39. The implied average declining rate (annual reduction) is 3%. This is trend based on five-year period laps. Annual based trend analysis provides similar result as indicated below.

Actual growth rate:
Using actual growth rate between the two periods and extrapolating to 2020 provides a poverty incidence of 39.4. The average annual reduction rate is 2.9%.

The simple forecasting exercise made on poverty incidence demonstrates that Ethiopia needs to undergo fundamental change in productivity levels to meet the millennium goals, if they were to be achievable. Simple forecasting and alternative growth scenarios will be made using the simulation approach below.

Simulation Approach

The purpose here is to illustrate the impact of agricultural growth on poverty using estimated parameters of determinants of per adult household consumption expenditure and the relationship of this welfare indicator with poverty incidence functions.

$$\ln(C_j) = \beta' X_j + \varepsilon_j \dots (1)$$

Using the estimated parameters (β) in the consumption model, predictions of consumption per adult for each household j can be generated as follows:

$$\hat{C}_j = e^{\hat{\beta} x_j} \dots (2)$$

Corresponding to every predicted level of consumption, there is a probability that the household being poor ($P_{\theta,j}$), which is given by:

$$P_{\theta,j} = \int_0^z (\frac{Z - C_j}{Z})^\theta f(C_j) dC_j \dots (3)$$

Where $f(C_j)$ is the probability function of per capita consumption of household j and Z is the poverty line.

Under the assumption that the random disturbance term of the consumption model is normally, independently and identically distriuted with mean 0 and variance σ^2, the distribution of per capita consumption follows a log normal distribution. Hence, the probability density function of the per capita consumption is given by

$$f(C_j) = \frac{1}{C_j \sigma \sqrt{2\pi}} \exp\left\{ -\frac{1}{2\sigma^2} (\ln(C_j) - \beta' X_j) \right\} \dots (4)$$

When θ takes a value of 0, the poverty measure boils down to the head-count index, which is given by:

$$P_{0,j} = \int_0^z \frac{1}{C_j \sigma \sqrt{2\pi}} \exp\left\{ -\frac{1}{2\sigma^2} (\ln(C_j) - \beta' X_j)^2 \right\} dC_j = \Phi\left(\frac{\ln(Z) - \beta' X_j}{\sigma} \right) \dots (5)$$

The last term provides, therefore, the estimated probability that a household being poor, measured by the head-count index given that ɸ is the standard normal distribution function, σ is the standard error of the regression, and ^ indicates estimated values. It is found preferable to compute the probability of being poor associated with any given level of predicted consumption, rather than classifying households as being poor or non-poor depending on the level of predicted consumption relative to the poverty line. The weighted average of the household probabilities of being poor gives the predicted national head-count index[*].

As demonstrated earlier, poverty is a function of expenditure, poverty line and income inequality. At the household level, it is possible therefore to estimate the expenditure elasticity of poverty by regressing poverty on expenditure, assuming constant poverty line in real terms and that income distribution remains the same.

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[*] The weight variable used here is the population weight.

The above formulas are applied to a national household income consumption and expenditure survey data set that was collected in 1995/96. The data is nationally representative. Given however our interest is to estimate agricultural growth elasticity of poverty, the data set is disaggregated and only the rural data is used in the estimation exercise.

Deflated per adult total expenditure

The dependent variable used is the deflated per adult total expenditure at household level. There is a general agreement that household welfare can be approximated by level of its expenditure. Moreover, since this variable is used in estimation of poverty measures, modeling it directly provides the advantage of simulating different scenarios and consequently determining corresponding poverty indicators.

To arrive at this figure, household size was converted into adult equivalent using adult equivalent scales. On the expenditure side, spatial price index was developed using the Lasperian price index formula and household nominal expenditure figures were converted into real values so that they are comparable across households and areas.

The list of independent variables estimated using the above formulas include the following:

Age of the Head of the Household
Participatory assessments have indicated that household heads becoming old aged is a factor that affects the well-being of the household. Hence, this variable is included in the model. Given that this is a continuous variable, the natural logarithm of the variable is included in the model as one of the determinants of the welfare of the household.

Education level of the Head of the Household
Similarly many studies in the past have established close correlation between the level of education of the household head and the level of its well-being. Given that this is a continuous variable, the natural logarithm of the variable is included in the model as one of the determinants of the welfare of the household.

Household size
Given that the dependent variable takes into account household size indirectly through adult equivalent, the relevance of this variable is diminished. However, it is included given that it is usually used as a determining variable and for the sake of completeness.

A dummy variable for engagement in Non-farm activities
This variable is constructed by looking into the actual data sets and differentiating those households that are engaged in non-farm activities, both as a full-time occupation and as supplementary activity, as opposed to those who are purely engaged in farm activities. In this way, some idea could be derived on the importance of non-farm activity in determining consumption.

Owning farm animals
The most important point here is whether farm households have oxen. Since, however, the question in the survey was framed in more general terms, the variable is incorporated as potential determinant of welfare as it is.

Owning transport animals
Given the scattered nature of settlement in rural areas and difficulty of access to market, ownership of transport animals is likely to make significant difference in the wellbeing of rural households. Hence, it is included in the estimation exercise.

Land ownership

This is a key variable that plays critical role in the welfare of rural people. Ownership also indicates tenure security and, therefore, long-term investment in agriculture.

Distance to various infrastructure

The variables included under this category include distance from Market, Primary School, Health Center and Transport facilities. Whereas these variables are important in themselves in determining welfare, access to such infrastructure also indicates degree of integration with the rest of society, which has likely positive impact on welfare.

Asset ownership

This is a broad category under which many variables are included in the regression analysis. Key variables selected and incorporated in the model include: ownership of farm tools, radio, and a house.

The following represents the results generated:

LdefPate	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
LageHead	-.0187325	.0548979	-0.34	0.733	-.1264384	.0889734
LeducHead	.0779454	.0217056	3.59	0.000	.0353605	.1205303
HHsize	-.0874874	.0071496	-12.24	0.000	-.1015144	-.0734605
NonfarmD	-.0886524	.0285051	-3.11	0.002	-.1445775	-.0327273
OwnFanim	.0611495	.0410369	1.49	0.136	-.0193621	.141661
OwnTranA	-.1344421	.0344407	-3.90	0.000	-.2020124	-.0668719
SexHead	.000482	.0725383	0.01	0.995	-.1418331	.1427971
OwnLand	.0753056	.0712039	1.06	0.290	-.0643917	.2150028
DistMark	.0033918	.0023703	1.43	0.153	-.0012586	.0080422
DistPrimS	.003505	.0037922	0.92	0.356	-.0039351	.0109451
DistHeal	-.0061137	.0016166	-3.78	0.000	-.0092854	-.002942
DistTrans	-.0026459	.0005667	-4.67	0.000	-.0037578	-.0015341
OwnTool	.0795843	.0407641	1.95	0.051	-.000392	.1595605
OwnRadio	.3011017	.0350128	8.60	0.000	.2324089	.3697945
OwnHous1	.0418804	.0654668	0.64	0.522	-.0865609	.1703217
cons	7.677969	.2564833	29.94	0.000	7.174766	8.181171

R-squared = 0.2380   Adj R-squared = 0.2286   Root MSE = .45453

Following the above estimations, predicted base values of the dependent variable were calculated using the above regression estimates and model equation 1. The national poverty line, which is estimated based on the same data set is directly applied. Using the predicted values and the model questions in 2,3 and 4, the following poverty estimates were obtained for the base year.

Variable	Obs	Mean	Std. Err.	[95% Conf. Interval]	
P0j	7094	.4023766	.0019878	.39848	.4062733
P1j	7094	.1124352	.0007994	.1108681	.1140022
P2j	7094	.2489921	.0004134	.2481818	.2498025
Popul	7503	6266.799	52.63027	6163.629	6369.969

Hence, the base simulation has provided a poverty incidence of 40.2 percent in rural areas with 11.2 and 24.9 poverty gap and severity respectively.

Simulation of Poverty to year 2000

Assumption 1.

Given the above actual and base simulation poverty measures for the year 1995/96, attempt is made here to estimate poverty levels in five-year after the base year. The percentage change in percapita value added of agricultural production is assumed to reflect the same percentage change in consumption per capita (adult). During this period percapita agricultural production has declined, on average, by –3.4 percent annually. In other words, percapita agricultural value added has declined by about 15.9 percent during the five-year period. Hence, per adult deflated consumption expenditure is also assumed to have declined by the same level. If we assume, income distribution has remained the same during this period, the application of the same poverty line in real terms, has provided poverty estimates for the year 2000/01 as follows:

```
Variable |   Obs      Mean   Std. Err.    [95% Conf. Interval]
-------------+-----------------------------------------------------------
    P0j0 |   7094   .6364872   .0019024     .632758    .6402164
    P1j0 |   7094   .2205062   .0010994     .2183511   .2226613
    P2j0 |   7094   .2754168   .0001746     .2750745   .2757591
    Popul |  7503   6266.799   52.63027     6163.629   6369.969
```

.Note that, annual inflation based on CPI has been on average 2.64 during the five-year period, which means the poverty line has to be increased by 13.9 percent. The poverty line in 2000 becomes, therefore, 1224 birr.

Poverty level in rural areas in the country by 2000 should have increased, therefore, to 63.6 percent with increased poverty gap at 22.0 and severity at 27.5. Such rapid increase in poverty level goes very with the general perception of the public as expressed during the PRSP consultation. A similar level of poverty was estimated based on survey data that was collected in selected rural areas in the country by the Economics Department of the Addis Ababa University.

Hence, while consumption expenditure and, therefore, agricultural value added per capita declined by 16 percent, poverty incidence has increased by 58 percent, implying agricultural growth elasticity of poverty -3.62, which is very high.

Assumption 2

Given that the majority of farmers are subsistence farmers who are not affected by market price as such, if we assume, inflation level as zero, then the poverty estimates will be:

```
 Variable |   Obs      Mean   Std. Err.    [95% Conf. Interval]
-------------+-----------------------------------------------------------
    P0j1 |   7094   .5372192   .0020152     .5332688   .5411695
    P1j1 |   7094   .0635812   .0011546     .0613178   .0658446
    P2j1 |   7094   .2754168   .0001746     .2750745   .2757591
    Popul |  7503   6266.799   52.63027     6163.629   6369.969
```

Still, poverty incidence has increased by about 34 percent, providing agricultural growth elasticity of poverty to be -2.12.

Assumption 3
If we assume for the moment that what is to be applied as a trend indicator beginning from 1995/96 is the long-term trend, which is a decline in agricultural value added per capita by 1.61 percent, then poverty estimates by 1999/00, 2004/05, 2009/10 and 2014/15 will be as follows:

Assuming further that inflation will remain constant
Consumption per adult expenditure in rural areas will decline by about 7.8 percent in the first five year period and by 15 percent in 2005, by 21.6 percent in 2010 and by 27.7 percent in 2015. Hence,

In the year 2000

Variable	Obs	Mean	Std. Err.	[95% Conf. Interval]	
P0j00Lt	7094	.4650446	.0020265	.461072	.4690172
P1j00Lt	7094	.1374843	.0008906	.1357384	.1392302
P2j00Lt	7094	.2594333	.0003295	.2587874	.2600793
Popul	7503	6266.799	52.63027	6163.629	6369.969

Poverty still has increased (by 15.7 percent) with this relatively better long-term trend in agricultural value added percapita growth. In this case, agricultural growth poverty elasticity becomes -0.98, or almost equal percentage change in opposite direction. *So, it is likely that at least or as a minimum a one percentage increase in agricultural per capita value added will result into a one percent decline in poverty level.*

Poverty by 2015
Based on long-term actual trend in agricultural percapita value added, a simulation was made to estimate poverty levels by the year 2015. Inflation level is assumed to remain constant concerning the poverty line, which is taken as fixed and that there will be no change in income distribution. Based on this assumption, poverty measures simulated for the year 2015 are as follows:

Variable	Obs	Mean	Std. Err.	[95% Conf. Interval]	
P0j15Lt	7094	.6521802	.0018739	.6485068	.6558537
P1j15Lt	7094	.2294721	.0011149	.2272866	.2316575
P2j15Lt	7094	.2763801	.0001709	.2760451	.2767152
Popul	7503	6266.799	52.63027	6163.629	6369.969

Indeed, about two-third of the rural population will be in absolute poverty by 2015 if past performance of the sector continues unchanged, i.e., an increase in poverty incidence by 62 percent. During the same period, based on long term trend of agricultural percapita decline by 1.6 percent, the overall reduction in per adult consumption expenditure during the fifteen year period is 27.7 percent. In the face of such mounting challenge, the realization of the millennium goals in Ethiopia is unlikely.

If we assume the last five trends continue as the best scenario
Agriculture value added per capita was growing at .04 percent (i.e., the agriculture sector growing by 3.04 percent & assuming population was growing by 3 percent). So, by 2015, consumption expenditure per adult could be assumed to increase by 8.3 percent. This will provide the following poverty estimates:

Variable	Obs	Mean	Std. Err.	[95% Conf. Interval]	
P0j15bc	7094	.3431604	.0019077	.3394208	.3468999
P1j15bc	7094	.090816	.0007067	.0894307	.0922014

```
P2j15b |   7094    .2357144   .0004974       .2347394   .2366894
Popul  |   7503    6266.799   52.63027       6163.629   6369.969
```

Hence, in this case, it was able to reduce poverty level by 2015 by 15 percent. Consumption expenditure per adult has increased by 8.3 percent during the same period. So, agricultural elasticity of poverty growth would be –1.8.

Table 4.2.1 Summary of Different Scenario Simulations

	Annual Growth in Consumption	Change in Po by 2000	Elasticity	
			2000	2015
Last 5 yrs actual trend	-3.4	58%	-3.62	
Last 5 yrs actual trend & no inflation	-3.4	34%	-2.12	
Long term trend and no inflation	-1.61	16%		-0.98
Same five-year actual trend	0.4	-15%		-1.8

The results of the regression analyses are summarized in the above table. Given past trends, poverty level in the country will increase tremendously in the coming period. If the declining trend in agricultural percapita growth is not reversed, Ethiopia faces deterioration of welfare situation and about two-third of the population will be in absolute poverty by 2015. However, if agricultural productivity increases and registers a positive percapita growth poverty levels could actually be reduced as the growth elasticities of poverty calculated in different scenarios have clearly shown very high return in terms of poverty reduction from a growth in farm productivity.

4.3 Discussions of Specific Channels

4.3.1 The food consumption channel

A growth in agricultural production could lead to increased food consumption in two ways. First, part or whole of an increase in agricultural produce of the small farmer could be directly consumed. Secondly, part or whole of an increase in agricultural produce could be sold and with the money generated, other food items could be purchased and consumed. The latter channel operates through the market mechanism. In both ways, agriculture plays a critical role in improving the conditions of food security in the country. The most important basic deprivation in Ethiopia is lack of access to adequate food. Hence, the benefits in terms of poverty reduction through this channel cannot be underestimated.

It is estimated that by 1996, about 25 million Ethiopians were living in absolute poverty consuming below the recommended minimum daily nutritional requirement and failing to satisfy basic nonfood requirements on a day-to-day basis (see Table 4.3.1).

Table 4.3.1 Level of Absolute Poverty in 1995/96

Population below poverty line, total, %	45.5
Rural	47.5
Urban	33.2

Source: WMU, MEDaC, March, 1999.

Close to 15 million Ethiopians are also currently exposed to famine and food shortages and many people, children in particular, have died and continue to die every day (See Table 4.3.2).

Table 4.3.2 Population affected and assistance requirement

Year	Pop affected	Mt requirement
2000	7,732,335	836,800
2001	6,242,300	639,246
2002	5,181,700	557,204
2003	14,490,318	1,461,679

On average 6.3 million people were exposed to hunger on yearly basis during the past decade. This is equivalent to more than 1 person out of 10 going hungry and becoming dependent on food aid every year.

Relationship between Per capita Food Production and Consumption

The relationship between the two variables and the size of impact could be affected by intra household consumption distribution, access to market, demand and supply (availability) of food items, household indebtedness, and level of post harvest losses.

> " Hunger and poverty are closely related. While the lack of sufficient income to purchase food is clearly a major factor causing household food insecurity, hunger itself contributes to poverty by lowering labour productivity, reducing resistance to disease and depressing educational achievements" (FAO: 2001).

The consumption channel of poverty reduction operates through its effect on nutritional intake, labour augmentation, and improved health and educational achievement.

The nutritional intake mechanism

Higher level of food consumption would almost definitely lead to higher level of nutritional intake. This is particularly true in case of high incidence of undernourishment.   However, consumption beyond minimum calorie (energy/ protein) requirement will not affect poverty incidence.

In rural Ethiopia, there is high level of malnourishment arising from shortage of food for considerable period within each year and also poor feeding habit. During normal period, food is consumed almost three times a day. Breakfast comprises, however, roasted grains with coffee. In lean time, meal frequency reduces to only once a day.

Different studies (WMU, 1999 and Mekonnen, 1999) have shown that cereals and pulses constitute the bulk of households' consumption in low-income groups. Table 4.3.3 demonstrates the direct and close linkage between level of consumption expenditure and calorie in take of household members.

Relationship between Per capita Food Consumption and Calorie Intake

Table 4.3.3 Relationship between food expenditure and calorie intake

Ranking based on real per capita income	Deflated Per Adult Food Expenditure	Calorie per adult
Lowest quartile	399.88	1433.13
Third quartile	591.42	1795.85
Second quartile	766.43	2103.48
Top quartile	1295.18	2873.42
	861.39	2205.03

Own computation using the 1995/96 HH ICE survey data set

A simple regression of deflated per adult food expenditure on calorie per adult has provided the following results:

$$\text{Calorie per Adult} = f(\text{deflated per adult food exp.})$$
$$= 993 + 1.4 \, (\text{defpafexp})$$

> Note: 993 is autonomous consumption calorie and an increase in annual average food expenditure by 1 birr results into 1.4 increase in calorie per adult on average. This underpins the importance of increased income for reducing food poverty in the country.

The decision how much to consume depend on prices and income and, therefore, on level of profits from farming activities. (Production decisions determine farm profits, which are a component of household income, which in turn influences consumption and labor-supply decisions). This one-way relation between production on the one hand and consumption and labor supply on the other hand is known as the *profit effect* (Singh, et al)*.*

4.3.2 Human Resource Linkages (labour augmentation & capacity enhancing)

As is now commonly understood, poverty is more than just a shortage of income. The understanding of poverty has recently become deeper and broader and continues to be enriched. The 1997 Human Development Report by the UNDP introduced the concept of human poverty, which focuses on 'the denial of opportunities and choices most basic to human development – to lead a long, healthy, creative life and to enjoy a decent standard of living, freedom, dignity, self-esteem and the respect of others'. The UNDP developed, therefore, a more appropriate measure of welfare called the Human Development Index(HDI). HDI encompasses three basic components: longevity measured by life expectancy at birth; educational attainment, measured by a combination of adult literacy and total gross enrolment ratios and standard of living, measured by adjusted GDP per capita or Purchasing Power Parity (PPP) dollars denominated GDP. In the following section we will explore the linkages between agricultural growth and factors that determine or influence these three variables.

Well-nourished individuals are likely to be more energetic and productive than undernourished persons. Measuring this relationship is not however easy. To begin with, the productive capacity of an individual depends on other important factors, such as, health, education (knowledge), and availability of resources. Moreover, production level is affected by a number of factors other than raw labour such as size and quality of land, use of inputs/ technology, and education.

An analysis of the relationship between food intake and household health and that between health and farm profits (income) can be made suing household survey data sets. Health can be assumed to affect income level if there is no well functioning labour market as is the case in remote, isolated farm households.

Increased farm production level could improve health directly through more consumption of own produce and/or through price channel – i.e., if, say, the price of vegetables and fruits decreases, you can assume more consumption of these to take place and, therefore, improvement in health. Improved nourishment is likely to enhance individuals' health situation and learning ability. Again, measuring this relationship is not however easy. Health and education are affected by a number of factors other than nutritional intake such as availability and use of basic services, complementary factors such as clean water, quality of education, and exposure to disease. So, no attempt is made here to quantify this relationship.

4.3.3   The Income Channel (given fixed prices)

A rise in farm household's production level would normally lead to increased household income when the value of the production is imputed at market prices. It could decline, however, if the price of the produce has been decreasing.

A rise in the mean income level may lower the absolute number of poor people. A recent World Bank study by Dollar and Kraay (2001) states that the income of the poor rises one for one with overall growth. This has been already demonstrated in the various simulation estimates made earlier. Given the dominance of the agriculture sector in the overall economy, its current contribution to income is expectedly very high. Table 4.3.3 shows sources of income for the average household at the national level.

Table 4.3.4 Average National Income by Source

Income from agriculture enterprise	208285.4	2083	40.5%
Income from non-agricultural enterprise	178550.4	1786	34.7%
Income from wages and salaries/pension/bonus	102834.1	1028	20.0%
Income from rent/house, machinery, animals	24340.94	243	4.7%
Income from deposit	0	0	0.0%
Income from share/profit	188.11	2	0.0%
Income from gift or obtained free	0	0	0.0%
Other incomes	0	0	0.0%
Total income	573320.8	5733	5142

Own computations based on the 1995/96 HHICE survey data

Agriculture dominates, therefore, not only in determining overall growth rate in the economy and employment level but in line with these factors also accounts the major source of income for the population at large. In terms of significance, its importance is double that of income obtained from wages and salaries.

Rural Income

Obviously, the importance of agriculture as source of income increases for the population living in rural areas. As Table 4.3.5 indicates, 72 percent of income in rural areas comes from engagement in agriculture enterprise.

Table 4.3.5. Average Rural Income by Source		
Income from agriculture enterprise	325409	71.5%
Income from non-agricultural enterprise	32972	7.2%
Income from wages and salaries/pension/bonus	13619	3.0%
Income from rent/house, machinery, animals	12568	2.8%
Income from deposit	0	0.0%
Income from share/profit	88	0.0%
Income from gift or obtained free	0	0.0%
Other incomes	0	0.0%
Total income	454989	100.0%

Own computations based on the 1995/96 HHICE survey data

Average income level in rural areas differ by type of income sources (see Table 4.3.6). Those engaged in non-farm activities earn relatively less than income level earned by households engaged fully in farm activities.

Table 4.3.6 Average Rural Income	
Farm households	460776
Non-farm households	441983
Total	454989

Own computations based on the 1995/96 HHICE survey data

Urban Income

Urbanization in Ethiopia is extremely small indicating the inadequacy of domestic demand to meet high level of agricultural surplus production. Demand is, therefore, a critical constraint that prohibits a continuous increase in incomes of farm households. This implies that agriculture has to be made internationally competitive, and that part of its production has to be oriented towards export.

Table 4.3.7. Average Urban Income by Source		
Income from agriculture enterprise	28728	3.8%
Income from non-agricultural enterprise	401730	53.2%
Income from wages and salaries/pension/bonus	239606	31.7%
Income from rent/house, machinery, animals	42390	5.6%
Income from deposit	0	0.0%
Income from share/profit	342	0.0%
Income from gift or obtained free	0	0.0%
Other incomes	0	0.0%
Total income	754731	100.0%

Own computations based on the 1995/96 HHICE survey data

As to be expected, major source of income in urban areas lie in the non-agricultural sector as is shown in Table 4.3.7. Still, agriculture comprises a source for about 4% of urban income.

4.3.4 The Price Channel

As mentioned earlier, a significant share of economic activity in rural areas is devoted to the production of basic commodities, especially staple foods, for which the income elasticity of demand is low. Semi commercial farm households in any case generate revenue by selling some of their agricultural products in the market. In order to get reasonable income, however, they should get adequate price so as to cover their expenses of agricultural inputs, land tax, school related costs, purchase of food items that are not produced in their farm, etc. The effects of change in prices of produce should therefore be compared with change in prices of inputs to determine net effect in price changes.

According to information obtained from participatory discussions, there is no big change in the market prices for most crops from year to year but there is considerable price difference between slack and peak seasons of the year. The high price period includes some months just before the new harvest while the low price period includes some months just after harvest. This relationship shows correlation of high supply period with low price and low supply period with high price. Farmers are usually requested to pay all their debts of agricultural inputs and land taxes during the low price period; there is little chance, therefore, to improve the price of crops by reducing the supplies in the market.

A key question here is whether agricultural households sell more if the price of a given agricultural commodity increases. It is assumed that households are price-takers for every commodity, including labor, that is both produced and consumed by the household. In this case, an increase in the price of agricultural produce would bring the same result in production using either the traditional theory of the firm on farm output supply and input demand as that of a fully specified agricultural household model. The same is not true, however, for consumption and labour supply (Singh, et al.). The traditional approach to consumer demand analysis would allow for the substitution effect and income effect of the change in the price or rice. The substitution effect is unambiguously negative. And for a normal commodity such as rice [i.e., the demand for it), the income effect can be confidently expected to be negative. The traditional approach, therefore, would predict an unambiguous decrease in the consumption of rice following an increase in its price. An integrated agricultural household model, however, allows for an additional effect – the profit effect [which arises when households are price takers).

When the price of say rice increases, farm profits increase. This means more household income, which will, of course, tend to increase the demand for rice. In the framework of an agricultural household model, therefore, the demand for rice is subject to two forces pulling in opposite directions. On the one hand, an increase in price will tend to reduce demand as a result of the traditional substitution and income effects of consumer theory. On the other hand, the profit effect associated with the same increase in price will tend to increase demand. The ultimate effect on demand is thus a matter for empirical investigation.

$$X_i = X \ (p_{i,} p_{m,}, w, Y) \ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.1$$

Standard function that demand depends on prices and income, where X is commodity demanded, Pi is its price, Pm is price of other goods, w is the wage rate and Y is income.

In the case of agricultural households, however, income is determined by the household's production activities. Hence, factors affecting production also affect consumption. Consumption behavior is dependent, therefore, on production behavior.

If the price of agricultural staple is increased,

$$\frac{dXa}{dp_a} = \frac{\partial X_a}{\partial p_a} + \frac{\partial X_a}{\partial Y}\frac{\partial Y}{\partial p_a} \ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..2$$

Hence, the effect of a change in price on demand is a matter of empirical investigation since it could either decrease or increase depending on what is called the "profit effect", which is the second term on the right side of the equation. The first term is the standard result of consumer demand theory and, for a normal good, is negative. In the case of farm households, however, a rise in price also leads to an increase in income which subsequently leads to increase in demand.

In traditional analysis, the substitution and income effects of a price change need to be considered.

Poor access to public goods and basic services as well as prolonged government interventionism has led to weak rural factor and product markets. High transaction costs and shallow rural markets make it difficult for rural households to accumulate assets and to manage income volatility (Alderman, H. et al, WB: 2001).

In conclusion, the effect of a change in price of output on welfare of farm households is not unidimensional. If the price of a given output increases, a representative household benefits as a producer and loses as a consumer. If the household is a net seller of the commodity, it has a positive effect. The net effect has to be taken into account, therefore.

4.3.5 The Non-farm and off-farm (Employment) Channel

According to the March 1999 CSA national labour survey: unemployment levels are 8.02% at national level and 26.4% in urban and 5.14% in rural areas. The agricultural household model discussed earlier is also relevant here since it can be used to explain the spillover effects of agricultural growth to other segment of rural population such as the landless and those engaged in rural non-farm activities. Since most rural investment strategies are designed to increase production, their primary impact is on the incomes of agricultural households, some of which may not reach landless households or households engaged in nonagricultural activities. It is necessary therefore to investigate the externalities that accrue to the latter from the former households.

According to FAO, the evidence is quite clear that broad-based agricultural development provides an effective means for both reducing poverty and accelerating economic growth (FAO, 2001). This is normally achieved not only by increasing incomes for producers and farm workers, but also by creating demand for non-tradeable goods- namely services and local products. It is this indirect effect on demand, and the associated employment creation in the off-farm sector of rural areas and market towns, that appears to be the main contributing factor to the reduction of rural poverty(FAO, 2001).

As was shown in Table 4.3.5, about 7.2 percent of rural income comes from non-farm activities. The increase in agricultural production is likely to generate improved self and hired employment opportunities to address the demand that is created from the growth of the agricultural sector. Households are normally expected to maximize the largest income gain possible from their fixed land holdings. This implies that a given household will go on hiring labor until the marginal revenue product of labour equals the market wage. To achieve this, the farm household uses

information on prices of both output and wage rate and on technological relationships between inputs and outputs.

An increase in the price of a produce will lead to increased production and hence demand for labour. Household income also increases and hence the demand for leisure which will reduce the supply of household labor. If there is a labour market, wage starts to rise and this will lead to second-round effect of reducing production in response to the increase in the price of a major input. Had the wage been fixed, the second round effects would have been eliminated. Given that in Ethiopia, there are many sellers, the assumption that any individual seller is unable to influence the market price may often be the most plausible description of the market behavior.

A model that incorporates consumer behavior allows to explore the consequences of increased incomes for agricultural households on the demand for products and services provided by nonagricultural, rural households. This channel is important given that the demand for nonagricultural commodities is often thought to be much more responsive to an increase in income than the demand for agricultural staples.

As indicated for prices of agricultural produce, wage rates in rural areas also vary between slack and peak seasons. Wage rate tends to increase during peak season and decline in slack period. In rural areas in Ethiopia, population pressure is increasingly becoming a serious problem and it is believed that in most parts the wage rate has been continuously decreasing from year to year both in peak and slack season. Thus large number of labourers are competing for limited off/ non-farm activities each year. The chances of off/non – farm incomes are becoming therefore increasingly rare.

Estimation of employment intensity of output can be carried out using the method of arc elasticities or econometrically.

Arc elasticity approach

A study conducted by Fantu (2003) for the time period of 1984-1994, agriculture, manufacturing, and trade, hotels and restaurants sectors of the economy were the most employment intensive sectors of the economy. In these sectors, a one percent increase in output (GDP or respective sectors) led to about 2, 5 and 16% increase in employment in agriculture, manufacturing, and trade, hotels and restaurants, respectively (see Table 4.3.8).

Above unity elasticity implies that employment expansion is not accompanied by a rise in labour productivity constraining the long-term impact on poverty. Improved productivity is essential for reducing poverty as this will transmit through increased real wages and earnings.

Table 4.3.8 Arc Elasticity of Employment by Major Economic Sectors

Selected sectors	1984-94	1994-99	1984-99
Agriculture	2.02	-1.21	1.06
Manufacturing	5.06	3.86	4.28
Wholesale, Retail Trade & Catering	16.18	2.53	4.07
Other Services	0.41	0.37	0.40
Total	1.91	-0.23	0.94

Source: Fantu (2003) unpublished material.

Theoretically, employment elasticities are expected to fall gradually overtime as the country becomes more developed and labor becomes relatively less abundant. The decline here could be, however, a general weakening of the economy rather than result of structural shifts. Note the point made earlier that the share of agriculture has declined whilst the economy has not undergone structural shift underpin by development.

<u>Econometric estimates</u>
Labor productivity, output and employment growths can be related to employment elasticity of output as follows:

$$P = Y/N \ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where P= Labour productivity;   Y = output and N = employment.

$$\frac{dP}{dt} = P(g_y - g_n) \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where gy represents output growth and gn   represents employment growth

$$g_p = g_y(1 - \frac{g_n}{g_y}) \Leftrightarrow g_p(1 - \ell_n) \ldots..(3)$$

Where g_p denotes productivity growth and ℓ_n is employment elasticity of output.

Hence, the role of agriculture in employment creation is affected by existing level of technology and population growth including degree of urbanization.

7. KEY CONDITIONS AFFECTING SIZE OF IMPACTS

The functioning of any individual farm system is strongly influenced by the external and rural environment, including policies and institutions, markets and information linkages. Not only are farms closely linked to the off-farm economy through commodity and labour markets, but the rural and urban economies are also strongly interdependent. Although in Ethiopia the significance of off-farm activity is not as high as commonly observed in other countries, small farm households still depend very much on this source.   Farm women and men are also linked to rural communities and social networks, and this social capital influences the management of farms.

Some of the key conditions that affect the size of the contribution of agricultural growth to poverty reduction identified in this study include the following:

  i)   An important factor is access to market and the degree of its well functioning.

  i)   Commonly, the rural-sector in poor countries is largely non-monitized.   Rural communities livelihood is, on relative terms, less dependent on the market system. As a result, an increase in level of agricultural production may not effectively translate into an increase in rural households income. *(It is likely that an increase more than the normal average production level could simply be stored with reduced motive for production in the next season).*

  b)   Rural communities are usually isolated societies who have weak linkage with the rest of the country due to absence of infrastructure such as roads, communication and transport – i.e., barriers to connection with outside markets.   Limited opportunities, poor access to commodities, less pressure from competition, etc. work against incentives and motivation for sustaining agricultural growth and continuous improvement in welfare situation.

  c)   Seasonal price fluctuations are more important than year to year variations.   When harvest period comes, prices usually go down while they increase sharply during slack period. Farmers are however requested to pay all their debts of agricultural inputs and

land taxes during the low price period; there is little chance, therefore, to improve the price of crops by reducing the supplies in the market.

d) Scattered nature of settlement in rural areas is identified, therefore, as a major barrier of benefit accumulation or acceleration. Scattered settlement makes it difficult and costly to provide access to education, health and infrastructure services.

ii) Urbanization in Ethiopia is extremely small indicating the inadequacy of domestic demand to meet high level of agricultural surplus production. Demand is, therefore, a critical constraint that prohibits a continuous increase in incomes of farm households. This implies that agriculture has to be made internationally competitive, and that part of its production has to be oriented towards export.

iv) In rural areas in Ethiopia, population pressure is increasingly becoming a serious problem and it is believed that in most parts the wage rate has been continuously decreasing from year to year both in peak and slack season. Thus large number of labourers are competing for limited off/ non-farm activities each year. The chances of off/non – farm incomes are becoming therefore increasingly rare.

8. CONCLUSIONS AND POLICY RECOMMENDATIONS

The most important basic deprivation in Ethiopia is lack of access to adequate food. The importance of the agriculture sector is, therefore, starkly clear. In Ethiopia, food insecurity is manifested in its extreme form of hunger and famine. Some 7.5 million people are estimated to be in need of relief food annually due to the nation's inability to produce and/or acquire its total food requirement as well as the inability of the vulnerable populations to access the food even if it were available on the market.

The problems of food insecurity in Ethiopia should be seen from their chronic and structural natures. Rapid population growth, declining land holding size, soil erosion, deforestation, poor technical know-how and rainfall dependent agriculture are some of the root causes of food insecurity in Ethiopia. Productivity in the agriculture sector is low and reliant primarily on rain fed production. The level of harnessing of available water supplies is also estimated to be a mere 11% of the total potential.

However, limited land of 'acceptable' quality remains available for future agricultural use. Much of the limited available land is probably suited to a narrow range of crops. Hence, further expansion is simply not a promising option. Areas for potential expansion also suffer from one or more soil or terrain constraints and usually are inhospitable from health point of view. Hence, there is a critical need for improving the performance of the agriculture sector by raising its productivity levels.

The long term trend analysis made in chapter 2 has shown that overtime the significance of the sector in the overall economy has been declining as a result of a general decline in growth of percapita value added of the sector. Its share in GDP and overall employment has declined significantly during the past four decades. Yet, it still remains to be the dominant sector.

The trend in the overall GDP was highly determined by the trend in the performance of the agriculture sector. The fact that GDP percapita has shown no improvement over such long period is mainly the result of poor performance in the agriculture sector. The welfare of the people has also shown a declining trend in line with weakening of the agriculture sector.

The different simulation estimates made under different scenarios have also clearly indicated that unless the declining trend of the sector achievement is arrested and reversed, poverty situation in the country will rapidly aggravate as a result of which, say, by 2015, close to about two-third of the population will be in absolute poverty. At the same time, it was shown that with little improvement in agricultural productivity, the trend in worsening poverty could be reversed and poverty actually reduced substantially by 2015. This is especially called for considering the fact that the industrial base of the economy has shown little improvement negatively affected probably by the weak agricultural sector among other factors. The service sector is gaining increasing significance and it has surpassed the contribution of agriculture to GDP in the last three years. This is a worrisome trend given that it cannot be sustainable in the long term.

The overall facts detect the need for addressing the constraints faced by the agriculture sector as top development priority. Even though the government pursues an Agriculture Development led industrialization strategy, the fact that no gain was made so far, while the weakening of the sector seems to have accelerated in recent years, point the existence of problems that have yet to be addressed. Some possible areas that need careful consideration include the following:

- ❑ The long-term declining trend in agricultural value added percapita needs to be addressed at policy level. The decline in the share of agriculture should not come as a result of a decline in the growth volume of agricultural output. Even under structural transformation, it is the degree of relative growth between agriculture and the remaining sectors that vary rather than absolute decline in its performance. Hence, ways should be explored to create dynamism in the sector. In particular, the sector should not be seen as an island on its own but as a driving force of growth in other sectors taking into consideration, therefore, sectoral interdependence and rural-urban linkages.

- ❑ Ethiopia needs to feed itself on priority basis before any other form of development is envisioned. It simply will not be decent and practical to talk of other dimensions of development without first resolving the food insecurity issue. The current trend in level of hunger is largely determined by the onset of adequate and timely rainfall. Given that the frequency and severity of drought seem to have increased over time, fundamental restructuring of the sector is needed. In particular, giving the growing population pressure and scarcity of land and growing landlessness, the land tenure system needs to be revisited and revised to create conducive environment for rapid development of the sector.

- ❑ Given the low level of urbanization and consequent inadequacy of domestic demand, the competitiveness of the agriculture sector and its orientation to production for export is crucially demanded.

- ❑ The IFIs have pushed Ethiopia to rapidly remove price controls and subsidies to farmers. Transportation and freight prices were deregulated serving to boost food prices in remote areas affected by drought. In turn, markets for farm inputs including fertilizer and improved seeds were handed to private traders. Given the results obtained in this study which indicated farmers suffering from fertilizer use and slumping prices of agricultural produce, some form of price control and subsidy to farmers need to be considered.

- ❑ The issue of scattered settlement in rural areas where most rural communities are isolated from the rest of the society is identified as key barrier to rural transformation. Hence, carefully planned voluntary villagization and settlement programs need to be implemented.

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Trend in Percapita Value Added

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