PLACE IN RETURN BOX
to remove this checkout from your record.
TO AVOID FINES return on or before date due.

DATE DUE	DATE DUE	DATE DUE
SEP 1 4 1999		

LIBERALIZA

MULTI

AGRICULTU

LIBERALIZATION OF AGRICULTURAL PRICING POLICIES IN MALAWI: A MULTI-MARKET ANALYSIS OF THE IMPACT ON SMALLHOLDER AGRICULTURAL PRODUCTION, GOVERNMENT BUDGET DEFICITS, AND HOUSEHOLD WELFARE

By

Leonidas Murembya

A DISSERTATION

Submitted to
Michigan State University
In partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Economics

1998

LIBERALIZA
MULTI-
AGRICULTU

The Mala

a stagnant smallho

live in the smallho

economy (around 3

1993), the governm

outputs. Because o

sector. It looks at th

agriculture:

1) The government

same time, it has se

objective is to disco

reasons.

2) The prices of sma

prices. This is a tax

ABSTRACT

LIBERALIZATION OF AGRICULTURAL PRICING POLICIES IN MALAWI: A MULTI-MARKET ANALYSIS OF THE IMPACT ON SMALLHOLDER AGRICULTURAL PRODUCTION, GOVERNMENT BUDGET DEFICITS, AND HOUSEHOLD WELFARE

By

Leonidas Murembya

The Malawian agricultural sector is divided into a rapidly growing estate sector and a stagnant smallholder sector. More than eighty percent of the rural population in Malawi live in the smallholder sector. Because of the importance of agriculture in the Malawian economy (around 37 percent of GDP and 85 percent of export earnings and employment, in 1993), the government has been active in the pricing policies of agricultural inputs and outputs. Because of the availability of data, the current study is limited to the smallholder sector. It looks at three major issues that surround pricing policies in the smallholder agriculture:

1) The government has set the producer price of maize above its import parity price; at the same time, it has set the maize consumer price below its import parity price. The official objective is to discourage external trade on this crop for food security and self-sufficiency reasons.

2) The prices of smallholder export crops (mainly tobacco) were set below the export parity prices. This is a tax on the smallholder export production.

3) Fertilizer price

import parity pric

prices of fertilizer

Simulation

and consumer pric

commodity, while

per-capita income

decreases and its c

households increas

the elimination of

proportion of the

improves, instead

The simul

smallholder toba

production of to

operations are pe

because of the re

tobacco (the ma

income.

3) Fertilizer prices offered to smallholder farmers by the government were below the import parity price and the private market prices. This is a subsidy on the procurement prices of fertilizer to smallholder farmers.

Simulation results indicate that the elimination of the subsidy on both the producer and consumer prices of maize alone leads to a decrease in the production of that commodity, while increasing the production of tobacco--the main cash crop. The overall per-capita income decreases. The median household is worse off as production of maize decreases and its consumer price increases, despite the fact that labor income for landless households increases with the policy change. The government deficit decreases, because of the elimination of the maize double subsidy. These effects are magnified when some proportion of the maize consumed in Malawi is imported. However, household welfare improves, instead of worsening, as imported maize becomes available for consumption.

The simultaneous elimination of fertilizer and maize subsidies, and of the tax on smallholder tobacco production leads to a mild increase in maize production, while production of tobacco increases greatly. The government budget deficits from agricultural operations are perfectly eliminated and households are better off after policy change, because of the resulting increase in the production of maize (the main staple crop) and tobacco (the main cash crop), which, in return, leads to an increase in the household's income.

Veni. Vidi. Vici.

Veni, Vidi, Vici,... et Vincam.

In Mei Patri Memoriam:
Requiescat in Pace

Without th

could not have be

John Strauss. I tr

Working with the

I must also thank P

my work.

My special

Commissioner for

authorized me to u

useful to the policy

the agricultural sec

I must than

and the African-A

I certainly

of my friend Maria

ACKNOWLEDGMENTS

Without the support and help of knowledgeable and thoughtful people, this work could not have been completed. My first thanks are to Professors Charles Ballard and John Strauss. I truly appreciated the quality and the speed of their feedback on my work. Working with them, I learnt that research can bring both fun and intellectual enrichment. I must also thank Professor Donald Mead for having taken time to read and comment on my work.

My special thanks are to the people of Malawi, in general, and to the Commissioner for Census and Statistics at the National Statistical Office for having authorized me to use their data to carry out my research. I hope my work will prove to be useful to the policy-makers of Malawi as they embark on a series of economic reforms in the agricultural sector.

I must thank the United States Agency for International Development (USAID) and the African-American Institute for their financial support to my studies.

I certainly could not have made it through the program without the caring support of my friend Marian Shears and her family. In moments of despair, she cheered me up.

Finally,

kept themselves

everyone, who

Finally, I would also like to thank my mother and some of my siblings for having kept themselves alive throughout the Rwandan holocaust of 1994. I must also thank everyone, who directly or indirectly contributed to the completion of this work.

TABLE OF CONTENTS

LIST OF TABLES

Figure 6.1. The M

LIST OF FIGURES

EPP: Ex

IPP: Im

NPC: No

ADMARC: Ag

SFFRFM: Sm

SAL: Str

USAID: Un

MK: Ma

MSMF: Mic

GOM: Gov

NRDP: Nat

MOA: Min

ADD: Agr

RDP: Rura

EPA: Exte

SACA: Sma

LREP: Land

SAP: Struc

ATC: Agric

LIST OF ABBREVIATIONS

EPP:	Export Parity Price
IPP:	Import Parity Price
NPC:	Nominal Protection Coefficient
ADMARC:	Agricultural Development and Marketing Corporation
SFFRFM:	Smallholder Farmers Fertilizer Revolving Fund of Malawi
SAL:	Structural Adjustment Loan
USAID:	United States Agency for International Development
MK:	Malawian Kwacha
MSMF:	Micro, Small, and Medium Enterprise
GOM:	Government of Malawi
NRDP:	National Rural Development Program
MOA:	Ministry of Agricultural
ADD:	Agricultural Development Division
RDP:	Rural Development Projects
EPA:	Extension Planning Areas
SACA:	Smallholder Agricultural Credit Administration
LREP:	Land Resources Evaluation Project
SAP:	Structural Adjustment Program
ATC:	Agricultural Trading Company

TAM	To
ASAC	A
EEC	E
NSCM	Na
SSMS	Sm
NSSA	Na
HESSEA	Ho

TAM:	Tobacco Association of Malawi
ASAC:	Agricultural Sector Adjustment Credit
EEC:	European Economic Community
NSCM:	National Seed Company of Malawi
SSMS:	Smallholder Seed Multiplication Scheme
NSSA:	National Sample Survey of Agriculture
HESSEA:	Household Expenditure and Small-Scale Economic Activities Survey

CHAPT

The centr

Malawi The goa

production in the s

welfare

1.1. The Practice

Since the

particular, have s

long period of t

but in principle

based on their

the population

production of

In Ma

reasons. Am

production.

(Graeme (1

price, whil

CHAPTER 1: INTRODUCTION

The central focus of the current study is the problem of agricultural price controls in Malawi. The goal is to examine the impact of loosening such controls on the agricultural production in the smallholder subsector, on the government budget deficit, and on household welfare.

1.1. The Practice of Price-Control Policy in the Malawian Agricultural Sector

Since their independence, Sub-Saharan African countries, in general, and Malawi, in particular, have systematically set official prices of agricultural outputs and inputs over a long period of time. The objectives of setting output prices vary from a country to another, but in principle such a policy is to encourage production of some crops relative to others, based on their respective contributions to the national food security and/or to the income of the population. Another objective, linked with the latter, is to ensure self-sufficiency of production of specific crops (rice in Senegal, maize in Malawi, etc.).

In Malawi, prices of agricultural output were set by the government for diverse reasons. Among those motives, one can cite the to increase rural incomes, to diversify crop production, to expand exports, and to enhance food security and production self-sufficiency (Graeme (1994), p. 17.). For instance, the maize producer price is set above its import parity price, while its consumer price is set below the import parity price. The objective of this maize pricing policy is to protect local farmers from external competition. Concerning input prices, the most important action undertaken by most Sub-Saharan countries and which the current study emphasizes, is of subsidizing fertilizer prices. These subsidies are offered for diverse reasons. Dalrymple (1975, pp. 4-8) identifies some of those reasons. Fertilizer subsidies are offered to:

i) encourage farmers to use fertilizer and thereby expand total production;

ii) offset the fact that fertilizer prices are often too high relative to the income level of the group of population that needs to be helped (smallholder farmers in the case of Malawi).

iii) expand the domestic market for fertilizer and allow for the establishment of fertilizer manufacturing, on the assumption that fertilizer production exhibits economies of scale;

iv) specific to West Africa, to offset the high export taxes which are charged on export crops for which the fertilizer are used. This policy of financing distortionary subsidies by distortionary taxes is not optimal; it would be better to simply cut down tax rates.

Fertilizer subsidies can be direct (involving a government payment to some group in the fertilizer production and marketing chain) and/or indirect (such as a subsidy on fertilizer transport, low interest rates on fertilizer loans, exchange rate policy, etc.)

In Malawi, there is no domestic production of fertilizer. A fertilizer subsidy was instituted to mitigate the effects of high transport costs and of exchange rate devaluation. Indeed, "while international prices of Malawi's most important fertilizers leveled off, or even declined, in dollar terms, their prices expressed in domestic currency tripled between 1982 and 1992, and the costs of ocean freight doubled. At the same time, transport costs from port to farmer rose ve

lengthened with t

Revenues

mainly tobacco

their export crops.

estate producers v

the world-market

Briefly, t

government has

implicit subsidy

has set the maiz

price. The offi

crop for food s

policy may hav

set prices of sm

parity prices.

offered to sma

the private ma

In the

economic str

to farmer rose very rapidly (probably also tripling over the decade) as transport routes lengthened with the war in Mozambique" (Graeme, 1994).

Revenues to finance the fertilizer subsidy came from taxes on smallholder exports (mainly tobacco). The Government was indirectly taxing smallholders by paying them, for their export crops, a price below the world-market price. Note that, at the same time, large estate producers were not subject to this tax, since they were selling their export products at the world-market prices through auction floors.

Briefly, the current study looks at three major agricultural pricing policies: 1) The government has set the producer price of maize above its import parity price (IPP); this is an implicit subsidy on the maize producer price. At the same time, the government of Malawi has set the maize consumer price below its IPP; this is a subsidy on the maize consumer price. The official explanation of this double subsidy is to discourage external trade on this crop for food security and self-sufficiency reasons. However, the real explanation for this policy may have more to do with public-choice concerns; 2) The government of Malawi has set prices of smallholder tobacco (the main cash crop, primarily exported) below the export parity prices. This is a tax on smallholder tobacco production; and 3) Fertilizer prices offered to smallholder farmers by the government were below the import parity prices and the private market prices. This is a subsidy on the fertilizer procurement price.

In the early 1980s, many Sub-Saharan African countries, including Malawi, adopted economic structural adjustment programs in the attempt to boost the slow growth of their agricultural sector. However, there is lack of information on the magnitude and the direction of changes in the farmers' behavior towards various policy alternatives (World Bank, 1994).

These structural adjustment programs proposed that fertilizer subsidies be eliminated and that agricultural output prices be liberalized.

Nevertheless, the elimination of fertilizer subsidies and liberalization of agricultural output prices in Malawi raises controversial issues among economists and policy-makers. Concerning the fertilizer subsidy, there is no common agreement to what effects this policy is going to have on the Malawian economy (increase or decrease of the production of some crops, of the government budget deficit, and of the smallholder farmers' income and welfare?).

With regard to output pricing policies, the Malawian agricultural policy discourages smallholders from growing cash crops such as tobacco by offering favorable marketing arrangements to large estates, by imposing restrictions on crops that smallholders can legally grow, and by taxing heavily those export crops that smallholders have been permitted to produce, in contrast to the treatment of estate producers (Sahn, (1992)). Does the import and export parity pricing of smallholder maize and tobacco increase the smallholder production and welfare? Does it decrease the government budget deficits?

The current study aims to bring some answers to the above questions.

1.2. Actual Facts about the Agricultural Pricing Policies in Malawi

Some facts emerge from the existing literature: On one hand, frequent price revisions conducted by the Malawian government in the 1980s did not result in an increase of agricultural productivity, but only in substitution between production of crops (Mtawali, [1993], p.161). The overall effects of liberalization of these prices is still unknown. On the other hand, fertilizer sales have continued to rise in the face of substantial increases in their official prices, but may have been diverted outside the smallholder sector to larger estates. Indeed, from 1980 to 1991, fertilizer sales increased from 49,000 to 107,000 tons. It is during that same period that prices of fertilizer and transport costs from port to farmer in domestic currency almost tripled (Graeme, [1994], p. 3). This may reflect the fact that some supply constraints have been relaxed, especially by increase in donor aid to relieve foreign exchange shortages and therefore, to release fertilizer quantity rationing. It may also be due to the fact that fertilizer use on non-food crops may have increased at the expense of maize, or to the fact that there has been greater leakage to estate sector; the hypothesis of relaxation of supply constraints (better credit access, better technology complementary to fertilizer use) is also plausible[1]. For example, the fall in fertilizer sales registered in 1993/94 was due to a credit recovery crisis; and even though fertilizer cash sales increased by 40 percent, it was insufficient to compensate the loss in credit sales (Conroy, 1994). This has

---

[1] The issues of agricultural financial credits and technology will not be addressed in the current study. Their inclusion may constitute an extension to the study for future researches.

been found to be

Senegal (Ausere

subsidized credit

by smallholders

1.3. Objectives

Questi

Malawi and in

income and v

What

parity pricin

i) the

ii) the

an

et

iii) or

vi) o

T

been found to be the case in other African countries. For example, a study on fertilizer use in Senegal (Auserehl, 1988) concluded that the revenue from cash-crops and availability of subsidized credits (e.g., low-interest credits) seem to explain much the demand for fertilizer by smallholders.

1.3. Objectives of the Study

Questions are still unanswered with regard to the agricultural pricing policy in Malawi and its impacts on agricultural production, government budget, and household income and welfare:

What are the effects of the subsidy removal, and of the output import and export parity pricing policy on

i) the production of maize?

ii) the production of other crops that are substitutes for maize in production and/or consumption (rice, tobacco, groundnut, sorghum, millet, cotton, etc.)?

iii) on household welfare; and

vi) on the government budget deficit?

The specific issues to be addressed in the current study are:

1) to understand the current agricultural pricing policies in Malawi;

2) to characterize the demand structures of the rural and urban Malawi, in order to better capture the impact of diverse policies mentioned above on the welfare of households;

3) to characterize the smallholder farming system in order to understand the impact of the above policies on agricultural production;

4) to understand the government budget deficits associated with agricultural policies, through procurements provided to smallholder farmers by the Agricultural Development and Marketing Corporation (ADMARC) and the Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM);

5) to make policy and research recommendations based on the findings of the study to appropriate institutions.

1.4. Related Researches

The closest studies to the current analysis, in terms of objectives and methodologies of research, are those of Harrigan (1990) and of Kirchner et al. (1985).

The study of Harrigan follows a partial equilibrium analysis and thus ignores the links between markets through cross-price elasticities of demand and supply. It also ignores the issues of income distribution and welfare of different categories of the population.

The objectives of Harrigan's study were to assess the achievements of Malawi's smallholder pricing policy. In particular, the study aimed to evaluate "the World Bank' prescriptions for smallholder pricing policy under the auspices of Malawi's three Structural Adjustment Loans (SALs) during the 1980s." The study concluded:

The Bank placed excessive emphasis on the removal of the price distortions, via adoptions of the import/export parity price criterion, while failing to pay adequate attention to the sequencing of policy reforms and conflicts between policy objectives. As a result, pricing decisions, although achieving some of the stated objectives of government policy, such as the build-up of a strategic food reserves, failed to achieve other goals, namely, a significant diversification of smallholder agriculture and a major increase in smallholder contribution to agricultural export revenues.

The study of Kirchner et al. follows, like the current study, a general equilibrium analysis. It includes the smallholder as well as the estate sectors. It shows that adjustments in the maize pricing that reduce unsalable maize surpluses substantially improve both parastatal (public enterprises) cash-flow and balance of payments. Movements of fertilizer and export crop prices toward their parity values are also demonstrated to result in improvement in most of policy objectives.

The current study improves upon the previous studies by first updating the agricultural pricing issues in Malawi. And second, especially with regard to the study of Kirchner et al., the current study is limited to the smallholder sector. It also uses a different specification of the production structures in the smallholder sector; and finally, the current study uses different sets of data and different parameter estimation techniques (calibration and econometrics).

1.5. Organization of the Study

The study is organized as follows: Chapter 2 provides a synopsis of the economic structure and macroeconomic policies in Malawi. In chapter 3, I present the agricultural pricing policies of Malawi. Chapter 4 presents the methodology used in the current analysis. Chapter 5 provides a description of the data to be used in the study as well as the estimation and specification of the model's parameters. Chapter 6 presents and discusses the simulation results of the model and chapter 7 is a summary of findings and conclusions, as well as propositions for future researches.

CHAPTER 2.

POI

This chapter

policies of Mala

illustrates the ne

idea is to help un

context in which

2.1. An ov

Malawi is a s

appendix 1). It g

mineral resource

Malawi's econon

represents on the

Agriculture

representing ove

CHAPTER 2. MACROECONOMIC STRUCTURE AND AGRICULTURAL POLICIES IN MALAWI

This chapter provides a synopsis of the economic structure and macroeconomic policies of Malawi. It gives an overview of the macroeconomic performance and illustrates the need for better formulation of agricultural pricing policies in Malawi. The idea is to help understand the research objectives and design, and to provide a broad context in which the study is situated.

2.1. An overview of the economic structure of Malawi.

Malawi is a small, poor, landlocked Sub-Saharan African country (see maps in appendix 1). It got independence, in 1964, from Britain. The country has no exploitable mineral resources and so, it was treated as a labor reserve for the South African mines. Malawi's economy depends heavily on the agricultural sector. In 1993, this sector represents on the average, 37 percent of GDP.

Agriculture contributes to over 85 percent of export earnings, with tobacco representing over 74 percent of the total export earnings.

Between 1964 and 1979, the Malawian economy maintained a strong upward trend: The growth rates of GDP, evaluated at market prices, averaged 5 percent. The World Bank and the International Monetary Fund (IMF) presented the country as the best performance amongst small landlocked countries and as one of the examples of successfully adopting their policy prescriptions. However, some analysts feel that this claim of success exaggerates the strengths while ignoring the weaknesses (Kydd and Chriastiansen, 1982 and Lele, 1989, pp. 4-5), namely the distribution issues were not optimal. This claim became clear between 1979 and 1982; time when the GDP growth reached a standstill.

Indeed, the GDP in 1978 market prices has known a negative growth rate since that year until 1982, and reached its 1978 level only in 1984. The government budget deficit has been growing over the time-period of 1978-88.

During this period (1978-88), besides the second oil shock in 1979, Malawi has been subject to numerous other external shocks:

1) A shard decline in the external terms of trade of tobacco (the country's main source of export earnings), a drought, and historically high interest rates in international financial markets resulted in growing bankruptcies of tobacco estate and an increase in the current account deficit and the debt service ratio.

2) Because of the war in Mozambique, external costs of transport were raised close to 20 percent of the value of exports and 3 percent of GDP by 1984. By mid-1988,

the infl

popula

macr

cond

dono

budg

wage

progra

subsidi

for publ

and gove

restructure

market and c

elite.

The imp

variables has bee

At a macro

percent below zer

picked up in 1988

the influx of refugees from Mozambique was estimated to 6 percent of the Malawian population (Malawi Government, Series of Economic Reports).

All these structural imbalances lead the Malawian government to restore macroeconomic balances through a structural adjustment program since 1981. The conditions to the three structural adjustment loans (SALs) by World Bank and other donors (Japan, USAID, Germany) were to improve the balance of payments, to cut the budget deficit and give market mechanisms greater importance in determining prices, wages, resource allocation, and the structure of production. Specifically, the adjustment program proposed to raise producer prices for smallholders, eliminate consumer subsidies, and fertilizer subsidies, adjust exchange and interest rates, charge higher fees for public utilities and services, cut and reorient public expenditure away from transport and government buildings, toward agriculture, health, education and housing, to restructure and improve management of parastatals including liberalization of the grain market and divestiture of public holding companies owned and operated by Malawi's elite.

The impact of the structural adjustment program on the key macro-economic variables has been mixed.

At a macroeconomic level, during 1983 - 1985, GDP at market prices grew at 4 percent below zero. Between 1985 and 1987, there was another decline; the economy picked up in 1988. In 1992, "real GDP in 1978 market prices declined by 7.9 percent compared to a g

agricultural pro

Always

deficit as a perce

the Malawian cu

million in 1993.

The budg

however, the dec

period raised aga

Between 1991 an

million to MK84

Investment as a ra

high rate of 31 4 p

goods under the im

adjustment progra

Interest rates charg

1987, and rose fron

20 percent in 1990

behind these high r

as well as repeated

expansion of money

compared to a growth rate of 7.8 percent in 1991, mainly due to short-fall in small-scale agricultural production arising from the drought" (Malawi government, 1993, p. 4).

Always as a result of the adjustment program, the Malawi's current account deficit as a percentage of GDP fell in 1980 (though rising again in 1983). In 1990 - 1992, the Malawian current account ran into a surplus, but plunged into a deficit of MK505.5 million in 1993, after the agricultural crisis in the same year.

The budget deficit as a percentage of GDP fell on the period 1981-1985; however, the decline of tobacco prices in 1985/86 and the influx of refugees at the same period raised again the current account and the government budget deficits (Lele, 1989). Between 1991 and 1993, the deficit in the government budget increased from MK328 million to MK848 million (6.48 percent to 9.36 percent of total GDP at market prices). Investment as a ratio of GDP declined in the same period. Inflation reached an all-time high rate of 31.4 percent in 1988, but fell to 15.7 percent in 1989 due to availability of goods under the import and industrial liberalization schemes that were part of structural adjustment program; inflation rate was 11.5 percent in 1990 and 11.9 percent in 1991. Interest rates charged by commercial banks for their lending were deregulated in July, 1987, and rose from their former level of 19 percent to 23 percent before falling back to 20 percent in 1990 and 1991(Malawi government 1993, p. 21). The driving forces behind these high rates of inflation and interest are the rapidly increasing money supply as well as repeated devaluation of the domestic currency. A major reason for the expansion of money supply in Malawi was the rapid increase in public sector credit to finan

senou

econo

foreca

p 21

estate

simila

induce

sharp

finance large budget deficits, including borrowing from commercial banks to address the serious financial problems of ADMARC (Graeme, G., 1994, p. 5). These poor economic performance combined with high population growth (3.3 percent), lead to a forecast of no per capita GDP growth between 1993 to 1996 (Malawi government 1993, p. 21).

At the sectoral level, there is a lack of supply response to the SAP. By 1987, estate production had not regained its 1983 peak; smallholder production showed a similar lack of aggregate production response. Changes in relative producer prices induced by SALs simply resulted in shifts among crops, and real per capita GDP took a sharp plunge from 1985 to 1988 (Malawi government 1993, p. 21).

2.2

grow

dual

Mala

extre

milli

gam

(Liv

with

durin

smal

perce

14).

Mala

21 pe

engag

(MSM

contr

2.2. Agricultural Policies

The Malawian agriculture in the 1970s has grown at a greater rate than the growth rate of the population (Mtawali , 1993, p.155). This sector is characterized by a dualistic structure: A rapidly growing estate sector accounting for the major part of the Malawian agricultural growth and an almost stagnant smallholder sector living in extreme poverty. However, the latter is the main employer of the rural labor force (2.1 million in 1987). Off-farm employment within the smallholder sector is dominated by *ganyu* (casual, seasonal) labor which counts for about 70 to 80 percent of rural labor (Livingston, et al., 1993, p. 44). Wage rates are highly variable; they are not determined with reference to minimum wage legislation and are below the minimum wage, except during peak-labor-demand seasons. Labor demand is highly seasonal: Seventy percent of smallholders hire some labor every year, but most do so for very short periods. Only 5 percent of the total labor force is supplied by hired labor (World Bank, 1994, Vol. II, p. 14).

There exist quite large variations in the estimates of non-farm employment in Malawi, from different studies. A most recent study (Daniels, et al., 1993) estimates that 21 percent of the population 15 years old and above (i.e., more than one million) is engaged in non-farm activities, namely in Micro, Small, and Medium Enterprises (MSMEs). The same study concludes that approximately two-thirds of MSMEs contribute 50 percent or more to household income in urban and rural areas.

polic

burle

small

from

p. 14

from 1

the rur

sector i

and 19

diminis

and iii) t

gap bet

GDP gr

only 1.5

prices) r

(GOM

smallho

to small

The cause behind the high performance of the estate sector was a deliberate policy to promote large-estate production of high-value crops such as tea, sugar, and burley and flue-cured tobacco. This policy emanated from a mistrust of the capacity of smallholder farmers to grow and handle export crops, and from a need to use the profits from estate production to reward political allies and create a support base (Ngwira, 1994, p. 14).

With regards to the overall performance of agricultural sector in general terms, from 1980 to 1991, agricultural GDP grew at 3.4 percent a year, about the same rate as the rural population. In two of the three years following this period, the agricultural sector has experienced negative growth rates, largely due to two major droughts in 1992 and 1994 (World Bank, 1994, vol. I, p. 3).

Since the early 1980s, the dualistic structure of Malawian agriculture has diminished because i) some of the better-off smallholders moved into the estate sector, and ii) the expansion of smallholder access to burley tobacco production. However, the gap between the two subsectors is still substantial. From 1980 to 1991, the estate sector GDP grew at an annual average rate of 9.4 percent, and the smallholder GDP grew at only 1.5 percent (World Bank, 1994, Vol. I, p. 3). Real agricultural output (in 1978 prices) rose by 53.4 percent in 1993 compared to a decline of 25.1 percent in 1992 (GOM, 1994, Table 2.1, p. 3). This performance is mainly due to an improvement in the smallholder production, attributable to favorable weather in 1993. Due to a credit crisis to smallholders in 1994, the agricultural production has declined.

2.2.1. T

2.2.1.1.

based o

that the

much.

approac

primary

to prov

grounds

not inc

Develo

extensio

organiz

and Mz

Machin

2.2.1. The Smallholder Sector

2.2.1.1. General Development Policy

Right after independence, the policy to smallholder agricultural development was based on the transformation approach. Between 1965 and 1969, the government realized that the efforts to develop agriculture without concerted programs would not achieve much. It then reoriented its policy toward concentration on promising regions.

Four projects were established which followed the integrated intensive package approach, the first of its kind to be financed by the World Bank (Lele, 1975). The primary objective of these projects was to construct roads and social services as well as to provide extension and credit and marketing services. Emphasized crops were cotton, groundnut, and rice. However, the efforts proved to be too expensive and the yields did not increase as projected. The government adopted a new approach, the National Rural Development Program (NRDP). The emphasis was then placed on credit provision, extension and marketing services.

Today, the agricultural field services of the Ministry of Agriculture (MOA) are organized into eight Agricultural Development Divisions (ADD). These are Karonga and Mzuzu in the North; Kasungu, Lilongwe, and Salima in the Central Region, and Machinga, Blantyre, and Ngabu in the South. Each ADD is divided into two to five

Rural

(EPA

gover

Devel

Fertili

ADM

local v

reserve

ADMA

hybrid

since th

smallho

traders v

: There
provides
enterprises
(SACA), w
1995 and 1

Rural Development Projects (RDP); each RDP is divided into Extension Planning Areas (EPA) which, in turn, are divided into Sections.

There exist other important institutional support provided by the Malawian government to support smallholder farmers; among others[2], the Agricultural Development and Marketing Corporation (ADMARC) and the Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM) are worth to be emphasized here. ADMARC is responsible for distributing fertilizer and hybrid, composite and improved local varieties of seed to smallholder farmers; it also manages the country's strategic reserves of maize, and it markets strategic crops based on ceiling and floor prices. ADMARC had monopoly on purchase of all smallholder produce until 1987.

ADMARC also had monopoly over retailing fertilizer and a great portion of hybrid and composite seed sales to smallholder farmers. The system has been liberalized since the 1994/95 agricultural season.

Since 1987, the Malawian government has allowed private traders in the smallholder market. Mtwali (1993, Table 7.3, p. 163) reports that in 1988, 144 private traders were registered; in 1991, that number had increased to 610.

---

[2] There also exist the Malawi Rural Finance Company, and the Malawi Mudzi Fund Trust, which provides financial credit to smallholder farmers and to resource-poor individuals for non-farm enterprises. These two institutions replaced the Smallholder Agricultural Credit Administration (SACA), which collapsed in 1993, with debts of MK800 million (for more details, see Benson, 1995 and 1996).

re

dis

ma

esta

thro

Fer

Mar

were

prod

tobac

The SFFRFM is a part of the ADMARC. It is responsible for procuring fertilizers required by smallholders, for managing the fertilizer buffer stock and facilitating the distribution of fertilizer provided under commodity aid agreements.

Apart from this administrative support to the smallholder sector, the Malawian macro-economic and sectoral policies have not favored this sector as compared to the estate sector. Smallholder producers have been conducting their commercial transactions through a middle market composed by public enterprises (e.g., Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM), and the Agricultural Development and Marketing Corporation (ADMARC)) for both inputs and outputs. However, large estates were allowed to operate on final markets. Public enterprises offered smallholders lower producer prices than those prevailing on the final markets for the export crops (mainly tobacco).

22

A. I

cult

beer

less

avai

decl

hecta

milli

be m

labor

smal

great

In ad

In

la

I

2.2.1.2. Development Constraints and Proposition of Solutions

A. Land

Productivity and growth of the smallholder sector are limited by the scarcity of cultivable land relative to population. Because of demographic pressure[3], farmers have been forced to abandon their fallow periods and to expand their cultivation to marginal, less fertile soils. Also, because of this demographic problem together with the non-availability (or non-intensive use) of inorganic fertilizer, the soil fertility has been declining through time.

The Land Resources Evaluation Project (LREP) has estimated that 0.25 million hectares of cultivable land in the customary sector is not being used. Moreover, 0.6 million hectares of public land is suitable for agriculture. However, these estimates may be misleading: The cultivation of this "unused" land involves considerate availability of labor and capital. But, we know that these factors constitute the main constraints to the smallholder agriculture. The utilization of public land, especially forest may bear greater social costs than the private costs due to externalities associated with such lands. In addition, about 90 percent of the land has been classified under the LREP as suitable

---

[3] In 1993, the Malawian total population was estimated at 9,575,000. At the same time, the arable land was estimated at 5,601,600 hectares (Government of Malawi, 1993 Annual Bulletin, table 1.1 & 1.4, p. 1 & 4).

or

air

fer

uni

hig

B.

inte

and

ave

by

ave

of A

hybr

87 to

or marginally suitable for agriculture in the southern and central regions of the country is already cropped or under short fallow (World Bank, 1994, Vol. II, p. 43).

Another problem associated with land is its degradation from soil erosion , soil fertility decline, and woodland and rangeland depletion.

The solutions to the above problems involve increasing agricultural cultivation on unutilized and/or public land and countering soil degradation by, for instance, use of high-analysis inorganic fertilizers and anti-erosion techniques.

B. Other Agricultural Inputs

Given the land and soil degradation constraints, smallholder farmers need to intensify their production with improved agricultural inputs, such as inorganic fertilizer and hybrid seed. The sales, by ADMARC, of nitrogen to smallholders increased by an average of 19.4 percent per annum between 1980 and 1991. Phosphate sales increased by 46.2 percent per annum over the same period. Sales of hybrid seed increased by an average of 11.4 percent per annum over the decade (Government of Malawi, the Ministry of Agriculture, 1995).

As a result of this growth in use of improved inputs, the area of land planted with hybrid maize, as a proportion of the total maize area rose from about 3 percent in 1986-87 to nearly 25 percent in 1992-93. The average maize yields rose from about 1000

i

s

T

e

d

co

or

sn

co

se

the

pro

pri

con

help

rela

chap

kgs/ha in 1986-87 to about 1,500 kgs/ha in 1992-93. One can notice that this is a significant development keeping in mind that about 80 percent of smallholder land is planted with maize (World Bank, 1994, Vol. II, Table 4.1, p. 48).

Numerous constraints to the improved input intake by the smallholder sector exist. On the supply side, due to the SFFRFM low capacity of import, currency devaluation, budgetary constraints, fertilizer subsidies, inflation, and increased transport costs, fertilizer supplies are inadequate. In addition, inefficient geographical distribution of available supplies has exacerbated the supply constraints.

On the demand side, the lack of resources is the most common reason for smallholder farmers' non-utilization of fertilizer and/or hybrid seed (Peters, 1992). Of course, the increase of the prices of improved inputs(inorganic fertilizers and hybrid seeds) lead to reduction in the intake of those input by smallholder farmers. In 1993-94, the government liberalized the import and domestic distribution of fertilizers and the production and marketing of hybrid seed. "However, given the undeveloped status of the private agricultural marketing sector, together with foreign exchange and capital constraints, it is unlikely that donor support of the liberalization process would greatly help the sector to realize its full benefits (World Bank, 1994, Vol. II, p. 52). Constraints related to the pricing system of agricultural commodities will be exposed in a separate chapter.

2.3.

from

pick

pop

3.4 p

expene

note that

sector stay

Bec

because of p

undertaken po

order to increas

controls of maize

government of Ma

order to raise enoug

Price controls and

resources, reduction

2.3. Conclusions

Globally, the Malawian economy maintained a steady growth (in terms of GDP) from 1964 to 1979. From 1979 to 1987, the growth rate was negative; but, the economy picked up again in 1988.

In the 1970s, the Malawian agricultural sector grew faster than the rate of population growth. From 1980 to 1991, it grew at the same rate as the population growth (3.4 percent). During the period of 1992 to1994, the overall Malawian agriculture experienced negative growth, due to two major droughts in 1992 and 1994. One must note that most of the agricultural growth was in the estate sector, while the smallholder sector stayed stagnant.

Because of population pressure on the available smallholder cultivable land and because of problems associated with soil degradation, the Malawian government has undertaken policies aimed to incite smallholder farmers to use inorganic fertilizer, in order to increase production of key crops such as maize. These policies included controls of maize price (producer and consumer), and fertilizer price subsidy. The government of Malawi has instituted a tax on the smallholder production of tobacco in order to raise enough money to sustain the subsidies mentioned above.

Price controls and subsidies lead to inefficiencies in the economy (misallocation of resources, reduction in household welfare, etc.). The IMF and the World Bank's economic adjustment programs have proposed that such policies (price controls, subsidies, and taxes) be eliminated.

In the next chapter, I will give an overview of the Malawian agricultural pricing policies.

CHAPTER 3

P

3.1. Agric

Be

pricing pol

marketed s

official ma

same time, t

below its imp

accounts thro

(selling) price

break-even pric

MK15.35 to M

below, one can s

ADMARC cons

tambala kg in 19

CHAPTER 3. AGRICULTURAL INPUT AND OUTPUT PRICING POLICIES

3.1. Agricultural output pricing policy

Before the first Structural Adjustment Loan (SAL) in 1981, agricultural output pricing policy was oriented toward food security objectives and was aimed at increasing marketed surpluses of maize. For this matter, the Malawian government fixed the official maize producer price at a level slightly higher than its import parity price. At the same time, the Malawian government offered a consumer price of maize, which was below its import parity price. This means that the ADMARC was losing revenues on two accounts: through a higher producer price (purchase price) and a lower consumer (selling) price. Sahn, David E. et al. (1990) shows that, if compared to the ADMARC break-even price, the maize official consumer price has been, in real terms, from MK15.35 to MK62.28 per metric ton higher between 1980 and 1988. From table 3.1, below, one can see that, compared to the Blantyre private market price, the maize ADMARC consumer price (nominal) was 11 tambala/kg lower in 1989; it was 8 tambala/kg in 1992.

Sc

ADMA

from taxes on sm

both directly bec

overvalued excha

Table 3.2

below its world p

[4] The issues of the

Table 3.1. Market and ADMARC Maize Consumer Prices 1988-1993 (Tambala/Kg)

	1988		1989		1990		1991		1992		1993	
ADD	M	A	M	A	M	A	M	A	M	A	M	A
BL	25	24	35	24	40	26	50	39	58	50	112	64.8
KR	31	24	29	24	33	26	33	39	40	50	66	64.8
KS	29	24	30	24	32	26	31	39	39	50	60	64.8
LL	27	24	34	24	39	26	47	39	60	50	82	64.8
M	24	24	32	24	37	26	36	39	40	50	76	64.8
MZ	34	24	32	24	40	26	39	39	50	50	65	64.8
SL	28	24	33	24	42	26	49	39	63	50	74	64.8
SH	33	24	31	24	41	26	45	39	60	50	70	64.8

Notes: M = Market Price
A = ADMARC price
BL, KR, KS, LL, M, MZ, SL, and SH stand for Blantyre, Karonga, Kasungu, Lilongwe, Machinga, Mzuzu, Salima, and Shire valley ADDs, respectively.

Source: 1) Government of Malawi, "Malawi Market Prices 1988 - 1993;
2) Graeme, Graeme W., 1994, Table 7, p. 43.

ADMARC provided the subsidy on maize consumer price by revenues raised from taxes on smallhoder export crops. Smallholder export crop producers were taxed both directly because ADMARC's prices were below world prices and indirectly by an overvalued exchange rate[4] (Scarborough, 1993, p. 5).

Table 3.2, below, shows that the ADMARC producer prices for tobacco were below its world price (EPP) between 1985 and 1991. For example, in 1985, the tax on

---

4 The issues of the exchange rate overvaluation are not included in the current study.

smallhold

percent w

Y

19

198

198

1988

1989

1990

1991

N

S

The fi

between 198

pricing princip

following tabl

of major crops

smallholder burley tobacco was 71.9 percent of the world-market price. It was 77.2 percent in 1990.

Table 3.2. Smallholder Tobacco Producer Nominal Price (Tambala/Kg)

	NDDF		SDDF		Sun/Air		Oriental		Flue-Cured		Burley	
Year	W	A	W	A	W	A	W	A	W	A	W	A
1985	151.5	102.0	95.2	81.5	106.6	84.6	N.A.	90.9	N.A.	237.5	181.6	51
1986	225.8	101.5	172.6	71.5	170.4	80.7	N.A.	92.1	N.A.	302.8	291.4	52
1987	324.8	105.7	235.2	82.4	266.3	83.7	N.A.	95.4	N.A.	396.0	396.3	78
1988	449.5	111.6	388.6	88.3	399.3	103.7	N.A.	129.4	N.A.	528.3	524.5	88
1989	604.8	157.7	629.9	119.2	505.2	148.2	N.A.	187.6	N.A.	652.9	369.9	118
1990	436.8	250.7	365.2	186.5	382.3	214.3	N.A.	214.7	N.A.	652.9	517.3	118
1991	602.8	250.7	577.9	215	701.4	214.3	783	229.7	N.A.	1094	1110	N.A.

Notes: W = World-market price
A = ADMARC price
N.A. = Not Available

Source: Graeme, G. W., (1994), Table 8, p. 44.

The first Structural Adjustment Program (SAP I), which covered the period between 1980/81 and 1982/83, proposed that the GOM make effort to adopt parity pricing principles in setting the level of ADMARC buying and selling prices. The following table (Table 3.3.) shows a series of government-fixed nominal producer prices of major crops produced by smallholder farmers.

increase

productu

ADMAI

led to fur

Table 3.3 Nominal Smallholder Producer Prices

	Nominal Prices (current tambala/kg)										
Year	Maze	Rce	Tob.[a]	G'nut	puls.[b]	cot.	mil.	sorg.	cas.	sun.[c]	veg.
1980	6.6	10.0	46.0	33.0	14.0	23.0	N.A.	N.A.	N.A.	N.A.	N.A.
1981	6.6	10.0	46.0	33.0	14.0	23.0	N.A.	N.A.	N.A.	N.A.	N.A.
1982	11.1	10.0	52.0	37.0	14.5	28.5	N.A.	N.A.	N.A.	N.A.	N.A.
1983	11.1	11.5	75.6	55.0	20.0	38.0	N.A.	N.A.	N.A.	N.A.	N.A.
1984	12.2	15.0	83.6	60.0	30.0	42.0	N.A.	N.A.	N.A.	N.A.	N.A.
1985	12.2	17.0	102.0	70.0	40.0	46.0	N.A.	N.A.	N.A.	N.A.	N.A.
1986	12.2	9.0	101.0	75.0	42.0	50.0	N.A.	N.A.	N.A.	N.A.	N.A.
1987	12.2	22.0	106.0	75.0	44.0	55.0	N.A.	N.A.	N.A.	N.A.	N.A.
1988	16.6	27.0	112.0	75.0	44.0	65.0	N.A.	N.A.	N.A.	N.A.	N.A.
1989	24.0	31.0	158.0	85.0	48.0	77.0	N.A.	N.A.	N.A.	N.A.	N.A.
1990	26.0	35.0	251.0	95.0	42.8	81.0	15.0	18.0	12.0	50.0	N.A.
1991	27.0	37.0	251.0	100.0	47.7	81.0	15.0	18.0	15.0	55.5	N.A.
1992	29.7	39.0	251.0	112.0	51.2	90.0	15.0	25.0	20.0	61.5	N.A.

Notes: [a] Average price of the Northern Division Dark-Fired (NDDF) and the Southern Division Dark-Fired (SDDF) tobaccos.

[b] For years 1980 to 1989, the price reported is that of white bean. For 1990 to 1992, the price is an average of prices of beans and peas.

[c] Average price of gray stripe, white, mixed, and black varieties.

N.A. = Not Available

Source: World Bank (1994), Malawi Agricultural Sector Memorandum: Statistical annex.

Under the SAP II (1983/84-1986/87), nominal prices of all export crops were increased while those of maize stayed constant. We assist in a continuous fall in maize production. During that period, world prices of tobacco fell. This put pressure on ADMARC's liquidity position: It could not buy all maize supplied by smallholders. This led to further reduction in maize production.

Co

during the

U

increase

1990/91

increase

R

production

Co

consequentl

Over

were increase

tobacco, *rice a*

Production of

concentrated o

In brief

production of s

in the 1980s, th

incentives. *Apa*

be raised. *There*

Contrary to nominal producer prices of agricultural commodities, which rose during the 1980s, the real prices fell during the same period (Scarborough, 1993, p.7).

Under SAP III (1987/88-1992/93), real prices of maize were substantially increased. Its production also increased against other crops between 1987/88 and 1990/91. The introduction of hybrid seed more productive helped to achieve this increase. From 1991/92, hybrid maize has substituted instead local (traditional) maize.

Real producer prices of maize declined between 1989/90 and 1991/92, but yet the production of hybrid maize increased (Scarborough, 1993, table 3, p. 8).

Consumer maize prices were also increased between 1987 and 1992, and consequently, the real consumer prices increased in 1990 and 1992.

Over this same period (1987-1992), nominal producer prices of all other crops were increased. However, ADMARC producer prices (both nominal and real) for tobacco, rice and groundnuts fell. Export commodities were once again disadvantaged: Production of groundnuts decreased by 70 percent and smallholder agriculture became concentrated on maize production.

In brief, the indirect taxation of smallholder production led to declining production of such crops as cotton, rice, and groundnuts. It is mainly for this reason that, in the 1980s, the structural adjustment programs emphasized the improvements of price incentives. Apart from increasing prices in general, relative prices of export crops had to be raised. There was an attempt to drive prices toward export (import) parity level.

Th

sh

sus

esp

vi

lan

pro

cha

sel

cor

Nevertheless, the following problems have been noted (see Graeme, 1994): i) The changes in prices of individual commodities were not permanent; ii) prices did not shift consistently in favor of export commodities; iii) parity prices were not achieved and sustained; iv) implicit taxation on smallholder export crops has not been eliminated, especially in the late 1980s when their official prices fell again relative to world prices; v) price revisions did not lead to agricultural productivity increase, but to reallocation of land in favor of those crops whose prices had increased.

As far as pricing is concerned, the Malawian government still sets a minimum price to farmers. It also sets a maximum consumer price that the private trader can charge. Because of the lack of storage facilities, farmers are limited most of the time to selling their product to the public enterprises instead of selling them to the final consumer.

s

fa

Sm

AD

AD

fertil

because

are cons

for the su

Th

of high tra

price to sm

1980s due t

internationa

Until

supplied by S

3.2. Agricultural input pricing policy

3.2.1. Fertilizer Policies

Since its independence, Malawi has encouraged the use of fertilizers by smallholder farmers. It then instituted a price subsidy that allowed smallholders to get fertilizers at a price below the import parity price. In 1983, Malawi created the Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM), as a part of the ADMARC, to import and distribute fertilizers to smallholders. Before then, the ADMARC was responsible for these operations, but was unable to ensure availability of fertilizers in sufficient quantities and at the right time.

SFFRFM faces long-term difficulties: Its import capacity is eroded over the years because it has to sell at government fixed prices. Its nominal capital is fixed and there are considerable government delays in funding its operational losses (subvention to pay for the subsidy); there is also general inflation in fertilizer world-market prices.

The Malawian government instituted the fertilizer subsidy to mitigate the effects of high transport costs and of frequent exchange rate adjustments. Indeed, the fertilizer price to smallholders in Malawi has gone up over the years, especially since the early 1980s due to the Kwacha devaluation, increased external transport costs, increased international fertilizer prices, and the reduction in the level of the fertilizer subsidy.

Until 1994, the GOM sets a pan-territorial retail price for each fertilizer type supplied by SFFRFM. In 1991/92, the subsidy rates were 23 percent on urea, 20 percent c

y

s

S

an

subsi

town

produc

directly

etc.)

O

also sells r

No

import licen

season.

This is a spec

on 23:21:0 + 4S[5], 18 percent, and on average of 7 percent on Calcium Ammonium Nitrate (CAN) and Sulfur Ammonium (SA).

There exist two parallel domestic markets for fertilizer in Malawi; one for smallholders and the other for estates. The prices of the former are administered by SFFRFM and those for the latter by Optichem, the Agricultural Trading Company (ATC) and Norsk Hydro.

Optichem, a private company, is the main supplier of fertilizers to estates. It is a subsidiary of a South African company. It has a granulation plant at Blantyre (the capital town of Malawi). It operates at 50 percent of its capacity resulting in high costs of production; this has led several estates to group themselves into association in order to directly import fertilizer (Tobacco Association of Malawi (TAM), Press Agriculture, etc.).

Optichem markets subsidized fertilizer both directly and through the ATC. It also sells non-subsidized fertilizers containing potash to the smallholder authorities.

Norsk Hydro is also a private importer and distributor of fertilizer. It needs an import license for its operations. This handicapped a lot its activities in the 1991/92 season.

---

5 This is a special combination of fertilizer nutrients

Table 3.4. (

Fertilizer Type
Ammonium su
Calcium ammo
nitrate
Urea
Diammonium p
B (4 18 15 0 :
Super
B(5 33 24 20 1
C (6 18 15 1 5
Super C(8 24 1
D (10 7 24 20
Super D
S (6 18 6 0 1B
Average price

Note: N.A.

Source: Con

From the above tab

percent as compare

Besides sub

prices in such a wa

crops, especially on

maize for the fortho

export import parity

of the fertilizer subs

Table 3.4. Comparison of Subsidized Fertilizer and Free Market Prices in 1991 (MK/50Kg bag)

Fertilizer Type	SFFRFM	ATC	OPTICHEM	NORSK HYDRO	Free Market
Ammonium sulfate	48.0	54.6	50.8	N.A	52.7
Calcium ammonium nitrate	45.0	59.9	59.9	47.3	53.6
Urea	45.0	71.6	67.7	57.3	65.5
Diammonium phosphate	49.0	77.2	73.0	N.A	75.1
B (4:18:15:0.1B)	65.0	65.0	N.A	N.A	65.0
Super	N.A	82.7	78.9	N.A	80.8
B(5:33:24:20:1.5B)					
C (6:18:15:1.5B)	56.4	72.6	68.8	N.A	70.7
Super C(8:24:15:0.1B)	N.A	83.3	79.5	N.A	81.4
D (10:7:24:20:1.5B)	58.0	74.8	71.0	N.A	72.9
Super D	N.A	83.8	79.9	72.0	81.9
S (6:18:6:0.1B)	55.0	68.1	N.A	N.A	68.1
Average price	52.7		N.A	N.A	69.8

Note: N.A. = Not Available

Source: Conroy, Ann, 1994, Table 6, p.12.

From the above table 3.4, one can see that, on the average, the fertilizer subsidy was 32 percent as compared to the private market prices.

Besides subsidizing fertilizer to smallholders, the government also fixes some prices in such a way as to maintain a target ratio of benefits to costs for fertilizer use on crops, especially on maize. The price of fertilizer was, thus, a function of the price of maize for the forthcoming season, the prices of other crops and their relationship to export/import parity, the likely procurement costs for various fertilizers, and the existence of the fertilizer subsidy(Lele, 1989, p. 11).

The existin

i) it encouraged le

subsector

Leakage

i) the fact that S

in trading fertili

are located side

estates are in th

are too high so

The su

through secon

(1990) estimat

ADMARC.[6]

ii) The

the subsidy is es

until the end of t

difficult to isolate

is not transparent a

[6] The problem of leakag
analyzed in the current

The existing structure of fertilizer subsidy, until 1994, led to some problems: i) it encouraged leakage of subsidized fertilizer from the smallholder to the estate subsector.

Leakage of fertilizer from smallholder to estate subsector could be explained by 1) the fact that SFFRFM's prices were way below those of any other company implicated in trading fertilizer in Malawi (thus below the world prices); 2) estates and smallholders are located side-by-side; 3) Optichem is located at Blantyre and Lilongwe, while most estates are in the north of Lilongwe; transport costs from these two points of distribution are too high so that estates either buy directly from SFFRFM, or from smallholders.

The subsidized fertilizer is smuggled directly from ADMARC and indirectly through secondary markets between smallholder and estate farmers. Mkandawire et al. (1990) estimate that, in 1989, 59.1 percent of the estates get their fertilizers from ADMARC.[6]

ii) The following other problems related to the fertilizer subsidy can be listed: 1) the subsidy is essentially a SFFRFM trading deficit; 2) the subsidy cannot be calculated until the end of the fiscal year, and thus, it affects the company's cash flow position; it is difficult to isolate the cost of the subsidy because it is the net result of all transactions; it is not transparent and does not allow easy tracing of individual costs; 4) many of the

---

6 The problem of leakage of subsidized fertilizer from the smallholder sector to the estate sector will not be analyzed in the current study, because of lack of reliable data.

benefits of the subs

leakage of fertilizer

Because of

be removed by th

introduction of h

fertilizers in 198

Neverth

again become n

rising landed co

refugees from

security and fo

resumed subsid

the 1988/89 sea

fertilizer by only

(Lele, 1989, p.1

Under the

agreement with th

The issue of fertilizer
current study

The World Bank has fi
Loans (SALs) in 1981,
Policy Operation in 198

benefits of the subsidy go to the estate sector (i.e., there is a need to accurately estimate leakage of fertilizers from smallholder to estate sectors)[7].

Because of all these problems, the SAPs had proposed that the fertilizer subsidy be removed by the 1988/89 season. This removal should have been accompanied by the introduction of high-analysis fertilizer with a target of 40 percent of imports being such fertilizers in 1988/89 (Sahn, 1990, p.116).

Nevertheless, by 1987, the Malawian fertilizer price/official maize price ratio had again become nearly three times that of Kenya (Lele, 1989, p. 11). This was due to rising landed costs of fertilizer, and declining marketed volumes of maize. The influx of refugees from Mozambique at that time constituted a serious threat to the national food security and forced the government to withdraw from the subsidy removal agreement and resumed subsidizing smallholder prices by about 25 percent (Lele, 1989, p.11). During the 1988/89 season, the producer price of maize was raised by 44 percent and the price of fertilizer by only 11 percent, and thereby the nutrient price/maize price ratio was reduced (Lele, 1989, p.11).

Under the Agricultural Sector Adjustment Credit (ASAC)[8] and with the agreement with the European Economic Community(EEC), the Government committed

---

7 The issue of fertilizer leakage between the smallholder and estate sectors is not included in the current study.

8 The World Bank has financed six adjustment operations in Malawi: Three Structural Adjustment Loans (SALs) in 1981, 84, and 86 respectively and a Fertilizer Loan in 1983, an Industry/Trade Policy Operation in 1988 and a ASAC in 1990.

to a phased reduct

agricultural seaso

Government exp

and 1.3 percent

removed since

The cu

alone, or in co

smallholder a

to a phased reduction of the fertilizer subsidy--with total elimination during the 1994/95 agricultural season): The total subvention of the subsidy as a percentage of the Government expenditure was not to exceed 2 percent in 1990/91, 1.6 percent in 1991/92, and 1.3 percent in 1992/93 season (Graeme, 1994, p. 8). The fertilizer subsidy has been removed since 1994/95 season so that smallholders and estates can face the same prices.

The current study analyzes the different effect of the fertilizer subsidy removal alone, or in conjunction with other policies (maize subsidy and tobacco tax), on smallholder agricultural production, government budget, and household welfare.

3.2.2 Supply of

Most sm

harvest. The N

hybrid and com

hybrid maize s

mid-1980s. T

production in

also intermitte

is mainly the

In the

households se

of seeds by re

analysis.

3.2.2. Supply of seeds

Most smallholders obtain their seeds by retaining part of the previous year's harvest. The National Seed Company of Malawi (NSCM) is concerned by the supply of hybrid and composite maize and tobacco seeds. Lever Brothers Limited (private) began hybrid maize seeds production in 1991/92; it is engaged in hybrid sunflower seeds since mid-1980s. The Smallholder Seed Multiplication Scheme (SSMS) concentrates its production in composite seeds for maize, beans, groundnuts, soy beans, and rice; it has also intermittently produced composite pigeon pea, cow pea, wheat and cotton seeds. It is mainly the hybrid maize seed that the government wants to promote.

In the current study, because I could not get enough information on the households seed demands, and given the fact that smallholder obtain a great proportion of seeds by retaining part of the previous year's harvest, I did not include this input in my analysis.

3.2.3. Labor

In the cu

market divides

only complete

et al for the C

with regards to

"Mala
at nearly 3 pe
rural, and of t
comprising es
the rural non-
very limited r

Only
percent in the
government s

Overal
irrespective of
labor force. Th
formal sector e
the rate of grow
in the formal sec
sector paid empl
exhibit many of t
employment is in
government."

According to

smallholder labor, ap

supplied within the loc

3.2.3. Labor

In the current study, I am interested in the rural agricultural labor market. This market divides into an informal (smallholder) and a formal (estate) labor markets. The only complete study on the Malawian labor market that exists so far is that of Livingston, et al. for the Government of Malawi (1993). The study draws the following conclusions with regards to the structure of the labor force and employment in Malawi:

> "Malawi's labor force (age 10 and over) of about 3.5 million is growing at nearly 3 percent per year. This labor force is overwhelmingly (92 percent) rural; and of this component only 6 percent are in the rural formal sector, comprising estate agriculture plus some government services; 86 percent are in the rural non-formal sector, essentially smallholder agriculture, together with a very limited rural non-farm sector.
>
> Only 8 percent of the labor force are in the urban areas: An estimated 6 percent in the urban formal sector dominated by trade and services, including government services and 2 percent in the informal sector.
>
> Overall the formal sector, defined to include all registered enterprises irrespective of the number of employees, employs only about 12 percent of the labor force. This proportion has not increased since 1977, because the growth of formal sector employment slowed down to less than 3 percent per year or about the rate of growth of the labor force. Most of paid employment in the economy is in the formal sector. The estate sub-sector provides about one-half of formal sector paid employment; also those engaged as tenants on the tobacco estates exhibit many of the characteristics of a paid labor force. The rest of formal sector employment is in urban/and rural non-agricultural enterprises and in government."

According to the study of Livingston et al., (1993), there exist three types of smallholder labor, apart from own family labor: 1) communal labor, in which labor is supplied within the local village community or extended family on a reciprocal basis (no wage is paid). 2

employed contr

more than 4 to 7

The lab

of the annual h

during this sam

This sa

labor, but this p

the rural labor r

markets exist.

From a

percent of the t

Earlier in this c

At the i

and semi-skilled

government serv

wages are genera

The follow

sector during the 19

Center, and South) a

wage is paid); 2) daily paid labor or "*ganyu*", which is hired by day, although it can be employed continuously over a few weeks or months; 3) permanent labor employed for no more than 4 to 7 months.

The labor-hiring activities in agriculture are centered on maize: 60 to 70 percent of the annual hired labor is done during maize season (October to January). It is also during this same period that two major cash crops (tobacco and cotton) are grown.

This same study reports that roughly 70 percent of smallholder farmers use hired labor; but this proportion varies from region to region. This support the hypothesis that the rural labor market is to some extent segmented and that distinct local labor sub-markets exist.

From a Malawian government report (Ministry of Agriculture, 1978), around 6 percent of the total hours devoted to agricultural activities are performed by hired labor. Earlier in this chapter, we saw that the World Bank estimates this proportion at 5 percent.

At the independence, Malawi inherited a minimum wage system for unskilled and semi-skilled (industrial) labor. Today, the minimum wage policy is followed only by government services and by the formal sector. In the informal sector (rural and urban), wages are generally lower than the minimum and are determined without reference to it.

The following table shows the wage rates offered in the smallholder agricultural sector during the 1984/85 agricultural season, by main regions of the country (North, Center, and South) and by Agricultural Development Division (ADD).

ADD

Karo
Mzuz
Nort
Kasu
Lilong
Salim
Cent
Mach
Blant
Shire
South
All M

So

In the c

Its wage is dete

supply, given b

Table 3.5. Average Wages in the Smallholder Agriculture, 1984/85

ADD/Region	Tambala/hour	Tambala/day(5 hours)
Karonga	22	110
Mzuzu	18	90
North	20	100
Kasungu	17	85
Lilongwe	14	70
Salima	29	145
Central	18	90
Machinga	10	50
Blantyre	18	90
Shire Valley	13	65
South	14	70
All Malawi	16	80

Source: Livingston, I. and S. Bose, 1993, Table V.4, p. 50.

In the current study, I consider the smallholder labor market to be competitive. Its wage is determined by market forces of demand and supply. Smallholder labor supply, given by the total family labor available, is inelastic.

3.2.4. Land

There are

percent) is held in

their use and occu

unallocated land.

occupants, and c

land rental price

over the cost of

Public (

national parks,

title or leased t

3.2.4. Land

There are three types of land tenure: customary, public and private. Customary (60 percent) is held in trust by traditional authorities, and allocated to heads of households for their use and occupation (right to cultivate, collect fuelwood and timber, and livestock on unallocated land, and agricultural land after harvest). This kind of land is not owned by its occupants, and cannot be bought or sold by individuals. In the current study, I impute the land rental price in reference to its marginal value product as a residual the product value over the cost of other inputs (See chapter 5, section 2, of the current study).

Public (26 percent) is land used or acquired by the government for public use(national parks, natural forests, etc.). Private (13 percent) is the land owned under freehold title or leased to individuals or corporations for a period of 21-99 years.

3.3. Governme

As seen

price of maize.

farmers. These

Development a

Revolving Fun

operations over

Table 3.6

P

Crops
Maize
Tobacco
Cotton
Groundnu
Rice
General Pr
Farm input
Crop Tradi
Profit

Source: ADMAR

In the curr

agricultural pricing

reference year being

3.3. Government Deficit from Agricultural Operations

As seen earlier, the government of Malawi supports the producer and consumer price of maize. It also used to subsidize the price of imported fertilizers for smallholder farmers. These subsidies are provided through public institutions (the Agricultural Development and Marketing Corporation and the Smallholder Farmer Fertilizer Revolving Fund of Malawi). These two institutions incurred losses on agricultural operations over the period of 1990 to 1994, as is shown in Table 3.6., below.

Table 3.6. Malawi: ADMARC and SFFRFM Crop Trading Profit, 1990/91 - 1993/94 (In millions of MK)

Crops	1990/91	1991/92	1992/93	1993/94
Maize	5.7	14.8	4.4	28.8
Tobacco	13.2	- 24.8	- 31.9	- 7.2
Cotton	2.8	- 4.0	- 4.6	6.3
Groundnuts	1.7	1.5	- 0.4	–
Rice	0.1	- 0.2	- 0.1	- 1.7
General Produce	- 1.5	- 1.0	–	6.6
Farm inputs	- 0.9	1.4	- 17.0	- 30.4
Crop Trading Profit	21.1	- 12.1	- 49.6	2.4

Source: ADMARC Annual Reports and Data from the Ministry of Statutory Corporations.

In the current study, we are interested in knowing how the change in the agricultural pricing policies of Malawi will affect these government budget deficits, the reference year being 1992/93.

3.4.

Phase

prices.

taxed t

to the t

to price

(especia

a period

private c

price sub

I

liberalizi

smallhold

househol

3.4. Conclusion

In brief, the Malawian agricultural pricing policy has had three different phases. Phase I (before 1980/81) is characterized by strong intervention of the government. Input prices, especially fertilizer prices, were subsidized. Smallholder exports were directly taxed through producer prices lower than the world-market prices. Phase II corresponds to the three SAPs (1981/81-1992/93); it is characterized by an attempt by the government to price exports based on export parity, to increase producer price for food crops (especially maize), and to adjust the exchange. Phase III (1994 to present) corresponds to a period of total liberalization of input markets (the fertilizer subsidy is removed and private companies are allowed to commercialize fertilizer; maize producer and consumer price subsidies are and the tobacco tax are eliminated)

In the following chapter, I present the methodology I use to analyze the effects of liberalizing the smallholder inputs and outputs' prices, including the impact on smallholder agricultural production, government deficit from agricultural operations, and household welfare.

the curr

analysis

(Braverr

[1994])

T

partial-e

adapted t

sectors

4.1. Intr

T

method to

models of

microecor

changes.

CHAPTER 4: ANALYTICAL METHODOLOGY

This chapter discusses the rationale for the selection of the analytical method used in the current study. The current study follows a Computational General Equilibrium (CGE) analysis, sometimes referred to, in Economic Development, as "multi-market" analysis (Braverman et al., [1986], Braverman et al., [1987], Dorosh et al., [1994], Arulpragasam, [1994]).

The chapter begins with a brief comparison between this methodology (CGE) and a partial-equilibrium analysis. It then specifies the building-bloc equations of the model as adapted to the institutional structure of the Malawian agricultural and foreign exchange sectors.

4.1. Introduction

The multi-market method can be viewed as extending the single-market surplus method to include income distribution and some general equilibrium considerations. It uses models of farm-household behavior as its basic building blocks. These models allow a microeconomic investigation of both producer and consumer response to exogenous price changes.

labor

suppl

evalua

policie

structu

restrict

the imp

mechan

Morduc

I

commod

question

C

producer

can't be i

substitutio

indirect ef

Variations in rural incomes are due to different size of landholdings and to different labor endowments, among other things. Through aggregation over households, aggregate supply and demand functions, including those of labor are derived and can be used to evaluate the direct impact of price changes at the household and the market level.

The multi-market analysis is a tool for simulating the effects of agricultural price policies on outcomes of interest. The policies considered are specific to the institutional structure of the economy. These frequently include taxes, subsidies, import and export restrictions, or administratively fixed commodity prices.

The method proceeds by assembling what is known about supplies and demands for the important commodities, the institutional structures of government policies and the mechanisms for market clearance (Braverman, Avishay, Jeffrey S. Hammer, and Jonathan J. Morduch [1987]).

Particular functional forms are specified for both demand and supply for each commodity of interest. The model is, thereafter, calibrated to actual data of the economy in question, at a particular period of time.

Compared to a single-market analysis (or a partial-equilibrium consumers' and producers' surplus analysis), a multi-market analysis allows substitution possibilities that can't be introduced in the former analysis. On the production side, the possibility of substitution between crops may lead to higher price-elasticities. This result helps to identify indirect effects of policies. Likewise, on the demand side, the spill-over effects of related markets are sub

also includes in

To asse

the domestic re

measures are m

address income

impact of taxes

A multi

consumption, a

to control for (c

dimensions of t

investment and

purpose of the a

The mu

policies is limit

varieties), tobac

cereals (mainly r

groundnuts, etc.).

---

9 Other tobacco

markets are substantial and have substantive policy implications. The multi-market analysis also includes income distribution considerations.

To assess the issues of agricultural pricing policies, some economists/analysts use the domestic resource cost and the effective protection rate for various crops. These measures are modified ratios of domestic prices to international prices; however, they do not address income distribution and public finance issues, nor can they address the quantitative impact of taxes and subsidies on production and consumption.

A multi-market analysis attempts to model only key commodities whose production, consumption, and prices have major effects on the key variables that the policy-makers want to control for (often, taxes and income distribution). This implies a status quo of other dimensions of the economy. In the present case, variables such as capital account flows, investment and saving, monetary policies, etc., are assumed to remain constant for the purpose of the analysis.

The multi-market model that I use to analyze the Malawian agricultural pricing policies is limited to the following commodities: maize (composite, hybrid, and traditional varieties), tobacco (burley and other varieties[9]), rice (hybrid and traditional), non-maize cereals (mainly millet, sorghum, and sunflower), cassava, and pulses (peas, beans, groundnuts, etc.).

---

9 Other tobaccos include the dark-fired, the sun-air, and the oriental varieties.

on sm

house

The an

consum

deficits,

The aim of this model is to analyze the direct effects of agricultural pricing policies on smallholder agricultural production, household consumption, government revenues, and household welfare in Malawi.

This analysis is carried at short to medium run levels, where technology is given. The analysis examines alternative price reform scenarios through simulation exercises.

The model used in the current study has six building blocks; namely, production, consumption, welfare change measurement, market-clearing conditions, government deficits, and price determination.

4.2. Th

4.2.1. S

characte

(also cal

of view,

agricultu

differentl

relativel

subsector

Sn

varieties),

cassava, to

three majo

The
Divis
orient

Pulses
pure s

4.2. The structure of the model

4.2.1. Smallholder Agricultural Production

In chapter one of this study, we saw that the Malawian agricultural production is characterized by a dualistic structure consisting of a rapidly growing "large-scale" sector (also called "estate" or "leasehold" sector) and a smallholder sector. From a production point of view, these two sectors differ from each other by the size of the farm land and the agricultural techniques used (fixed and variable inputs used). These two sectors are also differently regulated by the government--we saw that the estate sector has been somehow relatively more favored by these regulations. I limit my analysis on the smallholder subsector (see chapters 1 and 2 of the current study for reasons of this restriction).

Smallholder farmers grow mainly maize (traditional, hybrid, and composite varieties), rice (traditional and hybrid), non-maize cereals (millet, sorghum, and sunflower), cassava, tobacco[10], and pulses[11]. For the purpose of the analysis, I have divided Malawi into three major regions (North, Center, and South).

---

10 The following are the varities of tobacco grown in Malawi: Burley, flue-cured, Northern Division Dark-Fired (NDDF), Southern Division Dark-Fired (SDDF), sun-air and the oriental.

11 Pulses comprise white beans, pigeon peas, cow peas, grams, soya beans, ground beans, pure stand, and chick beans. I also include groundnuts in this category.

on sm

Cente

Cro
Loc
Hyb
Con
Loca
Hyb
Grou
Mil
Sorg
Sunf
Cass
Burle
Othe
Pulse

S

It

cassava, a

the centra

between m

The National Sample Survey of Agriculture (NSSA), which compiles information on smallholder production, provides the following crop combinations per region (North, Center, and South):

Table 4.1. Smallholder Crop Mix per Region from the NSSA (1992/93)

Crops	Regions: North (Karonga, Mzuzu ADDs)	Central (Kasungu, Lilongwe, and Salima)	South Machinga, Blantyre, and Shire Valley
Local maize	Local maize	Local maize	Local maize
Hybrid maize	Hybrid maize	Hybrid maize	Hybrid maize
Composite maize	Composite maize	-	Composite maize
Local rice	Local rice	-	Local rice
Hybrid rice	Hybrid rice	Hybrid rice	Hybrid rice
Groundnuts	Groundnuts	Groundnuts	Groundnuts
Millet	Millet	Millet	Millet
Sorghum	-	Sorghum	Sorghum
Sunflower	Sunflower	Sunflower	Sunflower
Cassava	Cassava	Cassava	Cassava
Burley tobacco	-	Burley tobacco	-
Other tobacco	-	Other tobaccos	-
Pulses	Pulses	Pulses	Pulses

Source: NSSA (1992/93)

It appears from the above table that maize, rice, groundnuts, millet, sunflower, cassava, and pulses are grown by smallholder farmers in all regions. Sorghum is grown in the central and southern regions of the country. In all regions, substitution possibilities are between maize and all other crops.

Inputs used in the smallholder agriculture vary from region to region and from crop to crop. It appears, from the NSSA data, that smallholder farmers in the central region of Malawi use fertilizer, land, and labor in their production. In the Northern region, farmers use mainly land, fertilizer, oxen, and labor. In the Southern region, smallholder farmers use only land, and labor (for more details, see chapter 5, section 1 of the current study).

Smallholder farmers maximize profits; they are constrained by the availability of land and fertilizer, technological possibilities for substitution, and the prices of outputs and inputs. Smallholders are assumed to be price-takers in both the input and output markets.

Because of the duality of the production function and the profit function, I can use either of them to characterize the Malawian production structure. As note Jamison and Lau (1982), the profit function is particularly attractive in this kind of analysis because of the Hotelling-Shephard lemma. This lemma states that the first-order derivatives of the profit function with respect to the input prices are the negatives of profit-maximizing input demand functions, and its first-order partial derivatives with respect to fixed inputs are the marginal products of those inputs.

Because the current study concerns only the short-to-intermediate run decisions, I use a normalized restricted Cobb-Douglas profit function. I use a Cobb-Douglas form for simplicity and because of scarcity of data. This form of profit function is said restricted because it allows a subset of inputs to be fixed (land), while another subset is variable (labor, fertilizer, pesticides, and oxen). The profit function is normalized relative to output prices.

I

conditio

where

r =

i =

n

See

Denote P_n^* the producer price of commodity n in region r. The profit function, conditional to land allocation between crops, is[12]:

$$\mathrm{Ln}\frac{\Pi_n^r}{P_n^*} = \alpha_{on} + \Sigma_{i=1}^{I}\alpha_{in}\mathrm{Ln}\frac{w_i}{P_n^*} + \beta_n LnK_n^r \qquad (1)$$

where

$$\alpha_{on} = (1-\mu)^{-1}\ln A + \ln(1-\mu) + \sum_{i=1}^{I}\frac{\alpha_i}{1-\mu}\ln\alpha_i,\ \ \mu = \sum_{i=1}^{I}\alpha_i$$

$$\alpha_{in} = -\frac{\alpha_i}{1-\mu},$$

$$\beta_n = \frac{\beta}{1-\mu},$$

$$A = \frac{\sum_I w_i z_{in} + rK_n^r}{P_n^* \prod_I z_{in}^{\alpha_i} K_n^{r\beta}}$$

r = 1 to 3, denotes the three regions (North, Center, and South) which comprise the eight Agriculture Development Districts (ADD);

i = 1 to 2 in the Central region, 1 to 3 in the Northern region, and 1 in the Southern region, denotes the variable factor index: labor, fertilizer, and oxen;

n is the crop index.

---

12 See Appendix 2A, for mathematical derivation of the paramaters of this profit function.

K_n^r represents the fixed land allocated to crop n by a representative household in region r.

The conditional supply function[13] of commodity n is:

$$Q_n^r = \frac{\partial \Pi_n^r}{\partial P_n^*} = \frac{\Pi_n^r}{P_n^*}(1 - \Sigma_{i=1}^{I} \alpha_{in}) \qquad (2)$$

The conditional supply function depends on the profit and the price of commodity n. This function, together with the land allocation condition between crops (see below), determine the way substitution between crops occurs as producer prices change. The key variables are the own-price elasticity of supply for commodity n (ε_{nn}^{p}) and cross-price elasticity of supply between commodity n and m (ε_{nm}^{p}).

For each household type r, land is allocated between crops until the value of its marginal product is equalized across crops n and m. In other words, land is allocated between n and m until the "shadow price" or "imputed value" of a marginal unit of land is equalized for both crops. We get the following condition:

13 These supply functions are conditional on the fixed land allocated to commodity n.

It must

ousehold r (K

we have the foll

It

is possibl

T

where H^R

$$P_n^* \frac{\partial \Pi_n^r}{\partial K_n^r} = P_m^* \frac{\partial \Pi_m^r}{\partial K_m^r}$$

(3)

$$implies \ \frac{P_n^* \Pi_i^r \beta_n}{K_n^r} = \frac{P_m^* \Pi_m^r \beta_m}{K_m^r}, \text{ for } n \neq m$$

It must also be true that the sum of land allocated to each crop grown within the household r (K^r_n) does not exceed the size of the household's landholding (K^r). In other words, we have the following identity:

$$\sum_{n=1}^{N} K_n^r = K^r \quad (4)$$

It is through this land allocation condition that production substitution between crops is possible.

The smallholder total market conditional supply, aggregated at the regional level, is:

$$Q_n^s = Q_n^r * H^R, \quad (5)$$

where H^R represents the total land area allocated to crop n in region r.

hous

level.

14

I
s
d
p

The conditional input demand functions (for variable factors)[14] for individual households are:

$$Z_{in}^{r} = -\frac{\partial \Pi_{n}^{r}}{\partial (w_i / P_n^{*})} = -\frac{\Pi_{n}^{r} \alpha_{in} P_{n}^{*}}{w_i} \qquad (6)$$

The smallholder total market conditional input demand, aggregated at the household level, is:

$$Z_{i}^{s} = (\Sigma_{n=1}^{N} Z_{in}^{r}) * H^{R} \qquad (7)$$

14 I should note that the demand for labor is 'net' instead of 'gross'. The household demands labor services above the supply of labor by its members. That is: *Household's net demand for labor = Total demand - labor supplied by members of the household.* In other words, the net demand concerns the portion of the farm labor, which is hired (exclusive of family labor).

4.2

de

va

P

C

Y

N

A

wea

4.2.2. Consumption

I use the Almost Ideal Demand System (Deaton, et al., 1980)[15] to characterize the demand system in Malawi. I include some demographic characteristics as explanatory variables. The Almost Ideal functional form becomes as follows:

$$\frac{P_n C_n^r}{Y^r} = \mu_n + \phi_n \ln(\frac{Y^r}{N^r P}) + v_n A^r + \tau_n lnN^r + \Sigma_h \gamma_{nh} lnP_h \qquad (8)$$

$$[P = \mathrm{Exp}(\mu_0 + \Sigma \mu_n \mathrm{Log}\, P_n + \Sigma_n \Sigma_h \gamma_{nh} (\mathrm{Log}\, P_n)(\mathrm{Log}\, P_h))]$$

P_n - Consumer price of good n

C_n^r - Quantity of good n purchased by household r

Y^r - Income of household r

N^r - Number of members in household r

A^r - Proportion of members of household r in the age group A

In the current study, we use household current total expenditure as a proxy of its wealth (or permanent income, see chapter 5, section 3.1.3 for econometric implications).

15 See Appendix 2B, for the mathematical derivation of the Almost Ideal Demand System.

Also

Ston

wher

Ideal

The a

Hom

16

Also, the general price index P is approximated by an observable price index (e.g., the Stone Price Index[16]):

$$lnP = \Sigma_{h=1}^{n} D_h lnP_h, \qquad (9)$$

where D_h is the h^{th} commodity expenditure share in the regional total expenditure.

The demand theory imposes certain restrictions on the parameters of the Almost Ideal model.

The adding up condition requires that:

$$\Sigma_{n=1}^{N} \mu_n = 1,$$

$$(10)$$

$$\Sigma_n \gamma_{nh} = \Sigma_h \gamma_{hn} = \Sigma_n \phi_n = \Sigma_n \nu_n = \Sigma_n \tau_n = 0,$$

Homogeneity requires that, for each commodity i,

$$\sum_h \gamma_{nh} = 0 \qquad (11)$$

16 The Stone Price Index has nice properties: i) It is easy to compute and understand; ii) It is homogenous of degree one. That means that doubling commodity price lead to a doubling of the index value and when incomes are deflated by this index, twice the income level is needed to achieve the same level of welfare.

Similarly, symmetry requires that:

$$\gamma_{nh} = \gamma_{hn} \tag{12}$$

A necessary, but not sufficient condition for a well-behaved demand is that the Hessian matrix of the demand system has negative diagonal elements (H_{nn}); that is,

$$H_{nn} = [\gamma_{nn} + \phi_n^2 \ln \frac{Y^r}{N^r P} - \frac{P_n C_n^r}{Y^r}(1 - \frac{P_n C_n^r}{Y^r})] \frac{Y^r}{P_n^2} < 0 \tag{13}$$

The sufficient condition, which is that the second-order Hessian matrix be negative semi-definite, is difficult to impose directly. However, it can be checked after calibration (or estimation).

Green et al. (1990) derive the uncompensated price elasticities of demand (ε_{nm}) associated with the Almost Ideal model:

$$\varepsilon_{nm} = -\delta_{nh} + \gamma_{nh} / D_n - \phi_n D_h / D_n, \tag{14}$$

Where δ_{nm} is the Kronecker delta ($\delta_{nh} = 1$, for n = h, $\delta_{nh} = 0$, for n $\neq$ h) and the other parameters are as defined before.

The expenditure elasticities of demand (ε_{ny}) for good n can be derived:

$$\varepsilon_{ny} = 1 + (\phi_n / D_n) \tag{15}$$

W

ex

is c

sim

rest

be re

the ϕ

(iv) th

propo

17

Household demographic structure is included in the demand system as explanatory variables because it is believed that household composition has on impact on the allocation of expenditure. The household composition elasticity of demand reflects the effect of an additional person in a specified demographic category (say, age) on the demand for good n relative to the change in expenditure that would have resulted in the same change in demand.[17] The formula for household composition elasticity (ε_{nh_d}) is:

$$\varepsilon_{nh_d} = \frac{\partial y_n^r / \partial h_d^r}{\partial y_d^r / \partial Y^r} * \frac{N^r}{Y^r}, \tag{16}$$

Where h_d^r denotes the characteristic d of household r and y_n^r ($P_n C_n^r$) is the expenditure on item n by household r.

The Almost Ideal has many advantages at the econometric viewpoint: (i) its equation is close to linear so that it can be estimated equation by equation using OLS, or simultaneously using Seemingly Unrelated Regression (SUR) technique; (ii) concerning P, restrictions on μ_n and γ_{hn} are such that P is linear homogeneous of individual prices. P can be replaced by any price index a priori estimated (the Stone price index, for instance); (iii) the ϕ_n parameters of Almost Ideal determine whether a good is luxury, necessity or inferior; (iv) the γ_{hn} parameters measure the change in the ith budget share following a one proportional change in P_h with (Y/P) held constant.

17 For a more detailed discussion about the importance of household demographic characteristics in its demand system, see Thomas, Duncan, John Strauss, and Mariza M.T.L. Barbosa (1989).

The Almost Ideal presents some disadvantages: The Almost Ideal permits a limited amount of non-linearity in the Engel curves. It also restricts Engel curves to zero intercepts. The consequences of this are that Engel curve slopes may be badly estimated even at the sample mean, and changes in the slopes as income changes may be missed (Inderjit, et al., 1986, p. 61). The solution to these problems is to use Engel curves with more curvature or to introduce non-zero intercepts, or both (e.g., by introducing quadratic terms in the Almost Ideal (Deaton, 1982 or Strauss, 1982)).

The total market demand for good n is:

$$D_n^R = C_n^r * N^R \tag{17}$$

N^R is the number of households in region r.

C_n^r is the consumption level of commodity n by household in region r.

D_n^R is the total demand level for commodity n in region r.

4.2.3. W

I

to a polic

and asks

change i

where C

expendit

2B).

4.2.3. Welfare Change

I use the equivalent variation (EV) to measure the change in household welfare due to a policy change. This measure uses the current prices (before policy change) as the base and asks what income change, at the current prices, would be equivalent to the proposed change in terms of its impact on utility (Varian, R. Hal [1992]).

$$EV = C(U^1 ; P^o) - C(U^o ; P^o) \tag{18}$$

where $C(U^1 ; P^o)$ is the expenditure needed to attain utility U^1 at current prices P^o. The expenditure functions are as defined above in the Almost Ideal demand structure (Appendix 2B).

4.2.4

study

Crop
Maiz
Rice
Non-
mille
pulse
Toba
cured
Inpu
Ferti
Labo

4.2.4.1

a. *Maiz*

good, d

4.2.4. Market-Clearing Conditions

The following table shows market closure for agricultural crops and inputs under study in the current analysis.

Table 4.2. Crops and Inputs Market Structure

Crop	Producer	Producer price	Consumer price	Market-clearing conditions
Maize	Smallholder	ADMARC	ADMARC	Domestic demand & supply
Rice	Smallholder	Private	Private	
Non-maize cereals (Sorg., millet, sunfl)., cas., and pulses	Smallholder	Private	Private	Domestic demand & supply
Tobacco (Burley, flue-cured and other varieties)	Smallholder	ADMARC	World price	Domestic demand & supply
Inputs	**User**	**Farmgate**		
Fertilizer	Smallholder	SFFRFM		Exports & domestic supply
Labor	Smallholder	Domestic market		
				Market-clearing condition
				Imports & domestic use
				Domestic supply and demand

4.2.4.1. Output Market-Clearing Conditions

a. Maize

As seen earlier in chapter 3 of the current study, maize has become a non-tradable good, due to a deliberate policy undertaken by the Malawian government by fixing the a

tl

yi

pr

tra

pl

to

sul

bet

firs

maize producer price above its import parity price and the consumer price below the import-parity price.

According to many studies (Smale et al., 1993 and Jayne et al., 1995), unlike its neighbors (Mozambique, Zambia, and Zimbabwe) where the color of the maize has been proven to be a key determinant of consumption preference between the locally-produced white maize and the imported yellow maize, Malawi's maize breeders have always taken into account the yield as well as the color variables of the hybrid maize in their researches so that the problem of color is inexistent in Malawi. However, rural households still prefer local or traditional maize for their own-consumption, reserving the hybrid maize for sale, if they plant it at all (Smale et al., 1991). Both varieties of maize are equally priced on the market.

ADMARC buys maize from smallholder farmers at fixed prices and sells it directly to consumers at a subsidized price.[18] I assume that ADMARC does not hold stocks. By subsidizing both the producer and consumer prices of maize, ADMARC widens the wedge between the two prices.

In the current study, I will consider two cases of the maize market closure. In the first case, maize is a non-traded good; its market-clearing conditions become:

$$Q_{mz} = D_{mz} \tag{19}$$

---

18 In this study, I assume that the share of private traders in the maize market is still negligible.

wh

for

bec

wher

b. Ot

marks

where Q_{mz} is the quantity of maize domestically produced and D_{mz} is the domestic demand for maize.

In the second case, Malawi is a net importer of maize. Its market-clearing conditions become:

$$Q_{mz} = D_{mz} + M_{mz}, \tag{20}$$

where M_{mz} represents imports of maize.

b. Other Non-Tradable Crops

For other non-tradable commodities produced by smallholder farmers in Malawi, the market-clearing condition is such that their local demand equal local supply.

$$Q_n^s = D_n \tag{21}$$

where n represents rice, non-maize cereals (millet, sorghum, and sunflower), cassava, and pulses.

d.

Malawi b

is given

4.2

inte

d. L

or b

incl

hect

chap

c. Tradable Crops (mainly tobacco)

$$Q^s_{tob} = X^{net}_{tob} \tag{22}$$

Malawi being a small country in the world market of tobacco, it takes world-market export prices as given. Thus, Malawi faces a perfectly elastic demand curve for its tobacco exports.

4.2.4.2. Inputs Market-Clearing Conditions

Inputs used by smallholder farmers are labor, fertilizer, oxen, and land. We are interested in the effects of the removal of the subsidy on the price of fertilizer.

d. Labor Market

I assume that there is no labor migration between regions (north, center, and south) or between Malawi and its neighboring countries. In each region, I also assume a perfectly inelastic supply of labor and allow the wage to adjust to clear the market.

The total labor demand (Z_l) is equal to the smallholder average demand for labor per hectare multiplied by the total land area allocated to crops under study (for more details, see chapter 5 of the current study).

da

th

ia

a

l

su

fe

th

Th

wi

fe

The total labor supply in the smallholder sector (L_o) is fixed and is equal to the labor demanded during the base-year agricultural season (1992/93). The wage is determined by the demand and supply of hired labor, which constitutes, on the average, 5 percent of the labor used in the smallholder sector.

e. Fertilizer

In Malawi, fertilizers and other chemicals are all imported. Not until long ago (1994/95), smallholder fertilizers were imported by ADMARC and distributed, at subsidized prices, to smallholder farmers. Malawi is a price-taker in the world market of fertilizers; thus, Malawi faces a perfectly elastic supply curve of fertilizers. The changes in the demand curve determine the total quantity of fertilizer used in the smallholder sector. These changes do not affect the world-market price of fertilizer.

$$M_f^{ADMARC} = D_f^s, \tag{23}$$

where M_f^{ADMARC} are imports of fertilizers by ADMARC and D^s_f are domestic uses of fertilizer in the smallholder sector.

wh
42
Da
Fe
in
p
fa
c
f
v

where the subscript "pest" stands for pesticides.

4.2.5. Government Deficits

In the current study, government deficits concern the accounts of the Agricultural Development and Marketing Corporation (ADMARC) and the Smallholder Farmers Fertilizer Revolving Fund (SFFRFM). Indeed, the government subsidizes these two institutions to cover their operating losses.

ADMARC buys maize from smallholders, at a price higher than the export parity price; it also sells that maize to urban consumers at a price below the import parity prices. In fact, because of this pricing policy, ADMARC creates a wedge between the producer and consumer prices.

The ADMARC deficits from maize and tobacco operations can be formulated as follows:

$$ADMARC_{DEF} = (P_{mz} - P^{*}_{mz} + h_{mz})*(Q^{mz}_{AD}), \quad (24)$$

where $P_{mz} - P_{mz}^{*}$ is the wedge between the producer and the consumer price of maize, created by the ADMARC;

h_{mz} are handling costs per unit of maize purchased ; and

Q^{mz}_{AD} is the quantity of maize purchased by ADMARC from smallholder farmers.

Another government budget deficit concerns the operations of the SFFRFM. Before the 1994/95 agricultural season, SFFRFM offered fertilizers to smallholders, at a price lower than the import parity price. Its deficits is , thus:

$$SFFRFM_{DEF} = (P_F^W - W_F^{sb} + h_F) * D_F, \qquad (25)$$

where F subscript denotes fertilizers;

P_F^w is the world market price of fertilizer; and

w_F^{sb} is the subsidized price of fertilizer.

ADMARC buys tobacco from smallholders, at a price lower than the farm-gate export parity price and sells it at the world market price. This constitutes an indirect tax on smallholder farmers, and is designed to cover losses incurred in maize and fertilizer operations. The government revenues can be formulated as follows:

$$GOV_{rev} = (P^*_{tob} - P_{tob}{}^w) * X_{tob}, \qquad (26)$$

where $P_{tob}{}^w$ is the tobacco world market price;

P^*_{tob} is the tobacco producer price offered by ADMARC; and

X_{tob} is the total quantity of tobacco exported.

The government total deficit from agriculture (GOV_{def}) is measured by the sum of ADMARC's and SFFRFM's net cash flows from smallholder marketing activities:

$$GOV_{def} = GOV_{rev} - (ADMARC_{DEF} + SFFRFM_{DEF}) \qquad (27)$$

4.2.6. Consumer, Producer, and Farm-gate Prices of Traded and Non-Traded Goods

Malawi, like other small open-economy countries, takes world market prices as given. Those prices are then converted into local currency terms using the exchange rate. Therefore, for imports, the farm-gate domestic price is determined by world market prices and the real or nominal exchange rate.[19]

Consumer prices can be derived from producer prices by adding to the latter handling, storage, and marketing costs plus a trade margin. Hence, the consumer price is determined as follow:

$$PC_n = P_n^{*} * (1 + h_n), \qquad (28)$$

where h_n represents handling, storage, and marketing costs plus a trade margin.

[19] For a discussion on the calculation of the IPP and EPP, see chapter 6, section 1 of the current study.

4.2.

The

IPP

P_n

ΠL

K_c

Q_c

Q_c

X_n

D_c

Z_{ic}

Z_i

D_c^R

Y^R

P^R

EV

ADM

SFFR

GOV

4.2.7. Endogenous, Exogenous, and Policy Instrument Variables

The endogenous variables from market-clearing conditions are:

IPP_n	Import Parity Price of good n;
P_n	Consumer price of commodity n;
Π_n^r	Household r's profit from commodity n;
K_n^r	Amount of land allocated to the production of crop n by household r;
Q_n^r	Quantity produced of crop n by household r;
Q_n^s	Total quantity of crop n produced in the smallholder sector;
X_n	Quantity exported of crop n;
D_n^r	Quantity demanded of crop n by household r;
Z_{in}^r	Quantity demanded of input i by household r, in the production of crop n ;
Z_i^s	Total quantity demanded of input i in the smallholder sector;
D_n^R	Total market demand for commodity n;
Y^R	Total household income;
P^R	General price index (Stone price index);
EV	Equivalent variation;
$ADMARC_{DEFn}$	ADMARC budget deficit from operations on crop n; and
$SFFRFM_{DEF}$	SFFRFM budget deficit from operations on fertilizer; and
GOV_{rev}	Government revenues from agricultural operations.

The exogenous variables are:

P_x^w	World export price;
P_m^w	World import price;
P_n^*	Domestic producer price of good n;
K^r	Fixed land available to household r;
H^R	Total number of household in the smallhoder sector;
M_i	Quantity imported of input I; and
W_i	Price of input I;

The policy instruments are:

s_F	Subsidy on the price of fertilizers offered by the government;
s^p_{mz}	Subsidy on the producer price of maize;
s^c_{mz}	Subsidy on the consumer price of maize; and
t_{tob}	Tax on the smallholder production of tobacco (all varieties).

The next chapter is devoted to the estimation of the model's behavioral parameters. I will start by a brief description of the methodologies used for the estimation.

CHAPTER 5: PARAMETER ESTIMATION

This chapter describes the methodology used to specify the model's parameters for production and demand. It also describes the data used to calibrate the model. Production data come mainly from the "National Sample Survey of Agriculture (NSSA), conducted during the agricultural season 1992/93. Consumption data for the urban and rural areas are from the "Household Expenditure and Small-Scale Economic Activities (HESSEA)" survey, conducted by the Malawian National Statistical Office (NSO), in 1990/91. I also use the "Malawi Maternal and Child Nutrition (MMCN) " survey, conducted by Cornell Food and Nutrition Policy Program (CFNPP), from October 1987 to September 1989 to impute rural household own-consumption of agricultural products.

5.1. Introduction

Shoven et al. (1992) give the following steps used in constructing and calibrating applied CGE models: Step one consists of collecting basic data for the economy for single or average years (national accounts, households income and expenditure, crop productions, SAM, tax data, trade and balance of payment, etc.). The second step consists of consistency adjustments (demand equal supply for the base year). In the third step, functional forms of different economic activities are specified and calibrated in order to specify the model's parameters. These parameters are then used to replicate base-year data. The next step is to specify policy changes. A counter-factual "equilibrium" is, then, computed from new policy regime. The last step is a policy appraisal based on pairwise comparison between counter-factual and the adjusted equilibria. One can then proceeds to new policy changes.

In order to ease calculations, Ballard et al. (1985) suggest to use the units convention. This technique allows us to rescale the units of measurement by setting all prices equal to one, for the base year. Then, one can translate data on factor payments by farmers into data on physical quantities used.

5.2. Production Parameters

In our model, farmers in the smallholder subsector maximize a restricted Cobb-Douglas profit function. Farmers in the smallholder sector are price-takers on the input and output markets. Therefore, in equilibrium, production parameters are equal to the input cost shares. In the current section, I will give a description of the data used as well as its preparation for the estimation of production parameters. Then, I will present the methodology used to estimate those parameters (i.e., input cost shares).

5.2.1. Data Description and Preparation

5.2.1.1. Data Description

Information concerning the smallholder production of the various crops is based on the "National Sample Survey of Agriculture" (NSSA). This survey is conducted once every twelve years to update benchmark data on the organization and structure of the smallholder agricultural sector of Malawi.

The first NSSA was carried out during the 1968/69 agricultural season. The second one was conducted in the 1980/81 agricultural season and the third one, on which this study is based, was carried out from October 1992 to September 1993.

The NSSA (1992/93) data are collected on 5 levels: the first level is the ADD, numbered 1 to 8. The second level is the Rural Development Project (PR) which are 30 in total. The third level is the stratum (STR); the number of STRs varies from one PR to another. There are 107 STRs in total. The fourth level is the Enumeration Area (EA: numbered 1 - 600). And lastly, the Household level (HHN, numbered 1 - 20 per each EA). The stratum boundaries never crosses PR and EA boundaries. This ensures that all strata contain a complete set of EAs, while all PRs contain a complete set of strata, and each ADD a complete set of PRs.

The sample was chosen using a two-stage methodology (The National Sample Survey Report, 1992/93). The Primary Sampling Units (PSUs) were the EAs while the Secondary Sampling Units were households. The EAs were selected with probability proportional to the size of the EA, the measure of the size being the total population of the EA as found in the 1987 population and housing census. A simple random procedure was employed in the selection of the sample households within the selected EA.

Malawi contains a total of 8395 EAs nationwide. Out of this total, 990 EAs cover forest reserves, cities, and other establishments, which did not belong to the smallholder sector of the country.

The sample consists of 600 EAs. The number of EAs to be selected per stratum was determined by the square root of the size of the stratum, where the size of the stratum was given by the sum of the population of all the EAs within the stratum.

5.2.1.2. Information Needed for the Present Study

Three questionnaires compose the NSSA survey: The household composition questionaire, the garden questionaire, and the household assets questionnaire.

The household composition survey gives information on labor demand and supply. Part B of this survey gives data on potential family labor (family members), while part E provides data on hired labor. Because these data were recorded at the household level (and not per crop or at the plot level), I was not able to use them in the current study.

The garden survey provides data on the household crop production and input demand at the plot level. A household may have several gardens. Each garden may contain several plots. For each crop grown on a plot, the enumerator measured a yield sub-plot (ysp) and weighed the ysp produce at harvest. A garden is defined as a continuous piece of land. If a path, road or river of more than three meters wide passes through the piece of land, then this divides it into two gardens.

A plot is part of a garden, which contains a different crop or crop mixture or is kept by a different operator in the same household or has a different method of cultivation. A plot is also a continuous piece of land within a garden; it should not be split by a path of more than one meter wide.

A Yield Sub-Plot (ysp) is a 50-square-meter area within a plot. The enumerator harvests and records the weight of the produce grown on the ysp.

The following are the main crops produced by smallholder farmers[1]: local maize, hybrid maize, composite maize, local rice, hybrid rice, millet, sorghum, sunflower, cassava, groundnut, pulses, burley tobacco, and other tobacco (i.e., dark-fired, sun/air, and oriental).

---

1 Notice that the importance of each crop in the smallholder production varies from a region to another.

5.2.1.3. Data Preparation for the Current Study

From sample data, I calculate median[2] crop productions and input (fixed and variable) uses per region (North, Center, and South). I use this information to infer crop yields and input intensities per hectare, at the sample level. I obtain regional total crop production and input uses per crop by multiplying the median crop production and input intensities with regional land use per crop.

a. Crop production

Production data are recorded at the plot level. A plot may have several crops grown on it. For each household, the enumerator records the first main crop, the second crop, and the third main crop grown on the plot. For each crop within a plot, the enumerator measures a Yield-Sub-Plot (YSP). There is not necessarily a one-to-one relationship between the plot and the crop, although most plots do have only one crop grown on each of them. For instance, in the Karonga ADD, of a sample of 1826 plots, 340 contain more than one crop.[3] In Mzuzu ADD, out of 2599 plots, 2291 have only one crop. In Kasungu, the number of plots with one crop is 3436 out of a sample of 3660. In Salima, 2148 out of 2459 plots have one crop. In Lilongwe, there are 4539 out of 6248 plots that have only one crop. Machinga

---

[2] The median was preferred over the average in order to penalize any possible outliers.

[3] Our calculations from the NSSA (1992/93) survey.

counts 3634 out of 4250; Blantyre has 2281 out of 3590; and finally, Shire Valley counts 1356 with only one crop out of a sample of 1581 plots. For practical reasons, I reduced my sample to only those plots with one crop. This leaves me with a sample of 21171 plots (i.e., 80.77 percent of the original sample of 26213 plots).

I impute crop production at the plot level from data on ysp production. For this purpose, I assume that the plot is uniformly productive. Let us assume that the produce of maize grown on a 50-square-meter ysp is 20 kilograms. If a plot measures 1000 square meters, the produce of maize from the whole plot is assumed to be 400 Kgs [4]. If we do this same exercise for each crop and plot within a garden, we can aggregate and find the crop production at the garden level for a median household in each region (Table A5, appendix 3A).

Knowing land allocated to each crop grown by a median household in each region, I am able to calculate crop yields per hectare, in each region[5] (Table A3, appendix 3A). Multiplying crop yields per hectare with regional total land use per crop (Table A2), I obtain regional total crop productions (Table A3).

---

4 400 kg = [20 * (1000/50)]

5 Crop yield per hectare is equal to actual median crop production divided by land allocated to the crop in question.

b. Input Demand

As seen in chapter four of the current study, the use of inputs, in the smallholder sector, varies by crop and region. However, in general terms, the following are the inputs used in the Malawian smallholder agriculture: The variable inputs are labor, fertilizers, and in some regions, oxen. Some households also use improved seeds purchased from ADMARC or other private markets. However, I cannot get enough information (quantity and prices) to include this input in the current study. The fixed input is mainly land. Some other fixed capital inputs do exist, such as hoes, oxcarts, wheelbarrows, water cans, ploughers, ridgers, and sprayers. Once again, the lack of reliable information (the intensity of use in each crop production, quantity demanded, prices, depreciation, etc.) does not allow me to include these inputs in the current study. Information on input use in the Malawian smallholder sector are contained in Table A4 of appendix 3A.

1. Labor Demand

As said earlier, labor data, recorded in the NSSA (1992/93), are at the household level. The survey provides data on actual hired labor and the number of family members classified by gender, age, and other social status indicators such as residency in the region, polygamy, schooling, visiting, and others. However, this information alone does not allow me to impute the labor intensities per crop in different regions.

A farm management study conducted by the Agricultural Research and Extension Trust of Malawi (1995) provides data on labor requirements (in manday units[6]) for a hectare of each crop grown by the Malawian smallholder and estate agricultural subsectors; these constitute the base-year data for the current study. In the policy simulations, these labor requirement coefficients can be changed.

In chapter 3 of the current study, we saw that, in 1978, hired labor roughly provided 6 percent labor services in the smallholder agriculture. This means that 96 percent of smallholder labor supply came from own family labor or communal labor (households in a village or extended family supplying labor to each other on a reciprocal basis without money payment).

From Table A4 (appendix 3A), it appears that labor is the main input in the smallholder agriculture in Malawi; it is used in all farming activities. It also appears that maize employs the largest portion of available labor in all the three regions of the country (North, Center, and South).

---

6 In Malawi, a manday is equivalent to five (5) hours of farming work by an adult male.

2. Inorganic Fertilizer and Oxen Demand

The NSSA (1992/93) provides reliable data on fertilizer and oxen uses on a per plot basis (i.e., per crop). Aggregation over different crops and agricultural regions gives data on input use per crop and per major agricultural regions (North, Center, and South).

Table A4 (appendix 3A) shows that inorganic fertilizer is used in the northern and central regions of the country on mainly tobacco and hybrid maize; oxen is used in the North in the production of maize (all varieties), millet, sunflower, and pulses (including groundnuts).

I use these estimates of crop production and input use, together with crops' producer prices and inputs' sale prices reported in Table A5 (appendix 3A), to calculate input cost shares,--the production parameters (see the following section 5.2.2. of the current chapter for the methodology used to estimate these coefficients).

5.2.2. Computation of Input Cost Shares

Computation of the input cost shares is straightforward. At the equilibrium, the value marginal product (VMP) of variable inputs (z_i) is equal to the input's price (w_i).

$$\mathbf{VMP} = \mathbf{W}_i, \qquad (6)$$

On the other hand and always at the equilibrium, the variable input cost share (α_i) is equal to the input elasticity of supply (ε_z).

$$\varepsilon_z = \frac{\partial Q}{\partial z_i} * \frac{z_i}{Q} = \alpha_i, \tag{7}$$

where Q is the quantity produced of a given crop.

From equations (6) and (7), one gets

$$p_n * \alpha_i * \frac{Q_n}{z_i} = w_i,$$

where p_n is the producer price of commodity n.

This implies that the variable input cost share can be estimated by the following identity:

$$\alpha_i = \frac{w_i z_i}{p_n Q_n} \tag{8}$$

For the fixed input (land) coefficient, our assumption of a constant-return-to-scale production technology implies that economic profits are equal to zero. The value of land is the residual of the value of total product over the total cost of variable inputs. That is,

$$p_k k = p_n Q_n - \sum_i w_i z_i,$$

where p_k is the return to land. If our assumptions about the production technology are right, p_k should be the same across crops. It must be true that the value marginal product of land in the production of crop n is equal to the return to land in the production of the crop. In other words, we can determine the land parameter in the Cobb-Douglas production function just the same way we determined the variable input cost shares:

$$\beta = \frac{p_k k}{p_n Q_n} \tag{9}$$

Knowing α_i and β allows me to infer the constant coefficient A in the Cobb-Douglas production function:

$$A = \frac{Q}{\prod_i z_i^{\alpha_i} k^{\beta}} \tag{10}$$

The input cost shares (the production parameters) calculated must not only fit the available information concerning the Malawian agricultural production for the base year (1992/93), but they also must not violate the requirements and assumptions of the model. The first requirement of the model is that all equations of the model hold. All crop production and input demand equations must be satisfied at given prices and fixed land areas used in the model.

The second type of requirement concerns the Cobb-Douglas functional form and the assumption we make in the model, as well as restrictions imposed by economic theory. In the current study, I characterize the Malawian agricultural production structure by use of a Cobb-Douglas production function, with constant returns to scale. This implies that the input coefficients (cost shares at the equilibrium) must sum to one, and that they must be between zero and one. I also assume perfect competition in both the input and output markets. This ensures that economic profits do not exist in the model. This also implies that the value marginal product (VMP) of any variable input must be equal to its price. Particular to the smallholder subsector where the household must decide how many crops to grow on the available land, the fixed factor (land) is allocated across crops, within a farm, in such a way that its marginal return is equalized for each pair of crops. It must also be true that the sum of land areas allocated to each crop by the household must be equal to the fixed land area available for agriculture in the household. Another restriction more from common sense than from theory is that all quantities produced and demanded must be positive.

Because of these restrictions, and because I do not consider uncertainty in the production decision-making process, actual observations may depart from those values that satisfy the requirements and assumptions of the model. Thus, my goal in the calibration process is to minimize this departure. For this purpose, I follow the technique proposed by Braverman et al. (1983, pp. 147-152).

The objective function consists in minimizing the departure of observed input demands (including variable and fixed inputs) and of the land allocation condition from their expected values; that is, values that respect the assumptions and requirements (constraints) of the model. The function can be presented as follows:

$$\underset{x_i}{Min}\sum_{i} a_i\left(\frac{z_i - z_o}{z_o}\right)^2 + a_k\left(\frac{k_i - k_o}{k_o}\right)^2 + a_p\left(\frac{p_{k_m} - p_{k_n}}{p_{k_n}}\right)^2, \tag{11}$$

where $P_k = \dfrac{PY^{*} - \sum_i w_i z_{o_i}}{k_o}$ is the "shadow" price of land, z_i and k_i are observed quantitiesof variable inputs and land uses, respectively. The z_o'*s* and k_o's are the values that the z_i'*s* and k_i'sare expected to take, given the various assumptions and requirements of the model. The a_i's, a_k's, and a_p's are arbitrary weights that reflect the degree of confidence in the starting values of z_o'*s* and k_o's.

The requirements (constraints) of the model are:

I) All equations of the model must hold, including

1) Input Demand equation

$$z_i^{*} = \left(\frac{w^{*}_i}{\alpha_i}\right)^{-\left[\frac{\alpha_i}{1-\mu}+1\right]} \prod_{j=1, j\neq i}^{4}\left(\frac{w^{*}_j}{\alpha_j}\right)^{-\frac{\alpha_j}{1-\mu}} A^{\frac{1}{1-\mu}} K^{\frac{\beta}{1-\mu}}, \tag{12}$$

where α_i and β represent input i's cost share and the land parameters, and $\mu = \sum_{i=1}^{4} \alpha_i$

2) Supply function equation

$$Y^{*} = A\prod_{i=1}^{4} z_i^{*\alpha_i} K^{\beta} = A^{\frac{1}{1-\mu}} \prod_{i=1}^{4}\left(\frac{w^{*}_i}{\alpha_i}\right)^{-\frac{\alpha_i}{1-\mu}} K^{\beta} \tag{13}$$

II) The sum of newly adjusted land allocation(K_{o_n}) must not exceed the household's

landholding size (K)

$$\sum_{n} K_{o_n} = K$$

III) The assumption of constant returns to scale must hold

$$\beta = 1 - \sum_i \alpha_i \tag{14}$$

IV) All quantities and parameters are positive

$$z_i, k_i, \alpha_i, \beta \geq 0, \tag{15}$$

The estimated cost shares are compiled in Table A6 (appendix 3A); I will use these coefficients, together with demand parameters (see section 5.3 of the current chapter for more details), in the simulation of effects of agricultural pricing policy changes in the Malawian smallholder sector (see chapter 6 of the current study). In the following section, I present the methodology used to estimate demand parameters.

5.3. Demand Parameters

I characterize the Malawian demand system by use of an Almost Ideal Demand System (see chapter 4, section 3 of the current study). In this section, I describe the data used to specify the parameters of the model. I then proceed to econometrically estimating those parameters.

5.3.1. Data Description and Preparation

As I said earlier in this chapter, there are two data sets I will use for the estimation of consumption demand parameters in Malawi: The "Malawi Maternal and Child Nutrition (MMCN)" survey and the "Household Expenditure and Small-Scale Economic Activities (HESSEA)" survey.

5.3.1.1. Data Description

For the estimation of rural household consumption demands in Malawi, I use both the MMCN survey, conducted from October 1987 to September 1989 and the HESSEA survey, conducted during the 1990/91 agricultural season.

The MMCN survey is a joint effort of the Center for Social Research (CSR) at the University of Malawi and the Cornell Food and Nutrition Policy Program (CFNPP). Simler (1994) gives a more detailed description of the survey.

The MMCN survey covered Mzuzu Agricultural Development District (ADD), located in the North of the country (see map in appendix 1). Mzuzu was chosen because it encompasses much of the agro-ecological diversity that characterizes Malawi, namely the lakeshore zone, the mid-altitude plains, and the upland zone.

Households that compose the sample for the survey were drawn from three districts of the Mzuzu ADD: Mzimba, Nkhata Bay, and Rumphi. In each district there were from four to seven study clusters, a cluster comprising two to ten villages, selected as follows: Clusters and the villages within each cluster were chosen in a multi-stage process. The first step was to eliminate estates, forest reserves, game reserves, national parks, urban or semi-urban areas, and places too distant from Mzuzu city (where the survey headquarters was located), for adequate supervision. Hence, the southern part of Mzimba district and the lakeshore north of Nkhata Bay were excluded from the survey. This process left eleven areas, nine of which were considered based on known or suspected agro-ecological patterns. Within each of the nine areas, a "seed village" (Simler) was randomly chosen, and all adjacent villages were selected until an estimated base population of 1,500 persons was obtained for each cluster. In eight of the nine areas, a second seed village was chosen within a ten-kilometer radius of the first and adjacent villages were again added until a base population of 1,500 was obtained. In total, seventeen study clusters were chosen.

The target baseline census base population of 1,500 per cluster was not reached in three clusters, all of them in the uplands zone, even after including all villages in the surrounding area. A total of 89 villages were included in the baseline survey; of these, 83 villages produced focus women who participated in the monthly MMCN interviews. One selected village was dropped due to lack of cooperation.

In the MMCN survey, a household is defined as a group of people who eat together, based on the strong link that is expected between food consumption and nutritional outcomes. These consumption units are different from household production units. These are defined as groups of people - usually living on the same compound - who share the same granary in maize-staple areas or are responsible for the same cassava gardens in the lakeshore zone, where cassava is the staple food.

Data on household income and expenditure, and on crop prices available for this study cover the period October 1987 through September 1989. These data were collected from a total of 299 households. I will use data relative to the 1989 agricultural season for the current study.

The HESSEA survey, used for the estimation of rural and urban household consumption demands, defines a household as a person or a group of persons either related or unrelated, who live together as a single unit in the sense that they have the same housekeeping arrangements (that is, they share or are supported by a common budget).

To design the sample, the country was divided into 10 strata, four of which were the cities of Blantyre, Lilongwe, Mzuzu, and the municipality of Zomba and the rest were other urban areas (also called "bomas") and rural areas. A sample of 6000 households in 600 enumeration areas was selected.

The selection of the sample for both the rural and the other urban areas followed a three-stage sampling scheme. In the rural strata, the first stage was to select Traditional Authority (TAs) areas from each region. The second stage consisted in selecting Enumeration Areas in each selected region. At the third stage, 10 households from each selected EA were chosen. For the other urban areas strata, the first stage consisted in selecting those other urban areas. The second and third stages were similar to those of rural strata.

A two-stage sampling technique was used for the major urban areas. The first stage consisted in selecting EAs from each urban area. At the second stage, 10 households were selected from each selected EA.

5.3.1.2. Preparation of Data Used in the Current Study

The Almost Ideal Demand Systems that I use in the current study relate the item expenditure share to its consumer (purchase) price, consumer prices of other goods and services consumed by the households, household demographic characteristics, and the household income per capita deflated by a price index (see chapter 4, section 2.2 of the current study). Thus, in order to estimate the Malawian consumption demand systems, we need accurate estimates of not only the household consumption purchases, but also of the households own-consumption (also known as home consumption or own-account consumption). We also need data on prices of consumption goods and services, on expenditures per selected items, on household incomes, and on some demographic characteristics of the household, such as the number of the household members as well as their distribution into different age groups.

The household own-consumption can be estimated by subtracting production sales, wages paid in kind, retained seeds, and transfers in kind to relatives and friends, from the household production (Strauss [1983], p. 13). It then must be adjusted for processing and storage losses, as long as data are available. To complete this estimate, one should add the wages and transfers in kind received by the household. The value of the household own-consumption is obtained by multiplying the quantity self-consumed by the item purchase price practiced on the regional free markets. The value of the total consumption is the sum of the household own-consumption and purchases.

An accurate measure of the household own-consumption must include the value of the owned dwelling. The argument for including the housing imputed rental expenditure in the household own-consumption is that the quality of life or the standard of living of household varies with the quality of the housing in which they live. The imputed rental price of housing must reflect the levels of expenditures, which the households would have had to incur if they were renters rather than own-occupiers of the dwelling. The imputed rental price of housing can be obtained by econometric regression of rental expenditure in a region (dependent variable) on the housing unit characteristics (World Bank, [1995], pp. 64 - 66).

Table 5.1 (below) shows the categories of commodities consumed by a representative household in Malawi from the HESSEA survey. I have identified over 90 such commodities.

A. Urban and Semi-Urban (Bomas) Consumption Demand

1. Data Description

The Household Expenditure and Small-Scale Economic Activities (HESSEA) survey, conducted in 1990/1991 by the National Statistical Office (NSO) in Malawi, provides household consumption data on seven main urban and semi-urban (also called "bomas") areas. These are the northern, central, and southern semi-urban areas, Mzuzu, Lilongwe, and Blantyre cities, and Zomba municipality. For each area, the survey provides three types of data that we are interested in: the household socio-economic characteristics (number of members in the household, their age distribution, etc.), the household income, and the household expenditure. Hence, for each area, two files from the survey are available. One file records data on socio-economic characteristics and income of the household and the other file records household expenditure per item.

Data on income and socio-economic characteristics of the household are recorded at the household level. Data on purchase expenditure are recorded by item.

2. Descriptive Statistics

Table B.1 (appendix 3B) shows means, standard deviations, the median, and the 90th percentile of household characteristics, for urban and semi-urban areas in each region of Malawi (North, Center, and South) and for the three regions altogether. The mean expenditure per household is highest in the South (an average of 1771.82 kwachas per household and per year). The mean income is highest in the Center (1843.73 kwachas per a year). Wages constitute the most important source of urban household incomes (more than 50 percent of total income in all three regions). Income's standard deviations are very high and differ a lot from a region to another.

The household size is almost the same in all regions (around 4.5 people). People of age 15 to 54 constitute the biggest proportion of the household members (around 60 percent).

Concerning expenditures, Table B.2 in appendix 3B provides, for a variety of food and non-food goods and services, means of budget shares, their standard deviations, and the proportion of households consuming the commodity. I have grouped consumption items in the following categories: cereals and grains, tubers, sweets, pulses, vegetables, groundnuts, fruits, meats and fish, oils and fats, non-alcoholic and alcoholic beverages, other foods, and non-food consumptions.[7]

---

[7] Refer to Table 5.1 above in the current chapter for a complete description of products in each category of consumption items.

Within the category of cereal and grain, maize has the greatest budget share in all three regions: A mean of 10.08 percent of total household expenditure in the North, 5.14 in the Center, 6.72 in the South, and 6.38 for the three regions combined. Above 60 percent of households that consume grains report having consumed maize. Maize is followed by other cereals and grains, which include primarily millet, sorghum, and sunflower. Rice comes third, with a mean budget share of 1.65 percent in the North, 1.00 percent in the Center, 1.27 percent in the South, and 1.18 percent for the three regions combined.

In the category of tubers (cassava, Irish potatoes, and sweet potatoes), expenditures are uniformly distributed (the mean budget share varies between 0.2 and 0.6 percent of total household expenditure).

The category of cereals and grains has the largest share in the household budget allocated to food. In the North, the share of cereals and grains is 14.77 percent of the household's food expenditures. This share is 11.24 percent in the Center, and 8.84 percent in the South; it is 11.46 percent for the three regions combined.

Cereals and grains are followed by meat and fish category, based on the level of their share in the urban household budget in Malawi. In this latter category, fish takes the largest share of the household budget (around 4.50 percent in all the three regions combined). Vegetables come in the third place of importance in the budget of urban Malawian households. The other categories of commodities can be ranked as follows in a decreasing order of their shares in the urban household in Malawi: oils and fats, beverages (alcoholic and non-alcoholic), eggs and milk, pulses, fruits, tubers, groundnuts, and sweets.

Above 90 percent of total households, in all three regions, report having consumed some cereals and grains during the period of the survey (the 1990/91 agricultural season). The same proportion is observed for vegetables, and meat and fish.

Within the category of meat and fish, fifty percent of total households report having consumed beef and veal, while more than 85 percent report having consumed fish (Malawi borders a lake rich in fish).

For other commodities (tubers, sweets, groundnuts, fruits, eggs and milk, oils and fats, and beverages), around 60 percent of total households in all three regions report having consumed these items.

Budget shares allocated to cereals and grains is highest in the North (14.77 percent); it is lowest in the South (8.84 percent). The southern region of Malawi has the highest budget share in tubers, while the North has the lowest budget share in that category. The central region comes first in terms of household budget shares of sweets (1.26 percent), vegetables (3.58 percent), meat and fish (11.93 percent), eggs and milk (3.08 percent), oils and fats (2.99 percent), and alcoholic and non-alcoholic drinks (2.62 percent).

The budget share of food for urban households is less than 50 percent of total expenditures. Precisely, it is 43.92 percent in the North, 49.15 percent in the Center, and

40.21 percent in the South; it is 46.45 percent for all the three regions combined. In fact, we expect the budget shares of food to decline as the degree of urbanization increases: Households spend more on non-food consumption and less on foods in terms of shares of their budgets. The most important categories of non-food consumption in the urban household budgets are housing rents, men and women clothing, and household semi-durable equipment's (blankets, decorations, furniture's, etc.).

Within the category of non-food consumption, housing rent (imputed)[8] takes 49.91 percent of total household expenditures in the North; this housing rent budget share is 8.0 percent in the Center and 15.72 percent in the South; it is 16.97 percent for the three regions combined.

The budget shares standard deviations are quite low and do not vary much across regions suggesting some homogeneity of spending within the three regions.

Concerning the pattern of spending across socio-economic classes of population, we expect the share of the budget allocated to food to decline as we go from the poorest income classes to the richest income classes of the population. Tables B.3 and B.4 (appendix 3B) provide means and proportion of households consuming the commodity, as well as the per capita expenditure per quartiles of per capita expenditure (PCE).

In Table B.3, the household budget shares for food declines from 56.2 percent for the lowest quartile of household expenditure to 23. 6 percent for the highest quartile, in the North. In the central region, the household budget share for food first increases a

---

8 For more details on how these rental prices were imputed, see World Bank (1995), pp. 65-66.

little from 51.9 percent for the first quartile to 56.4 and 56.3 percent for the second and third quartiles respectively. It then declines to 32.4 percent the fourth quartile. This declining pattern of budget shares from poor households to rich households is observed for all categories of foods (cereals and grains, tubers, vegetables, etc.).

From the same Table B.3, one can see that the budget share of non-food consumption increases as we go from poor households to rich households. This is particularly apparent for housing rent expenditure share. It goes from 29.61 percent of total expenditure for the first quartile of PCE to 73.2 percent for the fourth quartile in the North. For the Center, the range is between 4.95 percent and 60.51 percent. And for the South, it goes from 2.90 percent for the lowest quartile to 70.13 percent for the highest quartile.

Table B.4 shows that per capita expenditure increases from the lowest quartile of PCE (poor households) to highest quartile (rich households) for all commodities and in all regions: This is also an expected result.

B. Rural Consumption Demands in Malawi

For the estimation of rural consumption demands in Malawi, there are two data sets available: Data from the MMCN survey, conducted from October 1987 to December 1989 by Cornell University (CFNPP) in the Mzuzu ADD (in the northern region of Malawi) and the Household Expenditure and Small-Scale Economic Activities (HESSEA) survey, conducted in 1990/91, by the National Statistical Office (NSO) of Malawi.

The MMCN data set contains information on household own-consumption of agricultural commodities, but the HESSEA does not. On the other hand, the HESSEA data set reports the value of imputed rental price of housing for some households in the sample, which the MMCN survey does not report. Besides, the HESSEA survey covers the whole country, while the MMCN survey confines in the Mzuzu district.

The MMCN survey contains data on purchase expenditure per each item consumed by the household. It also provides information on crop productions and sales, and the value of "retained harvest". To obtain the value of the own-consumption, one might subtract from the value of retained harvest, the value of the harvest used for seed. One might also subtract the value of processing and storage losses and spoilage. There is no simple answer for the proportion of retained harvest used for seed the following season. First, the amount of seed used will be much more a function of the area planted than it is one of previous harvest. Second, most farmers, in Malawi, prefer consume all their harvest and then buy (or barter for) seeds from other farmers. For some crops, such as cassava, you need not to retain your harvest as seeds for the following season.

The rate to use for crop spoilage due to storage is rather arbitrary. Some analysts use 10 percent of the total amount stored. However, one must remember that the longer the crop is held in storage, the greater the spoilage losses will be. It is reasonable to assume that most smallholder farmers in Malawi deplete their stocks before the next harvest (Simler, 1994).

Processing losses vary with each crop. A complete estimation of the household own-consumption must take into account transfers (in-cash or in-kind) given away and received by the household. However, data provided by the MMCN survey record aggregated transfers per household (not per crop or consumption item).

Table B.7, in the appendix 3B, shows means and standard deviation of some household characteristics (size, income, expenditure) in the Mzuzu area, using data from the MMCN. It also contains means and standard deviations of the household own-consumption as a proportion of total expenditure per commodity. On the average, the value of maize own-consumed by the household represents 84.3 percent of the household total expenditure on maize. This share is respectively 90.1 percent, 64.3 percent, 89.2 percent, 73.6 percent, and 72.2 percent for cassava, other staples, pulses and beans, vegetables, and fruits.

Since the HESSEA survey, which covers the whole country of Malawi, does not contains household own-consumption of agricultural products, I must impute it. For that purpose, I use the MMCN data to econometrically estimate--using OLS technique--the relationship between household own-consumption of agricultural commodities (dependent variable) and per capita purchase expenditure, household size (number of the household members), size of the area cultivated per crop, per capita production, and per capita income (see Table 5.2, below). Then, I assume that these OLS coefficients are the same in other rural regions of Malawi as they are in Mzuzu and I use them to impute the household own-consumption of agricultural commodities in those other regions.

I impute rural household own-consumption of agricultural products using consumption data from the HESSEA. Per capita purchase expenditure , household size, and per capita income are reported in the HESSEA survey. For the size of the area cultivated per crop and crop production, I use their median values as they have been calculated from the NSSA (1992/93) survey (see Table A.5, in Appendix 3A)

Comparing the imputation results from the HESSEA survey in the North to the observed data on household own-consumption of agricultural products in the Mzuzu area from the MMCN, I find that they are very close (see the following Table 5.3).

Table 5.3. Own-Consumption Budget Shares: Means of Observed data in the Mzuzu Area and Imputed Results for the Northern Region of Malawi

	MMCN	HESSEA
Maize	18.11	19.56
Cassava	5.03	4.19
Other Staples	11.25	10.74
Pulses	2.45	2.13
Vegetables	3.61	3.45
Fruits	1.08	1.14

Note: These budget shares are calculated relative to total household expenditure.

Source: Own Calculations

I add these estimates of rural household own-consumption of agricultural products to the household purchase expenditure in order to obtain the household total expenditure on the same products.

Tables B.7. and B.8. in appendix B show comparative statistics on household characteristics in the Mzuzu district to those in the Northern region of Malawi (including Mzuzu district). The average total expenditure in the Mzuzu area is MK 951.84. It is MK 1247.33 for the whole northern region. Per capita household total expenditure is

MK 93.87 in Mzuzu, while it is MK 346.22 for the whole northern region. Per income is lower in Mzuzu (MK94.80) than it is for the whole northern region (MK 243.46). The average household size is higher in Mzuzu (10.14 persons per household) than it is in the whole region (4.74 persons per household).

Tables B.8 through B.11, in appendix B, provide descriptive statistics of the Malawian rural consumption demands. Table B.8. shows the means and standard deviations of some household characteristics in the rural Malawi. The average household total and per capita expenditures are highest in the central rural region-- MK1557.32 and MK410.34, respectively. Per capita income is highest in the central rural area (MK340.97). Own-account income, profits, and wages constitute the main sources of income in a decreasing order. This is different from the urban household composition of income. In fact, wages are the primary source of income for urban households. Table B.8. also shows that the average household size is around 4 members in all three regions. Members of age 15 to 54 constitute the largest proportion of the sample's population (above 50 percent in all three regions).

Table B.9. provides means and standard deviations of rural household budgets shares. It also shows the proportion of households consuming each item. Cereals and grains have the largest shares in the Malawian rural household expenditure (above 40 percent in all three regions). Men and women clothing, and household semi-durable equipment (blankets, bed sheets, etc.) have the second, third, and fourth largest budget shares for Malawian rural household.

The share of rural household budget that goes to food is above 60 percent in all three regions (64.24 in the North, 69.41 in the Center, 69.18 in the South, and 68.79 for the three regions combined). As we saw earlier, the share of budget allocated to food in urban areas is lower than that allocated to non-food consumptions.

Table B.10. provides household budget shares per quartile of per capita expenditure. It shows that even though the share of the budget that goes to food is still high (above 50 percent), this share decreases as you move from low-income families to high-income families. In fact, it is true that richer families allocated their income in the consumption of non-food luxurious goods and services away from food itself. This is true for rural as well as urban households.

However, the average per capita expenditure increases as you move from low-income households to high-income households for all items consumed and in all three regions(Table B.11.).

C. Data on Prices

In order to estimate Malawian rural, urban and semi-urban consumption demands, one needs data on consumer prices. In fact, the Almost Ideal Demand System model, that we use in our estimations, relates the item expenditure share in the household total expenditure to the household total income deflated by a price index (Stone price index), the household demographic characteristics, the consumer price of the item, and consumer prices of other items consumed by the household.

Because household-level prices may vary due to measurement errors and/or due to differences in quality choices, it is inappropriate to treat household-level prices as exogenous. Then, we must use market average prices (See Deaton, 1988, for a discussion and Strauss, 1982, for an application).

The HESSEA survey provides only the value of expenditures per household and per item consumed. Nothing is said about the quantity consumed. Therefore, it is impossible to infer prices from the data.

The price data that I use are provided by the Ministry of Agriculture and the National Statistical Office of Malawi. There are over 90 commodities consumed by urban and rural households in Malawi. I have grouped them into 7 categories (see Table 5.1., above). Although it was impossible to find market prices for all goods, I was able to find prices of food and non-food commodities that are frequently consumed by a typical household in Malawi (see Table B.5. in Appendix 3B).

I use the Stone index to calculate group prices and the overall price index (see chapter 4, section 4 of the current study for a discussion about the Stone index). This price index is a weighted-average purchase price, with weights being the regional averages of expenditure shares (D_i) of commodities consumed in each group. The arithmetically weighted purchase price of group g (P_g) is then,

$lnP_g = \Sigma_{i=1}^{N} D_i \, lnP_i, (i = 1,2,\ldots..,I)$, where I represents the number of commodities in group G.

In Table B.5., in appendix 3B, I present the means of the market-level price indices. As expected, maize has the lowest price index because the government was subsidizing its consumption price in 1993. Cassava is the second cheapest, because of its low production and processing costs. Other foods, which includes luxurious food products (for less developed societies) such as meat and fish, oils and fats, etc., is the most expensive food commodity consumed by households in Malawi. It is followed by groundnut, and rice respectively.

Non-food consumptions are more expensive than food consumption in both the rural and urban areas. In rural areas, semi-durable goods such as blankets, cloth, bed sheets, etc., are the most expensive items[9]. In urban areas, housing rents take the largest proportion of their budgets.

Except for maize, price tend to be higher in urban areas than in rural areas. Within the urban areas, prices are higher in big cities (Blantyre, Lilongwe, Mzuzu, and Zomba municipality, in a descending order).

---

9 It is important to emphasize that, due to a lack of information, I was not able accurately impute housing rents for all rural households in the sample.

5.3.1.3. Demand Parameter Estimation Results

A. Empirical Implementation

As I said earlier in this chapter, the Almost Ideal Demand System model relates the item expenditure share in the household total expenditure to the household total income deflated by a price index (Stone price index), the household demographic characteristics, the consumer price of the item, and consumer prices of other items consumed by the household.

Demand equations might be connected not because they interact, but because their error terms are related (e.g., shock on the demand for one good may affect the demand for other goods). In this case, estimating these equations as a set should improve efficiency. The econometric technique used is called Seemingly Unrelated Regression Estimation (SURE). It consists in writing a set of individual equations as one giant equation.

Before I can proceed with econometric estimations, I need to address the following issues: The first issue concerns prices. I use market average instead of household-level prices for reasons stated above in this chapter. Thus, there is not much variability in the price vector. It is then much likely that price series will be collinear with the consequence that parameter standard errors will tend to be too big. Imposing homogeneity and symmetry on the demand system may partially solve the problem.

The second and last issue concerns how the Almost Ideal demand systems behave relative to the demand theory. In fact, while the Almost Ideal demand systems are flexible characterization of behavior, they are not guaranteed to be well behaved for any arbitrary set of prices (or incomes). Thus, they need not satisfy the requirements of demand theory. It is then necessary to impose restrictions that assure that the demand systems conform to the basic requirements of economic theory in the base year of estimations. Particularly, one must make sure that the convexity property of the demand system be conserved. This implies that the expenditure function of the Almost Ideal system must be concave in commodity prices. That is the Hessian matrix (H) of the demand system has negative diagonal elements:

$$H_{nn} = [\gamma_{nn} + \phi_{nn}^2 \mathrm{Ln}\frac{Y}{P} - \frac{P_n C_n}{Y}(1 - \frac{P_n C_n}{Y})]\frac{Y}{P_n^2} < 0$$

for all commodities n and all income groups in the base period. This is a necessary, but not sufficient condition for a well behaved demand system. The latter condition (the Hessian matrix is negative semi-definite) is difficult to impose. However, it can be checked during estimation.

The other restrictions that can be imposed onto the Almost Ideal demand system to make it consistent with the theory of utility optimization behavior are adding-up, homogeneity and symmetry conditions (see chapter 4, section 2.2 of the current study). Homogeneity and symmetry are directly imposed on the data.

The adding-up condition is automatically satisfied since I use current expenditure as a proxy for lifetime wealth (or permanent income). In fact, total expenditure is the sum of expenditure on all goods. However, current expenditure may be endogenous to the model. I drop one category (other foods) to avoid the problem of perfect collinearity.

B. Econometric Results

Table 5.4 below presents parameters (coefficient estimates and standard errors in parenthesis) of the Malawian demand system estimated using the Zellner's Seemingly Unrelated Regression Estimation (SURE), with the adding-up, homogeneity and symmetry conditions imposed on the data. I use polled data from the urban and rural areas to increase the variability in the price vectors in order to avoid collinearity problems. In fact, in the rural area, there are only three different prices per each commodity corresponding to the three rural areas of Malawi (North, Center, and South).

In general terms, all the coefficients on expenditure for all consumption items, except for non-maize cereals (millet, sorghum, and sunflower), are statistically significant at a level of significance of less than 5 percent. Coefficients on age group proportions and household size are individually significant at 1 percent level of confidence for maize. They are not individually significant for any other item. Price coefficients are not significant due to the problems stated above (collinearity in the price vectors, endogeneity of current expenditure, etc.).

However, all coefficients are jointly significant at confidence levels of 0.02, 10, 21, 0.1, 2, and 0 percent for maize (F = 3.22), non-maize cereals (F = 1.59), cassava (F = 1.33), pulses (F = 2.87), rice (F = 2.03), and non-foods (F = 4.08) respectively.

Table 5.5 shows the uncompensated price elasticities, the expenditure elasticities, and the demographic outlay-equivalent ratios of the Malawian demand system.

a. Expenditure Elasticities

The expenditure elasticities (along the row) shows the percentage change in the demand for consumption items, due to a percentage change in the household's income (proxied by total expenditure, in the current study). Expenditure elasticities for all foods, except non-maize cereals, are less than one. This suggests that maintaining the price subsidy on maize, for example, is too expensive for the society as consumers are not responsive to the price change. The expenditure elasticity is lowest for rice (0.50). It is highest for non-food consumption (1.50).

b. Price Elasticities

Reading down a column gives the effect of a one percent change in the price of the item on the demand for other items, while reading across columns and along a row shows the effect on the item's consumption brought about by a percentage change in the prices of other items.

Uncompensated own-price elasticities are negative for all commodities. This is consistent with the demand theory that suggests that consistent consumption choices imply that the diagonal elements of the Hessian matrix must be negative. In fact, this confirms the law of demand: Price and quantity demanded of an item are inversely related. The demands for maize, non-maize cereals, and cassava are inelastic with respect to their own-price (the elasticities are - 0.07, - 0.52, and - 0.49 respectively). These crops are mainly produced for own-consumption. The own-price elasticity for pulses (fresh and dried beans and peas, groundnut, etc.) is - 1.27; it is - 1.23 for rice, - 1.55 for other foods (vegetables, fruits, meat and fish, oil and fats, etc.), and - 1.80 for non-food items (clothing, cookware, housing, etc.) Thus, these commodities are price-elastic and are mostly consumed by urban rich households. The own-price elasticity is biggest, in absolute terms, for non-food consumption items. This is because most of these items are considered as luxury consumption by a typical Malawian household.

Looking at cross-price elasticities for maize, one can see that non-food consumption has the biggest effect on the demand for maize (0.33), while maize price changes has the biggest effect, in absolute terms, on pulses (- 0.56). Non-maize cereals and rice demands are strongly related (0.61 and 1.61). The strongest cross-price effect, in absolute terms, is in between rice and pulses (- 2.99 for rice onto pulses and - 2.93 for pulses onto rice).

c. Demographic Outlay-Equivalent Ratios

The demographic outlay-equivalent ratios (along the row) show the percentage effect of a percentage change in the demographic characteristic considered on the expenditure on a particular item by the household. The demographic coefficients show positive as well as negative effects on the household expenditure. These demographic outlay-equivalent ratios range from 0.01 to 1.2, in absolute terms. For example, a one-percent increase in the proportion of the average household members aged between 0 and 4 years will decrease the expenditure on maize by 1.2 percent; the expenditure on non-maize cereals will decrease by 0.003 percent, and the expenditure on rice 0.08 percent. At the same time, the one-percent increase in the proportion of the average household members aged between 0 and 4 years will increase the expenditure on cassava by 0.08 percent; the expenditure on pulses will increase by 0.07 percent, the expenditure on other foods by 0.64 percent, and the expenditure on non-foods by 0.19 percent. The numbers for other age groups and the size of the household can be interpreted in the same fashion as above.

5.4. Conclusion

From a policy point of view, it is important and necessary to know how consumers react to price and income changes, and by how much. This study shows that consumption patterns in Malawi follow predictions of economic theory. Budget shares of food are lower in urban areas than they are in rural areas. Non-food consumption budget shares increase as you go from poor to rich households; the largest proportion of non-food consumption concerns housing expenditure.

Food commodities, for which own-price demand elasticities are low (inelastic demand), will experience a price decline as their supply increases. This implies that farmers profits will decline too; farmers will reallocate land previously used in the production of these crops into the production of crops whose own-price elasticities are high (elastic demand). The government of Malawi must then be careful while undertaking policies affecting prices of crops with low own-price elasticities; this is especially true for maize, which constitutes the main staple crop in Malawi.

Consideration of cross-price elasticities of demand, in a general equilibrium analysis, can make the above partial equilibrium results to fail. In the current study, I will use the above estimates (expenditure and price elasticities, as well as the demographic outlay-equivalent ratios) together with the input cost shares found in our analysis of the Malawian agricultural production (see section 2 of the current chapter) in order to forecast the possible effects of pricing policies and exchange rate liberalization on agricultural production and household welfare. This constitutes the object of the next chapter.

Table 5.1. Categories of Consumption Commodities from the HESSEA Survey (1990/91) in Malawi (Page 1 of 2)

Categories	Group No.	Components
Maize	1	Maize grain and maize flour
Non-maize grains and cereals	2	Millet grain and flour, sorghum grain and flour, sunflower grain and bread
Cassava	3	Cassava roots and flour
Pulses	4	Fresh beans and peas, dried beans, Groundnuts, and other pulses
Rice	5	Rice grain and derived products
Other Foods	6	
Other roots		Irish potatoes, sweet potatoes
Sugaries		Sugar, sugarcane, sweet spreads, cakes, biscuits, sweet roll, sweet and confectionery
Vegetables		Onions, carrots, cabbage, other fresh vegetables, processed vegetables
Fruits		Bananas, citrus fruits, pawpaw, pineaple, tinned fruit and fruit juice, other fresh fruits, dried fruits

Table 5.1. Categories of Consumption Commodities from the HESSEA Survey (1990/91) in Malawi (Page 2 of 2)

Categories	Group No.	Components
Animal products		Mutton (lamb), poultry, fresh and frozen fish, tinned fish and all shell, eggs, powdered milk, other dairy products, beef and veal, pork (bacon, lam gammon), other meats, dried and smoked fish, eggs, fresh milk
Oils and fats		Butter, margarine, and other oils and fats
Non-alcoholic bever.		Coffee, tea, soft drinks
Other foods		Packed food additives, herbs, spices, salt, other packaged and prepared meals, meals out and take-away food, other food, food undefined
Alcoholic beverages		Traditional beer, other beer, gin, other alcohol, bar purchases (unspecified)
Non-food	7	Firewood, charcoal, battery, toiletries (soap-body, soap-clothes), petrol and diesel fuel, power, housing imputed rental price, vehicle oil and grease, fuel to and from holiday, housing costs, men's, women's, boys', and girls' clothing, miscellaneous clothing, textile and furnishing, glassware, tableware, and household utensils, vehicle operating costs, other transport costs, recreation equipment, books, newspapers, personal goods and services, transfers, furniture and carpets, household appliances, non-durable goods, medical health expenses, vehicle purchases, communications, services-recreational, educational fees, holidays, miscellaneous payments.

Source: The HESSEA Survey (1990/91)

Table 5.2. Own-Consumption OLS Estimation (Page 1 of 2)

	OLS Estimates			
Explanatory Variables	Coefficients	St. Deviation	t-statistic	P-value
1. Maize Own-Consumption				
Per capita purchase expenditure	- 1.424	1.769	- 0.805	0.421
Number of the household members	1.939	0.288	6.714	0.000
Size of the area cultivated	0.541	0.777	0.697	0.487
Per capita production	5.695	0.309	18.404	0.000
Per capita income	- 0.344	0.143	- 2.393	0.017
Constant	- 17.566	3.314	- 5.300	0.000
$R^2 = 0.588$				
2. Cassava Own-Consumption				
Per capita purchase expenditure	2.106	2.518	0.836	0.404
Number of the household members	0.528	0.078	6.793	0.000
Size of the area cultivated	- 0.316	0.213	- 1.484	0.139
Per capita production	10.782	0.343	31.476	0.000
Per capita income	0.065	0.038	1.707	0.089
Constant	- 6.356	0.929	- 6.838	0.00
$R^2 = 0.782$				
3. Other Staples Own-Consumption				
Per capita purchase expenditure	- 0.290	1.379	- 0.210	0.834
Number of the household members	0.192	0.178	2.405	0.017
Size of the area cultivated	0.066	0.213	0.309	0.757
Per capita production	5.850	0.488	11.976	0.000
Per capita income	- 0.018	0.040	- 0.458	0.647
Constant	- 2.342	0.902	- 2.596	0.010
$R^2 = 0.336$				

Table 5.2. Own-Consumption OLS Estimation (Page 2 of 2)

	OLS Estimates			
4. Pulses Own-Consumption				
Per capita purchase expenditure	0.878	1.414	0.621	0.535
Number of the household members	0.113	0.069	1.625	0.105
Size of the area cultivated	0.282	0.182	1.550	1.122
Per capita production	4.984	0.339	14.706	0.000
Per capita income	- 0.082	0.035	- 2.340	0.020
Constant	- 1.099	0.809	- 1.359	0.175
R^2 =0.453				
5. Vegetables Own-Consumption				
Per capita purchase expenditure	- 1.302	0.806	- 1.615	0.107
Number of the household members	0.244	0.402	6.061	0.000
Size of the area cultivated	0.519	0.105	4.941	0.000
Per capita production	2.993	0.280	10.701	0.000
Per capita income	0.037	0.023	1.645	0.101
Constant	- 2.093	0.465	- 4.503	0.000
R^2 =0.459				
5. Fruits Own-Consumption				
Per capita purchase expenditure	- 15.367	0.332	- 46.243	0.000
Number of the household members	- 0.002	0.033	- 0.065	0.949
Size of the area cultivated	0.204	0.090	2.268	0.000
Per capita production	4.785	0.774	6.181	0.000
Per capita income	0.073	0.017	4.387	0.000
Constant	- 0.209	0.383	- 0.546	0.585
R^2 =0.882				

Source: The MMCN (1989), Cornell University

Table 5.4. Seemingly Unrelated Estimates of the Malawian Consumption Demand Parameters With Homogeneity and Symmetry Imposed (Page 1 of 2)

	Intercept	Maize	Non-Maize	Cassava	Pulses	Rice	Other Food	Non-Food
1. Prices [a]								
Maize	1.35	- 0.04						
	(0.36)	(0.03)						
Non-Maize	0.02	0.004	- 0.12					
	(0.20)	(0.02)	(0.06)					
Cassava	- 0.01	- 0.0004	0.01	- 0.008				
	(0.06)	(0.007)	(0.02)	(0.007)				
Pulses	- 0.13	- 0.03	- 0.04	0.003	- 0.6			
	(0.09)	(0.01)	(0.03)	(0.01)	(0.11)			
Rice	0.13	- 0.0007	0.14	- 0.02	- 0.15	- 0.13		
	(0.22)	(0.03)	(0.06)	(0.03)	(0.11)	(0.26)		
Other Food	0.36	- 0.003	0.005	- 0.005	0.54	- 0.0007	- 0.53	
Non-Food	- 0.72	0.07	0.001	0.02	0.28	0.16	- 0.01	- 0.52
	(0.72)	(0.05)	(0.09)	(0.03)	(0.12)	(0.29)		(0.36)
2. Expenditure [b]		- 0.07	0.002	- 0.007	- 0.008	- 0.02	- 0.06	0.16
		(0.02)	(0.009)	(0.001)	(0.003)	(0.009)		(0.03)

Table 5.4. Seemingly Unrelated Estimates of the Malawian Consumption Demand Parameters With Homogeneity and Symmetry Imposed (Page 1 of 2)

	Intercept	Maize	Non-Maize	Cassava	Pulses	Rice	Other Food	Non-Food
3. Age Groups								
0 -4		-0.85	- 0.03	0.06	0.06	- 0.04	0.52	0.28
		(0.32)	(0.17)	(0.05)	(0.06)	(0.16)		(0.64)
5 - 9		- 0.87	0.08	0.06	0.05	0.04	0.31	0.33
		(0.32)	(0.17)	(0.05)	(0.06)	(0.16)		(0.64)
10 - 14		- 0.84	- 0.009	0.06	0.06	- 0.08	0.41	0.40
		(0.32)	(0.17)	(0.05)	(0.06)	(0.16)		(0.64)
15 - 55		- 0.77	0.02	0.05	0.08	- 0.04	0.42	0.24
		(0.32)	(0.17)	(0.05)	(0.06)	(0.16)		(0.63)
4. Household Size [c]		- 0.05	0.003	- 0.002	- 0.005	0.02	0.044	- 0.01
		(0.02)	(0.01)	(0.004)	(0.005)	(0.02)		(0.05)

Note: [a] The natural logarithm of the weighted regional price indexes.
[b] The natural logarithm of the expenditure per capita deflated by a Stone price index.
[c] The natural logarithm of the household size.

See Table 5.1 of the current study for the definition of items included in each consumption category

Source: Own Calculations from the HESSEA data set (1990/91)

Table 5.5. Uncompensated Price Elasticities, Expenditure Elasticities, and Demographic Outlay-Equivalent Ratios

	Maize	Non-Maize	Cassava	Pulses	Rice	Other Foods	Non-Food
Maize	- 0.07	0.20	0.08	- 0.56	0.12	0.04	0.08
Non-Maize	0.07	- 0.52	0.58	- 0.76	1.61	0.06	- 0.11
Cassava	0.004	0.04	- 0.49	0.06	- 1.49	- 0.01	0.05
Pulses	- 0.09	- 0.17	0.17	- 1.27	- 2.93	1.65	0.85
Rice	0.008	0.61	- 0.99	- 2.99	- 1.23	0.005	0.48
Other Foods	0.07	0.02	- 0.13	2.85	0.15	- 1.55	- 0.20
Non-Food	0.33	0.002	1.11	1.65	2.16	0.03	- 1.80
Expenditure	0.75	1.01	0.65	0.84	0.50	0.82	1.50
Age Group							
0 -4	- 1.2	- 0.03	0.08	0.07	- 0.08	0.64	0.19
5 - 9	- 1.2	0.08	0.09	0.07	0.08	0.38	0.22
10 - 14	1.07	- 0.01	0.09	0.08	- 0.16	0.51	0.27
15 - 55	1.07	0.02	0.08	0.10	0.08	0.51	0.16
Household Size	0.18	0.01	- 0.10	0.12	0.50	0.13	- 0.03

Source: Own Calculations from the HESSEA data set (1990/91)

CHAPTER 6: POLICY CHANGE SIMULATIONS

6.1. Policy Scenarios

The current study deals with three major issues of the Malawian agricultural pricing policies in the smallholder subsector:

1) The government has set the producer price of maize above its import parity price (IPP); this is an implicit subsidy on the maize producer price. At the same time, the government of Malawi has set the maize consumer price below its import parity price; this is a subsidy on the maize consumer price. The objective of this double subsidy is to discourage external trade on this crop for food security and self-sufficiency reasons.

Gittinger (1982) defines the economic export and import parity prices as the estimated prices at the farm gate or project boundary, which are derived by adjusting the c.i.f. (cost, insurance, and freight) or f.o.b. (free on board) prices by all the relevant charges between the farm gate or the project boundary and the point where the c.i.f. or the f.o.b. price is quoted.

The c.i.f. price includes f.o.b. cost at the point of export, freight charges to the point of import, insurance charges, and unloading charges from ship to pier at port. It also includes import duties and subsidies, port charges at port of entry for taxes, and handling, storage, and agents' fees. The f.o.b. price includes all costs to get goods on board in the exporting country. These are local marketing and transport costs, local port charges, including taxes, storage, loading, fumigation, agents' fees, and the like. It also includes export taxes and subsidies, project boundary price or farm-gate price.

So, the EPP is a world price (f.o.b.) valued at the domestic farm gate by adjusting for (subtracting) the cost of transport to export market, storage and handling, insurance, and other marketing costs. The IPP is a c.i.f. price valued at the domestic farm gate by adjusting for (adding) the cost of transport from import market, storage and handling, insurance, and other costs. These costs create a wedge between the producer and consumer prices. In the case of maize in Malawi, the double subsidy on both the producer and consumer prices has widened the wedge between the two prices.

Concerning the implicit subsidy on the producer price of maize in Malawi, Sahn et al. (1990, p. 85) argue that the existence of this subsidy depends on which market and exchange rate (official or shadow) are used in the calculations of the EPP and IPP. Keeping in mind that South Africa has traditionally been the world's leading exporter of white maize and that prices have been freely determined by market forces, Sahn et al. show that the Malawian maize producer price has been subsidized over the years, if the official exchange rate is used and the South African market is taken as reference. In order to determine this implicit subsidy, one needs to compare the actual price paid to the EPP(/IPP) of the good under consideration. This comparison is captured by the Nominal Protection Coefficient (NPC), calculated as the ratio of a commodity domestic price to its border price (EPP/IPP). A Nominal Protection Coefficient greater than one implies an implicit subsidy on the producer price that protects producers. The NPC for maize has always been greater than one if the official exchange rate is used and the South African market is taken as reference. This subsidy was estimated at 10 percent of the IPP, during the 1986/87 agricultural season (Sahn et al., Table 20, p. 81).

Sahn et al. also argue that the explicit subsidy on the maize consumer price has been obvious in Malawi. They claim that this is revealed by the fact that the markup between the ADMARC producer and consumer prices has been "insufficient" to cover all the costs of product transformation, transportation, and storage. Sahn et al. (Table 27, p. 105) show that during the 1986/87 agricultural season, the ADMARC nominal consumer price (22 tambalas per kilo) was 4.80 tambalas (cents) per kilo below the Blantyre free-market price. This represented a subsidy of 27.6 percent relative to the IPP of maize. If you add this to the 10-percent departure created by the subsidy on the producer price, the subsidy-induced wedge between the two prices amounts to 37.6 percent of the free-market price.

In chapter 3 of the current study (Table 3.1), I showed that, in 1992, the ADMARC consumer price for maize (50 tambalas per kilo) was 8 tambalas (cents) per kilo lower than the Blantyre private free-market price for maize (i.e., a 16-percent rate of subsidy)[1]. Due to lack of information to estimate precisely the implicit subsidy on maize producer price for the base year (1992/93) of this analysis[2], for the current study, I will proceed to sensitivity

1 This change in the consumer price of maize from 1987 to 1992 is due to fluctuations in the maize world-market price to which the ADMARC subsidized price is adjusted.

2 In fact, one needs micro information on the real equilibrium exchange rate, transport and handling costs, insurance, etc. in order to estimate the import parity price (IPP) of maize. This information is not readily available for the 1992/93 agricultural season. An update of the estimates of the IPP and IPP of the main agricultural crops in Malawi could be an extension to the current study.

analysis in which I will assume the subsidy on maize producer and consumer prices to be 10, 20, and 30 percent of the import parity price of maize, respectively (i.e., the subsidy-induced wedge between the two prices is 20, 40, and 60 percent of the maize IPP, respectively).

The Malawian maize market can be illustrated by the demand-supply diagram below:

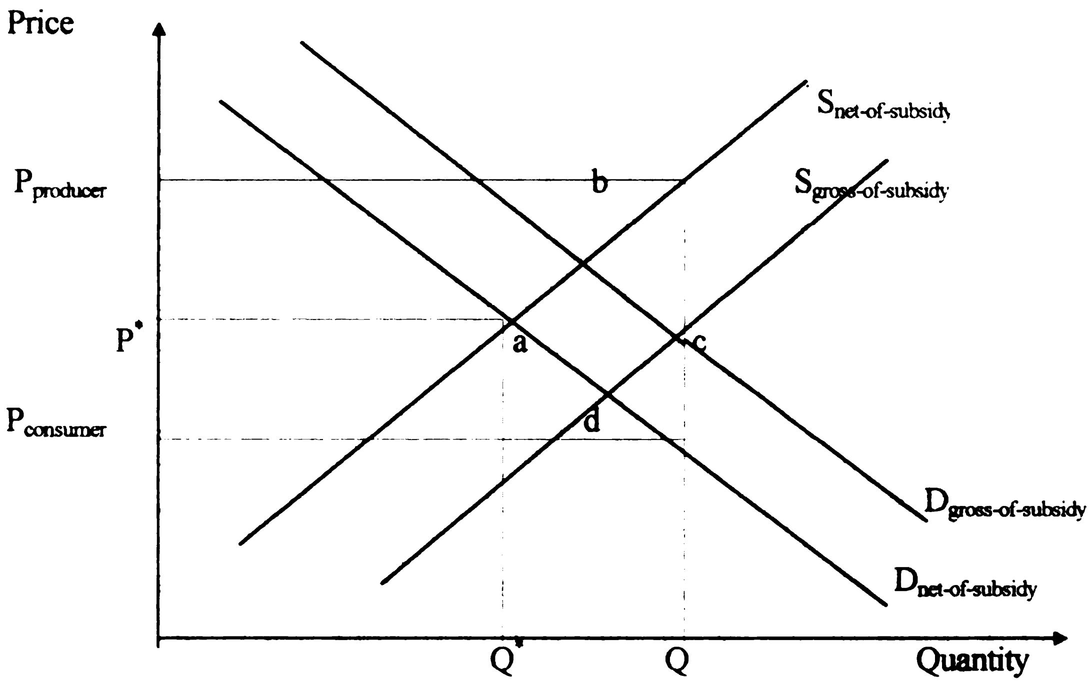


Figure 6.1. The Malawian Maize Market in 1992/93

$S_{net\text{-}of\text{-}subsidy}$ and $D_{net\text{-}of\text{-}subsidy}$ are free-market supply and demand curves. The initial free-market equilibrium is at point a, with the free-market price (the IPP) represented by P^* and the free-market quantity by Q^*. With the subsidy on maize production, the perceived supply curve becomes $S_{gross\text{-}of\text{-}subsidy}$ and with the subsidy on the maize consumer price, the perceived demand is $D_{gross\text{-}of\text{-}subsidy}$; the perceived equilibrium is at point c. The double subsidy on maize producer and consumer prices creates a wedge between the two prices equal to the interval $\overline{bd}$. In the current study, I simulate the economic effects of changing the size of this interval (wedge).

2) The second agricultural pricing policy analyzed in the current study concerns the tax imposed on smallholder tobacco production. The government of Malawi has set the price of smallholder tobacco (the main cash crop, primarily exported) below the export parity price. This is a tax on smallholder tobacco production.

3) Fertilizer prices offered to smallholder farmers by the government were below the import parity prices and the private market prices. Malawi started reducing the fertilizer subsidy in 1987; it was completely eliminated during the 1994/95 agricultural season.

There are four levels of policy simulations undertaken in the current study. The first simulation refers to an elimination of the subsidy-induced wedge between the maize producer price and consumer price. In one case, I consider maize as a non-traded good and I set its producer and consumer prices to be equal to the private free-market prices. In another case, I allow some portion of maize consumed in Malawi to be imported from outside the country; then, I set the producer price to be equal to the import parity price, but I maintain the subsidy on the consumer price. And in the last case, after a complete elimination of the subsidy-induced wedge between the producer and consumer prices of maize, I allow some portion of maize consumed in Malawi to be imported from outside the country. Malawi has followed a self-sufficiency policy in the production of maize. Very rarely--for example in case of prolonged drought--has it turned to imports of maize; but it would be interesting to see how this policy would affect our results.

For the second policy experiment, I consider the elimination of the direct tax on tobacco production. This calls for setting the producer price of tobacco to its export parity price (see Table 6.2 for detailed results). In 1987, the NPC for smallholder tobacco was 0.35 when evaluated at the official exchange rate, and 0.24 when evaluated at the shadow exchange rate (Sahn et al. 1990). This suggests that the smallholder tobacco export was implicitly taxed. In chapter 3 of the current study, we saw that the tax rate on smallholder burley tobacco was 71.9 percent in 1985. It was 77.2 percent in 1990. During the 1992/1993 agricultural year, some studies (World Bank, 1994) have estimated this tax to be 20 percent of the tobacco world market price (all varieties considered). These fluctuations in the tobacco tax rate are mainly due to fluctuations in the world-market price of tobacco, while its domestic price, fixed by the government, is constant (Table 3.2 in chapter 3 of the current study shows a series of domestic and world-market prices of tobacco).

Finally, the third policy simulation consists of removing the fertilizer subsidy. I mentioned in chapter 3 of the current study (see Table 3.1) that, until 1994, the government of Malawi set a pan-territorial retail price for each fertilizer type supplied by the Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM). In the 1980s, the aggregate fertilizer subsidy rate was about 25 percent (Sahn and Van Frasum, 1995). On the average in 1992, the fertilizer subsidy was 32 percent of the private market prices of fertilizers.

At this level, I will first consider the effects of removing the subsidy on the fertilizer price, while maintaining the subsidy on maize prices and the tax on smallholder tobacco production. Then, I will simulate the effects of eliminating both subsidies on fertilizer and on maize prices (maintaining the tax on smallholder tobacco production). The last simulation in this category will consist of removing all smallholder agricultural pricing policy distortions (fertilizer and maize subsidies, and the tax on smallholder tobacco production)[3].

In the next section, I present the results of simulations of all policy scenarios described above; however, one must be careful in interpreting these results. First, I only consider the reactions of smallholder farmers to changes in prices of agricultural inputs and outputs. I ignore the effects of other exogenous variables such as agricultural credit, interest rates, exchange rate, rainfall, etc.; these external effects can in some circumstances eliminate the effects of a price change. For example, the elimination of the fertilizer subsidy is expected to raise the farm-gate price of fertilizer. However, most smallholder farmers get their fertilizer on credit, with a promise to reimburse before the next agricultural season. If, for some reasons, this credit system fails, it may be true that the demand for fertilizer may decrease so much that the price of fertilizer will actually decrease after the elimination of the subsidy; some economists (National Statistical Office of Malawi) believe that this is what has been happening in Malawi since the elimination of the fertilizer subsidy during the 1994/95 agricultural season.

Second, because of the quality of the data, only the median household is considered in the simulations. Therefore, I cannot address distributional issues in a direct way. This means that, while the Marginal Costs of Public Funds (MCF) estimates are of great interest in

---

3 See Table 6.3. for detailed simulation results.

terms of economic efficiency gain (loss), they do not necessarily provide us with a complete ordering of policies.

Last, the assumptions and the behavioral functional forms used in the model greatly impact on the simulation results. For example, the assumption of perfect competition may not be a good description of the Malawian agricultural sector. Also, the Cobb-Douglas production function assumes all factors to be substitutes for each other, which in reality may not be true (see chapter 7 for ways of extending the current study). Specifically, some of the simulations may indicate very large effects on wage rates in the case in which the use of fertilizer changes, because the Cobb-Douglas production function treats fertilizer and labor as substitutes for each other. However, in Malawi, labor and fertilizer are more complementary than substitutes.

6.2. Simulation Results and Interpretation

In this simulation exercise, I use the model as described in chapter four of the current study; I then consider an agricultural pricing policy change, and record the resulting percentage change in (1) smallholder agricultural equilibrium output quantity and input use, (2) equilibrium prices, (3) per-capita household expenditure and income (including wages and profits), (4) the government budget deficit, and (5) household welfare. The latter is measured by the equivalent variation (EV) relative to the initial income. In fact, it measures how much income would have to be taken away from the consumer before the price change to leave him/her as well off as he would be after the price change. In other words, the EV measures how much income a consumer is willing to pay (or to be paid) in order to avoid the price change.

6.2.1. Maize Pricing Policies

Table 6.1 below shows the base-year equilibria for demand and supply of agricultural inputs and outputs. Total production of crops equals total demand (including domestic demand and export). Also, total production of inputs, and total import of fertilizers and other chemicals, equal domestic use of those inputs in the smallholder sector.

Table 6.1 also shows the effects of the total elimination of the subsidies on the producer and consumer prices of maize. First, I consider a case in which the subsidy-induced wedge between the producer and consumer prices of maize is equal to 20 percent of the maize import parity price (IPP); then, in another simulation, I assume the wedge to be 60 percent of the maize IPP. While in these two simulations I use the estimated elasticities (see Table 5.5 of the current study), I consider another case in which I assume the wedge to be 40 percent of the maize IPP and where I use high and low elasticities for simulations. These high and low elasticities are calculated by adjusting up or down the estimated demand parameters (see Table 5.4 of the current study) in such a way as to maintain restrictions imposed by the demand theory; that is the adding-up, zero homogeneity, and symmetry conditions (see equations (10) to (12), chapter 4 of the current study).

For the second policy simulation, I consider maize as a traded good and allow some portion of the maize consumed in Malawi to be imported.

a. Elimination of the Subsidy-Induced Wedge Between the Producer and Consumer Prices of Maize

The immediate effect of the elimination of the government subsidy on maize producer and consumer prices is to reduce the producer price of maize (previously set above its import parity price) and to increase the consumer price of maize (previously set below the import parity price). These two changes in the producer and consumer prices of maize will have a chain of effects on the production and consumption of maize and other agricultural crops, through price elasticities of supply, and price and income elasticities of demand. From figure 6.1 above, one can see that, when the subsidy-induced wedge between the producer and consumer price of maize is reduced (by a reduction in the supply and/or demand subsidy), the producer price of maize moves down along the actual supply curve ($S_{net\text{-}of\text{-}subsidy}$) toward the free-market equilibrium (a); at the same time, the maize consumer price moves upward along the actual demand curve toward (a).

In the first scenario, I assume that the subsidy-induced wedge between maize producer and consumer prices is equivalent to 20 percent of the maize import parity price (IPP). At the estimated price and income elasticities, the overall effects of the elimination of this wedge are a 10.3-percent decrease in the equilibrium producer price of maize and a reduction of 9.4 percent in its production. With a decrease in the overall household income

(- 0.7 percent at estimated elasticities), the demand for maize decreases; the maize consumer price increases by only 9.6 percent. The production of cassava declines by 3.4 percent and the production of rice declines by 5.2 percent, as inputs, previously used in the production of these crops, are shifted into the production of non-maize cereals, pulses (beans, peas, groundnuts, etc.), and tobacco. The production of non-maize cereals (sorghum, millet, and sunflower) increases by 8.0 percent, while the production of pulses and tobacco increase by 7.0 and 6.6 percent, respectively. In fact, non-maize cereals are substitutes for maize in consumption and they are domestically produced. As production of maize declines, it is normal that the production of its substitutes will increase. Besides, as production of maize becomes less attractive to smallholder farmers, they reallocate its land into the production of tobacco (the main cash crop).

Fertilizer is used mainly in the production of tobacco and hybrid maize. In fact, the government of Malawi requires smallholder farmers to buy seeds of hybrid varieties of maize and tobacco in order to get access to subsidized fertilizer. Tobacco is more intensive in the use of fertilizer, such that, when the production of tobacco increases in this simulation, there is an increase in the use of fertilizers (9.1 percent), even though the production of maize has declined. This simulation also suggests an increase in the use of oxen.

The reduction of the maize subsidy, while maintaining the tax on tobacco, means a double benefit for government revenues from agriculture, particularly because the production of tobacco has increased, despite the fact that the tax was maintained[4]. Thus, the

---

[4] In Table 6.4 of the current chapter, I present the results of policy simulations in which the government budget deficit is held constant.

government budget deficit falls by 84.4 percent. The deficit is not totally eliminated, because the government still subsidizes the price of fertilizer offered to smallholder farmers, and we just saw that the use of fertilizer by smallholder farmers increases as the production of tobacco rises. In fact, the government expenditure to support the fertilizer subsidy increases by 11.3 percent, while the tax revenue from tobacco production increases by 15.5 percent. The subsidy on maize is completely eliminated.

The change in the subsidy on the producer and consumer prices of maize has a direct impact on household per-capita expenditure and income, as well as on welfare. Because maize demand is price inelastic, the increase in its consumer price implies that per-capita expenditure on this commodity increases (7.0 percent). The prices of non-maize cereals, cassava, and rice have fallen, and so has the per-capita expenditure on these commodities. The per-capita expenditure on non-maize cereals falls by 2.4 percent; the per-capita expenditure on cassava and on rice decline by 8.1 percent and 12.1 percent, respectively. The expenditures on pulses, other food and non-food consumption goods, and services increase drastically as their consumer prices increase.

Smallholder profit income has mildly decreased (-1.4 percent) and landless households' labor income has increased (11.1 percent), due to an increase in the wage rate. Profit income has declined, because the decline in maize production is large enough to offset the increase in revenues from increased tobacco production. Besides, the use and prices of inputs (fertilizer, labor, and oxen) have also increased. The overall total income decreases by 0.7 percent.

Concerning household welfare change, the equivalent variation represents 0.7 percent of the initial income; this means that households would have to have, at initial prices, a decrease in income equivalent to 0.7 percent of their initial income in order to reach the level of utility under the policy change; households are worse off following the policy change. In fact, maize being the main staple crop in Malawi, the reduction in its availability together with an increase in its consumer price negatively affects the welfare of households.

The Marginal Cost of Public Funds (MCF)[5], measured by the negative of the ratio between the change in welfare (measured by the equivalent variation) and the change in government revenues, indicates that the provision of public exhaustive projects is associated with cost to the society, while financed by distortionary taxes. These costs could be costs of administration and compliance and indirect damage inflicted on the taxpayers, over and above the loss they suffer in actual money payment, because the tax system distorts relative prices. The MCF allows us to compare the consumer's welfare loss (gain) to the government revenue gain (loss). In this particular case in which the subsidy-induced wedge between the maize producer and consumer price (equal to 20 percent of the maize import parity price (IPP)) is eliminated, but no maize imports are allowed, and the fertilizer subsidy and the tobacco tax are maintained, the MCF is 1.3. This means that the elimination of the subsidy-induced wedge between the maize producer and consumer price leads to a consumer welfare loss of 1.30 dollars for every dollar saved by the government because of this policy change.

---

[5] For a more detailed discussion on the MCF, see Ballard and Fullerton (1993), and Ehtisham and Stern (1991).

Sensitivity analysis shows that the wider the subsidy-induced wedge between the producer and consumer prices of maize, the larger are the effects of its elimination; a wide wedge implies high subsidies on the producer and consumer prices of maize. If we assume that the subsidy-induced wedge between the maize producer and consumer prices is 60 percent of the import parity price, its elimination yields larger, but non-linear percent changes (in absolute terms) than those generated in the previous simulation case in which I assumed the wedge to be 20 percent of the maize IPP[6]; however, the directions of the effects stay the same (see Table 6.1 for more details).

I perform another sensitivity analysis with respect to price and income elasticities of demand. In general, the effects of the removal of the wedge are higher at higher elasticities and, as expected, the equilibration, at high elasticities, is achieved more by quantity changes than by price changes; that is, the percent quantity changes relative to the percent price changes are higher at higher price and income elasticities of demand than they are at lower elasticities (see Table 6.1, note (3) for explanation of how these elasticities are obtained).

For example, maize production declines by only 6.7 percent, while its producer price declines by 13.8 percent at low elasticities. At high elasticities, maize production declines by 27.5 percent and its producer price by only 19.1 percent. Non-maize cereals production increases by 8.1, while its price declines by 17.6 percent at low elasticities; the price of non-maize cereals declines by 25.1 percent, at high elasticities; this same pattern is observed for

---

6 In fact, while one would expect that the elimination of a 60-percent wedge would lead to effects about three times as big as the elimination of a 20-percent wedge, this fact seems to be true only for maize and not for any other crops.

all other crops. This pattern of changes in the prices and quantities of agricultural products implies that per-capita expenditure changes are higher at higher elasticities. Per-capita expenditure on non-food consumption increases drastically at high elasticities (114.0 percent). This is due to a tremendous increase in both the quantity (47.3 percent) and the price (45.3 percent) of this category of goods, due to a large price elasticity of demand for non-food consumption (see Table 5.5 of the current study) and an upward shift in the demand for non-food consumption caused by an increase in the income of landless households (33.2 percent).

Because of the increase in the cost of farming, per-capita income changes from profits are actually smaller at high elasticities than they are at low elasticities. However, labor income is definitely higher at high elasticities because of a tremendous increase in the wage rates.

The equivalent variation is 1.1 and 4.6 percent of base-year income at low and high elasticities, respectively. Smallholder households are worse off at high elasticities than they are at low elasticities. Even though the labor-income increase is higher at high elasticities (33.2 versus 23.3 percent, respectively at high and low elasticities), profits decrease by 2.7 percent at low elasticities, and by 5.2 percent at high elasticities.

A 50-percent reduction in the subsidy-induced wedge shows monotone effects as compared to those of a total elimination of the wedge discussed in the previous case, only the absolute magnitude of these changes is smaller, but the relationship is non-linear (see Table 6.1 for more details).

In the above policies, I have considered maize as a non-traded good. Let us consider a case in which imports of maize are possible.

b. Changes in the Size of the Subsidy-Induced Wedge Between Maize Prices With Maize Imports Allowed.

In this category of policy simulations, I consider two main scenarios: (1) Maize imports are allowed and the consumer price subsidy is maintained and (2) the subsidy-induced wedge is completely eliminated and maize imports are permitted.

In scenario (1), the government stops the subsidy on the producer price of maize, but it maintains the subsidy on the consumer price. Intuitively, one would expect the producer price of maize to decrease, because of the elimination of the subsidy on it, and because of increased competition from cheaper imports. The government allows imports of maize to cover shortages created by the subsidy on the consumer price.

From Table 6.1, one can see that, although the magnitude of the effects of this policy is higher than it is in the previous policy changes, the signs of the effects stay the same for both policies.

Specifically, I consider three cases of policy simulations, corresponding to a subsidy on the maize producer price of 10, 20, and 30 percent of the import parity price. In the first case (10-percent subsidy on the producer price), the elimination of the subsidy combined with the import of maize leads to a decline in the domestic production of maize (11.7

percent). At the estimated elasticities and at the equilibrium, maize imports increase by 12.5 percent relative to the initial local maize production in the base year.

With competition from imports, smallholder farmers shift their land and other inputs (fertilizer and labor) into the production of tobacco (an increase of 11.9 percent) and into the production of crops that are substitutes for maize in consumption (non-maize cereals and pulses). The producer price of maize decreases by 13.9 percent. The increase in the production of tobacco (the main cash crop) raises smallholder farmers' income and their ability to pay for imported maize in order to satisfy their inelastic demand for maize.

Since fertilizer is used intensively in the production of tobacco, its use increases by 22.5 percent. Because of the decline in both the price and production of maize and of the increase of both the price and use of inputs (fertilizer, labor, and oxen), at the estimated elasticities, farming profits decrease by 17.5 percent, while landless households' labor income increases by 25.0 percent. It appears that, when the maize producer and consumer subsidies are removed, landless households do much better. Assuming that landless households are poor, one can conclude that the maize subsidies punishes the poor and widens inequality between rich and poor smallholder farmers. The overall household income decreases by 15.3 percent.

Per-capita expenditure on maize, non-maize cereals, cassava, and rice declines. For maize and rice, this decline results from a combined decrease in their production and prices. For non-maize cereals and cassava, the decline is the result of a greater decrease in their prices relative to the increase in their production.

The equivalent variation shows that, at estimated elasticities, households are worse off by 7.5 percent of their initial income, because of a decline in both the production of maize and household income.

The increase in tax revenues from the increase of tobacco production is not great enough to offset the increased subsidy to fertilizer; the government deficit increases by 21.7 percent.

In the two other cases considered for sensitivity analysis (subsidy on producer price of maize equal to 20 and 30 percent of the import parity price), the elimination of the subsidy leads to magnified effects with the same directions (signs) in the changes as in the previous case of a 10-percent subsidy. In the case of high elasticities, the increase in the prices and uses of inputs is so great that it eliminates the increases in smallholder farmers' revenues from the increased tobacco production; farmers profits actually decrease by 80.6 percent, if compared to the base-year profits. Labor income increases by 72.3 percent, because of the increase in the wage rate. The overall income decreases by 36.4 percent. Households are worse off by 9.1 percent of their initial income.

In the second scenario, the subsidy-induced wedge is completely eliminated and maize imports are allowed. The direction of the changes in the variables considered in this analysis is exactly the same as in the previous case in which only the maize producer price subsidy was eliminated and maize imports were allowed. However, because of the elimination of the consumer price subsidy in the second scenario, the demand for maize is lower; the magnitude of changes (in absolute terms) is also smaller than in the previous case. A negative MCF (- 1.1 at estimated elasticities) shows that there is a gain in consumer welfare for every dollar saved by the government, after policy change. In fact, this policy has a double benefit to the Malawian society; first, it leads to a reduction of the budget deficit and second, it improves economic efficiency by eliminating a distortionary maize subsidy and by allowing imports of maize to take place.

6.2.2. Tobacco Pricing Policies

In Table 6.2 below, I present the results of policy changes in the tobacco market, either alone or combined with pricing policy changes in other crops' production, particularly maize. First, I consider the case in which only the tax on smallholder tobacco production is eliminated, while the subsidies on both the producer and consumer price of maize, and the subsidy on fertilizer price are maintained. Secondly, I combine the elimination of the tax on tobacco production with the elimination of the subsidy-induced wedge between the producer and consumer prices of maize. Lastly, I investigate the case in which both the tax on the tobacco producer price and the subsidy-induced wedge between the maize producer and consumer prices are eliminated, and in which some portion of maize locally consumed is allowed to be imported. In each case, sensitivity analysis is carried out considering low and high price and income elasticity cases (see Table 6.1, note (3), for details on how these elasticities are obtained).

a. Elimination of the 20 percent Tax on Smallholder Tobacco While Maintaining the Subsidy on Maize and Fertilizer Prices.

In this policy, the government subsidizes both the producer and consumer prices of maize as well as the procurement price of fertilizer. Besides, the government does not levy any tax on the production of tobacco. The government deficit from agricultural operations increases by 25.3 percent, when I use estimated price and income elasticities. It increases by 15.0 and 40.4 percent, when I use low and high elasticities, respectively.

Another effect of this policy is that production of subsidized crops (mainly maize) increases, while that of non-subsidized crops (non-maize cereals, cassava, pulses, and rice) decreases. The supply of tobacco increases, responding to an increase in its producer price after the elimination of the tax. The supply of tobacco increases relatively more as a result of this policy than does the supply of maize (when calculated using estimated elasticities, I obtain increases of 18.1 and 5.4 percent, respectively, for tobacco and maize). The increase in the quantity available of maize is due to an increase in its demand, as the household income (farmers' profits and landless households' wage income) increases. In fact, the overall total income increases by 17.7 percent, at estimated elasticities.

Tobacco and maize (especially hybrid maize) are intensive in labor and fertilizer inputs. An increase in their production implies an increase in the use of those inputs. The use of fertilizer increases by 17.1 percent. Since the supply of labor is assumed to be inelastic, an increase in the demand for labor leads to an increase in the wage rate (19.1 percent), leaving the quantity of labor available unchanged.

Because of the increases in the production and price of maize and tobacco, profits increase by 17.1 percent at estimated elasticities. The increase in the wage rate leads to a

19.1-percent increase in the income of landless households. This policy change clearly benefits both the poor and rich farmers. Households are better off with the policy change by 2.8 percent of their initial income, despite the increase in prices of maize, pulses, other foods, and non-food consumption.

The MCF is greater than one (1.4, at estimated elasticities), indicating that this policy of eliminating the tobacco tax leads to a consumer welfare loss relatively larger than the government budget gain for every dollar spent by the government on maize and fertilizer price subsidies brought about, in part, by the elimination of the tobacco tax.

Sensitivity analysis at low and high elasticities shows that, in both cases, the direction of the changes in all variables considered is the same as the direction of change in the case of estimated elasticities; only the magnitude of changes is reduced or increased for low and high elasticities respectively.

b. Elimination of the Tobacco Tax and of the Subsidy-Induced Wedge Between the Producer and Consumer Prices of Maize

In this policy, the price received by smallholder farmers of tobacco has increased. At the same time, the producer price of maize has decreased, while its consumer price has increased as a result of the elimination of the subsidies on both prices. Production of maize decreases by 19.3 percent, while its producer price decreases by 25.9 percent at the estimated elasticities.

Land and other inputs (mainly fertilizer and labor) previously used in the production of maize are reallocated to the production of tobacco (which increases by 39.6 percent), and of some other staple crops (non-maize cereals and pulses, whose production increases by 5.4 and 3.4 percent respectively, at the estimated elasticities).

The increase in the consumer price of maize is big enough (33.9 percent) to offset the decrease in its supply: The per-capita expenditure on maize increases by 8.0 percent at the estimated elasticities. It increases by 14.1 percent at low elasticities and decreases by 51.7 percent at high elasticities. This decrease is due to a large decrease in the production of maize and a price increase not big enough to offset the decrease in production (or, in other words, an elastic demand for maize). The use of inputs (fertilizer and oxen) increases, but not by much. Fertilizer use increases by 2.1 percent and oxen demand increases by 1.2 percent. The reason for this mild increase is that the change in crop production has implied a reallocation of resources, instead of an influx of new resources.

Because of the decline in the price and production of maize, farmers' profits decrease by 9.3 percent at estimated elasticities and by 26.0 percent at low elasticities. Profits decline by 5.0 percent at high elasticities. Labor incomes increase by 19.9 percent, at estimated elasticities; they increase by 9.3 percent at low elasticities and by 33.3 percent at high elasticities. The total per-capita income increases by 8.2 percent, at estimated elasticities.

At high elasticities, production of maize (the main staple good) has decreased (even though its consumer price has increased) to the point that the per-capita expenditure on it has decreased. The equivalent variation indicates a worsening situation of household welfare in all three scenarios of estimated, low, and high elasticities. The MCF is greater than one in all three scenarios, indicating a consumer welfare loss relatively greater than the government budget gain for every dollar that the government spends on fertilizer subsidies, after the elimination of the tobacco tax and of the subsidy-induced wedge between the maize producer and consumer prices.

Because the government has reduced its subsidy to maize production and consumption, its budget deficit from agricultural operations decreases by 71.3 percent at estimated elasticities. It decreases by 50.1 percent at low elasticities, and by 88.2 percent at high elasticities.

c. Elimination of the Tobacco Tax and of the Subsidy-Induced Wedge Between the Maize Producer and Consumer Prices, and Increase in Maize Imports

The production and producer price of maize are simulated to decrease in the three scenarios of estimated, low, and high price and income elasticities, while the production and price of tobacco increase in the three scenarios. In fact, local production of maize has been replaced by imports; land and other inputs previously used in the production of maize have been reallocated to the production of other crops, especially tobacco (the main cash crop). With increased imports and consumer price of maize, the per-capita expenditure on this commodity increases, despite the decline observed in its domestic production.

The observed decrease of profits is due to a decrease in both the production and producer price of maize, and an increase in the use and prices of inputs (i.e., low receipts, high costs). However, because of the increase in the price of labor, landless households' labor income increases. The overall total income decreases in all three scenarios considered (estimated, low, and high elasticities).

The equivalent variation in the three scenarios shows that households are better off with the new policy, because of the increased imports of maize and its lower consumer price, if compared to the results of the previous cases.

The government budget deficit increases at a decreasing rate as you go from low to high price and income elasticities (42.5, 21.4, and 19.8 percent, respectively). In fact, at high elasticities, even though the absolute increase in maize imports is higher than it is for low elasticities, relative to the absolute rate of decline in maize production, this increase is higher for low elasticities than it is for high elasticities. Since the government still subsidizes the consumer price of maize, it pays higher subsidies at lower elasticities.

6.2.3. Fertilizer Pricing Policies

In what follows, I consider three combinations of agricultural pricing policy changes. First, only the fertilizer subsidy is eliminated, keeping the subsidy on both the producer and consumer prices of maize and the tax on smallholder tobacco production unchanged. Secondly, the elimination of the fertilizer subsidy is combined with the elimination of the subsidy on maize producer and consumer prices. Lastly, I consider a case in which all distortions in the smallholder agriculture are eliminated (fertilizer and maize subsidies as well as the tax on smallholder tobacco production).

Table 6.3 below shows the results of these three policy scenarios. As in the previous policy analyses on maize and tobacco, I perform sensitivity analysis considering low and high price and income elasticities.

a. Only Fertilizer Subsidy is Eliminated, Keeping the Subsidy on Both Producer and Consumer Prices of Maize and the Tax on Smallholder Tobacco Production Unchanged

The immediate effect of this policy is to raise the price of fertilizers supplied to smallholders. But, since the subsidy on the producer and consumer prices of maize is maintained, smallholder farmers find it profitable to increase production of that crop. This is sustained by an inelastic demand for this main staple crop. The equilibrium quantity of maize increases by 1.2, 0.08, and 3.5 percent, respectively, for estimated, low, and high elasticities. Since tobacco production is more fertilizer intensive, its production drops significantly when fertilizer becomes more expensive (the decrease is 10.8 percent at estimated elasticities, 5.2 percent at low elasticities, and 18.1 percent at high elasticities). However, one must note that these results are conditional to the functional form of the production function. Usually, labor and fertilizer should be complements in production, but the Cobb-Douglas production function forces all inputs to be substitutes.

All prices increase, except those of non-maize cereals and cassava. The increase in the consumer price and the quantity consumed of maize leads to an obvious increase in per-capita expenditure on that commodity. The same story can be told for pulses, rice, other foods, and non-food items.

Profits mildly decrease by 1.5 percent, at estimated elasticities, and by 1.7 percent, at low elasticities. At high elasticities, profits decrease by 0.7 percent. The decline in profits is mainly due to a reduction in the production of tobacco. Labor's price has increased, which raises labor incomes for landless households. The equivalent variation indicates that households are worse off in all three scenarios considered, mainly because of the reduction in their overall income (- 1.1 percent, at estimated elasticities) and of the increase in the consumer price of maize (1.3 percent, at estimated elasticities).

The MCF is very large (2.2, at estimated elasticities), meaning a great damage to the consumer welfare relative to the government budget gain, after the elimination of the fertilizer subsidy for every dollar raised by the government from the tobacco tax and spent on maize subsidies.

The government still subsidizes the production and consumption of maize, whose quantity available has increased with the policy change by only 1.2 percent. The production of tobacco has decreased by 10.8 percent, meaning that tax revenues from that activity have declined. However, the cessation of the subsidy on fertilizer, which lightens the budget deficit from agricultural operations, is so strong that the total effect of the above changes is to decrease the government budget deficit by 3.4 percent at estimated elasticities, 1.4 percent at low elasticities, and 4.3 percent at high elasticities.

b. Elimination of Fertilizer Subsidy Combined With the Elimination of the Subsidy-Induced Wedge Between the Producer and Consumer Prices of Maize

In this policy, besides the elimination of the subsidy on the procurement price of fertilizer to smallholder farmers, the government also stops subsidizing both the consumer and producer price of maize. These two changes lead to a decline in maize production, in general, and in hybrid maize production, in particular, as it is more intensive in the fertilizer use than the traditional variety. Maize production declines by 1.9 percent at estimated elasticities; it declines by 0.3 percent at low elasticities, and by 3.8 percent at high elasticities. We get a smaller decrease in the production of maize than the decrease observed in the case in which only the subsidy-induced wedge between the maize producer and consumer prices was eliminated (see Table 6.1 of the current chapter), because in the current case, the production of tobacco (the main cash crop) is equally unattractive to farmers. Smaller proportions of land are diverted into the production of non-maize cereals and other crops. In fact, the production of tobacco and rice declines. Land and labor are reallocated toward production of non-maize cereals, cassava, and pulses. The production of non-maize cereals increases by 5.7 percent, while the production of cassava increases by 1.2 percent and that of pulses by 10.1 percent, at estimated elasticities. The use of fertilizer drops, while oxen use increases. Very little fertilizer is used in the production of non-maize cereals, cassava, and pulses.

The price of pulses increases by 15.2 percent, while the price of fertilizer increases by 21.7 percent and the price of labor increases by 25.9 percent, at estimated elasticities. One must note that this pattern does not change whether you consider low or high elasticities cases. Despite the decline in maize production, its consumer price increase is big enough to induce an increase in per-capita expenditure on that crop.

Because of the decline in the producer price of maize, its domestic production declines and the production of tobacco (more intensive in fertilizer) declines after the increase in the price of fertilizer, due to the elimination of the fertilizer price subsidy. All these factors lead to a decrease in farmers' profits. At estimated elasticities, agricultural profits decrease by 2.6 percent. Profits decrease by 1.5 percent, at low elasticities, and by 4.0 percent, at high elasticities. Labor use having risen, labor income for landless households increases; however, this rise is not big enough to compensate for the loss caused by the decrease in the production of maize and thus in the farming profits. Households' welfare declines.

The elimination of both the fertilizer and maize subsidies, while maintaining the tax on smallholder tobacco production, has a triple positive effect on the government budget from agricultural operations. That deficit decreases by 93.6 percent, at estimated elasticities; it decreases by 93.8 percent, at low elasticities and by 91.2 percent, at high elasticities.

c. Elimination of All Price Distortions in Smallholder Agriculture

In this last set of simulations, I consider the elimination of the fertilizer and maize subsidies, and of the tax on smallholder tobacco production. In all scenarios considered, because the producer price of tobacco increases, farmers reallocate their resources in favor of that crop. Production of tobacco (the main cash crop in Malawi) increases drastically (11.4, 7.9, and 16.4 percent for estimated, low, and high elasticities). With more income from tobacco production, smallholder farmers are able to increase their demand for maize, cassava, and pulses. The quantities produced of maize, cassava, and pulses increase in all the three scenarios (2.2, 1.7, and 8.9 percent, respectively, at estimated elasticities). However, there will be a shift of resources away from the production of non-maize cereals and rice; the production of non-maize cereals decreases by 2.0 percent and the production of rice by 0.07 percent.

Prices of all inputs increase: At estimated elasticities, the price of fertilizer increases by 22.7 percent, the price of labor increases by 27.5 percent, and the price of oxen increases by 1.5 percent. The reason for the increase in the prices of fertilizer and oxen is that the use of these inputs increases as production of maize and tobacco increases. With a perfectly inelastic supply curve of labor, the increase in the demand for labor leads to an increase in the wage rate. The increase in the price of consumption commodities is due to an increase in their demand as household incomes rise. At estimated elasticities, total per-capita income increases by 13.2 percent.

In fact, as the production and the producer prices of maize and tobacco increase, so does the profit income earned by smallholder farmers (9.0, 5.0, and 11.5 percent, respectively, at estimated, low, and high elasticities). Also, the increased use of labor implies increased labor income for landless households.

Despite the increase in the equilibrium prices of household consumption items, the increase in its income is so strong that households are better off after than before the policy change; the equivalent variation indicates that households are better off by 6.1 percent of their initial income, at estimated elasticities. Households are better off by 4.4 percent of their initial income, at low elasticities, and by 14.2 percent, at high elasticities. Concerning the government budget deficit from agricultural operations, it is perfectly eliminated.

The MCF is below zero in all three scenarios considered, suggesting that the simultaneous elimination of all agricultural price distortions discussed in the current study actually benefits the society, for every dollar saved from the elimination of the subsidies on maize and fertilizer.

6.2.4. Policy Simulations at Constant Government Budget Deficit

In the following simulations, the maize producer and consumer subsidies, the tobacco tax, and the fertilizer subsidy adjust after a policy change so as to leave the government budget deficit unchanged[7]. I consider three simulations: (1) a complete elimination of the subsidy-induced wedge between the producer and consumer prices of maize; (2) a complete elimination of the subsidy-induced wedge, allowing maize to be imported; and (3) a complete elimination of the fertilizer subsidy. In each case, I perform sensitivity analyses considering the estimated, low, and high elasticities.

Table 6.4 shows the simulation results of the above policy changes, considering two algorithms: In the first algorithm, all subsidies and taxes adjust simultaneously, after a policy change, so as to keep the government budget deficit constant; and in the second algorithm, only one distortion adjusts, after a policy change, keeping other distortions constant. In the case in which the subsidy-induced wedge between the producer and consumer prices of maize is eliminated, the tax on tobacco decreases by 35.2 percent and the fertilizer subsidy increases by 21.7 percent, at the estimated elasticities, in order to keep the budget deficit unchanged. The increase in the subsidy on fertilizer encourages the use of this input, which increases by 10.3 percent at estimated elasticities. It also has positive effects on the production of tobacco. The production of tobacco, more fertilizer intensive than the production of maize, increases drastically, due to the combined effects

---

7 We assume that fertilizer and maize subsidies are exclusively financed by revenues from the tobacco tax.

of the increased use of fertilizer and a favorable producer price brought about by a reduction in the tax on that crop.

The production of maize mildly decreases by 2.2 percent, at the estimated elasticities. Maize production decreases by 1.1 percent at low elasticities, and by 5.5 percent at high elasticities. The decline in maize production is mainly due to the elimination of the subsidies on the maize producer and consumer prices. However, if compared to the results in the previous simulations in which the government deficit was allowed to change, the current decline in maize production is lower, because of the increase in the fertilizer subsidy, which, in return, triggers an increase in the use of fertilizer in the production of maize; hence, raising maize production.

The increase in the production of tobacco and the wage rates has obvious effects on household income: Profits increase by 5.5 percent; landless households' income increases by 25.8 percent, and the overall household income increases by 5.7 percent, at estimated elasticities. This improvement in income raises household welfare. The equivalent variation indicates that households are better off by 10.8 percent of their initial income, at the estimated elasticities.

For the case in which the subsidy-induced wedge between the maize producer and consumer prices is eliminated and the fertilizer subsidy is kept constant, the tax on tobacco production declines by 67.1 percent (compared to 35.2 percent in the previous case in which the fertilizer subsidy was allowed to change). The production of maize declines by 5.7 percent and the production of tobacco increases by more than its increase in the previous case (27.1 percent as opposed to 15.4 percent in the previous case).

For the case in which the subsidy-induced wedge between the maize producer and consumer prices is eliminated and the tax on tobacco production is kept constant, the subsidy on fertilizer increases by 71.2 percent, in order to maintain the government budget deficit at the initial level. Because of the increase in the fertilizer subsidy, the production of maize actually increases by 1.5 percent (instead of decreasing as in the previous two cases). The production of tobacco increases by only 11.2 percent (lower than the increase in the two previous cases), because maize production has also increased, which reduces the resources available for the production of tobacco. Income and household welfare also increase more (8.7 percent and 14.4 percent, respectively).

In the case in which the subsidy-induced wedge between the producer and consumer prices of maize is eliminated and maize imports are allowed, domestic production of maize actually decreases and is replaced by imports. The increase in the production of tobacco is even greater than that observed in the previous case in which maize imports were not allowed. Tobacco production increases by 24.2 percent at estimated elasticities. The increase in the household welfare is also greater than in the previous case (13.7 percent of initial income, at estimated elasticities).

In the last simulation, I consider the total elimination of the fertilizer subsidy. In that case, the government is able to reduce the tax on tobacco by 7.1 percent at estimated elasticities and to increase the subsidy-induced wedge between the producer and consumer prices of maize by 2.3 percent at estimated elasticities. The increase in the subsidy to maize leads to an increase in the domestic production of that crop (by 12.2

percent at estimated elasticities). The reduction in the tobacco tax--implying an increase in its price--leads to an increase in tobacco production.

Like in the first case of simulations, the increase in the production of maize and tobacco improve the welfare of households. The equivalent variation is 4.2 percent of the initial income.

For the case in which the fertilizer subsidy is eliminated and the tobacco tax is kept constant, the subsidy-induced wedge between the maize producer and consumer prices increases by 9.1 percent. The production of maize increases by 28.7 percent, which drains resources from the production of tobacco (the production of tobacco increases by only 5.1 percent). The increase in the production of maize and tobacco raises farmers' profits by 25.7 percent. Household welfare increases by 15.1 percent.

When the fertilizer subsidy is eliminated and the subsidy-induced wedge between the maize producer and consumer prices is kept constant, the tobacco tax can be decreased by 25.2 percent. The production of maize still increases by 18.1 percent (lower than in the previous case) and the production of tobacco increases by 19.0 percent. The overall income increases more than its increase in the previous case (33.5 percent as opposed to 27.0 percent). Household welfare increases by 16.2 percent.

6.2.5. Conclusion

A comparison across agricultural pricing policy reforms in Malawi shows a strong substitution effect between maize (the main staple crop) and tobacco (the main cash crop) productions in the smallholder sector. A reduction (elimination) of the subsidy on maize producer and consumer prices, whether taken alone or in combination with other policies (elimination of the tobacco tax and of the fertilizer subsidy), leads to a reduction in the production of maize and an increase in the production of tobacco. As the producer price of maize decreases, smallholder farmers shift inputs (including land, fertilizer, labor, and oxen) from maize production into tobacco production. The government can allow imports of maize to compensate for the reduction in the domestic production of maize; household welfare improves in this case.

In the case in which all agricultural distortions (maize subsidy, tobacco tax, and fertilizer subsidy) are simultaneously eliminated, maize production actually increases, because of the increased demand for maize as farmers' income increases.

The government can undertake pricing policy reforms that leave its budget deficit constant at the initial level. In that case, when the government eliminates the subsidy on maize producer and consumer prices, it must reduce its tax on tobacco and/or raise the fertilizer subsidy. These two last changes lead to an increase in the use of fertilizer and in the productions of tobacco and maize: The welfare of households greatly increases.

One can use the marginal cost of public funds (MCF) criterion to rank the different agricultural pricing policy reforms.

Table 6.5, below, shows that the policy of eliminating the subsidy-induced wedge between the maize producer and consumer prices, with imports of maize allowed, and the tobacco tax as well as the fertilizer subsidy maintained, yields the lowest MCF among all policy change scenarios; this policy is followed by the simultaneous removal of all agricultural price distortions (the subsidy-induced wedge between the maize producer and consumer prices, the fertilizer subsidy, and the tobacco tax). The MCF less than one implies that consumer welfare improves for every dollar saved by the government from the elimination of subsidies on maize and/or fertilizer.

The elimination of the tobacco tax, while maintaining the subsidy on the maize producer and consumer prices, and the fertilizer subsidy, comes in the third place, with an MCF of 1.4, at estimated elasticities.

In the case in which the elimination of the tobacco tax is combined with the elimination of the subsidy-induced wedge between the maize producer and consumer prices, and the government allows imports of maize, consumer welfare actually improves; the MCF is 0.9, at estimated elasticities.

The case in which only the fertilizer subsidy is eliminated, leaving other distortions (the subsidy-induced wedge between the maize producer and consumer prices, and the tobacco tax) unchanged, yields the highest MCF (2.2, at estimated elasticities).

Table 6.1. Simulation Results of Changes in Maize Pricing Policies In Malawi (Page 1 of 6)

	Base-Year Data				Wedge Completely Eliminated				50 % of the Wedge Eliminated			
	Actual	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3		Case 1	Case 2	Case 3	
Equilibrium Quantity					Est.	Est.	Low	High	Est.	Est.	Low	High
Maize	1306.8	1241.1	1414.2	1295.3	- 9.4	- 17.1	- 6.7	- 27.5	- 4.8	- 10.2	- 2.6	- 18.7
Non-maize Cereals	39.5	39.5	39.5	39.5	8.0	16.7	8.1	33.4	3.8	9.1	3.9	27.6
Cassava	129.9	129.9	129.9	129.9	- 3.4	- 9.8	- 2.0	- 15.7	- 1.1	- 5.2	- 0.9	- 9.3
Pulses	84.0	84.0	84.0	84.0	7.0	21.7	10.7	35.6	3.3	17.8	5.8	28.1
Rice	43.7	43.7	43.7	43.7	- 5.2	- 9.8	- 5.7	- 12.5	- 8.1	- 4.8	- 2.6	- 8.7
Tobacco	20.9	21.0	21.0	21.0	6.6	31.9	9.7	40.4	2.2	27.8	6.8	30.9
Other Foods	66.6	66.6	66.6	66.6	0.005	0.07	0.0	0.09	0.001	0.02	0.0	0.05
Non-Food	2274.9	2274.9	2274.9	2274.9	15.3	33.1	15.1	47.3	9.0	26.3	8.7	38.5
Import and Export												
Tobacco (Export)	20.9	21.0	21.0	21.0	6.1	31.2	9.2	39.4	1.8	27.2	6.1	30.3
Maize (Import)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Input Use												
Fertilizer	50.3	51.1	51.1	51.1	9.1	19.2	9.6	27.1	4.5	11.2	4.9	20.1
Labor	123.6	123.6	123.6	123.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxen	3.2	3.2	3.2	3.2	0.6	2.8	0.1	3.2	0.1	2.0	0.05	2.4

Table 6.1. Simulation Results of Changes in Maize Pricing Policies In Malawi (Page 2 of 6)

		Base-Year Data				Wedge Completely Eliminated				50 % of the Wedge Eliminated			
		Actual	Case 1	Case 2	Case 3	Case 1 Est.	Case 2 Est.	Case 3 Low	Case 3 High	Case 1 Est.	Case 2 Est.	Case 3 Low	Case 3 High
Equilibrium Prices													
Maize	Producer	0.8	0.6	1.1	0.7	- 10.3	- 21.4	- 13.8	- 19.1	- 6.2	- 11.2	- 6.7	- 15.7
	Consumer	0.5	0.4	0.7	0.5	9.6	39.0	26.4	18.0	15.7	18.9	15.1	5.3
Non-maize Cereals		1.6	1.6	1.6	1.6	- 9.9	- 18.2	- 17.6	- 25.1	- 5.4	- 10.3	- 9.5	- 19.9
Cassava		0.9	0.9	0.9	0.9	- 4.7	- 14.6	- 9.1	- 14.7	- 2.5	- 9.6	- 5.8	- 9.9
Pulses		1.6	1.6	1.6	1.6	8.1	25.1	18.3	32.2	4.2	18.5	12.1	25.4
Rice		1.6	1.6	1.6	1.6	- 6.9	- 13.9	- 11.2	- 10.8	- 3.5	- 8.7	- 7.1	- 6.8
Tobacco		2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Foods		2.1	2.1	2.1	2.1	11.2	31.8	8.1	15.3	6.3	24.2	4.9	10.1
Non-Food		2.2	2.2	2.2	2.2	14.3	30.1	19.2	45.3	9.6	25.2	10.5	38.1
Fertilizer		1.4	1.4	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Labor		0.8	0.8	0.8	0.8	11.1	25.4	23.3	33.2	7.6	21.1	18.9	26.2
Oxen		11.0	11.0	11.0	11.0	1.1	3.1	0.3	2.8	0.5	1.8	0.08	1.4
Per Capita Expenditure													
Maize		275.1	205.2	291.1	212.5	- 0.7	15.2	17.9	- 9.2	0.06	6.8	12.1	- 14.4
Non-maize Cereals		8.8	8.8	8.8	8.8	- 2.4	- 4.2	- 10.7	0.2	- 1.5	- 1.8	- 5.7	2.5
Cassava		29.0	29.0	29.0	29.0	- 8.1	- 23.2	- 11.1	- 1.6	- 3.8	- 14.5	- 6.9	- 18.5
Pulses		18.8	18.8	18.8	18.8	15.5	52.0	30.8	79.0	7.5	39.4	18.4	60.4
Rice		9.8	9.8	9.8	9.8	- 12.1	- 22.6	- 16.6	- 22.2	- 11.6	- 13.4	- 9.8	- 15.2
Other Foods		14.9	14.9	14.9	14.9	11.1	31.6	8.0	15.2	6.2	24.1	4.8	10.0
Non-Food		508.4	508.4	508.4	508.4	31.8	73.1	37.9	113.0	19.5	58.1	20.1	91.3
Total		864.8	794.9	880.8	802.2	21.0	45.8	26.0	65.8	10.6	30.2	18.9	44.7

Table 6.1. Simulation Results of Changes in Maize Pricing Policies In Malawi (Page 3 of 6)

	Base-Year Data				Wedge Completely Eliminated				50 % of the Wedge Eliminated			
	Actual	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3		Case 1	Case 2	Case 3	
Per Capita Income					Est.	Est.	Low	High	Est.	Est.	Low	High
Profit	1447.7	1421.2	1461.1	1439.3	- 1.4	- 3.3	- 2.7	- 5.2	- 0.6	- 1.2	- 0.7	- 1.8
Landless Labor Income	18.5	16.8	20.6	17.7	11.1	25.4	23.3	33.2	7.6	21.1	18.9	26.2
Total	1466.2	1439.0	1481.7	1457.0	- 0.7	- 2.6	- 2.1	- 3.5	- 0.2	- 0.9	- 0.4	- 1.1
Equivalent Variation	-	-	-	-	0.7	3.3	1.1	4.6	0.4	2.8	0.3	3.9
Government Deficit	49.6	46.6	53.1	48.2	- 84.4	- 93.4	- 81.7	- 95.2	- 24.6	- 39.8	- 18.3	- 59.3
MCF					1.3	1.6	1.1	1.7				

Notes: (1) Case 1: A subsidy-induced wedge equivalent to 20 percent of the maize IPP, 20 percent of tobacco tax , and of fertilizer subsidy;
Case 2: A subsidy-induced wedge equivalent to 60 percent of the maize IPP, 20 percent of tobacco tax , and 20 percent of fertilizer subsidy;
Case 3: A subsidy-induced wedge equivalent to 40 percent of the maize IPP, 20 percent of tobacco tax , and 20 percent of fertilizer subsidy.
MCF: Marginal Cost of Public Funds

Over........

Table 6.1. Simulation Results of Changes in Maize Pricing Policies In Malawi (Page 4 of 6)

	Prod. Subs. Elim. & Imports Allowed				Wedge Eliminated & Imports Allowed			
	Case 1	Case 2	Case 3		Case 1	Case 2	Case 3	
Equilibrium Quantity	Est.	Est.	Low	High	Est.	Est.	Low	High
Maize	- 11.7	- 39.2	- 19.5	- 79.6	- 9.6	- 30.5	- 15.0	- 72.3
Non-maize Cereals	9.1	18.1	1.6	12.3	8.2	16.2	1.1	11.5
Cassava	6.1	19.9	3.6	10.2	5.4	18.0	3.1	9.4
Pulses	12.2	24.3	5.8	18.3	11.4	21.8	5.0	17.1
Rice	- 2.8	- 13.0	- 1.2	- 8.7	- 2.4	- 12.4	- 0.9	- 8.1
Tobacco	11.9	43.9	23.3	56.8	12.1	42.2	21.9	55.0
Other Foods	0.06	0.1	0.04	0.12	0.01	0.9	0.02	0.1
Non-Food	21.3	54.1	29.5	87.4	20.1	53.0	28.4	84.2
Import and Export								
Tobacco (Export)	11.2	42.9	21.3	55.1	10.1	40.2	20.7	53.2
Maize (Import)	12.5	35.1	21.2	71.7	11.2	34.5	20.5	70.8
Input Use								
Fertilizer	22.5	45.5	19.6	71.1	21.3	44.2	18.6	70.1
Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxen	4.4	11.7	3.7	15.6	3.8	10.2	3.1	13.8

Table 6.1. Simulation Results of Changes in Maize Pricing Policies In Malawi (Page 5 of 6)

		Prod. Subs. Elim. & Imports Allowed				Wedge Eliminated & Imports Allowed			
		Case 1	Case 2	Case 3		Case 1	Case 2	Case 3	
Producer Prices		Est.	Est.	Low	High	Est.	Est.	Low	High
Maize	Producer	- 13.9	- 44.5	- 22.2	- 76.3	- 16.1	- 55.5	- 30.7	- 39.1
	Consumer	5.9	10.5	9.2	7.3	3.3	1.8	9.6	1.2
Non-maize Cereals		- 10.1	- 19.2	- 4.2	- 11.7	- 8.7	- 17.2	- 3.8	- 10.1
Cassava		- 8.1	- 24.9	- 8.5	- 9.3	- 7.7	- 23.6	- 7.8	- 9.1
Pulses		15.7	27.8	9.1	15.8	14.7	26.2	8.4	14.2
Rice		- 4.0	- 14.6	- 3.3	- 8.2	- 3.7	- 13.1	- 3.0	- 7.8
Tobacco		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Foods		17.7	29.4	8.8	23.4	16.6	28.1	8.0	22.1
Non-Food		29.2	51.1	39.3	86.7	27.1	50.7	37.4	88.5
Fertilizer		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Labor		25.0	53.1	37.8	72.3	22.7	50.8	35.9	71.8
Oxen		4.7	15.3	8.6	15.3	3.9	14.0	8.1	14.8
Per Capita Expenditure									
Maize		6.7	6.0	11.1	8.0	5.0	5.9	15.6	- 0.003
Non-maize Cereals		- 1.6	- 4.3	- 2.4	- 0.5	- 0.9	6.6	- 2.4	0.5
Cassava		- 2.7	- 10.2	- 5.4	- 0.3	- 3.0	8.6	- 5.2	- 0.8
Pulses		29.6	58.6	15.2	36.8	27.6	39.5	13.6	33.5
Rice		- 7.0	- 26.0	- 4.8	- 16.5	- 6.3	- 16.0	- 4.2	- 15.6
Other Foods		17.6	29.2	8.7	23.2	16.5	17.5	7.9	22.0
Non-Food		56.7	132.8	80.4	249.8	52.6	94.4	76.4	247.2
Total		20.9	72.9	20.0	96.2	25.2	34.2	28.7	67.4

Table 6.1. Simulation Results of Changes in Maize Pricing Policies In Malawi (Page 6 of 6)

	Prod. Subs. Elim. & Imports Allowed				Wedge Eliminated & Imports Allowed			
	Case 1	Case 2	Case 3		Case 1	Case 2	Case 3	
Per Capita Income	Est.	Est.	Low	High	Est.	Est.	Low	High
Profit	- 17.5	-21.9	- 31.5	- 80.6	- 6.7	- 17.6	- 11.4	- 34.2
Landless Labor Income	25.0	53.1	37.8	72.3	22.7	50.8	35.9	71.8
Total	- 15.3	-11.2	- 25.1	- 36.4	- 5.4	- 15.6	- 9.8	- 32.8
Equivalent Variation	7.5	4.6	5.6	9.1	- 4.1	- 11.4	- 1.6	- 27.4
Government Deficit	20.2	58.1	18.4	65.2	- 90.6	- 82.2	- 92.3.9	- 94.9
MCF					- 1.1	- 1.3	- 1.1	- 1.4

Notes: (2) The Quantities in the base year are in thousands of metric tons, prices of commodities are in kwacha per kilo, the labor wages are in kwacha per manday, the price for oxen services is in kwacha per hour. The per capita income and expenditure are in kwacha. And the government deficit is expressed in thousands of kwacha. All policy change effects are expressed in percentage terms.

(3) Estimated elasticities are provided in Table 5.5., chapter 5 of the current study. High and low elasticities are derived by adjusting demand parameters (Table 5.4, chapter 5) up and down in a way that respect economic theory restrictions (Section 4.2, chapter 4).

Table 6.2. Simulation Results of the Elimination of the Smallholder Tobacco Tax in Malawi (Page 1 of 3)

			Only the 20-percent Tobacco Tax is Eliminated			Both the 20-percent Tobacco Tax and the 40-percent Wedge Between Maize Producer and Consumer Prices Eliminated			Previous Case + Maize Imports are Allowed		
Equilibrium Quantity	Base Year	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Maize	1306.8	1295.3	5.4	1.1	16.7	- 19.3	- 10.7	- 59.2	- 47.3	- 18.4	- 79.6
Non-maize Cereals	39.5	39.5	- 1.0	- 0.7	- 4.1	5.4	3.1	8.1	4.1	2.1	12.3
Cassava	129.9	129.9	- 2.4	- 1.8	- 4.4	- 5.1	- 1.1	- 6.9	- 3.6	- 1.5	10.2
Pulses	84.0	84.0	- 3.2	- 1.5	- 7.8	3.4	1.2	14.3	9.7	1.2	18.3
Rice	43.7	43.7	- 2.8	- 2.2	- 5.7	- 4.5	- 2.8	- 7.0	- 5.2	- 1.8	- 8.7
Tobacco	20.9	21.0	18.1	8.2	21.6	39.6	12.2	42.9	50.1	25.2	65.1
Other Foods	66.6	66.6	0.02	0.0	0.05	0.2	0.03	0.5	0.6	0.08	0.8
Non-Food	2274.9	2274.9	12.5	7.1	20.7	47.2	15.3	54.1	30.5	13.3	81.4
Import and Export											
Tobacco (Export)	20.9	21.0	18.1	8.2	21.6	39.6	12.2	42.9	30.1	25.2	65.1
Maize (Import)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.1	21.6	71.7
Input Use											
Fertilizer	50.3	51.1	17.1	7.5	26.6	2.1	3.2	12.5	26.1	17.3	55.1
Labor	123.6	123.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxen	3.2	3.2	1.2	0.6	11.7	1.2	0.4	2.4	5.9	1.7	10.6

Table 6.2. Simulation Results of the Elimination of the Smallholder Tobacco Tax in Malawi (Page 1 of 3)

			Only the 20-percent Tobacco Tax is Eliminated			Both the 20-percent Tobacco Tax and the 40-percent Wedge Between Maize Producer and Consumer Prices Eliminated			Previous Case + Maize Imports are Allowed		
Equilibrium Quantity	Base Year	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Equilibrium Prices											
Maize Producer	0.8	0.7	7.3	2.2	18.8	- 15.9	- 13.8	- 21.5	- 36.8	- 34.0	- 32.9
Consumer	0.5	0.5	7.3	2.2	18.8	24.0	27.8	18.5	3.2	6.1	7.2
Non-maize Cereals	1.6	1.6	- 1.9	- 1.9	- 5.6	- 7.1	- 5.9	- 10.2	- 4.2	- 2.9	- 11.2
Cassava	0.9	0.9	- 3.4	- 4.8	- 4.3	- 4.7	- 2.1	- 9.9	- 5.9	- 2.7	- 9.9
Pulses	1.6	1.6	3.9	1.7	10.3	6.2	1.7	13.8	11.1	1.5	16.8
Rice	1.6	1.6	- 3.6	- 5.2	- 6.2	- 5.8	- 4.3	- 9.6	- 7.3	- 3.3	- 8.6
Tobacco	2.1	2.1	14.4	10.1	23.3	40.9	13.1	47.6	55.4	26.1	70.6
Other Foods	2.1	2.1	3.2	0.9	11.8	11.3	7.7	19.4	7.3	2.7	12.4
Non-Food	2.2	2.2	14.3	10.1	21.2	45.3	12.2	51.1	30.3	13.2	68.1
Fertilizer	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Labor	0.8	0.8	19.1	9.8	18.4	19.9	9.3	33.3	31.7	22.0	59.1
Oxen	11.0	11.0	1.5	0.9	3.1	3.5	1.4	18.3	7.6	2.7	10.3

Table 6.2. Simulation Results of the Elimination of the Smallholder Tobacco Tax in Malawi (Page 2 of 3)

			Only the 20-percent Tobacco Tax is Eliminated			Both the 20-percent Tobacco Tax and the 40-percent Wedge Between Maize Producer and Consumer Prices Eliminated			Previous Case + Maize Imports are Allowed		
Per-capita Expenditure	Base Year	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Maize	275.1	212.5	13.1.2	3.3.4	47.4	0.0	14.1	- 51.7	6.1	9.5	5.2
Non-maize Cereals	8.8	8.8	- 2.6	- 2.3	- 9.2	- 1.8	-2.7	- 2.6	0.03	- 0.6	0.02
Cassava	29.0	29.0	- 6.0	- 6.7	- 8.7	- 9.8	- 3.4	- 16.3	- 9.5	- 4.4	- 1.0
Pulses	18.8	18.8	0.4	0.02	1.5	9.6	2.8	29.9	21.7	2.6	38.0
Rice	9.8	9.8	- 6.6	- 7.6	- 11.9	- 10.3	- 7.3	- 16.2	- 12.4	- 5.4	- 16.8
Other Foods	14.9	14.9	3.1	0.8	11.7	11.2	7.6	19.3	7.2	2.6	12.3
Non-Food	508.4	508.4	28.6	17.9	46.3	113.9	29.4	132.8	70.0	28.2	204.9
Total	864.8	802.2	16.1	6.7	41.9	73.2	29.4	68.3	9.8	2.3	95.0
Per-capita Income											
Profit	1447.7	1439.3	17.1	9.7	29.1	- 9.3	- 26.0	- 5.0	- 7.2	- 4.1	- 8.5
Landless Labor Income	18.5	17.7	19.1	9.8	18.4	19.9	9.3	33.3	31.7	22.0	59.1
Total Income	1466.2	1457.0	17.7	9.9	30.4	- 8.2	- 25.1	- 4.6	- 6.1	- 3.2	- 7.2

Table 6.2. Simulation Results of the Elimination of the Smallholder Tobacco Tax in Malawi (Page 3 of 3)

			Only the 20-percent Tobacco Tax is Eliminated			Both the 20-percent Tobacco Tax and the 40-percent Wedge Between Maize Producer and Consumer Prices Eliminated			Previous Case + Maize Imports are Allowed		
	Base Year	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Equivalent Variation		-	- 2.7	- 1.0	- 3.8	1.3	0.6	2.1	- 1.0	- 0.2	-4.1
Government Deficit	49.6	48.2	24.2	14.1	39.5	- 71.3	- 50.1	- 88.2	42.5	21.4	19.8
MCF			1.4	1.2	1.8	1.3	1.2	1.6	0.9	0.7	1.0

Notes: Case 3: Simulated base-year data for the case where the subsidy-induced wedge between the producer and consumer prices of maize is equivalent to 40 percent of maize IPP; the tobacco tax is equal to 20 percent of its producer price and the fertilizer subsidy is 20 percent of its sale price.

Table 6.3. Simulation Results Of Changes in the Fertilizer Subsidy in Malawi (Page 1 of 3)

			20% Fertilizer Subsidy Eliminated			20% Fertilizer Subsidy and 40% Wedge Between Maize Prod. and Con. Prices Elim.			All Distortions in the Smallholder Agricultural Sector Eliminated		
Equilibrium Quantity	Base Year	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Maize	1306.8	1295.3	1.2	0.08	3.5	- 1.9	- 0.3	-3.8	2.2	0.6	8.7
Non-maize Cereals	39.5	39.5	1.1	0.01	1.8	5.7	2.5	9.5	- 2.0	- 1.5	- 4.5
Cassava	129.9	129.9	0.06	0.0	0.9	1.2	0.6	2.2	1.7	0.9	2.8
Pulses	84.0	84.0	2.3	0.4	4.2	10.1	4.3	18.7	8.9	2.7	10.6
Rice	43.7	43.7	- 2.7	- 1.3	- 5.5	- 0.05	- 0.01	-0.09	- 0.4	- 0.07	- 2.1
Tobacco	20.9	21.0	- 10.8	- 5.2	- 18.1	- 4.7	- 2.4	- 9.5	11.4	7.9	16.4
Other Foods	66.6	66.6	0.02	0.01	0.04	0.02	0.0	0.03	0.03	0.01	0.05
Non-Food	2274.9	2274.9	0.4	0.07	2.6	0.09	0.02	1.5	4.6	2.1	14.2
Import and Export											
Tobacco (Export)	20.9	21.0	- 10.4	- 4.8	- 17.8	- 4.2	- 1.8	- 8.9	11.4	7.9	16.4
Maize (Import)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Input Use											
Fertilizer	50.3	51.1	- 5.3	- 1.2	- 11.5	- 12.4	- 5.7	- 25.1	15.4	6.3	17.4
Labor	123.6	123.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxen	3.2	3.2	0.04	0.01	0.1	0.8	0.06	1.7	1.0	0.4	2.5

Table 6.3. Simulation Results Of Changes in the Fertilizer Subsidy in Malawi (Page 2 of 3)

			20% Fertilizer Subsidy Eliminated			20% Fertilizer Subsidy and 40% Wedge Between Maize Prod. and Con. Prices Elim.			All Distortions in the Smallholder Agricultural Sector Eliminated		
Equilibrium Quantity Equilibrium Prices	Base Year	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Maize Producer	0.8	0.7	1.3	0.1	4.3	-24.0	-25.4	-25.6	-23.2	-22.4	-27.3
Consumer	0.5	0.5	1.3	0.1	4.3	15.9	14.5	14.2	17.2	17.4	12.3
Non-maize Cereals	1.6	1.6	-1.4	-0.09	-3.6	-6.2	-4.1	-12.6	2.4	1.7	4.6
Cassava	0.9	0.9	-0.08	0.02	1.6	2.0	1.2	4.8	1.9	1.5	2.7
Pulses	1.6	1.6	2.5	0.7	4.0	15.2	7.1	21.6	10.1	4.5	10.7
Rice	1.6	1.6	2.9	2.3	5.6	0.5	0.1	0.6	0.9	0.2	1.8
Tobacco	2.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	12.1	10.8	16.5
Other Foods	2.1	2.1	1.2	0.6	2.3	1.1	0.2	2.9	0.2	0.06	1.3
Non-Food	2.2	2.2	0.7	0.1	3.3	0.1	0.09	1.4	4.9	4.6	13.1
Fertilizer	1.4	1.4	21.2	12.4	33.8	21.7	10.2	26.5	22.7	13.6	16.4
Labor	0.8	0.8	26.0	17.7	32.3	25.9	16.1	31.6	27.5	17.6	30.7
Oxen	11.0	11.0	0.04	0.02	0.08	0.7	0.08	1.9	1.5	0.8	2.1

Table 6.3. Simulation Results Of Changes in the Fertilizer Subsidy in Malawi (Page 3 of 3)

			20% Fertilizer Subsidy Eliminated			20% Fertilizer Subsidy and 40% Wedge Between Maize Prod. and Con. Prices Elim.			All Distortions in the Smallholder Agricultural Sector Eliminated		
Per-capita Expenditure	Base Year	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Maize	275.1	212.5	8.8	6.3	14.6	13.7	14.2	9.9	19.8	18.1	22.1
Non-maize Cereals	8.8	8.8	-0.01	0.2	-1.6	-0.6	-1.4	-4.0	0.7	0.5	0.2
Cassava	29.0	29.0	-0.3	-0.2	2.3	3.0	1.6	6.8	3.4	2.2	5.3
Pulses	18.8	18.8	4.7	0.9	8.2	26.6	11.5	44.1	19.7	7.2	22.2
Rice	9.8	9.8	-0.2	0.6	-0.6	0.09	-0.3	0.2	0.1	-0.2	-0.7
Other Foods	14.9	14.9	1.1	0.5	2.2	1.0	0.08	2.8	0.08	-0.06	1.2
Non-Food	508.4	508.4	1.1	0.2	6.0	0.2	0.1	2.9	9.7	6.8	29.1
Total Expenditure	864.8	802.2	3.6	2.1	8.4	2.9	2.4	5.2	13.2	8.9	25.9
Per-capita Income											
Profit	1447.7	1439.3	-1.5	-1.7	-0.7	-2.6	-1.5	-4.0	9.0	5.0	11.5
Landless Labor income	18.5	17.7	26.0	17.7	32.3	25.9	16.1	31.6	27.5	17.6	30.7
Total Income	1466.2	1457.0	-1.1	-1.3	-0.2	-1.6	-0.9	-3.7	11.4	6.5	13.5
Equivalent Variation		-	0.6	0.2	0.3	4.2	2.1	5.3	-6.1	-4.4	-14.2
Government Deficit	49.6	48.2	-3.4	-1.4	-4.3	-93.6	-93.8	-91.2	-100.0	-100.0	-100.0
MCF			2.2	1.8	2.6	1.1	0.8	1.3	-0.7	-0.5	-0.9

Notes: Case 3: Simulated base-year data for the case where the subsidy-induced wedge between the producer and consumer prices of maize is equivalent to 40 percent of maize IPP; the tobacco tax is equal to 20 percent of its producer price and the fertilizer subsidy is 20 percent of its sale price.

Table 6.4. Simulation Results Of Changes in the Maize Subsidy, Fertilizer Subsidy, and Tobacco Tax in Malawi, With Constant Government Budget Deficit (Page 1 of 6)

		Maize Wedge Elim.			Maize Wedge Elim. & Import			Fert. Subs. Elim.		
	Case 3	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast.	High Elast	Est. Elast.	Low Elast	High Elast.
Subsidy and Tax Rates										
Maize Price Wedge	20	- 100.0	- 100.0	- 100.0	- 100.0	- 100.0	- 100.0	2.3	1.7	4.1
Tobacco Tax	20	- 35.2	- 21.2	-41.0	- 30.1	- 19.0	- 38.6	-7.1	-4.5	-10.1
Fertilizer Subsidy	20	21.7	16.7	25.3	17.8	14.5	22.3	- 100.0	- 100.0	- 100.0
Equilibrium Quantity										
Maize	1295.3	- 2.2	- 1.1	- 5.5	- 4.9	- 1.3	- 10.8	12.2	3.6	28.7
Non-maize Cereals	39.5	1.1	0.1	2.8	3.7	1.5	9.7	- 2.1	- 1.3	- 4.5
Cassava	129.9	1.6	0.8	3.9	1.2	0.6	2.2	1.5	0.9	2.7
Pulses	84.0	2.1	1.4	4.2	10.3	3.3	19.4	8.9	2.7	10.6
Rice	43.7	- 8.7	- 4.3	- 15.5	- 1.5	- 1.1	- 3.9	- 1.4	- 0.7	- 3.1
Tobacco	21.0	15.4	6.8	27.8	24.2	8.8	38.9	17.4	8.9	36.4
Other Foods	66.6	0.2	0.1	0.5	1.0	0.5	3.3	0.3	0.1	0.5
Non-Food	2274.9	2.4	1.2	9.6	10.9	7.2	21.5	11.6	5.1	24.2
Import and Export										
Tobacco (Export)	21.0	15.4	6.8	27.8	14.2	4.8	28.9	17.4	8.9	36.4
Maize (Import)	0.0	0.0	0.0	0.0	10.4	5.3	21.6	0.0	0.0	0.0

Table 6.4. Simulation Results Of Changes in the Maize Subsidy, Fertilizer Subsidy, and Tobacco Tax in Malawi, With Constant Government Budget Deficit (Page 2 of 6)

			Maize Wedge Elim.			Maize Wedge Elim. & Import			Fert. Subs. Elim.	
<u>Input Use</u>										
Fertilizer	51.1	10.3	5.2	21.5	12.4	5.7	25.1	17.4	8.3	27.4
Labor	123.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxen	3.2	2.4	1.1	6.1	1.8	1.0	3.7	2.0	0.9	3.5
<u>Equilibrium Prices</u>										
Maize Producer	0.7	-22.3	-22.1	-27.7	-31.2	-30.9	-33.4	13.2	6.4	27.6
Consumer	0.5	17.7	17.9	12.3	8.8	9.1	6.6	11.2	5.4	17.6
Non-maize Cereals	1.6	-3.4	-1.9	-9.6	-5.2	-2.1	-8.6	2.4	1.7	4.6
Cassava	0.9	-0.8	-0.2	-1.6	2.1	1.2	5.8	1.9	1.5	2.7
Pulses	1.6	2.1	0.9	4.6	15.2	7.1	21.6	10.1	4.5	10.7
Rice	1.6	2.2	1.3	5.9	1.5	1.1	3.6	0.9	0.2	1.8
Tobacco	2.1	15.1	8.4	21.7	4.8	2.2	9.1	12.3	7.8	19.5
Other Foods	2.1	1.4	0.9	2.2	1.1	0.2	2.9	0.6	0.2	1.3
Non-Food	2.2	2.7	1.1	5.3	3.1	1.9	9.4	4.9	4.6	13.1
Fertilizer	1.4	-21.2	-12.4	-33.8	-21.7	-10.2	-26.5	21.7	8.6	26.4
Labor	0.8	25.8	18.2	31.9	25.9	16.6	31.7	28.0	12.8	30.6
Oxen	11.0	0.4	0.2	0.8	0.7	0.3	1.9	1.5	0.8	2.1

Table 6.4. Simulation Results Of Changes in the Maize Subsidy, Fertilizer Subsidy, and Tobacco Tax in Malawi, With Constant Government Budget Deficit (Page 3 of 6)

		Maize Wedge Elim.			Maize Wedge Elim. & Import			Fert. Subs. Elim.		
<u>Per Capita Expenditure</u>										
Maize	212.5	15.1	16.6	6.1	14.8	13.5	18.1	24.8	9.2	51.4
Non-maize Cereals	8.8	- 2.0	- 1.5	- 6.8	- 1.4	- 0.3	0.6	0.6	0.7	0.2
Cassava	29.0	0.5	0.3	2.0	3.1	1.6	7.9	3.2	2.2	5.2
Pulses	18.8	4.1	2.2	8.8	26.9	10.5	45.0	19.7	7.2	22.2
Rice	9.8	- 7.0	- 3.4	- 10.8	- 0.4	- 0.4	- 0.8	- 0.9	- 0.8	- 1.7
Other Foods	14.9	1.5	0.9	2.6	2.0	0.6	6.2	0.8	0.2	1.7
Non-Food	508.4	5.2	2.3	15.4	14.3	9.2	32.9	17.0	9.9	40.5
Total Expenditure	802.2	5.6	1.8	6.9	5.1	2.5	9.6	6.1	2.3	11.7
<u>Per Capita Income</u>										
Profit	1439.3	5.5	0.7	7.2	6.2	4.0	14.6	17.7	6.3	39.5
Landless Labor income	17.7	25.8	18.2	31.9	25.9	16.6	31.7	28.0	12.8	30.6
Total	1457.0	5.7	1.1	7.5	6.7	4.2	15.0	18.1	6.5	39.9
<u>Equivalent Variation</u>	-	- 10.7	- 1.3	- 12.5	- 13.7	- 3.1	- 16.1	- 4.2	- 1.0	- 7.2
<u>Government Deficit</u>	48.2					Constant				

Over......

Table 6.4. Simulation Results Of Changes in the Maize Subsidy, Fertilizer Subsidy, and Tobacco Tax in Malawi, With Constant Government Budget Deficit (Page 4 of 6)

	Case 3	Maize Wedge Elim. Fert. Subs. Constant	Maize Wedge Elim. Tob. Tax Constant	Fert. Subs. Elim. Tob. Tax Constant	Fert. Subs. Elim. Maize Wedge Constant
Subsidy and Tax Rates					
Maize Price Wedge	20	- 100.0	- 100.0	9.1	0.0
Tobacco Tax	20	- 67.1	0.0	0.0	-25.2
Fertilizer Subsidy	20	0.0	71.2	- 100.0	- 100.0
Equilibrium Quantity					
Maize	1295.3	- 5.7	1.5	38.7	16.1
Non-maize Cereals	39.5	1.1	3.7	- 2.1	- 2.9
Cassava	129.9	1.6	1.2	1.5	1.5
Pulses	84.0	2.1	10.3	8.9	8.2
Rice	43.7	- 8.7	- 1.5	- 1.4	- 1.8
Tobacco	21.0	27.1	11.2	5.1	9.0
Other Foods	66.6	0.2	1.0	0.3	0.3
Non-Food	2274.9	2.4	10.9	11.6	11.6
Import and Export					
Tobacco (Export)	21.0	27.1	11.2	5.1	9.0
Maize (Import)	0.0	0.0	10.4	0.0	0.0
Input Use					
Fertilizer	51.1	10.3	12.4	17.4	17.4
Labor	123.6	0.0	0.0	0.0	0.0
Oxen	3.2	2.4	1.8	2.0	2.0

Table 6.4. Simulation Results Of Changes in the Maize Subsidy, Fertilizer Subsidy, and Tobacco Tax in Malawi, With Constant Government Budget Deficit (Page 5 of 6)

	Case 3	Maize Wedge Elim. Fert. Subs. Constant	Maize Wedge Elim. Tob. Tax Constant	Fert. Subs. Elim. Tob. Tax Constant	Fert. Subs. Elim. Maize Wedge Constant
Equilibrium Prices					
Maize Producer	0.7	-29.3	-21.4	15.4	37.8
Consumer		10.7	19.7	39.2	37.8
Non-maize Cereals	1.6	-3.4	-5.2	2.4	2.3
Cassava	0.9	-0.8	2.1	1.9	1.5
Pulses	1.6	2.1	15.2	10.1	10.0
Rice	1.6	2.2	1.5	0.9	1.1
Tobacco	2.1	15.1	0.0	0.0	12.5
Other Foods	2.1	1.4	1.1	0.6	0.7
Non-Food	2.2	2.7	3.1	4.9	5.1
Fertilizer	1.4	0.0	-35.2	22.5	24.6
Labor	0.8	27.2	31.4	44.7	38.1
Oxen	11.0	0.4	0.7	1.5	1.3
Per Capita Expenditure					
Maize	212.5	9.4	21.5	93.1	60.0
Non-maize Cereals	8.8	-2.0	-1.4	0.6	0.6
Cassava	29.0	0.5	3.1	3.2	3.2
Pulses	18.8	4.1	26.9	19.7	19.7
Rice	9.8	-7.0	-0.4	-0.9	-0.9
Other Foods	14.9	1.5	2.0	0.8	0.8
Non-Food	508.4	5.2	14.3	17.0	17.0
Total Expenditure	802.2	6.1	6.3	71.7	45.2

Table 6.4. Simulation Results Of Changes in the Maize Subsidy, Fertilizer Subsidy, and Tobacco Tax in Malawi, With Constant Government Budget Deficit (Page 6 of 6)

	Case 3	Maize Wedge Elim. Fert. Subs. Constant	Maize Wedge Elim. Tob. Tax Constant	Fert. Subs. Elim. Tob. Tax Constant	Fert. Subs. Elim. Maize Wedge Constant
Per Capita Income					
Profit	1439.3	7.6	8.1	25.7	31.1
Landless Labor income	17.7	27.2	31.4	44.7	38.1
Total	1457.0	8.3	8.7	27.0	33.5
Equivalent Variation	-	- 11.3	- 14.4	- 15.1	- 16.2
Government Deficit	48.2		Constant		

Notes: Case 3: Simulated base-year data for the case where the subsidy-induced wedge between the producer and consumer prices of maize is equivalent to 40 percent of maize IPP; the tobacco tax is equal to 20 percent of its producer price and the fertilizer subsidy is 20 percent of its sale price.

Table 6.5. Marginal Costs of Public Funds (MCF) of Agricultural Pricing Policy Changes in Malawi

	Subsidy-Induced Wedge Completely Eliminated					Wedge Completely Eliminated and Imports Allowed				
	Case 1	Case 2	Case 3			Case 1	Case 2	Case 3		
	Est.	Est.	Low	Est.	High	Est.	Est.	Low	Est.	High
EV	0.7	3.3	1.1	2.4	4.6	- 4.1	- 11.4	- 1.6	- 16.3	- 27.4
MCF	1.3	1.6	1.1	1.3	1.7	- 1.1	- 1.3	- 1.1	- 1.2	- 1.4

Table 6.5. Marginal Costs of Public Funds (MCF) of Agricultural Pricing Policy Changes in Malawi (Continued)

	Only Tobacco Tax Eliminated			Previous case + Maize Wedge Eliminated and Imports Allowed			Only Fertilizer Subsidy Eliminated			All Price Distortions Eliminated		
	Case 3			Case 3			Case 3			Case 3		
	Est. Elast.	Low Elast.	High Elast.	Est. Elast.	Low Elast	High Elast.	Est. Elast	Low Elast	High Elast	Est. Elast.	Low Elast.	High Elast.
EV	- 2.7	- 1.0	- 3.8	- 1.0	- 0.2	- 4.1	0.6	0.2	0.3	- 6.1	- 4.4	- 14.2
MCF	1.4	1.2	1.8	0.9	0.7	1.0	2.2	1.8	2.6	- 0.7	- 0.5	- 0.9

Note: The EV's are expressed in percent of the initial income

CHAPTER 7. CONCLUSIONS: POLICY IMPLICATIONS AND FUTURE RESEARCH

Malawi's agricultural sector presents a special structure among Sub-Saharan African Countries; it is divided into a rapidly growing estate subsector accounting, on the average, for 95 percent of the country's total exports, and a stagnant smallholder subsector. More than 90 percent of the rural population in Malawi live in the smallholder sector, where nearly 45 percent of households have enough land for either actual or potential self-sufficiency or production surplus for the market and the rest (55 percent) do not have enough land and therefore rely on wage employment for income and on the market for food. The smallholder agricultural sector is characterized by extreme poverty; it also experiences increasing demographic pressure.

Given the importance of the smallholder agricultural sector in the lives of the rural population in Malawi, the government has been active in formulating policies intended to protect that sector. The most important of these policies undertaken by the Malawian government are price controls of some identified agricultural inputs and outputs. Specifically, the government has set the producer price of maize above its import parity price (IPP); this constitutes an implicit subsidy on the producer price of maize. At the same time, it has set the maize consumer price below its import parity price (IPP); this is a subsidy on the consumer price of maize. The objective is to discourage external trade on this crop for food security and self-sufficiency reasons. Also, the government of Malawi has set prices of smallholder tobacco (the main cash crop, primarily exported) below the export parity prices; this is a tax on smallholder tobacco production. Finally, the fertilizer prices offered to smallholder farmers by the government were below the import parity prices and the private market prices; this constituted a subsidy on smallholder fertilizers.

The economic theory shows that price controls lead to production and consumption inefficiencies because of misallocation of the society's resources. It is in this perspective that the World Bank and the IMF have proposed, in their economic adjustment program for Malawi, a total removal of agricultural price controls. Thus, one question comes in mind: What are the effects of the removal of agricultural price controls on the Malawian economy, in general? The current study focuses on the effects of such a removal on the smallholder agricultural production, on government budget deficits from agricultural operations, and on household welfare. It uses a computational general equilibrium–also called "multi-market"– analysis for this purpose.

A computational general equilibrium (CGE) model extends a single-market analysis by including income distribution and some other general equilibrium considerations. For example, it allows substitution possibilities in production and consumption. On the production side, substitution between crops leads to higher price elasticities. On the demand side, substitution allows the researcher to account for spillover effects of related markets.

A CGE (multi-market) analysis uses models of farm-household behavior as its basic building blocks. These models allow a microeconomic investigation of both production and consumption response to exogenous price changes.

In the current study, smallholder farmers maximize a restricted Cobb-Douglas profit function, with a constraint of fixed total available land, given input and output prices. Thus, smallholder farmers allocate available land between different crops that they grow in an optimal manner (i.e., the marginal product value of land is equalized across crops grown). For the characterization of the Malawian consumption demand structure, I use the Almost Ideal Demand System. Then, I specify market-clearing conditions for each input used and each output produced; it is through these conditions that market equilibria are reached.

Three main data sets are available for the specification of smallholder agricultural production and consumption demand behavioral parameters in Malawi: The National Sample Survey of Agriculture (NSSA) conducted by the Ministry of Agriculture during the 1992/93 agricultural season, the Household Expenditure and Small-Scale Economic Activity (HESSEA) survey conducted by the National Statistical Office in 1990/91, and the Malawi Maternal and Child Nutrition (MMCN) survey conducted by the "Cornell Food and Nutrition Policy Program" in 1987/89.

The NSSA provides data on smallholder agricultural productions; specifically, it allows us to estimate the average household crop production per year, and crop yields per hectare. It also contains information on fertilizer and oxen use. For labor use, I obtain information from a farm-management study conducted by the agricultural Research and

Extension Trust of Malawi (1995); it provides information on labor requirements (in mandays) for a hectare of each crop grown by a typical smallholder farmer in Malawi.

The HESSEA survey provides data on household consumption demand and expenditure, on household income, and on household demographic characteristics such as the number of its members and their age, their gender, etc. I use the MMCN data to estimate the household own-consumption per each crop grown.

Simulation of the effects of different policy changes shows the following results: (1) The elimination of the subsidy-induced wedge between the maize producer and consumer prices, while maintaining the subsidy on the fertilizer price and the tax on smallhoder tobacco production, leads to a reduction in the production of maize. The production of tobacco and non-maize cereals increase; and the use and price of fertilizer also increases, because of increased demand from tobacco production. The producer price of tobacco increases, while that of maize decreases (the maize consumer price actually increases). Household welfare is reduced because of diminished production of maize and the increase in its price. In fact, maize is consumed by almost 99 percent of Malawian households, which spend around 22 percent of their budget on this staple crop.

If the government allows part of maize consumed in Malawi to be imported, local production of maize will drop even more and will be replaced by imports. Tobacco production will also increase more. Briefly, all the effects mentioned in the first simulation will be magnified.

The elimination of the smallholder tobacco tax, while maintaining the subsidy on maize and fertilizer prices, implies that the production of subsidized crops (mainly maize) increases, while that of non-subsidized crops (non-maize cereals, cassava, pulses, and rice) decreases. The supply of tobacco increases, responding to an increase in its producer price after the elimination of the tax. The consumer price of maize increases because of increased demand for maize, and the producer price of tobacco increases, because of the elimination of the tax on tobacco.

Because of increases in the production of maize and tobacco, input use (fertilizer, labor, and oxen) rises; labor incomes also rise. The combined effect is a rise in household welfare. If the above policy is combined with an elimination of the subsidy-induced wedge between maize producer and consumer prices, the production of maize decreases instead of increasing; households end up worse off with the policy change. The government deficit from agricultural operations drops.

The last sets of policy changes concern the subsidy on the fertilizer price offered to smallholder farmers. If only the fertilizer subsidy is eliminated, while the subsidy on maize prices and the tax on tobacco production are maintained, the production and price of maize increase, but not very much (between 1 to 4 percent relative to base-year values). The production of tobacco drops, because fertilizer has become expensive, and household welfare improves a little bit, because of the increase in the production of maize. But, because the government still subsidizes maize production and consumption, its budget deficit increases with the policy change.

The total elimination of all agricultural price distortions (the subsidy-induced wedge between maize producer and consumer prices, the tax on smallholder tobacco production, and the subsidy on fertilizer prices) yields the most astonishing results: In all scenarios considered, because the production and the price of tobacco increase, farmers reallocate their resources in favor of that crop. Production of tobacco (the main cash crop in Malawi) increases drastically. With more income from tobacco production, smallholder farmers are able to buy fertilizer and improved varieties of maize and other crops' seeds. Production of maize, cassava, and pulses increase in all three scenarios. However, there will be a shift of resources away from the production of non-maize cereals and rice; their production decreases.

Prices of inputs increase, the reason for this increase being that the use of these inputs increases as production of maize and tobacco increases. The increase in the price of consumption commodities is due to an increase in their demand as household incomes rise.

In fact, as production and prices of maize and tobacco increases, so does the profit income earned by smallholder farmers. Also, the increased use of labor implies increased labor income for landless households.

Despite the increase in the equilibrium prices of household consumption items, the increase in income is so strong that households are better off after the policy change. Concerning the government budget deficit from agricultural operations, it is perfectly eliminated. It is interesting to see that, keeping the government deficit constant at the initial (base-year) level, every dollar spent by the government on subsidies improves household welfare, as the productions of maize and tobacco increase.

Using the MCF criterion to rank policies, one can see that the policy of eliminating the subsidy-induced wedge between the maize producer and consumer prices, with imports of maize allowed, and the tobacco tax as well as the fertilizer subsidy maintained, yields the lowest MCF among all policy change scenarios; this policy is followed by the simultaneous removal of all agricultural price distortions (the subsidy-induced wedge between the maize producer and consumer prices, the fertilizer subsidy, and the tobacco tax). The MCF less than one implies that consumer welfare improves for every dollar saved by the government from the elimination of subsidies on maize and/or fertilizer.

The elimination of the tobacco tax, while maintaining the subsidy on the maize producer and consumer prices, and the fertilizer subsidy, comes in the third place, with an MCF of 1.4, at estimated elasticities.

In the case in which the elimination of the tobacco tax is combined with the elimination of the subsidy-induced wedge between the maize producer and consumer prices, and the government allows imports of maize, consumer welfare actually improves; the MCF is 0.9, at estimated elasticities.

The case in which only the fertilizer subsidy is eliminated, leaving other distortions (the subsidy-induced wedge between the maize producer and consumer prices, and the tobacco tax) unchanged, yields the highest MCF (2.2, at estimated elasticities).

Economically speaking, it is clear that the Malawian society will be better off by reforming all distortions of prices that exist in the smallholder agricultural sector, instead of undertaking isolated policy changes, while leaving others unchanged. However, when it comes to policy-making decisions, especially toward agriculture, economic efficiency is not the only consideration. For example, the double subsidy on maize producer and consumer prices was instituted in Malawi for self-sufficiency and food security. Even the guardian of world free trade--the World Trade Organization (WTO)--grants waivers and exemptions of different kinds to the agricultural sector; the reason for these exemptions is that agriculture is viewed by both politicians and economists as being a very sensitive sector involving an interplay of economics, politics, etc. In fact, to date the agricultural sector is almost untouched by the liberalization brought by the WTO. The reason is that all countries have recognized the unique status agriculture holds, even in the most industrialized countries of this world. To give a few examples, the USA maintains quotas on imports of textiles from Mauritius and Kenya (permissible under the Agreement on Textiles and Clothing) in order to protect its cotton farmers from the cheap imports that would ensue as a result of lower labor costs in the two competing countries. In another example, the European Community (EC) and South Africa are locked in negotiations over a Free Trade Agreement because the EC wants to exclude certain fruits and vegetables from the list, in order to protect its farmers from the onslaught of cheaper imports from South Africa again necessitated by low labor costs.

The Malawian government needs to define its objectives clearly before undertaking any policy changes. If their goals are self-sufficiency and food security in maize, it will be better to maintain the maize subsidies and eliminate the tobacco tax and the fertilizer subsidy; but, if their goal is economic efficiency, then total elimination of all agricultural price distortions will be more beneficial to the Malawian society than an isolated policy change.

Malawi needs to examine the various options available to it under various multilateral arrangements that would permit it to maintain subsidies on agriculture, before it makes policy decisions in these areas. Of course, subsidies need to be carefully monitored to ensure that they are serving the purpose for which they were intended. Otherwise, they could just result in waste. It is estimated that in the EC, there is approximately 20 to 40 percent over capacity in agriculture (depending on the products), due to subsidies.

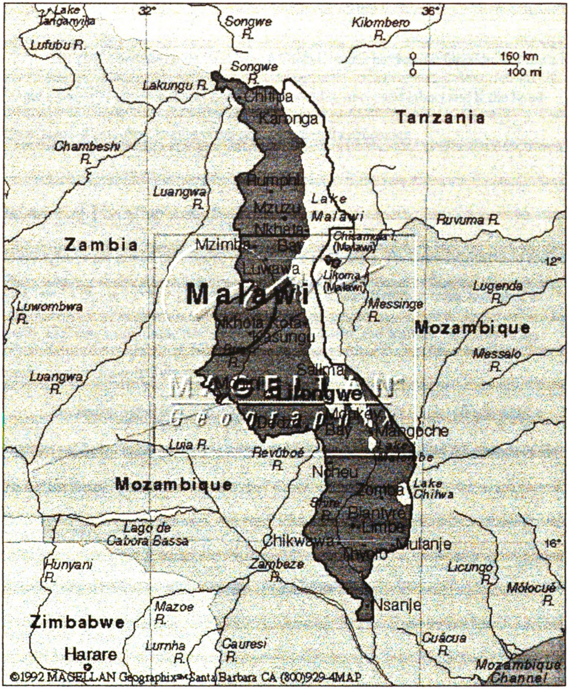
The results of the current study, on which I base my conclusions, must be interpreted with some caution, as the study leaves out some economic variables that may be very important in determining the effects of the policy changes examined above. The inclusion of these variables may be important for future research. One may wonder how the above simulation results will change, if we take into consideration issues related to agricultural credit, estate production, exchange rate, border trade, input and output distribution, and others.

For example, as I said earlier, the elimination of the fertilizer subsidy is expected to raise the farm-gate price of fertilizer. However, most smallholder farmers get their fertilizer on credit with a promise to reimburse before the next agricultural season. If for some reasons this credit system fails, it may be true that the demand for fertilizer will decrease so much that prices of fertilizer will actually decrease after the elimination of the subsidy. Exchange rate devaluation is supposed to favor exports against imports; while I found in the current study that allowing maize imports will lead to a reduction in local maize production, with exchange rate devaluation, it may be true that export opportunities are so great that local production of maize actually increases. Border trade between Malawi and its neighboring countries may be so great as to eliminate the government policy of self-reliance. Of course, all these issues need further research in order to determine their effects on the smallholder agricultural production, on the government deficit, and on household welfare.

Finally, the availability of better data may help to relax some of the assumptions of the current study and improve the simulation results of different policy changes. Among others, with better data, one can analyze the distributional issues of policy changes between urban and rural households on one hand, and between rich and poor households on the other hand. With better data, one can also use more flexible production functions that allow complementarity of some inputs in production.

APPENDICES

Appendix 1
Map of Malawi



Appendix 2A
Mathematical derivation of the parameters of the profit function used in the current study

The profit function is derived from a Cobb-Douglas production function. Let use z to denote a vector of variable inputs (fertilizer, pesticides, oxen, and labor) and K the fixed input (land). The Cobb-Douglas production function f(x) becomes:

$$f(z,K) = A\prod{}^{I}{}_{i=1} z_i^{\alpha_i} K^{\beta}, \quad \alpha_i, \ \beta > 0$$

where a_i and b are inputs' cost shares in the crop n production. For constant returns to scale to hold, $b = 1 - \Sigma^{I}_{i=1} \alpha_i$. $i = 1,..., I$ denotes the variable inputs (fertilizer, oxen, and labor in North; fertilizer, oxen, pesticides, and labor in the Centre; and fertilizer and labor in the South). In what follows, I am going to use the highest i (4).

The farmer's problem is to maximize the short-run profits (Π) by choosing the z variables subject to input and output prices, the production function, and the amount of the fixed input (land). That is,

$$\underset{z}{Max}\, \Pi = Pf(z,K) - \sum_{i=1}^{4} w_i z_i$$

The normalized restricted profit function Π / P_n^* becomes

$$\underset{z}{Max} \frac{\Pi}{P^*_n} = f(z,K) - \sum_{i=1}^{4} \frac{w_i}{P^*_n} z_i$$

The first-order condition from profit maximization is

$$\frac{A\alpha_i \prod_{i=1}^{4} z_i^{\alpha_i} K^{\beta}}{z_i} = w^{\bullet}_i, \text{ where } w^{\bullet}_i = \frac{w_i}{P^{\bullet}_n}$$

The i subscript represents variable inputs. For clarity, we omit the farmer's subscript (t).

Taking natural logarithms, we get

$$\sum_{k=1}^{4} \alpha_i \ln z_i - \ln z_i = \ln\left(\frac{w^{\bullet}_i}{\alpha_i}\right) - \ln\left(AK^{\beta}\right) \quad (i = 1,\ldots,4).$$

This system of linear equations can be written in matrix form as follows:

$$\begin{bmatrix} \alpha_1 - 1 & \alpha_2 & \alpha_3 & \alpha_4 \\ \alpha_1 & \alpha_2 - 1 & \alpha_3 & \alpha_4 \\ \alpha_1 & \alpha_2 & \alpha_3 - 1 & \alpha_4 \\ \alpha_1 & \alpha_2 & \alpha_3 & \alpha_4 - 1 \end{bmatrix} \begin{bmatrix} \ln z_1 \\ \ln z_2 \\ \ln z_3 \\ \ln z_4 \end{bmatrix} = \begin{bmatrix} \ln\left(\frac{w^{\bullet}_1}{\alpha_1}\right) - \ln\left(AK^{\beta}\right) \\ \ln\left(\frac{w^{\bullet}_2}{\alpha_2}\right) - \ln\left(AK^{\beta}\right) \\ \ln\left(\frac{w^{\bullet}_3}{\alpha_3}\right) - \ln\left(AK^{\beta}\right) \\ \ln\left(\frac{w^{\bullet}_4}{\alpha_4}\right) - \ln\left(AK^{\beta}\right) \end{bmatrix}$$

Let us use B to denote the left-hand matrix of alphas. We can solve the above system by finding the inverse of B (e.g., B^{-1}).

$$B^{-1} = -\left(1-\sum_{i=1}^{4}\alpha_i\right)^{-1}\begin{bmatrix} \left(1-\sum_{i=1,i\neq 1}^{4}\alpha_i\right) & \alpha_2 & \alpha 3 & \alpha 4 \\ \alpha_1 & \left(1-\sum_{i=1,i\neq 2}^{4}\alpha_i\right) & \alpha 3 & \alpha 4 \\ \alpha_1 & \alpha_2 & \left(1-\sum_{i=1,i\neq 3}^{4}\alpha_i\right) & \alpha 4 \\ \alpha_1 & \alpha_2 & \alpha 3 & \left(1-\sum_{i=1,i\neq 4}^{4}\alpha_i\right) \end{bmatrix}$$

We can now use B^{-1} to solve for the optimal value of $\ln z_i$ ($\ln z^*_i$):

$$\ln z_i^* = -\left(\frac{\alpha_i}{1-\sum_{j=1}^{4}\alpha_j}+1\right)\ln\left(\frac{w^*_i}{\alpha_i}\right) - \sum_{j=1,j\neq i}^{4}\frac{\alpha_j}{1-\sum_{j=1}^{4}\alpha_j}\ln\left(\frac{w_j^*}{\alpha_j}\right) + \left(\frac{1}{1-\sum_{j=1}^{4}\alpha_j}\right)\ln\left(AK^{\beta}\right)$$

This implies that

$$z_i^* = \left(\frac{w^*_i}{\alpha_i}\right)^{-\left[\frac{\alpha_i}{1-\mu}+1\right]}\prod_{j=1,j\neq i}^{4}\left(\frac{w^*_j}{\alpha_j}\right)^{-\frac{\alpha_j}{1-\mu}} A^{\frac{1}{1-\mu}}K^{\frac{\beta}{1-\mu}}, \text{ where } \mu = \sum_{i=1}^{4}\alpha_i$$

After substitution of the values of z_i^* in the production function:

$$Y^* = A\prod_{i=1}^{4} z_i^{*\alpha_i}K^{\beta} = A^{\frac{1}{1-\mu}}\prod_{i=1}^{4}\left(\frac{w^*_i}{\alpha_i}\right)^{-\frac{\alpha_i}{1-\mu}}K^{\beta}$$

Therefore, the normalized restricted profit function $\Pi^*(w^*_i, K)$ is:

$$\Pi^*\left(w_i^*, K\right) = Y^* - \sum_{i-1}^{4} w_i^* z_i^* = A^{\frac{1}{1-\mu}}(1-\mu)\prod_{i=1}^{4}\left(\frac{w_i^*}{\alpha_i}\right)^{-\frac{\alpha_i}{1-\mu}}K^{\frac{\beta}{1-\mu}}$$

This profit function is not only a function of the input and output prices, but also of the quantities of the fixed input (land) used in the production of commodity n.

Taking the log of the above profit function, one gets the form used in the current analysis:

$$\ln \Pi^{*} = \alpha_{on} + \sum_{i=1}^{4} \alpha_{in} \ln w_i^{*} + \beta_n \ln K, \quad \text{where}$$

$$\alpha_{on} = (1-\mu)^{-1} \ln A + \ln(1-\mu) + \sum_{i=1}^{4} \frac{\alpha_i}{1-\mu} \ln \alpha_i$$

$$\alpha_{in} = -\frac{\alpha_i}{1-\mu},$$

$$\beta_n = \frac{\beta}{1-\mu}$$

Appendix 2B
Mathematical derivation of the Almost Ideal Demand System (AIDS)

The AIDS model assumes an expenditure function of the form

$$\ln c(p,u) = a(p) + ub(p)$$

Where a(.) and b(.) are functions to be defined, p is a price vector and u is a utility function.

Let a(.) and b(.) functions be approximated by:

$$a(p) = \alpha_o + \Sigma_{i=1}^{n} \alpha_i \ln p_i + \frac{1}{2} \Sigma_{i=1}^{n} \Sigma_{j=1}^{n} \gamma_{ij}^{*} \ln p_i \ln p_j$$

$$b(p) = \beta_0 \Pi_{i=1}^{n} p_i^{\beta_i}$$

Define w_i as the budget share of commodity i, then applying Sheppard's lemma to the expenditure function, one gets:

$$\begin{aligned} w_i &= \frac{\partial \ln c(p,u)}{\partial \ln p_i} \\ &= \frac{\partial c(p,u)}{\partial p_i} * \frac{p_i}{y} \\ &= \frac{x_i^m(p,y)\, p_i}{y} \end{aligned}$$

Given the assumed forms for a(p) and b(p), one gets (Lesser, C.E.V., [1963]:

$$\frac{\partial a(p)}{\partial \ln p_i} = \alpha_i - \Sigma_{j=1}^{n} \gamma_{ij} lnp_j$$

$$\frac{\partial b(p)}{\partial lnp_i} = \beta_i b(p)$$

where $g_{ij} = 1/2(g_{ij}^{*} + g_{ji}^{*})$. Using these two derivatives and the definition of w_i, we get

$$w_i = \alpha_i + \Sigma_{j=1}^{n} \gamma_{ij} lnp_j + \beta_i u b(p)$$

From the definition of the expenditure (cost) function given above,

$$u = [lny - a(p)] / b(p)$$

$$Implies \quad w_i = \alpha_i + \Sigma_{j=1}^{n} \gamma_{ij} lnp_j + \beta_i \ln(y / P)$$

where P is a price index defined by:

$$lnP = a(p) = \alpha_o + \Sigma_{j=1}^{n} \alpha_j lnp_j + 1/2\, \Sigma_{j=1}^{n} \Sigma_{i=1}^{n} \gamma_{ij} lnp_j lnp_i$$

The AIDS associated with this expenditure function is as follows:

$$\frac{P_i C_i}{Y} = \alpha_i + \beta_i \ln(\frac{Y}{P}) + \lambda_i lnN + \Sigma_j \gamma_{ij} lnP_j$$

P_i - Price of good i

C_i - Quantity purchased of good i

Y - Household income

$$P = \text{Exp}[\alpha_0 + \Sigma \alpha_i \text{Log}\, P_i + \Sigma_i \Sigma_j \gamma_{ij} (\text{Log}\, P_i)(\text{Log}\, P_j)]$$

N - Number of household members

For empirical study, the price index P is approximated by an observable price index; e.g., the Stone price index:

$$lnP = \Sigma_{j=1}^{n} w_j lnp_j$$

where w_j is as defined above (the jth commodity expenditure share).

Appendix 3A
Descriptive Data on the Malawian Smallholder Agricultural Production

Table A.1. Estimated Smallholder Farming Population and Households in 1993 (in '000)

ADD	Total Population	Total farmers	Proportion of farmers	Total farming Households	Average household size	Units of labor per household
Malawi	9700.5	7700.8	79.5	1561.4	4.9	2.7
Karonga	297.2	279.3	94.0	52.5	5.3	2.9
Mzuzu	809.8	6628.2	77.6	117.0	5.4	3.2
North	**1170.0**	**907.5**	**82.0**	**169.5**	**5.4**	**3.1**
Kasungu	1233.6	873.9	70.8	164.8	5.3	2.8
Salima	447.3	446.0	99.7	90.9	4.9	2.56
Lilongwe	2102.5	1489.9	70.9	310.6	4.8	2.6
Center	**3783.4**	**2809.8**	**74.3**	**566.3**	**5.0**	**2.7**
Machinga	1759.3	1589.0	90.3	335.1	4.7	2.6
Blantyre	2418.0	1885.9	78.0	390.0	4.8	2.7
Ngabu	632.8	508.6	80.4	100.6	5.1	2.7
South	**4810.1**	**3983.6**	**82.8**	**825.7**	**4.9**	**2.7**

Source: Government of Malawi, "The National Sample Survey Agriculture (1992/93): Household Composition Report," Zomba, Malawi, forthcoming.

Table A.2. National Land Use per Crop and ADD, in 1992/93 (Thousands of Hectares)

Crop	Malawi	Karonga	Mzuzu[a]	North	Kasungu	Salima	Lilongw	Center	Machinga	Blantyre	Shire Valley	South
Maize												
Local	498.52	9.21	47.73	56.94	88.26	37.12	93.16	218.54	112.41	76.25	34.38	223.04
Hybrid	273.51	4.25	30.77	35.02	58.64	118.48	58.19	235.31	59.20	38.15	5.83	103.18
Composite	2.47	0.23	0.41	0.64	-	-	-	-	0.18	1.61	0.04	1.83
Groundnuts	58.18	1.36	6.31	7.67	20.20	4.28	12.61	37.09	9.54	3.53	0.35	13.42
Rice												
Local	11.88	4.93	0.12	5.05	0.01	0.3	-	0.31	4.16	2.01	0.35	6.52
Hybrid	6.60	1.66	0.01	1.67	-	2.42	-	2.42	1.50	0.16	0.85	2.51
Pulses	108.79	3.59	7.96	11.55	2.66	0.41	43.52	46.59	10.67	35.28	1.70	47.65
Millet	21.95	0.56	3.90	4.46	0.34	1.67	2.76	4.77	1.58	1.23	9.91	12.72
Sorghum	23.64	-	-	-	0.08	0.09	0.04	0.21	2.85	8.23	12.35	23.43
Cassava	29.77	6.25	4.34	10.59	0.73	6.82	0.46	8.01	3.38	7.71	0.08	11.17
Sunflower	12.17	-	1.62	1.62	4.63	0.14	0.59	5.36	0.66	4.53	-	5.19
Tobacco												
Burley	48.97	.05	0.43	0.48	24.67	1.11	18.01	43.79	3.70	0.98	0.02	4.70
Other	12.83	0.08	0.52	0.60	5.60	0.22	4.56	10.38	1.39	0.56	-	1.95

Notes: [a] Karonga, Mzuzu, Kasungu, Salima, Lilongwe, Machinga, Blantyre, and Shire Valley are Agricultural Development Divisions that constitute the three regions of the country (North, Center, and South).

Source: Government of Malawi, Ministry of Agriculture (1996).

Table A.3. National Crop Productions and Yields by Regions, in 1992/93 (Thousand Tons)

Crop	North					Center						South			
	Mal.	Kar.	Mzuzu	Tot.	Yield	Kas.	Sal.	Lil.	Tot.	Yield	Mach.	Blant.	S. Valley	Total	Yield
Maize															
Local	701.64	14.34	74.661	89.00	1.56	138.17	49.43	136.73	324.33	1.48	146.21	90.68	51.47	288.36	1.29
Hybrid	601.23	9.06	78.37	87.43	2.50	152.55	34.99	145.35	332.89	1.41	110.10	60.73	10.08	180.91	1.75
Composite	3.83	0.36	0.73	1.09	1.70	-	-	-	-	-	0.49	2.16	0.09	2.74	1.50
Groundnut	34.29	0.45	2.46	2.91	0.38	14.54	2.91	9.09	26.54	0.72	2.95	1.77	0.12	4.84	0.36
Rice															
Local	27.07	14.90	0.32	15.22	3.01	-	0.64	-	0.64	2.06	8.46	2.08	0.67	11.21	1.72
Hybrid	16.63	5.91	-	5.91	3.54	-	7.65	-	7.65	3.16	2.01	0.20	0.86	3.07	1.22
Pulses	49.72	3.56	2.95	6.51	0.56	3.30	0.49	18.80	22.59	0.48	10.75	8.64	1.23	20.62	0.43
Millet	16.98	1.06	5.32	6.38	1.43	0.09	0.47	0.98	1.54	0.32	0.56	0.22	8.28	9.06	0.71
Sorghum	15.85	-	-	-	-	0.10	0.04	-	0.14	0.67	1.54	3.79	10.37	15.7	0.67
Cassava[a]	129.91	19.56	32.55	52.11	4.92	2.12	39.90	1.31	43.33	5.41	12.17	21.90	0.40	34.47	3.09
Sunflower	6.66	-	1.03	1.03	0.64	2.77	0.08	0.33	3.18	0.59	0.42	2.03	-	2.45	0.47
Tobacco[a]															
Burley	55.96	0.08	0.61	0.69	1.44	24.65	1.59	22.51	48.75	1.11	5.44	1.06	0.02	6.52	1.38
Other	20.42	0.04	0.27	0.31	0.52	16.24	0.12	2.74	19.10	1.84	0.71	0.3	-	1.01	0.52

Note: [1] Yields per hectare are estimated using data from Tables A2 and A3 above
[2] Other tobaccos comprise the dark-fired (NDDF and SDDF), the sun-air, and the oriental varieties.

Source: Government of Malawi, Ministry of Agriculture, (1996) "Estimates from the NSSA (1992/93)."

Table A.4. Median and Total Household Input Use in the Malawian Smallholder Agriculture (1992/93)

	Median Household Input Use									Total Household Input Use					
	North				Center			South		North			Center		South
crop	Land	Fert.	Oxen	Labor	Land	Fert.	Labor	Land	Labor	Fert.	Oxen	Labor	Fert	Labor	Labor
Loc. Maize	0.33	0.00	5.50	23.10	0.40	0.00	39.60	0.44	27.50	0.00	1491.2	6263.4	0.00	24039	24039
Hyb. Maize	0.50	50.00	5.75	18.25	0.40	42.5	24.82	0.44	16.79	7004.0	805.46	2556.5	29414	17178	17178
Co. Maize	0.22	1.25	5.75	14.30	-	-	-	0.38	13.00	3.64	16.73	41.60	-	-	266.20
Local Rice	0.31	0.00	0.00	14.30	-	-	-	0.34	18.20	0.00	0.00	656.50	-	-	477.00
Hyb.Rice	0.50	0.00	0.00	11.00	0.13	0.00	4.40	0.12	13.20	0.00	0.00	183.70	0.00	266.20	21.00
Millet	0.15	0.00	2.50	15.00	0.02	0.00	5.00	0.14	12.00	0.00	74.35	446.00	0.00	477.00	428.80
Sorghum	-	-	-	-	0.13	0.00	5.00	0.07	12.00	-	-	-	0.00	21.00	664.83
Sunflower	0.06	0.00	3.00	7.20	0.06	0.00	19.20	0.05	3.20	0.00	54.00	129.60	0.00	428.80	3261.30
Cassava	0.34	0.00	0.00	8.30	0.40	0.00	11.62	0.40	18.26	0.00	0.00	878.97	0.00	664.83	6305.30
Pulses	0.09	0.00	2.00	3.00	0.07	0.00	2.80	0.05	9.80	0.00	462.00	909.50	0.00	3261.3	11692
Groundnut	0.05	0.00	4.00	20.40	0.09	0.00	23.80	0.04	5.30	0.00	255.64	1303.9	0.00	6305.3	2076.0
Bur. Tob.	-	-	-	-	0.11	83.33	80.10	-	-	-	-	-	12164	11692	-
Other Tob.	-	-	-	-	0.28	37.50	46.00	-	-	-	-	-	1692	2076.0	-
Total										**7007.6**	**3159.4**	**13267**	**43270**	**66407**	**66407**

Notes: (1) Land is measured in hectares, labor services in mandays, fertilizer in metric kilograms, and oxen services in hours.

Source: 1) National Sample Survey of Agriculture (1992/93)
2) Government of Malawi, Agricultural Research and Extension Trust

Table A.5. Actual Household Median Smallholder Crop Production (in KGs), Crops' Producer Prices and Inputs' Sale Prices (in MK) in Malawi (1992/93)

Crop	Crop Production and Input Use			Crop Producer and Input Sale Prices		
	North	Center	South	North	Center	South
Local Maize	327.6	444.0	270.9	0.49	0.55	0.56
Hybrid Maize	550.0	451.2	262.5	0.49	0.55	0.56
Composite Maize	170.0	-	150.0	0.49	0.55	0.56
Groundnuts	57.0	115.2	14.4	4.47	3.95	3.57
Local Rice	270.9	-	137.6	2.56	2.69	2.71
Hybrid Rice	460.2	144.2	70.2	2.56	2.69	2.71
Pulses	56.0	72.0	38.7	2.22	2.46	3.00
Millet	128.7	16.0	99.7	0.15	0.15	0.15
Sorghum	-	127.3	53.6	0.25	0.25	0.25
Cassava	295.2	324.6	278.1	0.53	0.6	0.58
Sunflower	70.4	70.8	37.6	0.61	0.61	0.61
Burley Tob.	-	277.5	-	6.52	6.52	6.52
Other Tob.	-	312.8	-	4.41	4.41	4.41
Fertilizer				1.41	1.41	1.41
Oxen				11.00	11.00	11.00
Labor				1.00	1.00	0.68

Note: (1) Smallholder farmers cultivate on customary land. There exists no price for this kind of land because the law prohibits the sale of it by any member of the household.
(2) The price of other tobaccos is an average of price of dark-fired (NDDF and SDDF), the sun-air, and the oriental tobaccos.

Source: 1) The National Sample Survey of Agriculture (NSSA), 1992/93; 2) World Bank, (1994), Vols. I, II, III, and Statistical Annex, op.cit.; 3) Simler, Kenneth, (1994), op.cit., Table 5, p. 13; 4) Government of Malawi, (1993), op.cit.; 5) Conroy, Ann, (1994), op.cit., p. 7; 6) Livingston, S. et al., op.cit.

Table A.6. Input Cost Shares in the Malawian Smallholder Agriculture

	North				Central			South	
crop	Land	Fertilizer	Oxen	Labor	Land	Fertilizer	Labor	Land	Labor
Local Maize	0.91	0.00	0.02	0.07	0.91	0.00	0.09	0.90	0.10
Hybrid Maize	0.87	0.09	0.00	0.03	0.85	0.09	0.06	0.94	0.06
Comp. Maize	0.87	0.01	0.03	0.08	-	-	-	0.91	0.09
Local Rice	0.95	0.00	0.00	0.05	0.97	0.00	0.03	0.87	0.13
Hybrid Rice	0.98	0.00	0.00	0.02	0.69	0.00	0.31	0.81	0.19
Millet	0.86	0.00	0.02	0.12	0.96	0.00	0.04	0.88	0.12
Sorghum	-	-	-	-	0.73	0.00	0.27	0.78	0.22
Sunflower	0.86	0.00	0.04	0.10	0.96	0.00	0.04	0.91	0.09
Cassava	0.97	0.00	0.00	0.03	0.96	0.00	0.04	0.93	0.07
Pulses	0.91	0.00	0.04	0.05	0.79	0.00	0.21	0.75	0.25
Groundnuts	0.57	0.00	0.07	0.36	-	-	-	0.63	0.37
Burley Tob.	-	-	-	-	0.41	0.30	0.29	-	-
Other Tob.	-	-	-	-	0.73	0.12	0.15	-	-

Note: See Chapter 5, Section 5.2.2., for the methodology used to estimate these coefficients.

Source: Own Calculations from Table A.4.

Appendix 3B
Descriptive Data on the Malawian Consumption Demands

Table B.1. Household Characteristics, Income (MK/year), and Expenditure (MK/year) in Urban Malawi: Mean, Standard Deviation, and Percentile

	North				Center				South				The three regions together			
	Mean	s. dev	50%il	90%il	Mean	s. dev	50%il	90%il	Mean	s. dev	50%il	90%il	Mean	s. dev	50%il	90%il
1. Exp.																
Per item	15.3	51.1	0.0	39.6	18.3	56.6	0.0	53.2	22.8	94.3	0.0	60.0	18.6	64.9	0.0	51.6
Per capita (PCE)	3.4	11.2	0.0	8.7	3.9	11.6	0.0	11.8	5.4	21.2	0.0	15.0	4.1	13.9	0.0	11.8
Ln(PCE)	1.31	1.5	1.4	3.3	1.4	1.5	1.5	3.2	1.5	1.6	1.6	3.5	1.4	1.5	1.5	3.3
Total Exp.	1103	842	922.5	2106	1432	1871	1039	2988	1772	2066	1059	3895	1468	1804	1037	3052
Tot Exp. /cap.	732	963	482.9	1245	528.9	1621	286.4	582.8	1201	1949	553.8	2726	695	1618	346.9	975.6
2. Inc.																
Total Hhold	1122	1184	660.0	1923	1843	6896	671.1	4173	1241	1824.	628.0	2924.	1736.	7980	658.8	3248.
Per Capita	709	1171	159.0	787	380.9	1200	129.4	844.4	450.7	816.9	182.8	1155.	647.1	6812	156.0	902.3
% of Tot. Inc.																
Wages	0.57	0.48	0.94	100	0.56	0.48	0.93	100	0.58	0.48	0.94	100	0.57	0.48	0.94	100
Profits	0.11	1.71	0.00	0.84	0.26	0.40	0.58	100	0.25	0.39	0.00	0.97	0.23	0.38	0.00	0.96
Gifts	0.05	0.15	0.00	0.11	0.02	0.11	0.00	0.00	0.01	0.42	0.00	0.001	0.03	0.27	0.00	0.25
Other Cash	0.04	0.14	0.00	0.08	0.04	0.18	0.00	0.01	0.05	0.20	0.00	0.03	0.05	0.17	0.00	0.36
Own-acc.	0.17	0.30	0.01	0.71	0.11	0.25	0.006	0.43	0.07	0.18	0.00	0.27	0.12	0.25	0.005	0.45
In-kind	0.01	0.07	0.00	0.01	0.006	0.06	0.00	0.002	0.005	0.02	0.00	0.03	0.007	0.05	0.00	0.006
3. Hhold Char.																
Hhold Size	4.91	2.77	4.00	9.00	4.97	2.80	5.00	9.00	4.54	2.76	4.00	8.00	4.88	2.79	4.00	9.00
Age 0-4	0.14	0.15	0.125	0.33	0.13	0.15	0.08	0.33	0.11	0.15	0.00	0.33	0.13	0.15	0.09	0.33
5 - 9	0.12	0.14	0.00	0.22	0.12	0.14	0.00	0.33	0.11	0.15	0.00	0.33	0.12	0.14	0.00	0.33
10 - 14	0.11	0.14	0.00	0.33	0.12	0.15	0.00	0.33	0.12	0.16	0.00	0.33	0.12	0.15	0.00	0.33
15 - 54	0.59	0.26	0.50	1.00	0.59	0.27	0.50	1.00	0.61	0.28	0.56	1.00	0.59	0.27	0.50	1.00
> 54	0.04	0.15	0.00	0.14	0.04	0.15	0.00	0.10	0.05	0.16	0.00	0.12	0.04	0.15	0.00	0.33

Source: Household Expenditure and Small-Scale Economic Activities (1990/91)

Table B.2. Household Budget Shares in Urban Malawi: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 1 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Consuming
Cereals and Grains												
Maize	10.08	11.13	68.08	5.14	10.4	64.51	6.72	8.98	69.00	6.38	10.45	66.05
Millet	0.02	0.42	1.27	0.0008	0.02	1.57	0.00	0.00	0.00	0.005	0.19	1.54
Rice	1.65	3.23	48.41	1.00	4.03	51.44	1.27	2.09	53.50	1.18	3.60	51.25
Other	2.67	6.67	32.35	0.71	3.74	18.04	0.58	1.85	25.90	1.06	4.29	22.27
Bread	0.34	0.55	73.58	0.29	1.32	86..01	0.26	0.39	83.01	0.29	1.08	83.06
Subtotal	**14.77**	**13.19**	**92.81**	**11.24**	**12.2**	**96.07**	**8.84**	**9.70**	**97.02**	**11.46**	**12.15**	**95.63**
Tubers												
Cassava	0.39	0.96	39.96	0.25	0.94	36.27	0.51	1.19	40.55	0.33	1.00	37.79
Other (Irish & Sweet Potatoes)	0.24	0.70	24.95	0.33	1.05	46.01	0.58	1.60	47.56	0.36	1.13	42.28
Subtotal	**0.63**	**1.34**	**52.00**	**0.86**	**1.59**	**64.12**	**1.09**	**1.09**	**67.73**	**0.86**	**1.66**	**62.49**
Sweets												
Sugar	2.88	3.41	71.88	2.02	4.41	83.99	2.76	3.29	87.69	2.32	4.05	82.38
Sugarcane	0.05	0.30	10.15	0.17	0.73	26.41	0.18	0.52	31.00	0.15	0.63	24.17
Other sweets (spread, cake, ...)	0.60	1.66	49.26	0.52	2.44	62.09	1.01	1.60	73.04	0.63	2.17	61.72
Subtotal	**0.65**	**1.70**	**52.22**	**1.26**	**2.84**	**69.87**	**1.19**	**1.67**	**80.27**	**1.13**	**2.48**	**68.47**
Pulses	1.64	2.09	64.48	1.14	4.10	70.39	1.55	2.09	72.82	1.32	3.49	69.73
Vegetables												
Cabbages	0.06	0.19	39.11	0.06	0.65	48.82	0.06	0.13	54.35	0.06	0.53	48.02
Onions	0.59	1.27	63.42	0.39	2.20	64.05	0.68	1.18	70.91	0.49	1.89	65.24
Fresh Tomatoes	1.83	1.98	87.53	1.47	3.25	92.81	2.30	2.44	96.60	1.70	2.92	92.52
Carrots	0.05	0.48	1.90	0.01	0.29	1.70	0.02	0.18	4.03	0.02	0.32	2.18
Processed Vegetables	0.02	0.33	0.21	0.007	0.14	0.78	0.01	0.12	1.49	0.009	0.18	0.80
Subtotal	**2.55**	**2.88**	**90.70**	**3.58**	**4.45**	**95.82**	**3.08**	**2.91**	**98.72**	**3.29**	**3.94**	**95.39**

Table B.2. Household Budget Shares in Urban Malawi: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 2 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Groundnuts	0.54	0.92	53.70	0.34	1.84	54.78	0.56	1.20	59.23	0.42	1.60	55.41
Fruits												
Bananas	0.64	1.15	58.78	0.27	0.99	53.92	0.90	2.42	63.27	0.46	1.43	56.63
Pawpaw	0.004	0.05	1.48	0.005	0.07	2.28	0.02	0.30	3.19	0.08	0.15	2.30
Citrus Fruits	0.08	0.67	10.99	0.09	0.80	23.86	0.15	0.83	16.14	0.10	0.78	19.93
Pineapple	0.004	0.05	1.48	0.01	0.26	4.71	0.06	0.36	5.52	0.02	0.26	4.24
Other Fresh Fruits	0.24	0.80	26.00	0.27	2.79	39.22	0.56	1.22	47.56	0.32	0.23	32.28
Tinned Fruits & Fruit Juices	0.01	0.17	1.27	0.01	0.26	1.50	0.004	0.04	1.49	0.01	0.22	1.46
Dried Fruits	0.002	0.04	0.42	0.04	0.43	3.66	0.05	0.46	3.82	0.04	0.40	3.07
Subtotal	**0.98**	**1.92**	**65.96**	**1.45**	**3.50**	**73.53**	**1.74**	**3.05**	**81.32**	**1.42**	**3.18**	**73.57**
Meat & Fish												
Beef & Veal	2.91	4.53	50.53	1.68	4.31	47.19	1.67	3.01	40.34	1.92	4.17	46.52
Mutton & Lamb	0.12	1.02	2.33	0.19	1.60	8.41	0.52	1.81	16.14	0.24	1.55	8.73
Pork	0.37	1.90	7.61	0.09	1.17	4.12	0.24	1.16	7.22	0.18	1.35	5.38
Poultry	0.82	1.48	14.59	0.78	2.85	27.84	0.97	2.08	28.87	0.82	2.65	25.51
Other Meat	0.16	1.11	3.17	0.15	1.13	6.28	0.09	0.53	7.22	0.15	1.04	5.86
Fish	5.23	6.05	86.04	3.50	5.97	88.04	6.72	6.38	94.27	4.45	6.20	88.84
Subtotal	**9.66**	**9.18**	**93.23**	**11.93**	**9.61**	**94.05**	**10.21**	**8.37**	**97.45**	**11.17**	**9.35**	**94.54**
Eggs & Milk												
Eggs	0.74	1.92	27.06	0.49	1.54	40.72	0.80	1.60	42.04	0.60	1.64	38.36
Fresh Milk	1.00	2.81	40.38	0.72	2.23	47.25	0.61	1.28	39.91	0.75	2.22	44.54
Powdered Milk	0.30	1.14	10.57	0.26	1.84	11.83	0.36	1.27	15.71	0.29	1.63	12.33
Other Dairy Products	0.21	0.91	10.57	0.12	0.82	9.02	0.19	0.86	11.89	0.15	0.85	9.86
Subtotal	**2.29**	**4.25**	**56.45**	**3.08**	**4.63**	**64.64**	**1.97**	**2.92**	**63.48**	**2.73**	**4.31**	**62.85**

Table B.2. Household Budget Shares in Urban Malawi: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 3 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Oils & Fats												
Butter	0.04	0.40	1.48	0.01	0.19	2.42	0.02	0.21	1.28	0.02	0.25	2.02
Margarine	0.42	1.51	16.49	0.16	0.83	20.20	0.28	0.78	21.87	0.23	1.00	19.81
Other Oils & Fats	2.11	3.19	62.58	1.31	4.66	72.81	1.80	2.45	76.86	1.56	4.08	71.62
Subtotal	**2.61**	**3.93**	**67.02**	**2.99**	**5.16**	**76.40**	**2.10**	**2.63**	**80.68**	**2.75**	**4.56**	**75.42**
Non-alcoholic Beverages												
Tea	0.26	0.68	38.06	0.28	1.87	45.69	0.32	0.78	46.28	0.28	1.54	44.34
Coffee	0.09	0.80	2.75	0.03	0.49	1.96	0.04	0.34	2.97	0.04	0.54	2.30
Soft Drinks	0.88	2.11	38.69	0.82	3.73	46.41	0.85	1.80	50.96	0.84	3.17	45.80
Alcoholic Beverages	0.91	3.77	15.22	0.57	2.65	16.93	0.74	2.15	18.26	0.67	2.81	16.85
Subtotal	**2.26**	**5.11**	**64.06**	**2.62**	**5.51**	**72.68**	**1.95**	**3.34**	**74.95**	**2.42**	**5.09**	**71.46**
Other Foods	0.92	1.67	59.20	1.16	4.43	85.03	1.37	2.21	81.10	1.15	3.69	79.35
Total Foods	**43.92**	**27.57**	**97.67**	**49.15**	**24.9**	**99.86**	**40.21**	**22.18**	**100**	**46.45**	**25.21**	**99.47**
Non-Foods												
Mens Clothing	0.94	2.14	51.59	0.28	1.09	24.51	1.63	3.00	43.52	0.66	1.90	33.30
Women Clothing	0.69	3.16	31.71	0.50	3.02	34.58	1.39	2.31	44.37	0.70	2.95	35.89
Boys Clothing	0.21	0.94	19.03	0.17	0.76	19.08	0.41	1.15	21.02	0.22	0.89	19.44
Girls Clothing	0.19	0.51	20.08	0.12	0.55	16.80	0.40	2.18	18.90	0.19	1.08	17.83

Table B.2. Household Budget Shares in Urban Malawi: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 4 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Non-Foods (continued)												
Other Clothing	0.13	0.46	13.74	0.15	1.63	18.76	0.35	1.50	17.41	0.18	1.45	17.54
Furniture & Carpets	0.07	0.34	9.09	0.07	0.58	12.48	0.62	3.10	14.44	0.18	1.45	12.21
Textiles & Furnishing	0.25	1.04	20.93	0.12	0.63	21.11	0.14	0.40	21.87	0.15	0.69	21.22
Households Appliances	0.05	0.24	7.40	0.05	0.91	5.42	0.13	0.37	27.38	0.07	0.75	9.98
Glassware, Tableware, etc.	0.09	0.38	10.36	0.12	1.99	10.92	0.22	0.99	18.90	0.14	1.63	12.33
Other Semi-Durables	0.78	1.02	69.34	0.86	2.41	91.24	1.34	2.28	84.50	0.93	2.19	85.77
Household Services	0.25	0.53	47.15	0.23	1.50	41.76	0.92	2.54	66.54	0.37	1.66	47.49
Health Expenses	0.56	2.25	59.83	0.22	0.79	52.42	0.44	1.13	53.08	0.33	1.27	53.96
Vehicle Operating Costs	0.09	0.45	11.84	0.06	0.39	15.75	0.98	3.36	29.06	0.24	1.55	17.54
Other Transport Costs	0.19	0.60	20.51	0.31	0.91	47.39	0.73	1.92	39.70	0.37	1.14	40.78
Communication	0.05	0.33	7.61	0.03	0.30	8.43	0.25	1.30	14.22	0.08	0.63	9.38
Recreational Equipment	0.13	0.53	13.32	0.13	0.61	17.25	0.40	1.33	27.18	0.18	0.80	18.39
Recreational Services	0.07	0.49	10.99	0.06	0.34	11.50	0.13	0.70	19.11	0.07	0.46	12.85
Books, Newspapers, etc.	0.02	0.13	4.86	0.02	0.17	12.15	0.06	0.35	12.53	0.03	0.21	10.83
Educational Fees	0.38	1.58	58.57	0.24	1.03	63.46	0.57	1.41	60.09	0.33	1.12	61.88
Personal Goods & Services	0.24	0.57	39.96	0.26	0.77	53.53	0.47	1.05	48.83	0.30	0.80	50.04
Holidays	0.06	0.20	14.59	0.009	0.14	1.18	0.20	1.05	11.89	0.05	0.48	5.78
Transfers	0.60	2.37	35.31	0.34	1.12	46.86	1.47	3.38	50.53	0.61	2.05	45.35
Miscellaneous Payments	0.11	0.37	14.59	0.12	0.62	22.94	1.96	5.25	53.71	0.47	2.46	27.21
Housing Rent	46.91	31.36	20.93	8.09	23.5	29.48	15.72	28.62	43.73	16.97	30.11	30.56

Table B.2. Household Budget Shares in Urban Malawi: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 5 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Non-Foods (continued)												
Mortgage	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.38	0.42	0.005	0.17	0.16
Council Rates	0.006	0.09	1.27	0.007	0.11	2.94	0.01	0.20	0.85	0.008	0.13	2.22
Dwelling Repair & Maintenance	0.01	0.13	1.69	0.02	0.27	2.55	0.11	1.06	3.18	0.04	0.51	2.51
Water	0.52	3.30	44.40	0.39	2.51	54.12	0.57	1.70	44.16	0.45	2.55	50.36
Electricity	0.06	0.30	6.13	0.10	1.15	8.50	0.57	2.47	22.08	0.18	1.43	10.63
Paraffin	0.24	0.43	54.76	0.20	1.72	58.63	0.39	1.44	62.21	0.25	1.51	58.57
Firewood	0.09	0.32	14.16	0.51	2.38	50.85	0.53	1.58	47.77	0.44	2.00	43.25
Other Fuels	0.04	0.27	4.65	0.08	0.56	17.71	0.06	0.54	5.52	0.08	0.52	12.89

Notes: The numbers in parenthesis represent the total number of households consuming the item category.

Source: Household Expenditure and Small-Scale Economic Activities (1990/91)

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households (Page 1 of 10)

	North								Center							
	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile		1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Cereals and Grains																
Maize	12.2	56.3	12.4	77.8	10.8	79.7	5.0	58.8	9.91	54.2	9.43	67.7	8.5	69.4	4.7	66.92
Millet	0.08	0.84	0.01	1.7	0.0	1.7	0.0	0.0	0.0	0.0	0.0	1.6	0.0	1.3	0.0	2.10
Rice	1.65	38.7	1.66	51.3	2.19	55.9	1.09	47.9	1.43	36.12	1.9	55.6	2.0	61.0	1.2	53.28
Other	3.74	36.1	3.13	37.9	2.45	27.9	1.4	29.4	1.21	15.71	0.78	13.2	0.94	20.7	0.87	22.83
Bread	0.39	63.0	0.46	77.8	0.29	78.8	0.22	74.8	0.54	73.29	0.68	90.6	0.56	92.2	0.34	88.71
Subtotal	**18.0**	**88.2**	**17.7**	**92.3**	**15.7**	**94.9**	**7.7**	**95.8**	**13.1**	**91.9**	**12.8**	**97.4**	**12.0**	**98.4**	**7.2**	**96.3**
Tubers																
Cassava	0.56	29.4	0.40	41.0	0.32	39.8	0.25	49.6	0.54	36.12	0.41	37.3	0.29	38.2	0.09	33.86
Other (Potatoes)	0.29	15.1	0.27	28.2	0.25	27.9	0.17	28.6	0.73	38.22	0.64	45.1	0.49	52.9	0.26	48.29
Subtotal	**0.9**	**39.5**	**0.7**	**55.6**	**0.6**	**51.7**	**0.4**	**61.3**	**1.3**	**58.4**	**1.0**	**66.1**	**0.8**	**69.1**	**0.4**	**63.5**
Sweets																
Sugar	3.06	58.8	3.47	76.9	3.31	82.2	1.67	69.7	4.62	78.80	4.45	88.2	3.98	88.8	2.02	80.31
Sugarcane	0.04	5.04	0.02	9.41	0.07	13.6	0.06	12.6	0.27	27.49	0.31	28.4	0.18	24.1	0.13	25.98
Other sweets (spread)	0.65	43.7	0.75	52.1	0.55	55.1	0.43	46.2	0.69	50.26	0.98	60.9	1.58	69.6	0.88	67.72
Subtotal	**0.7**	**46.2**	**0.8**	**53.0**	**0.6**	**58.5**	**0.5**	**51.2**	**0.9**	**60.7**	**1.3**	**70.6**	**1.8**	**74.3**	**1.0**	**73.8**
Pulses	**2.5**	**65.6**	**1.9**	**71.8**	**1.6**	**69.5**	**0.6**	**51.3**	**2.5**	**67.3**	**2.1**	**73.0**	**2.1**	**74.3**	**1.2**	**66.9**
Vegetables																
Cabbages	0.08	34.4	0.07	40.2	0.02	43.2	0.03	38.7	0.05	40.84	0.11	49.6	0.12	55.5	0.03	49.87
Onions	0.63	51.3	0.84	72.7	0.51	69.5	0.42	60.5	0.58	48.95	0.61	68.7	0.78	70.7	0.69	68.50
Fresh Tomatoes	2.28	84.0	2.23	89.7	1.74	90.7	1.08	85.7	2.91	86.91	3.35	96.6	3.08	96.0 7	1.89	91.86
Carrots	0.00	0.00	0.08	1.71	0.01	1.69	0.11	4.21	0.00	0.00	0.03	0.52	0.01	2.36	0.05	3.94
Processed Vegetables	0.06	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.52	0.00	2.61	0.03	2.10
Subtotal	**3.0**	**86.6**	**3.2**	**94.9**	**2.3**	**91.5**	**1.6**	**89.9**	**3.6**	**90.6**	**4.1**	**97.9**	**4.0**	**97.4**	**2.7**	**97.1**

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households (Page 2 of 10)

	North								Center							
	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile		1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Groundnuts	**0.7**	**50.4**	**0.6**	**59.8**	**0.5**	**57.6**	**0.3**	**47.0**	**0.9**	**52.4**	**0.6**	**63.8**	**0.4**	**51.8**	**0.2**	**51.4**
Fruits																
Bananas	0.65	49.6	0.78	58.1	0.70	67.8	0.41	59.7	0.48	37.43	0.71	57.8	0.73	62.30	0.51	58.79
Pawpaw	0.0	1.68	0.0	1.71	0.00	0.00	0.01	2.52	0.01	0.78	0.01	1.83	0.02	4.19	0.01	2.36
Citrus Fruits	0.02	5.04	0.19	12.0	0.06	16.9	0.05	10.1	0.20	14.92	0.15	25.7	0.25	29.1	0.19	25.98
Pineapple	0.00	0.00	0.01	1.71	0.0	1.69	0.0	2.52	0.02	0.52	0.01	2.36	0.08	7.07	0.09	8.92
Other Fresh Fruits	0.21	18.5	0.33	26.5	0.24	31.4	0.16	27.7	0.23	25.39	0.46	39.9	0.80	45.6	0.51	46.46
Tinned Fruits & Juices	0.02	0.84	0.01	0.85	0.01	0.85	0.03	2.52	0.0	0.26	0.01	0.78	0.04	1.04	0.07	3.94
Dried Fruits	0.00	0.00	0.01	0.85	0.0	0.85	0.00	0.00	0.09	3.14	0.04	2.36	0.03	4.71	0.05	4.46
Subtotal	**0.9**	**56.3**	**1.3**	**6.7**	**1.0**	**73.7**	**0.7**	**67.2**	**1.0**	**57.3**	**1.4**	**78.5**	**2.0**	**80.1**	**1.4**	**78.2**
Meat & Fish																
Beef & Veal	4.8	51.3	2.97	51.3	2.64	55.9	1.24	43.9	2.95	41.62	3.70	51.70	3.37	56.54	1.39	39.37
Mutton & Lamb	0.20	2.52	0.06	1.71	0.21	4.24	0.02	0.84	0.44	5.76	0.42	7.61	0.38	10.4	0.21	9.97
Pork	0.82	9.24	0.31	7.70	0.18	5.93	0.16	7.56	0.13	3.93	0.06	2.62	0.13	3.14	0.22	6.82
Poultry	0.64	7.56	0.97	15.4	1.13	20.3	0.54	15.2	1.09	14.66	1.73	28.1	2.49	40.6	0.85	28.35
Other Meat	0.07	1.68	0.27	3.42	0.15	3.39	0.15	4.21	0.27	4.71	0.17	5.25	0.21	6.54	0.19	8.66
Fish	7.75	84.9	5.94	90.6	4.44	88.1	2.80	80.7	8.44	86.39	9.00	93.9	6.90	91.4	3.12	80.31
Subtotal	**14.3**	**90.7**	**10.5**	**94.9**	**8.9**	**95.8**	**4.9**	**91.6**	**13.3**	**92.4**	**15.1**	**97.6**	**13.5**	**96.1**	**6.0**	**90.0**
Eggs & Milk																
Eggs	0.69	17.6	0.94	33.3	0.82	28.8	0.53	28.6	0.55	17.54	1.28	42.3	1.81	57.3	1.01	46.19
Fresh Milk	1.51	29.4	0.99	42.7	1.03	50.9	0.46	38.7	0.80	27.75	1.59	51.2	1.99	62.8	0.84	47.76

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households (Page 3 of 10)

	North								Center							
	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile		1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Powdered Milk	0.17	6.72	0.32	10.3	0.35	12.7	0.36	12.6	0.14	4.71	0.54	12.3	0.59	17.8	0.42	12.59
Other Dairy Products	0.31	8.40	0.21	11.9	0.21	9.32	0.13	12.6	0.06	2.09	0.14	7.87	0.32	13.6	0.24	12.60
Subtotal	**2.8**	**46.2**	**2.5**	**59.8**	**2.4**	**60.2**	**1.5**	**59.7**	**1.5**	**37.4**	**3.5**	**73.5**	**4.7**	**80.1**	**2.5**	**68.0**
Oils & Fats																
Butter	0.00	0.00	0.07	1.71	0.04	1.69	0.06	2.52	0.0	0.26	0.01	1.31	0.08	2.62	0.16	5.51
Margarine	0.20	7.56	0.87	24.8	0.35	18.6	0.27	15.1	0.18	6.28	0.39	19.4	0.67	28.3	0.39	27.03
Other Oils & Fats	2.71	57.1	3.09	76.9	1.61	63.6	1.01	52.9	1.88	59.42	2.90	79.5	3.16	80.9	2.17	72.18
Subtotal	**2.9**	**60.5**	**4.0**	**79.5**	**2.0**	**67.8**	**1.5**	**60.5**	**2.1**	**60.4**	**3.3**	**81.1**	**3.9**	**85.9**	**2.7**	**79.0**
Non-alc. Beverages																
Tea	0.34	27.7	0.30	41.9	0.22	41.5	0.18	41.2	0.33	37.96	0.41	47.5	0.48	52.9	0.40	44.62
Coffee	0.17	3.36	0.12	2.56	0.06	2.54	0.02	2.52	0.01	0.52	0.06	1.31	0.08	3.40	0.07	2.62
Soft Drinks	0.99	27.7	0.93	41.9	1.16	45.8	0.45	39.5	1.16	34.55	1.06	46.9	1.53	55.5	1.36	49.08
Alcoholic Beverages	**1.7**	**15.1**	**1.0**	**17.1**	**0.6**	**11.9**	**0.4**	**16.8**	**0.8**	**12.0**	**1.1**	**19.2**	**1.1**	**20.2**	**0.5**	**16.5**
Subtotal	**3.3**	**54.6**	**2.6**	**69.2**	**2.0**	**68.6**	**1.1**	**63.9**	**2.3**	**61.5**	**2.7**	**75.6**	**3.2**	**82.2**	**2.3**	**71.4**
Other Foods	**1.1**	**50.4**	**1.1**	**67.5**	**0.9**	**62.7**	**0.5**	**56.3**	**2.2**	**8.2**	**1.94**	**87.7**	**2.1**	**86.6**	**1.0**	**84.5**
Total Foods	**56.2**	**95.0**	**52.4**	**98.3**	**43.5**	**97.5**	**23.6**	**100**	**51.9**	**99.5**	**56.4**	**100**	**56.3**	**99.7**	**32.4**	**100**
Non-Foods																
Mens Clothing	1.36	53.8	1.12	56.4	0.81	53.4	0.47	42.9	0.79	18.84	0.69	25.9	0.58	29.6	0.24	23.88
Women Clothing	1.52	31.9	0.64	36.8	0.42	36.4	0.15	21.8	0.98	28.80	0.93	37.3	1.13	37.9	0.34	34.38
Boys Clothing	0.41	16.8	0.18	18.8	0.20	27.1	0.06	13.4	0.52	18.84	0.33	21.5	0.29	21.2	0.10	14.96
Girls Clothing	0.22	14.3	0.25	23.9	0.18	24.6	0.09	17.6	0.33	15.44	0.37	20.7	0.24	19.1	0.09	12.07

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households (Page 4 of 10)

	North								Center							
	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile		1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-Foods (cont'd)																
Other Clothing	0.25	17.6	0.11	11.1	0.11	15.2	0.05	10.9	0.22	14.66	0.41	18.1	0.27	23.8	0.11	18.63
Furniture & Carpets	0.10	7.56	0.08	10.2	0.06	11.0	0.03	7.56	0.14	11.26	0.18	14.7	0.09	12.6	0.04	11.28
Textiles & Furnishing	0.33	11.7	0.28	23.9	0.19	27.9	0.19	20.1	0.28	13.61	0.28	20.7	0.32	28.5	0.25	21.78
Households Appliances	0.04	6.72	0.72	8.55	0.06	10.1	0.02	4.21	0.07	3.66	0.05	4.98	0.23	6.28	0.08	6.81
Glassware, Tableware	0.06	6.72	0.15	11.1	0.11	14.4	0.04	9.24	0.13	6.54	0.28	9.19	0.20	14.7	0.08	13.39
Other Semi-Durables	1.23	68.0	0.77	71.7	0.71	71.1	0.41	66.3	1.88	90.84	1.85	93.4	1.66	91.3 6	0.86	88.98
Household Services	0.38	50.4	0.33	43.0	0.19	44.9	0.11	46.2	0.39	40.57	0.41	40.4	0.44	45.0	0.14	41.21
Health Expenses	1.20	57.1	0.50	59.8	0.33	60.1	0.22	62.1	0.51	43.19	0.61	59.3	0.52	58.9	0.24	48.30
Vehicle Operating Costs	0.11	9.24	0.13	11.9	0.10	16.1	0.04	10.0	0.07	6.81	0.11	12.9	0.21	22.3	0.19	20.99
Other Transport Costs	0.13	8.40	0.28	24.7	0.26	27.9	0.09	21.0	0.68	32.46	0.95	54.5	0.90	54.4	0.36	48.03
Communication	0.13	10.0	0.05	6.84	0.02	8.47	0.00	5.04	0.04	3.93	0.12	9.97	0.09	8.63	0.06	11.29
Recreational Equipment	0.22	14.2	0.13	13.6	0.15	18.6	0.01	6.72	0.30	13.61	0.24	16.8	0.27	22.5	0.11	16.27
Recreational Services	0.13	10.0	0.06	13.6	0.02	8.47	0.06	11.7	0.03	6.81	0.15	12.6	0.15	17.0	0.03	9.71
Books, Newspapers,	0.02	4.20	0.03	2.56	0.02	7.63	0.09	5.04	0.04	5.24	0.05	11.6	0.07	18.6	0.03	13.38
Educational Fees	0.97	62.1	0.30	64.9	0.18	59.3	0.09	47.9	0.66	64.66	0.44	70.1	0.40	64.1	0.18	55.64
Personal Goods	0.31	29.4	0.26	37.6	0.27	47.5	0.12	45.4	0.48	3953	0.57	56.9	0.63	60.9	0.31	56.69
Holidays	0.09	17.6	0.06	19.6	0.05	11.0	0.02	10.0	0.02	0.79	0.01	1.31	0.01	1.57	0.01	1.05
Transfers	1.23	34.4	0.60	40.1	0.44	41.5	0.17	25.2	0.89	34.81	1.27	53.0 1	1.00	55.7 6	0.39	44.36
Misc.Payments	0.09	10.9	0.15	14.5	0.14	17.8	0.07	15.1	0.30	15.71	0.33	24.4	0.32	28.5	0.15	23.36
Housing Rent	29.6	5.04	37.4	8.54	50.2	14.4	73.2	55.4	4.95	24.08	5.88	27.8	29.3	31.7	60.5	34.65
Mortgage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households (Page 5 of 10)

	North								Center							
	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile		1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-Foods (cont'd)																
Council Rates	0.01	1.68	0.01	1.71	0.00	0.85	0.00	0.84	0.01	1.30	0.03	2.88	0.03	4.71	0.01	2.88
Dwelling Repair & Maintenance	0.01	0.84	0.01	0.86	0.03	4.24	0.01	0.84	0.02	1.31	0.09	3.67	0.03	2.61	0.02	2.62
Water	1.49	46.2	0.28	47.0	0.21	44.1	0.10	40.3	0.72	43.46	0.82	60.6	0.87	59.4	0.42	53.54
Electricity	0.13	9.24	0.05	5.98	0.06	6.78	0.01	2.52	0.21	3.14	0.25	10.2	0.21	11.3	0.11	9.45
Paraffin	0.27	47.1	0.24	50.4	0.27	63.6	0.16	57.9	0.35	59.95	0.44	62.9	0.28	54.5	0.34	57.48
Firewood	0.07	8.40	0.18	19.7	0.08	13.6	0.04	15.1	1.04	49.74	1.06	55.4	0.69	48.7	0.28	49.87
Other Fuels	0.05	1.68	0.05	5.98	0.06	7.63	0.02	3.36	0.18	9.16	0.32	22.3	0.37	23.8	0.12	15.75
Mean PCE		227.09		399.58		585.52		1762.17		206.26		369.84		557.51		1664.64
Mean Household Size		5.57		5.14		4.74		3.75		5.39		4.95		4.50		4.71

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households in the Southern Region (Page 6 of 10)

	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Cereals and Grains								
Maize	9.32	70.33	9.21	71.19	6.58	71.19	1.72	63.25
Millet	0.00	0.00	0.001	2.54	0.00	0.00	0.00	0.00
Rice	1.61	54.24	1.61	54.24	1.32	55.93	0.55	49.58
Other	0.91	27.97	0.64	23.72	0.53	22.03	0.24	29.91
Bread	0.23	75.42	0.39	86.44	0.30	85.59	0.14	84.61
Subtotal	**12.1**	**96.6**	**11.9**	**97.5**	**8.7**	**94.9**	**2.6**	**99.1**
Tubers								
Cassava	0.91	47.46	0.67	43.22	0.37	42.37	0.09	29.06
Other (Potatoes)	1.17	46.61	0.61	44.91	0.45	51.69	0.09	47.01
Subtotal	**2.1**	**72.0**	**1.3**	**69.5**	**8.2**	**63.6**	**0.2**	**65.8**
Sweets								
Sugar	4.17	89.83	3.74	90.68	2.29	88.98	0.84	81.19
Sugarcane	0.29	32.20	0.24	37.29	0.14	30.51	0.05	23.93
Other sweets (spread)	1.25	71.12	1.46	76.27	0.86	69.49	0.46	69.21
Subtotal	**1.5**	**8.4**	**1.7**	**86.4**	**1.0**	**78.8**	**0.5**	**71.8**
Pulses	**3.0**	**82.2**	**1.8**	**78.8**	**1.1**	**72.9**	**0.3**	**57.3**
Vegetables								
Cabbages	0.08	41.52	0.08	50.85	0.06	59.32	0.03	65.81
Onions	0.76	61.86	0.98	70.34	0.68	77.97	0.31	73.50
Fresh Tomatoes	3.46	98.30	2.82	96.61	1.99	96.61	0.90	94.87
Carrots	0.00	0.00	0.01	0.85	0.05	5.09	0.04	10.26
Processed Vegetables	0.01	0.85	0.003	0.85	0.00	0.00	0.03	4.27
Subtotal	**4.3**	**98.3**	**3.9**	**98.3**	**2.8**	**99.2**	**1.3**	**99.1**

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households in the Southern Region (Page 7 of 10)

	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Groundnuts	**1.2**	**76.3**	**0.6**	**61.9**	**0.3**	**54.2**	**0.1**	**44.4**
Fruits								
Bananas	1.75	51.69	1.12	63.55	0.44	67.79	0.25	70.08
Pawpaw	0.06	4.25	0.002	0.85	0.01	2.54	0.006	5.12
Citrus Fruits	0.11	6.78	0.26	16.95	0.17	21.19	0.06	19.66
Pineapple	0.04	0.85	0.08	5.08	0.04	6.78	0.06	9.40
Other Fresh Fruits	0.60	35.59	0.71	50.00	0.62	55.93	0.29	48.72
Tinned Fruits & Juices	0.004	0.85	0.003	0.85	0.001	0.85	0.008	3.41
Dried Fruits	0.10	5.93	0.01	2.54	0.07	4.24	0.02	2.56
Subtotal	**2.7**	**71.2**	**2.2**	**83.1**	**1.4**	**88.1**	**0.7**	**82.9**
Meat & Fish								
Beef & Veal	2.09	31.35	2.37	50.85	1.63	41.52	0.55	37.60
Mutton & Lamb	0.55	11.86	0.80	17.80	0.61	22.88	0.11	11.96
Pork	0.16	2.54	0.47	10.17	0.29	11.02	0.05	5.13
Poultry	0.44	10.17	1.54	33.90	1.51	45.76	0.39	25.64
Other Meat	0.13	6.78	0.07	5.08	0.09	6.78	0.06	10.26
Fish	10.70	99.15	8.80	98.30	5.78	96.61	1.56	82.90
Subtotal	**14.1**	**99.2**	**14.1**	**98.3**	**9.9**	**98.3**	**2.7**	**94.0**
Eggs & Milk								
Eggs	0.47	24.58	1.09	38.98	1.25	53.39	0.41	51.28
Fresh Milk	0.49	28.81	0.81	38.14	7.57	47.46	0.38	45.30
Powdered Milk	0.08	3.39	0.53	18.64	0.66	23.73	0.18	17.09
Other Dairy Products	0.01	2.54	0.36	13.56	0.18	16.01	0.11	15.38
Subtotal	**1.1**	**44.9**	**2.8**	**66.9**	**2.9**	**71.2**	**1.1**	**70.9**

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households in the Southern Region (Page 8 of 10)

Goods and Services	1 - 25%ile av.	1 - 25%ile % hh	26-50%ile av.	26-50%ile % hh	51-75%ile av.	51-75%ile % hh	76-100%ile av.	76-100%ile % hh
Oils & Fats								
Butter	0.009	0.85	0.00	0.00	0.02	0.85	0.04	3.42
Margarine	0.05	3.39	0.39	19.49	0.43	32.20	0.24	32.48
Other Oils & Fats	2.31	77.96	2.25	77.11	1.93	83.05	0.71	69.23
Subtotal	**2.4**	**79.5**	**2.6**	**80.5**	**2.4**	**86.4**	**1.0**	**76.1**
Non-alc. Beverages								
Tea	0.46	44.92	0.43	51.69	0.22	49.15	0.17	39.32
Coffee	0.00	0.00	0.002	0.85	0.009	5.08	0.05	5.98
Soft Drinks	0.50	29.66	1.14	54.23	1.17	65.25	0.58	54.70
Alcoholic Beverages	**0.5**	**10.2**	**1.3**	**20.3**	**1.0**	**28.8**	**0.2**	**13.7**
Subtotal	**1.4**	**57.6**	**2.8**	**81.3**	**2.5**	**86.4**	**1.0**	**74.4**
Other Foods	**1.8**	**79.7**	**2.0**	**81.4**	**1.3**	**84.7**	**0.5**	**78.6**
Total Foods	**55.0**	**100**	**53.7**	**100**	**38.7**	**100**	**13.3**	**100**
Non-Foods								
Mens Clothing	1.42	30.51	2.29	50.00	1.96	49.16	0.87	44.44
Women Clothing	1.40	37.29	1.90	53.39	1.69	48.30	0.56	38.46
Boys Clothing	0.48	17.80	0.67	26.27	0.38	27.97	0.12	11.96
Girls Clothing	0.31	14.41	0.42	19.49	0.78	30.51	0.008	11.11

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households in the Southern Region (Page 9 of 10)

	1 - 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-Foods (cont'd)								
Other Clothing	0.29	11.86	0.32	14.40	0.56	20.33	0.23	23.07
Furniture & Carpets	0.39	10.17	0.57	15.25	1.06	18.65	0.47	13.68
Textiles & Furnishing	0.12	13.56	0.13	20.33	0.19	25.48	0.11	28.20
Households Appliances	0.19	35.59	0.13	27.11	0.12	16.95	0.07	29.91
Glassware, Tableware	0.15	11.02	0.36	19.49	0.21	24.58	0.15	20.51
Other Semi-Durables	1.39	78.81	1.69	85.59	1.26	87.29	1.03	86.32
Household Services	0.36	70.33	0.80	67.79	1.44	72.04	1.07	55.56
Health Expenses	0.43	44.91	0.43	47.46	0.53	56.78	0.38	63.25
Vehicle Operating Costs	0.43	19.49	0.84	27.12	1.56	28.81	1.11	41.03
Other Transport Costs	0.55	26.27	0.74	39.83	1.16	46.61	0.47	46.15
Communication	0.07	10.16	0.16	12.71	0.34	11.86	0.45	22.22
Recreational Equipment	0.29	22.03	0.35	22.88	0.70	34.74	0.24	29.05
Recreational Services	0.07	15.25	0.09	17.80	0.23	20.33	0.11	23.08
Books, Newspapers,	0.02	5.91	0.11	10.17	0.03	14.41	0.06	19.66
Educational Fees	0.48	58.47	0.68	66.95	0.57	60.17	0.54	54.70
Personal Goods	0.27	34.74	0.48	50.85	0.62	59.32	0.51	50.43
Holidays	0.34	19.50	0.20	10.17	0.14	4.24	0.12	13.68
Transfers	1.05	32.20	1.68	48.31	2.03	64.41	1.09	57.26
Misc.Payments	1.50	44.07	1.65	53.39	2.78	6017	1.91	57.26
Housing Rent	2.90	18.64	3.70	36.44	35.69	54.24	70.13	65.81
Mortgage	0.00	0.00	0.06	0.84	0.04	0.85	0.00	0.00
Council Rates	0.03	0.85	0.003	0.85	0.00	0.00	0.002	1.71
Dwelling Repair & Maintenance	0.06	2.54	0.02	0.85	0.25	6.78	0.11	2.56

Table B.3. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Urban Households in the Southern Region (Page 10 of 10)

Goods and Services	1 - 25%ile av.	1 - 25%ile % hh	26-50%ile av.	26-50%ile % hh	51-75%ile av.	51-75%ile % hh	76-100%ile av.	76-100%ile % hh
<u>Non-Foods (cont'd)</u>								
Water	0.39	27.12	0.79	45.76	0.75	48.31	0.34	55.56
Electricity	0.06	6.78	0.61	22.88	0.69	27.97	0.91	30.76
Paraffin	0.86	75.42	0.34	63.56	0.21	54.24	0.13	55.56
Firewood	0.43	40.68	0.95	53.39	0.55	50.00	0.19	47.00
Other Fuels	0.00	0.00	0.02	4.23	0.05	7.62	0.17	10.26
Mean PCE		185.64		405.88		790.91		3431.01
Mean Household Size		5.62		4.53		4.14		4.17

Source: The HESSEA

Table B.4. Per Capita Expenditures per Quartile of PCE in Urban Malawi (in Malawian Kwacha) (Page 1 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Cereals and Grains												
Maize	29.38	49.73	63.92	56.01	21.06	34.59	46.86	108.77	18.04	36.43	49.20	38.00
Millet	0.13	0.03	0.008	0.00	0.00	0.69	0.01	0.02	0.00	0.00	0.00	0.00
Rice	3.76	6.57	12.07	12.37	3.26	7.01	11.20	12.95	2.92	6.62	9.86	13.28
Other	8.03	12.31	14.13	17.19	2.54	2.80	5.02	11.03	1.52	2.48	4.13	6.38
Bread	0.90	1.81	1.73	3.14	1.23	2.49	3.14	3.94	0.43	1.59	2.24	3.39
Subtotal	**42.21**	**70.44**	**91.85**	**88.67**	**28.08**	**46.91**	**66.23**	**136.70**	**22.91**	**47.13**	**65.43**	**61.06**
Tubers												
Cassava	1.30	1.56	1.90	3.26	1.13	1.50	1.60	1.18	1.67	2.59	2.66	2.34
Other (Potatoes)	0.72	1.02	1.36	2.11	1.53	2.32	2.73	2.97	1.92	2.35	3.21	2.03
Subtotal	**2.02**	**2.58**	**3.27**	**5.37**	**2.67**	**3.82**	**4.33**	**4.15**	**3.59**	**4.94**	**5.87**	**4.37**
Sweets												
Sugar	6.82	13.95	19.17	19.60	9.59	16.27	21.86	27.94	7.79	15.09	17.85	18.25
Sugarcane	0.09	0.11	0.41	0.80	0.55	1.11	0.94	1.51	0.52	0.94	1.04	1.56
Other sweets (spread)	1.52	2.92	3.13	5.10	1.54	3.59	8.69	10.57	2.10	5.80	6.94	10.86
Subtotal	**1.61**	**3.02**	**3.54**	**5.90**	**2.08**	**4.69**	**9.63**	**12.09**	**2.62**	**6.74**	**7.98**	**12.43**
Pulses	**5.66**	**7.41**	**9.41**	**6.56**	**5.26**	**7.90**	**11.42**	**16.96**	**5.35**	**7.20**	**8.43**	**6.81**
Vegetables												
Cabbages	0.19	0.31	0.16	0.39	0.12	0.41	0.68	0.42	0.13	0.33	0.43	0.72
Onions	1.29	3.24	3.04	5.14	1.26	2.28	4.35	9.80	1.24	3.93	5.30	7.73
Fresh Tomatoes	4.87	8.72	10.42	13.88	6.21	12.40	17.04	21.56	6.03	11.35	15.19	20.61
Carrots	0.00	0.32	0.05	1.37	0.00	0.11	0.09	0.57	0.00	0.07	0.46	1.34
Processed Vegetables	0.11	0.00	0.00	0.00	0.00	0.06	0.01	0.34	0.02	0.02	0.00	0.55
Subtotal	**6.46**	**12.60**	**13.64**	**20.79**	**7.59**	**15.27**	**22.17**	**32.69**	**7.43**	**15.69**	**21.39**	**30.95**
Groundnuts	**1.61**	**2.58**	**2.76**	**3.27**	**1.64**	**2.04**	**2.28**	**2.27**	**2.08**	**2.57**	**2.20**	**2.83**

Table B.4. Per Capita Expenditures per Quartile of PCE in Urban Malawi (in Malawian Kwacha) (Page 2 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Fruits												
Bananas	1.47	3.02	4.08	5.63	1.01	2.61	4.00	5.68	2.83	4.39	3.69	6.41
Pawpaw	0.03	0.01	0.00	0.05	0.03	0.03	0.11	0.11	0.17	0.01	0.15	0.16
Citrus Fruits	0.05	0.73	0.33	0.84	0.41	0.57	1.46	2.24	0.14	1.03	1.40	2.07
Pineapple	0.00	0.04	0.03	0.06	0.05	0.05	0.47	1.17	0.09	0.31	0.42	2.34
Other Fresh Fruits	0.49	1.31	1.45	1.84	0.49	1.77	4.39	7.31	1.08	2.79	4.87	7.41
Tinned Fruits & Juices	0.05	0.05	0.08	0.35	0.004	0.03	0.25	1.09	0.006	0.02	0.01	0.21
Dried Fruits	0.00	0.04	0.02	0.00	0.17	0.16	0.19	0.77	0.24	0.05	0.55	0.54
Subtotal	**2.09**	**5.21**	**5.97**	**8.77**	**2.17**	**5.21**	**10.88**	**18.37**	**4.55**	**8.60**	**11.10**	**19.15**
Meat & Fish												
Beef & Veal	11.44	11.90	15.48	13.91	6.24	13.77	18.60	15.97	3.92	9.71	12.47	12.34
Mutton & Lamb	0.46	0.21	1.14	0.23	0.98	1.59	2.13	2.38	1.05	3.41	4.87	2.53
Pork	2.03	1.14	1.05	1.90	0.28	0.22	0.73	2.37	0.37	1.75	2.50	1.90
Poultry	1.63	3.83	6.35	5.36	2.59	6.69	13.93	9.04	0.97	6.28	11.49	8.32
Other Meat	0.18	1.05	0.88	1.51	0.55	0.68	1.16	1.96	0.20	0.23	0.75	1.79
Fish	17.24	23.13	26.06	30.62	17.91	33.25	38.15	35.04	19.98	35.33	43.75	34.53
Subtotal	**33.11**	**41.28**	**51.52**	**53.77**	**28.56**	**56.19**	**74.69**	**66.72**	**26.03**	**56.71**	**75.84**	**61.45**
Eggs & Milk												
Eggs	1.79	3.68	4.73	6.03	1.23	4.79	10.15	10.79	1.01	4.74	9.21	9.74
Fresh Milk	3.28	3.95	5.90	5.55	1.82	5.86	11.15	9.43	0.98	3.60	5.78	9.09
Powdered Milk	0.44	1.24	2.00	3.70	1.30	2.08	3.31	6.29	0.20	2.00	5.46	3.64
Other Dairy Products	0.72	0.78	1.21	1.53	0.14	0.51	1.70	2.61	0.16	1.51	1.67	3.16
Subtotal	**6.62**	**9.65**	**13.83**	**16.98**	**3.49**	**13.23**	**26.31**	**29.12**	**2.35**	**11.85**	**22.11**	**25.63**

Table B.4. Per Capita Expenditures per Quartile of PCE in Urban Malawi (in Malawian Kwacha) (Page 3 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Oils & Fats												
Butter	0.00	0.25	0.24	0.75	0.004	0.05	0.47	1.80	0.03	0.00	0.17	0.71
Margarine	0.56	3.38	2.09	2.80	0.45	1.48	3.75	4.32	0.08	1.60	3.20	6.87
Other Oils & Fats	6.47	12.29	9.33	11.64	4.18	10.75	17.51	29.22	4.47	9.42	14.95	16.02
Subtotal	**7.09**	**15.94**	**11.88**	**15.90**	**4.64**	**12.29**	**21.73**	**35.44**	**4.57**	**11.02**	**18.31**	**23.78**
Non-alc. Beverages												
Tea	0.78	1.20	1.25	2.29	0.74	1.54	2.79	3.98	0.92	1.73	1.73	3.14
Coffee	0.36	0.54	0.43	0.19	0.02	0.20	0.44	0.64	0.00	0.01	0.80	1.02
Soft Drinks	2.24	3.56	6.73	5.27	2.50	3.99	8.51	17.68	1.15	4.59	8.80	12.84
Alcoholic Beverages	3.22	3.96	3.26	5.92	1.71	4.15	6.24	5.55	0.97	5.59	8.44	4.57
Subtotal	**6.89**	**10.35**	**11.92**	**14.05**	**4.97**	**9.89**	**17.98**	**27.84**	**3.04**	**11.93**	**19.77**	**21.58**
Other Foods	2.31	4.36	5.28	8.20	4.41	7.08	12.12	12.47	3.25	7.50	9.67	11.15
Total Foods	**128.61**	**207.16**	**253.60**	**275.19**	**110.41**	**208.64**	**312.32**	**442.37**	**101.56**	**215.68**	**295.96**	**309.52**
Non-Foods												
Mens Clothing	2.71	4.37	4.70	5.25	1.57	2.50	3.16	2.58	2.96	9.50	15.46	25.93
Women Clothing	1.79	2.64	2.41	1.53	1.94	3.34	6.29	3.63	2.65	8.05	13.24	15.47
Boys Clothing	0.68	0.77	1.12	0.62	1.01	1.23	1.59	1.10	0.97	2.74	2.96	3.23
Girls Clothing	0.45	0.02	1.03	0.99	0.66	1.35	1.34	0.83	0.55	1.88	6.74	1.68

Table B.4. Per Capita Expenditures per Quartile of PCE in Urban Malawi (in Malawian Kwacha) (Page 4 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Non-Foods (cont'd)												
Other Clothing	0.57	0.43	0.61	0.52	0.48	1.65	1.51	1.30	0.68	1.26	3.87	6.37
Furniture & Carpets	0.19	0.30	0.33	0.40	0.29	0.60	0.56	0.56	0.78	2.45	8.17	16.13
Textiles & Furnishing	0.49	1.15	1.14	2.38	0.60	1.04	1.77	3.07	0.29	0.47	1.36	3.67
Households Appliances	0.14	0.30	0.37	0.25	0.13	0.20	1.28	2.55	0.32	0.49	0.91	1.83
Glassware, Tableware	0.13	0.56	0.61	0.59	0.28	1.07	1.05	0.97	0.36	1.61	1.55	4.20
Other Semi-Durables	2.75	3.07	4.13	4.39	3.91	6.87	9.18	9.43	2.71	6.89	9.98	22.89
Household Services	0.91	1.28	1.07	1.23	0.83	1.59	2.41	1.57	0.68	3.25	10.56	31.38
Health Expenses	1.51	1.98	1.88	2.54	1.00	2.26	2.90	2.50	0.78	1.84	4.79	8.25
Vehicle Operating Costs	0.27	0.54	0.56	0.41	0.18	0.43	1.20	3.03	0.89	3.51	14.05	29.73
Other Transport Costs	0.23	1.18	1.44	1.05	1.52	3.54	5.00	4.00	1.12	3.08	8.61	12.21
Communication	0.27	0.18	0.14	0.08	0.10	0.43	0.49	0.57	0.12	0.61	2.61	7.87
Recreational Equipment	0.52	0.55	0.81	0.12	0.65	0.88	1.51	1.45	0.53	1.48	5.11	5.32
Recreational Services	0.14	0.26	0.15	0.56	0.09	0.53	0.78	0.47	0.11	0.40	2.16	3.67
Books, Newspapers	0.04	0.12	0.11	0.11	0.10	0.17	0.40	0.43	0.06	0.52	0.23	3.18
Educational Fees	1.27	1.21	1.00	0.92	1.16	1.61	2.17	2.02	0.88	2.98	4.79	11.21
Personal Goods	0.69	1.00	1.51	1.52	1.01	2.08	3.50	3.48	0.61	1.99	5.50	15.24
Holidays	0.23	0.23	0.32	0.16	0.03	0.03	0.10	0.05	0.64	0.91	0.91	4.22
Transfers	1.64	2.34	2.55	1.57	1.91	4.62	5.58	4.40	2.15	6.79	15.63	31.24

Table B.4. Per Capita Expenditures per Quartile of PCE in Urban Malawi (in Malawian Kwacha) (Page 5 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Non-Foods (cont'd)												
Misc.Payments	0.20	0.58	0.77	0.68	0.58	1.20	1.78	1.58	3.30	7.02	23.77	48.31
Housing Rent	74.84	151.62	295.68	1451.1	11.03	21.88	165.65	1140.21	5.73	15.03	291.57	2690.40
Mortgage	0.00	0.00	0.00	0.00	0.00	0.006	0.00	0.00	0.00	0.28	0.30	0.00
Council Rates	0.03	0.04	0.005	0.03	0.03	0.11	0.17	0.11	0.08	0.01	0.00	0.36
Dwelling Repair & Maintenance	0.02	0.03	0.20	0.09	0.04	0.30	0.15	0.19	0.16	0.05	1.63	2.85
Water	1.23	1.12	1.21	1.10	1.32	3.07	4.81	4.33	0.88	3.31	5.40	7.86
Electricity	0.30	0.20	0.32	0.12	0.24	0.91	1.18	1.08	0.12	2.56	5.43	19.00
Paraffin	0.61	1.00	1.59	2.02	0.74	1.59	1.56	3.30	1.58	1.31	1.68	3.25
Firewood	0.16	0.68	0.45	0.40	2.14	4.06	3.71	3.26	0.80	3.78	3.88	4.67
Other Fuels	0.16	0.18	0.33	0.24	0.37	1.20	2.02	1.23	0.00	0.11	0.41	6.21
Mean PCE	227.09	399.58	585.52	1762.17	206.26	369.84	557.51	1664.64	185.64	405.88	790.91	3431.01

Source: HESSEA (1990/91)

Table B.5. Malawi Consumer Prices in Urban and Rural Areas (in Kwacha per unit), in 1993

	North		Center		South		
Goods and Services	Bomas Rural	Mzuzu City	Bomas Rural	Lilongwe City	Bomas Rural	Blantyre City	Zomba
Cereals and Grains							
Maize grain (Kg)	0.77	0.84	0.65	0.87	0.77	1.96	0.69
Maize flour (Kg)	2.62	2.14	1.92	2.53	1.92	3.67	1.78
Millet (Kg)	1.55	1.78	1.93	3.34	2.74	2.27	2.74
Rice (Kg)	4.18	4.22	4.02	3.99	3.91	3.70	3.56
Bread (Loaf)	2.20	2.21	2.21	2.21	2.19	2.21	2.19
Tubers							
Cassava (Kg)	0.61	0.60	0.95	1.00	0.84	1.14	0.67
Other (Potatoes) (Kg)	0.90	1.51	1.13	1.30	0.81	1.93	1.88
Sweets							
White Sugar (Kg)	0.90	0.91	0.91	0.91	0.91	0.91	0.91
Brown Sugar (Kg)	0.88	0.89	0.88	0.89	0.89	0.89	0.89
Pulses (Kg): Average price	4.08	3.99	4.20	4.06	4.81	4.22	4.28
White haricots	4.92	3.72	3.63	3.92	4.70	4.63	4.64
Kidney haricots	4.13	4.26	4.17	4.19	4.93	4.89	4.00
Cow peas	2.60	3.51	3.12	5.86	3.01	4.64	6.18
Vegetables							
Cabbages (Kg)	1.42	0.82	0.91	0.82	1.34	1.27	1.46
Onions (Kg)	4.23	4.73	6.00	4.57	7.55	5.50	4.88
Fresh Tomatoes (Kg)	2.65	2.79	2.39	2.18	2.51	1.71	1.58

Table B.5. Malawi Consumer Prices in Urban and Rural Areas (in Kwacha per unit), in 1993

	North		Center			South	
Goods and Services	Bomas Rural	Mzuzu City	Bomas Rural	Lilongwe City	Bomas Rural	Blantyre City	Zomba
Groundnuts : Shelled	9.06	5.08	5.02	5.30	4.42	5.34	7.85
Unshelled	5.55	4.09	4.71	5.20	5.31	5.17	7.37
Fruits							
Bananas (Kg)	0.91	0.95	1.19	1.22	0.97	0.99	1.07
Meat & Fish							
Beef & Veal (Kg)	6.05	13.19	6.12	16.40	6.30	12.07	13.39
Poultry (Kg)	4.49	9.55	6.05	11.27	12.01	10.04	10.77
Fish (450g)	-	4.99	-	4.66	-	4.35	4.91
Eggs & Milk							
Eggs (Unit of 10)	-	7.59	-	6.38	-	5.12	5.65
Fresh Milk (Liter)	1.16	1.17	1.16	1.17	1.17	1.16	1.17
Powdered Milk (750g)	5.06	4.47	6.36	4.47	4.76	4.47	4.47
Oils & Fats							
Margarine (250g)	3.25	2.92	3.25	2.95	3.25	3.23	2.91
Cooking Oil (500ml)	5.23	5.17	5.18	5.19	5.14	5.19	5.17
Non-alc. Beverages							
Tea (250g)	3.16	3.29	3.35	3.29	3.39	3.19	3.19
Soft Drinks (500ml)	2.85	1.58	2.76	2.67	2.16	3.82	1.98
Alcoholic Beverages (72cl)	4.45	4.45	4.45	4.45	4.45	4.45	4.45

Table B.5. Malawi Consumer Prices in Urban and Rural Areas (in Kwacha per unit), in 1993

	North		Center		South		
Goods and Services	Bomas Rural	Mzuzu City	Bomas Rural	Lilongwe City	Bomas Rural	Blantyre City	Zomba
Non-Foods							
Mens Clothing (Pants)	38.44	38.97	37.14	39.42	32.73	41.95	35.22
Women Clothing (Dress)	30.34	24.99	22.73	36.37	24.90	84.95	48.73
Boys Clothing (Shorts)	12.52	15.35	13.71	14.89	10.72	17.28	14.36
Girls Clothing (Dress)	19.02	21.45	19.95	25.50	17.49	34.95	27.97
Glassware and Cooking Pots	-	18.58	-	31.90	-	18.56	32.36
Semi-Durables (Blanket & Bedsheets)	51.07	48.91	58.62	48.52	56.87	46.25	38.90
Health Expenses (Malaria)	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Transport Costs (Bus Fare)	18.88	1.87	10.98	0.85	5.60	0.85	1.10
Educational Fees (per pupil/year)	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Housing Rent (Dwelling)							
Water (Metric Ton)	-	5.52	-	6.57	-	7.08	7.22
Electricity (Kwatt/hour)	-	20.91	-	20.91	-	20.91	20.91
Paraffin	1.65	1.65	1.65	1.65	1.65	1.65	1.65
Firewood (m^3)	0.21	0.22	0.21	0.44	0.22	0.39	0.24
Fuels	2.08	2.18	2.35	2.31	2.27	2.26	2.32

Sources: 1) The Ministry of Agriculture of Malawi
2) The National Statistical Office of Malawi

Table B.6. Urban and Rural Consumer Price Indices in Malawi: Means by Region and City

	North			Center			South			
Groups of Products	Rural	Bomas	Mzuzu City	Rural	Bomas	Lilongwe City	Rural	Bomas	Blantyre	Zomba Municipality
Maize	75.80	66.72	77.80	66.31	53.66	81.84	66.31	53.66	152.64	75.79
Non-Maize Grains and Cereals	132.29	145.22	158.74	143.87	162.42	197.71	157.16	182.73	171.20	182.73
Cassava	71.93	60.70	59.69	96.64	94.95	100.00	89.03	83.85	154.67	66.73
Pulses	153.13	159.79	158.61	154.48	161.34	159.53	160.96	168.80	161.60	162.36
Groundnuts	173.49	187.70	159.10	149.68	158.56	161.05	145.00	152.90	161.39	180.17
Rice	154.37	161.21	161.60	152.44	159.00	158.61	151.16	157.54	154.67	152.69
Other Foods	166.43	197.24	257.00	184.66	226.55	266.48	194.42	242.66	255.33	256.58
All Foods	**122.95**	**190.96**	**174.52**	**172.22**	**173.34**	**188.70**	**173.49**	**168.97**	**202.03**	**197.00**
Non-Foods	200.65	221.64	215.16	198.67	219.15	223.42	194.19	213.50	235.62	223.84
All Goods	**182.22**	**221.55**	**208.43**	**115.81**	**202.94**	**216.28**	**111.42**	**206.52**	**212.35**	**225.92**

Source: Own Calculations using data from Table B.5 and the HESSEA survey

Table B.7. Household Characteristics in the Rural Mzuzu District: Means and Standard Deviations (Page 1 of 2)

	Mean	Standard Deviation
1. Expenditure		
Total Household	79.32	86.39
Per Capita (PCE)	8.49	8.42
Ln(PCE)	1.92	0.73
Total Household Expenditure	951.84	1036.68
Total Expenditure per Capita	93.87	101.04
2. Income		
Total Household	883.32	1184.52
Per capita	94.80	113.52
Source as proportion of total income		
Crop sale	27.76	33.47
Wages	16.64	23.41
Transfers	34.14	28.05
Trade	6.59	15.11
Self-employment (exclude trade)	16.79	21.37
3. Household Characteristics		
Household size	10.14	5.29
Age Group 0 – 4	20.81	10.00
5 – 9	15.01	11.26
10 – 14	11.97	10.13
15 – 59	47.52	13.39
>= 60	4.69	6.69

Table B.7. Household Characteristics in the Rural Mzuzu District: Means and Standard Deviations (Page 2 of 2)

	Mean	Standard Deviation
4. Own-consumption as a proportion of total expenditure per item		
Maize	84.3	82.31
Cassava	90.1	84.24
Other Staples	64.3	52.05
Pulses and Beans	89.2	77.22
Vegetables	73.6	56.73
Fruits	72.2	80.04

Source: The Malawi Maternal and Child Nutrition (MMCN) survey, 1987 - 89.

Table B.8. Household Characteristics in the Rural Malawi: Mean and Standard Deviation

	North		Center		South		Whole Country	
	Mean	S. Dev.	Mean	S. Dev.	Mean	S. Dev.	Mean	S. Dev.
1. Expenditure								
Total Household /item	17.68	96.13	18.90	204.59	11.45	82.90	15.16	146.95
Per capita (PCE)	4.93	32.32	4.90	69.93	3.04	18.67	4.00	47.94
Ln(PCE)	1.46	1.72	1.03	1.79	0.81	1.75	0.96	1.77
Total Expenditure	1247.33	1035.07	1551.32	2278.11	904.07	1092.67	1206.55	1710.98
Total Expend./ capita	346.22	417.70	410.34	776.36	239.71	305.03	321.08	564.48
2.Income								
Total Household	1235.52	719.27	1340.85	3712.40	1062.57	1009.35	1123.31	777.23
Per Capita	243.46	235.02	340.97	130.82	251.00	144.84	310.77	151.98
% of Total Income								
Wages	13.89	30.38	15.60	31.19	19.81	32.03	17.44	31.59
Profits	27.67	31.09	25.94	28.78	21.53	30.45	24.00	29.93
Gifts	2.33	12.80	1.30	8.30	6.22	18.69	3.77	14.81
Other Cash Income	4.50	17.68	1.30	8.86	10.59	26.33	6.10	20.44
Own-account Income	49.24	37.74	55.16	32.92	40.47	33.75	47.47	34.56
In-kind Income	2.37	11.13	0.69	4.31	1.37	6.08	1.20	6.24
3. Household Characteristics								
Household Size	4.74	3.05	3.94	2.18	3.99	2.32	4.05	2.37
Group Age 0 - 4	12.52	14.99	0.00	0.00	0.00	0.00	1.40	6.37
5 - 9	12.47	14.90	17.18	18.49	16.20	18.74	16.18	18.29
10 - 14	10.65	13.96	11.77	15.66	13.45	16.79	12.45	16.07
15 - 54	53.31	27.13	61.52	28.50	59.32	29.45	59.54	28.91
> 54	11.06	23.38	9.53	22.13	11.03	23.06	10.43	22.72

Source: The Household Expenditure and Small-Scale Economic Activities (1990/91)

Table B.9. Rural Household Budget Shares: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 1 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Cereals and Grains												
Maize	26.43	18.3	56.74	28.8	23.2	90.93	28.0	29.9	89.25	28.32	28.16	89.74
Millet	11.06	9.03	1.06	0.01	0.21	0.86	0.07	0.69	3.53	0.06	0.60	2.77
Rice	3.11	3.74	23.05	0.40	1.63	16.15	0.25	1.47	14.20	0.29	1.52	15.26
Other	43.55	31.9	57.45	20.5	24.6	69.08	11.0	21.0	59.56	13.77	22.51	61.57
Bread	2.01	2.53	19.50	0.52	1.46	35.15	0.41	1.68	30.15	0.44	1.63	31.58
Subtotal	**45.79**	**27.2**	**90.07**	**51.1**	**26.1**	**96.63**	**46.0**	**24.3**	**95.43**	**47.62**	**25.76**	**95.39**
Tubers												
Cassava	3.46	6.22	7.09	0.20	0.98	20.46	0.59	4.51	23.08	0.48	3.85	22.33
Other (Irish & Sweet Potatoes)	1.06	1.63	3.55	0.07	0.35	9.41	0.14	0.91	13.93	0.12	0.79	12.64
Subtotal	**2.96**	**5.49**	**9.57**	**0.28**	**1.06**	**26.42**	**1.06**	**4.71**	**33.68**	**0.67**	**3.47**	**28.41**
Sweets												
Sugar	5.35	8.09	52.13	2.11	4.61	49.41	1.96	4.91	55.79	2.03	4.82	53.98
Sugarcane	0.76	0.87	5.67	0.17	0.63	28.67	0.25	0.93	34.85	0.22	0.85	33.09
Other sweets	0.59	0.91	30.14	0.37	0.92	48.02	0.40	2.82	51.63	0.40	2.44	50.59
Subtotal	**0.66**	**0.94**	**33.69**	**0.56**	**1.18**	**59.76**	**1.00**	**3.14**	**64.18**	**0.75**	**2.37**	**59.42**
Pulses	5.82	7.48	38.30	0.68	1.98	30.31	0.92	2.51	45.53	0.85	2.38	41.17
Vegetables												
Cabbages	1.15	1.93	10.64	0.19	0.73	17.62	0.07	0.38	11.30	0.11	0.51	13.11
Onions	0.56	0.61	16.67	0.13	0.61	20.21	0.04	0.21	17.12	0.07	0.37	18.00
Fresh Tomatoes	1.06	1.16	33.69	0.67	1.33	54.84	0.47	1.33	61.68	0.52	1.33	59.72
Carrots	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Processed Vegetables	0.00	0.00	0.00	0.003	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**1.50**	**1.83**	**38.30**	**1.02**	**1.98**	**58.12**	**0.98**	**1.78**	**64.10**	**0.96**	**1.83**	**59.18**

Table B.9. Rural Household Budget Shares: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 2 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Groundnuts	2.81	4.40	13.48	0.39	1.59	25.75	0.25	0.99	33.75	0.29	1.19	31.45
Fruits												
Bananas	0.70	0.91	19.15	0.36	3.06	45.42	0.23	1.33	31.95	0.27	1.97	35.81
Pawpaw	0.00	0.00	0.00	0.01	0.09	2.16	0.00	0.03	0.48	0.00	0.05	0.96
Citrus Fruits	0.17	0.16	2.48	0.00	0.08	3.11	0.01	0.30	2.91	0.01	0.26	2.97
Pineapple	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.26	1.59	0.00	0.22	1.14
Other Fresh Fruits	0.33	0.33	1.06	0.08	0.33	14.68	0.11	0.90	18.36	0.10	0.78	17.31
Tinned Fruits & Fruit Juices	0.84	-	0.35	0.00	0.00	0.00	0.00	0.07	0.49	0.00	0.06	0.35
Dried Fruits	15.29	12.2	5.32	0.03	0.69	130	0.00	0.11	0.97	0.01	0.38	1.06
Subtotal	**3.70**	**8.17**	**25.89**	**0.51**	**3.13**	**52.16**	**0.56**	**1.80**	**43.80**	**0.58**	**2.74**	**45.40**
Meat & Fish												
Beef & Veal	6.74	9.89	26.60	1.13	3.96	24.61	0.33	1.21	11.09	0.56	2.85	14.96
Mutton & Lamb	8.89	7.81	6.74	0.44	2.28	13.47	0.27	1.88	7.35	0.32	2.00	9.10
Pork	3.06	3.25	6.03	0.30	1.45	11.74	0.05	0.47	2.29	0.12	0.87	5.00
Poultry	9.68	9.61	21.28	0.46	2.09	10.71	0.34	2.10	9.21	0.37	2.10	9.64
Other Meat	7.12	10.66	1.06	1.40	6.78	13.56	0.75	5.34	9.98	0.94	5.79	11.00
Fish	3.81	3.94	61.35	3.00	4.57	70.90	4.28	6.48	83.71	3.91	6.02	80.04
Subtotal	**9.65**	**10.63**	**73.05**	**7.20**	**9.89**	**83.16**	**9.62**	**9.00**	**94.87**	**8.39**	**9.55**	**88.03**
Eggs & Milk												
Eggs	0.98	1.40	4.61	0.09	0.81	6.74	0.10	1.15	6.86	0.10	1.06	6.82
Fresh Milk	1.15	1.59	9.93	0.05	0.30	6.82	0.04	0.38	5.89	0.04	0.36	6.16
Powdered Milk	3.22	3.14	3.55	0.04	0.53	1.55	0.04	0.42	3.19	0.04	0.45	2.72
Other Dairy Products	2.74	2.43	4.61	0.005	0.07	0.95	0.01	0.20	0.90	0.01	0.18	0.91
Subtotal	**2.09**	**2.71**	**19.15**	**0.20**	**1.06**	**13.30**	**0.34**	**1.53**	**14.62**	**0.29**	**1.35**	**14.53**

Table B.9. Rural Household Budget Shares: Means, Standard Deviation by Household, and Proportion of Households Consuming (Page 3 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Oils & Fats												
Butter	0.00	0.00	0.00	0.00	0.00	0.00	0.005	0.21	0.07	0.004	0.17	0.07
Margarine	1.41	1.47	1.06	0.04	0.50	1.55	0.01	0.20	1.66	0.02	0.32	1.63
Other Oils & Fats	2.48	2.42	33.33	0.43	1.57	19.52	0.48	1.94	26.40	0.47	1.84	24.43
Subtotal	**2.50**	**2.40**	**33.69**	**0.50**	**1.71**	**20.12**	**0.94**	**2.69**	**30.98**	**0.76**	**2.27**	**26.88**
Non-alcoholic Beverages												
Tea	0.75	0.81	16.31	0.08	0.47	12.34	0.06	0.36	11.64	0.07	0.40	11.84
Coffee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Soft Drinks	6.92	15.69	26.24	1.28	6.03	35.49	0.36	2.43	21.83	0.62	3.85	25.74
Alcoholic Beverages	7.53	12.53	28.37	1.00	3.04	28.32	0.22	1.49	7.00	0.45	2.08	13.11
Subtotal	**7.98**	**14.80**	**51.06**	**2.46**	**6.80**	**57.60**	**1.26**	**3.81**	**38.80**	**2.01**	**6.25**	**47.55**
Other Foods	2.51	2.41	74.46	2.02	2.96	85.49	1.00	3.95	48.30	1.29	3.72	58.95
Total Foods	**64.24**	**23.03**	**100**	**69.41**	**22.3**	**100**	**69.18**	**19.1**	**99.79**	**68.79**	**20.91**	**99.90**
Non-Foods												
Mens Clothing	11.43	9.54	26.24	2.54	6.91	26.07	2.21	4.28	81.08	2.31	5.18	65.33
Women Clothing	10.11	7.03	36.88	3.76	6.80	40.76	2.45	6.71	35.13	2.83	6.76	36.75
Boys Clothing	5.37	5.79	23.05	0.84	2.81	17.44	1.13	4.10	19.68	1.05	3.78	19.04
Girls Clothing	5.01	4.10	14.54	0.85	2.81	18.04	0.56	3.59	10.95	0.64	3.39	12.98

Table B.9. Rural Household Budget Shares: Means, Standard Deviation, and Proportion of Households Consuming (Page 4 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Non-Foods (continued)												
Other Clothing	7.53	9.49	14.54	1.39	6.95	14.33	0.91	3.98	21.76	1.05	5.03	19.63
Furniture & Carpets	8.30	10.89	5.32	0.29	1.45	12.35	0.29	2.87	8.73	0.29	2.54	9.77
Textiles & Furnishing	9.52	6.23	21.99	0.88	3.44	11.66	0.31	3.28	8.66	0.48	3.34	9.52
Households Appliances	0.93	-	0.35	0.03	0.37	1.99	0.60	2.82	13.31	0.44	2.41	10.06
Glassware, Tableware, etc.	8.44	10.95	12.06	0.51	2.52	10.62	0.08	0.88	2.56	0.20	1.55	4.87
Other Semi-Durables	7.05	8.11	93.26	5.00	7.92	91.54	1.96	4.21	49.00	2.83	5.70	61.18
Household Services	6.22	5.63	50.35	2.29	3.92	75.99	2.89	6.58	90.16	2.72	5.95	86.10
Health Expenses	1.43	2.90	55.67	1.05	2.58	65.54	2.01	4.98	85.01	1.74	4.45	79.50
Vehicle Operating Costs	2.43	3.22	4.61	0.31	2.40	5.35	0.32	2.28	6.86	0.31	2.31	6.43
Other Transport Costs	7.23	9.19	20.21	0.79	3.03	16.32	0.55	2.95	12.82	0.62	2.97	13.82
Communication	0.93	1.80	2.84	0.02	0.23	2.16	0.21	1.35	7.76	0.16	1.15	6.15
Recreational Equipment	6.96	9.12	17.73	0.23	1.48	6.30	0.16	1.42	5.61	0.18	1.44	5.81
Recreational Services	9.88	19.68	7.45	0.09	0.33	13.21	0.29	1.75	15.11	0.23	1.50	14.56
Books, Newspapers, etc.	4.05	4.50	1.42	0.01	0.13	1.12	0.002	0.05	0.69	0.004	0.09	0.82
Educational Fees	2.45	7.03	61.70	0.48	1.64	41.28	0.39	3.09	28.21	0.41	2.76	31.95
Personal Goods & Services	2.77	3.96	34.04	0.58	1.60	32.98	0.24	1.20	17.11	0.34	1.34	21.66
Holidays	3.87	1.10	0.71	0.009	0.17	0.86	0.46	1.29	38.32	0.33	1.11	27.60
Transfers	7.70	11.55	17.38	0.67	3.48	33.77	0.73	2.74	37.35	0.71	2.97	36.33
Miscellaneous Payments	10.06	13.87	12.41	3.47	13.7	26.08	0.83	4.04	25.02	1.59	8.18	25.32
Housing Rent	6.08	4.92	2.48	0.27	2.31	4.92	0.08	0.91	1.73	0.13	1.46	2.65

Table B.9. Rural Household Budget Shares: Means, Standard Deviation, and Proportion of Households Consuming (Page 5 of 5)

Goods and Services	North			Center			South			All Country		
	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.	Mean	St. Dev.	% Hsld Cons.
Non-Foods (continued)												
Mortgage	2.10	-	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Council Rates	3.04	0.95	0.71	0.00	0.00	0.00	0.006	0.17	0.21	0.004	0.14	0.15
Dwelling Repair & Maintenance	2.79	1.65	1.77	0.18	1.92	3.97	0.21	2.05	4.15	0.20	2.01	4.01
Water	0.00	0.00	0.00	0.02	0.21	1.12	0.001	0.03	1.04	0.006	0.12	1.06
Electricity	0.00	0.00	0.00	0.01	0.19	0.60	0.00	0.00	0.00	0.003	0.10	0.22
Paraffin	2.05	1.99	37.94	0.66	2.78	51.99	0.67	1.30	70.75	0.67	1.84	65.38
Firewood	5.29	3.89	2.13	0.12	1.18	4.92	0.07	0.59	5.61	0.09	0.80	5.41
Other Fuels	0.00	0.00	0.00	0.01	0.20	0.43	0.02	0.64	0.35	0.02	0.55	0.37

Notes: The numbers in parenthesis represent the total number of households consuming the item category.

Source: Household Expenditure and Small-Scale Economic Activities (1990/91)

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in Each Region
(Page 1 of 12)

	North								Center							
	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile		1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Cereals and Grains																
Maize	18.5	42.83	18.3	56.76	16.94	61.54	10.9	61.54	34.8	82.1	34.3	91.7	29.9	94.1	18	95.5
Millet	0.00	0.00	0.14	2.70	0.33	1.54	0.05	0.85	0.02	0.70	0.00	0.00	0.02	1.37	0.0	1.37
Rice	0.83	9.53	0.44	13.51	0.81	33.85	0.69	27.35	0.49	7.37	0.59	17.1	0.36	18.5	0.2	21.3
Other	24.8	33.33	25.9	54.05	23.03	63.07	25.9	68.38	15.1	51.9	19.3	66.3	21.5	72.5	27	85.2
Bread	0.39	7.94	0.10	5.41	0.79	32.31	0.27	23.08	0.73	21.0	0.40	23.7	0.60	41.9	0.5	53.6
Subtotal	**44.6**	**77.8**	**45.0**	**91.9**	**41.9**	**93.9**	**37.9**	**94.0**	**51.2**	**90.5**	**54.7**	**96.9**	**52.4**	**99.3**	**46**	**99.7**
Tubers																
Cassava	0.48	3.18	0.43	10.81	0.18	9.23	0.10	6.84	0.40	14.3	0.17	21.6	0.16	25.0	0.1	20.6
Other (Potatoes)	0.00	0.00	1.09	40.54	0.10	6.15	0.04	5.13	0.06	5.26	0.10	7.90	0.08	11.3	0.0	13.0
Subtotal	**0.5**	**3.2**	**0.4**	**10.8**	**0.3**	**12.3**	**0.1**	**11.1**	**0.5**	**18.2**	**0.3**	**28.5**	**0.2**	**30.6**	**0.2**	**28.2**
Sweets																
Sugar	3.30	36.51	2.07	40.54	2.52	60.00	2.89	59.83	2.78	34.0	2.05	42.6	2.21	54.6	1.8	66.3
Sugarcane	0.00	0.00	0.05	5.40	0.11	1077	0.03	5.98	0.22	19.6	0.21	23.7	0.14	31.9	0.1	39.1
Other sweets (spread)	0.03	7.94	0.14	24.32	0.33	41.53	0.19	37.61	0.48	35.0	0.50	47.7	0.32	52.5	0.2	56.3
Subtotal	**0.03**	**7.9**	**0.2**	**29.7**	**0.4**	**50.7**	**0.2**	**39.3**	**0.7**	**45.3**	**0.7**	**58.8**	**0.5**	**64.9**	**0.4**	**69.8**
Pulses	**3.6**	**30.2**	**1.8**	**32.4**	**2.0**	**33.8**	**1.8**	**47.0**	**0.7**	**18.9**	**1.0**	**32.6**	**0.6**	**32.6**	**0.6**	**36.8**
Vegetables																
Cabbages	0.12	6.35	0.32	8.11	0.06	4.52	0.10	17.09	0.19	8.77	0.30	18.9	0.16	16.8	0.1	25.8
Onions	0.04	4.76	0.14	13.51	0.05	13.85	0.13	25.64	0.13	9.82	0.15	20.2	0.15	25.4	0.0	25.0
Fresh Tomatoes	0.18	11.11	0.47	29.73	0.46	40.00	0.36	43.59	0.77	37.5	0.95	62.8	0.66	60.4	0.3	58.0
Carrots	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.34
Processed Vegetables	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.34	0.0	0.00
Subtotal	**0.3**	**15.9**	**0.9**	**35.1**	**0.6**	**40.0**	**0.6**	**50.4**	**1.1**	**41.4**	**1.4**	**65.6**	**1.0**	**64.3**	**0.6**	**60.8**

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in Each Region (Page 2 of 12)

	North								Center							
	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile		1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Groundnuts	**0.2**	**6.3**	**0.3**	**8.1**	**0.4**	**12.3**	**0.5**	**19.7**	**0.5**	**17.2**	**0.5**	**27.8**	**0.5**	**25.4**	**0.3**	**32.3**
Fruits																
Bananas	0.25	15.87	0.08	13.51	0.13	21.54	0.09	21.37	0.79	38.2	0.31	46.7	0.22	48.8	0.1	47.7
Pawpaw	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.01	1.37	0.02	4.12	0.0	2.41
Citrus Fruits	0.00	0.00	0.00	2.70	0.003	4.62	0.00	2.56	0.00	1.40	0.01	2.06	0.02	5.15	0.0	3.78
Pineapple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
Other Fresh Fruits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.56	0.07	9.47	0.10	13.4	0.10	18.9	0.0	16.8
Tinned Fruits & Juices	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
Dried Fruits	2.72	9.52	0.17	2.70	0.54	6.15	0.15	3.42	0.08	0.35	0.03	1.72	0.00	1.03	0.0	2.06
Subtotal	**3.0**	**22.2**	**0.3**	**18.9**	**0.7**	**30.8**	**0.2**	**27.4**	**1.0**	**42.8**	**0.5**	**5.3**	**0.4**	**56.7**	**0.3**	**56.3**
Meat & Fish																
Beef & Veal	0.78	7.94	2.04	21.62	1.94	29.23	2.18	36.75	1.27	11.9	1.33	20.6	1.16	29.9	1.1	35.7
Mutton & Lamb	0.39	3.17	0.69	2.70	0.55	7.69	0.71	9.40	0.27	4.91	0.66	14.0	0.50	13.4	0.4	21.3
Pork	0.00	0.00	0.04	2.70	0.08	4.62	0.38	11.11	0.22	5.61	0.45	11.6	0.28	10.3	0.2	19.2
Poultry	1.20	7.94	2.53	16.21	2.87	26.15	1.91	27.35	0.31	2.46	0.51	5.84	0.52	12.0	0.5	22.3
Other Meat	0.00	0.00	0.00	0.00	0.02	1.54	0.17	1.71	0.97	5.96	0.76	9.97	1.11	15.1	3.0	23.0
Fish	2.91	46.03	3.00	56.76	2.25	61.54	1.86	70.94	4.47	63.5	3.38	71.8	3.21	75.6	1.9	72.5
Subtotal	**5.3**	**49.2**	**8.3**	**70.3**	**7.7**	**80.0**	**7.2**	**82.9**	**7.5**	**70.9**	**7.1**	**82.1**	**6.8**	**89.3**	**7.4**	**90.0**

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in Each Region (Page 3 of 12)

	North								Center							
	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile		1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Eggs & Milk																
Eggs	0.08	1.58	0.01	5.41	0.00	0.00	0.06	8.55	0.05	2.46	0.10	4.81	0.13	7.90	0.1	11.6
Fresh Milk	0.09	3.17	0.04	5.41	0.10	15.38	0.15	11.97	0.03	1.75	0.06	5.50	0.06	7.22	0.0	12.7
Powdered Milk	0.00	0.00	0.00	0.00	0.23	3.08	0.14	6.84	0.00	0.35	0.02	0.34	0.04	1.03	0.1	4.47
Other Dairy Products	0.22	3.17	0.00	2.70	0.04	1.54	0.16	7.69	0.00	0.00	0.00	0.69	0.00	0.34	0.0	2.75
Subtotal	**0.4**	**6.3**	**0.06**	**13.5**	**0.4**	**18.5**	**0.5**	**28.2**	**0.1**	**4.6**	**0.2**	**10.7**	**0.2**	**14.1**	**0.3**	**23.7**
Oils & Fats																
Butter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.34
Margarine	0.00	0.00	0.00	0.00	0.05	1.54	0.01	1.71	0.04	0.70	0.00	0.00	0.09	2.41	0.0	3.09
Other Oils & Fats	0.27	11.11	0.77	21.62	1.17	41.54	0.96	44.44	0.36	9.12	0.46	16.8	0.55	21.3	0.4	30.5
Subtotal	**0.3**	**11.1**	**0.8**	**21.6**	**1.2**	**43..1**	**1.0**	**44.4**	**0.4**	**9.5**	**0.5**	**16.8**	**0.6**	**22.3**	**0.5**	**31.6**

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in Each Region (Page 4 of 12)

	North								Center							
	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile		1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-alc. Beverages																
Tea	0.08	4.76	0.08	5.41	0.20	20.00	0.12	23.93	0.06	3.51	0.09	9.28	0.10	15.8	0.1	20.6
Coffee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
Soft Drinks	1.62	4.76	2.20	18.92	1.10	36.92	2.20	34.19	1.32	20.7	1.42	26.4	1.23	41.2	1.2	52.9
Alcoholic Beverages	**2.6**	**19.0**	**1.8**	**37.8**	**2.8**	**32.3**	**1.6**	**28.2**	**1.3**	**22.5**	**1.1**	**26.1**	**1.0**	**30.6**	**0.8**	**34.0**
Subtotal	**4.3**	**25.4**	**4.1**	**48.6**	**4.1**	**64.6**	**3.9**	**58.1**	**2.7**	**40.4**	**2.6**	**50.5**	**2.3**	**66.0**	**2.2**	**73.2**
Other Foods	**3.3**	**65.1**	**2.0**	**73.0**	**1.5**	**76.9**	**1.3**	**78.6**	**3.3**	**80.0**	**2.5**	**90.4**	**1.6**	**87.3**	**1.1**	**84.2**
Total Foods	**73.3**	**100**	**67.2**	**100**	**64.1**	**100**	**58.5**	**100**	**73.9**	**100**	**72.8**	**100**	**69.3**	**100**	**61**	**100**
Non-Foods																
Mens Clothing	1.85	6.35	4.03	32.43	2.76	24.52	3.43	35.90	1.83	10.1	2.85	18.2	3.06	34.3	2.9	41.2
Women Clothing	2.05	15.87	3.42	29.73	4.70	40.00	4.19	48.72	3.25	18.2	4.20	34.3	4.75	51.5	3.7	58.4
Boys Clothing	0.34	6.35	0.68	10.81	1.30	24.62	1.86	35.04	0.24	2.46	0.61	10.3	0.99	20.2	1.7	36.4
Girls Clothing	0.57	7.94	1.06	16.22	0.54	7.69	0.81	21.37	0.59	4.21	0.75	11.3	1.13	20.6	1.1	35.7

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in Each Region (Page 5 of 12)

	North								Center							
	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile		1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-Foods (cont'd)																
Other Clothing	0.29	3.17	0.92	10.81	0.76	9.23	1.77	24.79	1.07	6.32	0.90	7.90	1.93	18.2	1.7	24.7
Furniture & Carpets	0.00	0.00	0.27	2.70	0.53	4.62	0.69	9.40	0.18	4.21	0.20	7.56	0.29	14.4	0.4	23.0
Textiles & Furnishing	0.68	4.76	1.08	8.10	2.06	20.00	3.19	36.75	0.43	1.75	0.82	5.84	1.14	14.4	1.4	24.4
Households Appliances	0.00	0.00	0.00	0.00	0.01	1.54	0.00	0.00	0.03	1.05	0.05	1.37	0.17	2.75	0.0	2.75
Glassware, Tableware	0.05	1.59	0.49	5.41	0.58	9.23	1.95	21.37	0.25	1.75	0.34	5.84	0.61	12.7	0.9	21.9
Other Semi-Durables	7.01	92.06	4.93	91.89	7.79	95.38	6.18	93.16	6.57	82.4	5.09	93.8	4.86	93.1	4.6	96.5
Household Services	4.82	49.21	2.92	45.95	3.60	63.08	2.03	45.30	4.07	69.8	1.94	72.5	2.15	79.3	1.4	82.1
Health Expenses	1.08	33.33	0.86	56.76	0.58	58.46	0.74	65.81	1.06	48.4	1.26	65.2	1.17	73.2	0.9	74.9
Vehicle Operating Costs	0.00	0.00	0.00	0.00	0.19	3.08	0.16	9.40	0.16	1.75	0.12	1.37	0.13	5.15	0.8	13.0
Other Transport Costs	0.44	7.94	1.00	13.51	1.66	18.46	2.05	29.91	0.28	4.56	0.46	8.25	1.42	20.6	1.3	31.6
Communication	0.00	1.59	0.00	0.00	0.10	3.08	0.00	4.27	0.02	1.05	0.02	1.72	0.01	3.44	0.0	2.41
Recreational Equipment	1.24	6.35	1.14	10.81	0.62	15.38	1.59	27.35	0.07	1.05	0.37	5.84	0.19	5.15	0.3	13.0
Recreational Services	0.43	4.76	0.57	13.51	0.009	3.08	1.36	9.40	0.10	6.32	0.13	12.0	0.08	14.0	0.0	20.2

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in Each Region (Page 6 of 12)

	North								Center							
	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile		1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-Foods (cont'd)																
Books, Newspapers, ...	0.00	0.00	0.00	0.00	0.06	1.54	0.11	2.56	0.00	0.00	0.00	0.00	0.02	1.03	0.0	3.44
Educational Fees	0.90	34.92	2.79	62.16	1.66	72.31	1.36	70.08	0.40	21.7	0.46	34.7	0.51	45.0	0.6	63.2
Personal Goods	0.74	20.63	0.64	35.14	1.03	35.38	1.10	4017	0.72	17.5	0.60	30.2	0.70	34.3	0.5	49.4
Holidays	0.00	0.00	0.00	0.00	0.05	1.54	0.04	0.85	0.01	0.70	0.00	0.34	0.01	0.69	0.0	1.72
Transfers	0.57	6.35	0.86	10.81	1.75	15.38	1.67	26.50	0.47	21.7	1.01	34.0	0.58	35.4	0.9	43.6
Misc.Payments	0.54	4.76	1.29	5.41	0.31	6.15	2.14	22.22	1.60	13.3	0.95	17.1	1.83	27.4	9.3	46.0
Housing Rent	0.00	0.00	0.4	2.70	0.08	1.54	0.19	4.27	0.39	2.46	0.22	1.37	0.28	4.47	0.3	11.3
Mortgage	0.00	0.00	0.00	0.00	0.03	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
Council Rates	0.00	0.00	0.00	0.00	0.10	3.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
Dwelling Repair & Maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.12	4.27	0.01	0.70	0.07	1.72	0.28	3.78	0.3	9.62

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in Each Region (Page 7 of 12)

	North								Center							
	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile		1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-Foods (cont'd)																
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.02	0.69	0.0	3.09
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.34	0.00	0.34	0.0	1.72
Paraffin	1.46	38.10	1.09	40.54	0.54	33.85	0.44	39.32	0.10	32.6	0.73	57.0	0.67	59.7	0.3	58.0
Firewood	0.13	1.59	0.00	0.00	0.05	1.54	0.18	3.42	0.21	3.86	0.10	3.09	0.07	4.81	0.1	7.90
Other Fuels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.0	1.37
Mean PCE		80.15		182.80		298.99		969.19		78.30		180.59		349.00		1524.82
Mean Household Size		6.52		5.54		4.85		4.05		5.20		4.66		4.24		3.98

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in the Southern Region (Page 8 of 12)

	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Cereals and Grains								
Maize	37.55	83.33	33.36	88.09	30.49	91.97	24.70	93.63
Millet	0.09	2.22	0.17	3.88	0.04	2.49	0.16	5.54
Rice	0.27	3.61	0.32	9.97	0.44	14.96	0.63	31.02
Other	9.75	38.61	14.44	59.00	15.59	67.59	13.51	68.98
Bread	0.27	11.39	0.38	21.61	0.74	33.51	1.20	54.02
Subtotal	**47.9**	**87.8**	**48.7**	**96.7**	**47.3**	**98.6**	**40.2**	**98.6**
Tubers								
Cassava	1.70	19.17	0.53	21.33	0.37	21.33	0.70	30.47
Other (Potatoes)	0.21	7.50	0.21	13.30	0.19	14.13	0.19	20.77
Subtotal	**2.0**	**26.4**	**0.8**	**31.3**	**0.6**	**31.9**	**0.9**	**45.2**
Sweets								
Sugar	2.06	26.39	3.38	54.02	3.27	63.16	3.01	79.50
Sugarcane	0.50	26.67	0.33	30.47	0.35	38.50	0.22	43.77
Other sweets (spread)	0.95	36.39	0.51	45.43	0.60	57.06	0.52	67.59
Subtotal	**1.5**	**50.3**	**0.8**	**60.4**	**0.9**	**67.0**	**0.7**	**78.9**
Pulses	**1.9**	**34.7**	**1.3**	**39.9**	**1.1**	**49.6**	**1.4**	**57.9**
Vegetables								
Cabbages	0.05	3.06	0.13	6.37	0.14	12.74	0.17	22.99
Onions	0.04	5.00	0.05	5.59	0.08	19.67	0.13	35.18
Fresh Tomatoes	0.72	43.06	0.94	60.66	0.71	65.37	0.73	77.56
Carrots	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Processed Vegetables	0.00	0.00	0.00	0.00	0.00	0.00	0.004	0.28
Subtotal	**0.8**	**43.9**	**1.1**	**61.2**	**0.9**	**69.3**	**1.0**	**82.0**

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in the Southern Region (Page 9 of 12)

	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Groundnuts	**0.3**	**16.1**	**0.4**	**30.2**	**0.4**	**40.4**	**0.4**	**48.2**
Fruits								
Bananas	0.34	16.94	0.30	29.92	0.39	39.61	0.28	41.27
Pawpaw	0.002	0.28	0.00	0.00	0.004	0.83	0.002	0.83
Citrus Fruits	0.001	1.67	0.04	1.94	0.01	3.88	0.02	4.16
Pineapple	0.003	0.28	0.03	0.83	0.02	1.66	0.02	3.60
Other Fresh Fruits	0.19	12.78	0.23	16.90	0.13	17.73	0.14	26.04
Tinned Fruits & Juices	0.006	2.78	0.00	0.00	0.003	0.55	0.008	1.11
Dried Fruits	0.002	2.78	0.006	0.55	0.007	1.39	0.01	1.66
Subtotal	**0.6**	**27.5**	**0.6**	**42.1**	**0.6**	**50.7**	**0.5**	**54.8**
Meat & Fish								
Beef & Veal	0.29	4.17	0.38	4.99	0.41	11.91	1.07	23.27
Mutton & Lamb	0.04	0.28	0.28	5.82	0.31	7.76	0.86	15.51
Pork	0.007	0.28	0.06	1.94	0.06	2.49	0.11	4.43
Poultry	0.26	2.50	0.45	5.54	0.66	10.24	0.73	18.56
Other Meat	0.68	5.00	0.94	9.14	0.92	10.80	1.38	14.96
Fish	7.10	74.44	6.16	80.33	6.40	88.64	5.80	91.41
Subtotal	**9.6**	**87.8**	**9.2**	**95.3**	**9.2**	**97.2**	**10.5**	**99.2**
Eggs & Milk								
Eggs	0.08	1.39	0.06	3.05	0.13	8.31	0.26	14.68
Fresh Milk	0.04	1.94	0.08	4.15	0.11	6.37	0.16	11.08
Powdered Milk	0.02	0.56	0.08	2.77	0.06	1.39	0.17	8.03
Other Dairy Products	0.00	0.00	0.00	0.00	0.01	0.27	0.06	3.32
Subtotal	**0.1**	**3.9**	**0.2**	**10.2**	**0.3**	**15.8**	**0.7**	**28.5**

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in the Southern Region (Page 10 of 12)

	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Oils & Fats								
Butter	0.00	0.00	0.00	0.00	0.02	0.28	0.00	0.00
Margarine	0.00	0.00	0.03	0.55	0.02	0.83	0.07	5.26
Other Oils & Fats	0.33	8.06	0.65	16.07	1.07	33.24	1.16	48.20
Subtotal	**0.4**	**10.3**	**0.8**	**20.2**	**1.2**	**37.4**	**1.4**	**56.0**
Non-alc. Beverages								
Tea	0.06	5.00	0.08	7.48	0.10	11.63	0.13	22.44
Coffee	0.00	0.00	0.00	0.00	0.00	0.00	0.006	0.55
Soft Drinks	0.33	6.67	0.44	17.45	0.64	22.71	0.87	40.44
Alcoholic Beverages	**0.4**	**5.0**	**0.2**	**5.0**	**0.4**	**7.8**	**0.4**	**10.2**
Subtotal	**0.8**	**18.1**	**0.9**	**32.1**	**1.5**	**41.0**	**1.8**	**64.0**
Other Foods	**2.9**	**53.3**	**1.1**	**43.5**	**0.9**	**49.0**	**0.7**	**47.4**
Total Foods	**73.3**	**99.2**	**70.9**	**100**	**69.4**	**100**	**63.2**	**100**
Non-Foods								
Mens Clothing	3.26	63.33	3.61	82.27	3.36	88.08	3.31	90.58
Women Clothing	2.92	17.78	4.16	32.69	3.98	35.46	4.09	54.57
Boys Clothing	1.16	9.72	1.45	13.02	2.07	20.77	2.27	35.18
Girls Clothing	0.66	3.33	0.70	9.42	0.64	11.08	1.17	19.94

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in the Southern Region (Page 11 of 12)

	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Non-Foods (cont'd)								
Other Clothing	0.62	6.39	1.65	19.11	1.41	22.99	1.92	38.50
Furniture & Carpets	0.27	3.61	0.42	7.76	0.36	6.93	0.70	16.62
Textiles & Furnishing	0.24	0.83	0.51	6.65	0.37	11.08	0.54	16.07
Households Appliances	0.30	2.22	1.07	12.19	1.14	15.24	1.17	23.55
Glassware, Tableware	0.08	1.11	0.17	1.38	0.15	3.32	0.16	4.43
Other Semi-Durables	4.18	48.33	2.87	45.98	2.63	51.25	2.45	50.41
Household Services	4.83	79.72	3.47	91.69	4.14	94.46	4.36	94.74
Health Expenses	3.27	73.06	3.11	87.26	2.63	88.92	2.40	91.14
Vehicle Operating Costs	0.30	4.44	0.31	4.43	0.38	4.99	0.85	13.57
Other Transport Costs	0.47	5.56	0.81	8.86	0.74	11.91	1.35	24.93
Communication	0.06	1.39	0.22	5.26	0.37	8.59	0.68	15.79
Recreational Equipment	0.10	1.39	0.25	4.43	0.18	5.54	0.39	11.08
Recreational Services	0.44	9.44	0.35	10.53	0.29	16.90	0.46	23.55
Books, Newspapers, ...	0.003	0.28	0.006	0.83	0.006	0.27	0.008	1.39
Educational Fees	0.61	18.06	0.49	22.71	0.42	30.19	0.59	41.83
Personal Goods	0.36	7.50	0.28	10.80	0.42	21.05	0.55	29.09
Holidays	0.44	14.44	0.73	32.69	0.78	44.88	0.81	61.22
Transfers	0.94	27.22	0.89	31.30	1.16	38.23	1.75	52.63
Misc.Payments	0.46	12.22	0.82	17.17	1.36	28.25	2.20	42.38
Housing Rent	0.00	0.00	0.03	0.28	0.08	1.38	0.33	5.26
Mortgage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Council Rates	0.00	0.00	0.00	0.00	0.007	0.28	0.02	0.55

Table B.10. Budget Shares: Means and Proportion of Households Consuming by Quartiles of PCE for Rural Households in the Southern Region (Page 12 of 12)

	1 – 25%ile		26-50%ile		51-75%ile		76-100%ile	
Goods and Services	av.	% hh	av.	% hh	av.	% hh	av.	% hh
Dwelling Repair & Maintenance	0.17	1.67	0.23	3.32	0.31	3.32	0.59	8.31
Water	0.00	0.00	0.007	0.55	0.003	0.83	0.01	2.77
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.28
Paraffin	1.28	50.56	1.11	67.31	1.06	80.88	0.84	84.21
Firewood	0.09	2.22	0.07	3.05	0.09	5.26	0.28	11.91
Other Fuels	0.00	0.00	0.00	0.00	0.07	0.28	0.05	1.11
Mean PCE		53.03		132.45		247.20		764.07
Mean Household Size		5.43		4.79		4.16		3.76

Source: The HESSEA

Table B.11. Per Capita Expenditures per Quartile of PCE in Rural Malawi (in Malawian Kwacha) (Page 1 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Cereals and Grains												
Maize	15.49	30.64	53.24	90.04	26.97	60.98	103.72	193.18	20.21	43.26	74.44	156.00
Millet	0.00	0.23	0.83	0.23	0.02	0.00	0.07	0.12	0.05	0.25	0.08	0.53
Rice	0.68	0.81	2.71	17.51	0.36	1.03	1.21	3.99	0.16	0.42	1.01	4.51
Other	18.99	46.00	67.11	200.13	13.46	34.99	74.41	352.60	5.53	19.42	38.14	92.44
Bread	0.44	0.25	2.53	4.55	0.51	0.68	2.03	6.51	0.14	0.50	1.86	11.16
Subtotal	**35.61**	**77.94**	**126.42**	**312.46**	**41.22**	**97.70**	**181.44**	**556.40**	**26.08**	**63.85**	**115.53**	**264.66**
Tubers												
Cassava	0.12	0.76	0.52	0.69	0.25	0.27	0.52	1.09	0.70	0.71	0.92	4.53
Other (Potatoes)	0.00	2.07	0.32	0.91	0.03	0.18	0.24	0.70	0.10	0.25	0.52	1.51
Subtotal	**0.12**	**0.76**	**0.84**	**1.60**	**0.29**	**0.45**	**0.76**	**1.79**	**0.83**	**0.98**	**1.44**	**6.06**
Sweets												
Sugar	3.31	4.27	10.33	27.07	2.14	3.80	7.91	19.78	1.26	4.42	8.49	19.25
Sugarcane	0.00	0.08	0.34	0.19	0.22	0.35	0.50	1.39	0.26	0.41	0.82	1.55
Other sweets (spread)	0.03	0.27	0.97	1.61	0.31	0.92	1.06	3.20	0.36	0.63	1.50	3.38
Subtotal	**0.03**	**0.36**	**1.31**	**1.80**	**0.53**	**1.26**	**1.56**	**4.59**	**0.61**	**1.04**	**2.32**	**4.94**
Pulses	**2.52**	**3.76**	**6.34**	**11.18**	**0.65**	**1.85**	**2.23**	**9.33**	**1.09**	**1.73**	**3.05**	**9.39**
Vegetables												
Cabbages	0.06	0.50	0.12	1.34	0.16	0.72	0.61	1.26	0.03	0.18	0.38	1.20
Onions	0.03	0.16	0.18	2.59	0.11	0.27	0.55	0.87	0.03	0.07	0.18	0.90
Fresh Tomatoes	0.14	0.84	1.25	6.19	0.63	1.74	2.35	4.38	0.41	1.30	1.77	4.59
Carrots	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Processed Vegetables	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.20
Subtotal	**0.23**	**1.50**	**1.55**	**10.12**	**0.90**	**2.73**	**3.55**	**6.54**	**0.48**	**1.55**	**2.34**	**6.90**
Groundnuts	**0.15**	**0.64**	**1.39**	**2.58**	**0.32**	**0.81**	**1.47**	**3.22**	**0.17**	**0.56**	**1.03**	**2.64**

Table B.11. Per Capita Expenditures per Quartile of PCE in Rural Malawi (in Malawian Kwacha) (Page 2 of 5)

Goods and Services	North				Center				South			
	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Fruits												
Bananas	0.20	0.18	0.50	0.96	0.32	0.50	0.82	1.82	0.13	0.47	0.92	1.53
Pawpaw	0.00	0.00	0.00	0.00	0.002	0.02	0.06	0.05	0.002	0.00	0.01	0.01
Citrus Fruits	0.00	0.01	0.007	0.07	0.005	0.02	0.05	0.06	0.007	0.08	0.02	0.29
Pineapple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.003	0.07	0.07	0.22
Other Fresh Fruits	0.00	0.00	0.00	0.14	0.07	0.15	0.34	0.73	0.10	0.27	0.33	1.08
Tinned Fruits & Juices	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.003	0.00	0.08	0.14
Dried Fruits	1.60	0.06	1.49	1.55	0.01	0.07	0.02	0.14	0.0007	0.004	0.02	0.11
Subtotal	**1.80**	**0.25**	**2.01**	**3.02**	**0.41**	**0.76**	**1.30**	**2.80**	**0.25**	**0.89**	**1.38**	**3.38**
Meat & Fish												
Beef & Veal	0.58	4.43	6.17	23.97	0.72	2.49	3.86	13.92	0.16	0.41	1.07	20.97
Mutton & Lamb	0.37	1.42	1.70	8.28	0.25	1.28	1.74	6.13	0.03	0.34	0.77	9.06
Pork	0.00	0.13	0.27	5.75	0.21	0.83	0.96	3.07	0.003	0.08	0.13	0.88
Poultry	0.84	4.71	7.09	39.49	0.30	0.93	1.76	7.09	0.15	0.73	1.88	7.53
Other Meat	0.00	0.00	0.18	1.20	0.74	1.18	4.07	37.19	0.43	1.40	2.27	14.28
Fish	2.52	5.53	6.91	19.45	3.27	6.01	11.33	21.45	3.67	8.30	15.72	37.80
Subtotal	**4.30**	**16.23**	**22.32**	**98.15**	**5.48**	**12.73**	**23.71**	**88.88**	**5.07**	**12.44**	**22.86**	**93.63**
Eggs & Milk												
Eggs	0.05	0.03	0.00	0.64	0.05	0.14	0.37	1.30	0.04	0.08	0.34	1.72
Fresh Milk	0.10	0.06	0.33	1.68	0.02	0.12	0.17	1.06	0.03	0.12	0.21	1.85
Powdered Milk	0.00	0.00	0.56	4.02	0.003	0.04	0.12	1.33	0.01	0.14	0.15	1.81
Other Dairy Products	0.17	0.008	0.15	1.25	0.00	0.007	0.008	0.27	0.00	0.00	0.06	0.59
Subtotal	**0.32**	**0.14**	**1.04**	**7.59**	**0.07**	**0.31**	**0.66**	**3.96**	**0.08**	**0.36**	**0.77**	**6.00**
Oils & Fats												
Butter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.03	0.00
Margarine	0.00	0.00	0.10	0.19	0.03	0.00	0.31	0.92	0.00	0.02	0.04	0.80
Other Oils & Fats	0.19	1.63	3.69	7.54	0.34	0.94	2.19	5.73	0.21	0.90	2.88	9.40
Subtotal	**0.19**	**1.63**	**3.79**	**7.74**	**0.37**	**0.94**	**2.50**	**6.75**	**0.26**	**1.14**	**3.08**	**11.26**

Table B.11. Per Capita Expenditures per Quartile of PCE in Rural Malawi (in Malawian Kwacha) (Page 3 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Non-alc. Beverages												
Tea	0.09	0.17	0.49	1.20	0.06	0.15	0.32	1.39	0.03	0.09	0.25	0.98
Coffee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Soft Drinks	0.65	3.88	2.94	22.40	1.15	2.64	4.70	15.86	0.28	0.59	1.88	6.87
Alcoholic Beverages	1.55	3.41	8.65	11.22	0.01	1.91	3.74	6.85	0.17	0.30	2.24	3.04
Subtotal	**2.29**	**7.46**	**12.08**	**34.82**	**2.22**	**4.70**	**8.77**	**24.10**	**0.52**	**1.22**	**3.88**	**13.06**
Other Foods	3.13	4.03	4.29	9.92	2.50	4.78	5.67	13.54	1.15	1.40	0.94	4.24
Total Foods	**56.87**	**121.04**	**194.31**	**531.40**	**57.46**	**132.76**	**241.15**	**739.09**	**39.01**	**93.60**	**171.46**	**441.84**
Non-Foods												
Mens Clothing	1.49	7.76	7.58	43.86	1.80	5.07	10.87	37.91	1.87	4.87	8.58	21.78
Women Clothing	2.86	6.15	13.62	48.06	2.84	7.42	16.56	40.81	1.69	5.42	10.11	27.43
Boys Clothing	0.43	0.99	4.16	16.31	0.19	1.24	3.69	20.07	0.61	1.96	5.12	14.64
Girls Clothing	0.54	1.82	1.71	8.48	0.60	1.41	4.18	14.28	0.37	0.95	1.53	31.12

Table B. 11. Per Capita Expenditures per Quartile of PCE in Rural Malawi (Page 4 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1- 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Non-Foods (cont'd)												
Other Clothing	0.14	1.48	2.24	19.02	0.86	1.81	7.02	55.49	0.40	2.09	3.58	11.66
Furniture & Carpets	0.00	0.93	1.50	9.33	0.14	0.34	1.18	5.49	0.14	0.49	0.89	22.35
Textiles & Furnishing	0.71	2.25	6.53	32.71	0.23	1.32	3.66	16.17	0.17	0.69	0.85	5.91
Households Appliances	0.00	0.00	0.05	0.00	0.03	0.08	0.43	0.58	0.24	1.53	2.88	9.65
Glassware, Tableware	0.05	1.13	1.82	21.03	0.14	0.66	2.12	9.36	0.05	0.28	0.36	0.86
Other Semi-Durables	5.60	9.67	23.79	55.94	4.62	9.32	16.87	53.78	2.02	3.65	6.41	15.39
Household Services	3.23	5.08	8.67	28.59	2.60	3.61	7.38	15.16	2.15	4.77	10.45	38.45
Health Expenses	1.09	1.53	1.87	6.22	0.82	2.16	4.06	10.21	1.69	4.19	6.40	16.78
Vehicle Operating Costs	0.00	0.00	0.55	6.18	0.06	0.22	0.40	12.62	0.22	0.36	0.94	8.96
Other Transport Costs	0.48	1.24	5.74	19.76	0.23	0.89	5.36	31.40	0.27	0.98	1.76	12.91
Communication	0.005	0.00	0.30	0.06	0.006	0.05	0.04	0.33	0.04	0.29	0.90	4.13
Recreational Equipment	1.02	2.42	2.13	19.22	0.07	0.74	0.60	8.46	0.05	0.32	0.47	2.55
Recreational Services	0.36	1.08	0.03	5.99	0.07	0.24	0.29	0.65	0.27	0.51	0.65	3.91
Books, Newspapers, ...	0.00	0.00	0.07	1.77	0.00	0.00	0.08	0.32	0.001	0.01	0.03	0.14
Educational Fees	0.86	4.73	4.16	13.78	0.28	0.74	1.65	7.87	0.24	0.70	1.03	8.86
Personal Goods	0.73	1.25	3.28	8.64	0.59	1.12	2.41	5.91	0.20	0.36	1.04	3.77
Holidays	0.00	0.00	0.05	0.24	0.01	0.002	0.02	0.33	0.28	1.02	1.97	5.93
Transfers	0.33	1.53	4.72	15.85	0.39	2.13	2.26	15.34	0.58	1.24	2.95	12.41
Misc.Payments	0.94	2.43	0.77	23.14	1.64	1.89	6.01	381.72	0.21	1.11	3.05	18.26
Housing Rent	0.00	1.62	0.29	1.67	0.38	0.36	0.95	4.71	0.00	0.04	0.30	2.58
Mortgage	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Council Rates	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.05

Table B. 11. Per Capita Expenditures per Quartile of PCE in Rural Malawi (Page 5 of 5)

	North				Center				South			
Goods and Services	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1- 25%ile	26- 50%ile	51- 75%ile	76- 100%ile	1 - 25%ile	26- 50%ile	51- 75%ile	76- 100%ile
Non-Foods (cont'd)												
Dwelling Repair & Maintenance	0.00	0.00	0.00	2.42	0.03	0.12	0.96	6.23	0.09	0.33	0.67	3.53
Water	0.00	0.00	0.00	0.00	0.00	0.005	0.06	0.58	0.00	0.008	0.01	0.14
Electricity	0.00	0.00	0.00	0.00	0.00	0.02	0.03	1.27	0.00	0.00	0.00	0.11
Paraffin	0.99	2.07	1.80	3.18	0.64	1.31	2.38	4.47	0.68	1.47	2.51	5.84
Firewood	0.04	0.00	0.18	0.72	0.10	0.15	0.27	1.38	0.04	0.09	0.21	1.95
Other Fuels	0.00	0.00	0.00	0.00	0.001	0.00	0.00	1.03	0.00	0.00	0.07	0.38

Source: HESSEA (1990/91)

BIBLIOGRAPHY

BIBLIOGRAPHY

Arulpragasam, Jehan. "The Effects of Trade and Exchange Policies in Food Markets, Household Food Consumption and Urban Poverty in Guinea Maritime: A Multi-Market Analysis." CFNPP Publications. March 1994.

Ballard, L. Charles, Don Fullerton, John B. Shoven, and John Whalley (1985), "A General Equilibrium Model for Tax Policy Evaluation," A National Bureau of Economic Research (NBER) Monograph, The University of Chicago Press.

Ballard, Charles L., and Don Fullerton (1992), "Distortionary Taxes and the Provision of Public Goods," **Journal of Economic Perspectives**, 6 (Summer): 117-131.

Benson, T. (1995), "Special and Temporal Valuation in Fertilizer Recommendation for Maize Grown by Small Farmers in Malawi," Department of Agricultural Research, Zomba, Lilongwe.

Benson, T. (1996), "A Geographical and Economic Analysis of Past Nutrient Response Trial Results for Maize in Malawi," in [ed.] **Fifth Regional Maize Conference for Eastern and Southern Africa**, CYMMYT, Maize Program, Arusha, Tanzania.

Braverman, Avishay et al.. "Multimarket Analysis of Agricultural Pricing Policies in Korea," in Newbery David and Nicholas Stern, **"The Theory of Taxation in Developing Countries."** A World Bank Research Publication, 1987, pp. 467-488.

Braverman, Avishay and Jeffrey S. Hammer. "Multi-market Analysis of Agricultural Pricing Policies in Senegal," in Singh I., L. Squire and J. Strauss. **"Agricultural Household Models,"** A World Bank Publication, The Johns Hopkins University Press, 1986, pp. 233-254.

Braverman, A., Jeffrey S. Hammer, and Jonathan J. Morduch (1987), "Wheat and Maize Price Policies in Hungary: Tradeoffs Between Foreign Exchange and Government Revenue," in **Agricultural Economics**, 1:273-290, Elsier Science Publishers.

Conroy, Anne (1992), " Inputs Sector: Fertilizer and Seeds," Malawi Agricultural Sector Memorandum, World Bank, Working Paper No. 6.

Daniels, Lisa, and Austin Ngwira (1993), "Results of a Nationwide Survey on Micro, Small, and Medium Enterprises in Malawi," Growth and Equity through Microenterprise Investments and Institutions (GEMINI), Michigan State University.

Darymple, G. Dana (1975), "Evaluating Fertilizer Subsidies in Developing Countries." Office of Policy Development and Analysis. Bureau for Program and Policy Coordination, U.S. Agency for International Development.

Deaton, A., (1988), "Quality, Quantity, and Spatial Variation of Prices, **American Economic Review**,78:418-430.

Donovan, Graeme W. (1994), "Fertilizer Policy and Fertilizer Development in Sub-Saharan Africa, Development Division, Technical Department, Africa Region, World Bank.

Donovan, W. G. (July 1994). "Malawi: Economic Reform and Agricultural Strategy." AFTES Working Paper No. 10. The World Bank.

Dorosh, Paul, and René Bernier. "Agricultural and Food Policy Issues in Mozambique: A Multi-market Analysis." CFNPP Publications. March, 1994.

Duncan, Thomas, Mariza M. T. L. Barbosa, and John Strauss, 1989, "Estimating the Impact of Income and Price Changes on Consumption in Brazil," Economic Growth Center Discussion Paper No. 589, Yale University.

Edwards, Sebastian, 1989, "Real Exchange Rates, Devaluation, and Adjustment," Cambridge, Massachussets, USA, MIT Press.

Ehtisham, Ahmad and N. Stern, 1991, "The Theory and Practice of Tax Reform in Developing Countries," Cambridge University Press.

Fitch, James and Joe Carvalho (1991), "Estate Farm Management in Malawi: Considerations for Policy Formulation,"Institute for Development Anthropology (IDA) and the United States Agency for International Development (USAID).

The Government of Malawi, 1995, "ADMARC and Private Seed Retailers," The Ministry of Agriculture, Zomba.

Green, Richard and Julian Alston (May 1990), "Elasticities in AIDS model," **American Journal of Agricultural Economics**, Vol. 72, No 2, pp. 442-445.

Harrigan, Jane (1990), "Malawi: The Impact of Pricing Policy on Smallholder Agriculture," Institute for Development and Management, University of Manchester.

Jayne, T.S., L. Rubey, D. Tschirley, M. Mukumbu, M. Chisvo, A. Santos, M. Weber, and P. Diskin, 1995, "Effects of Market Reform on Access to Food by Low-Income Households in Eastern and Southern Africa, Michigan State University International Development Paper No. 19.

Kelly, Valerie Auserehl. "Acquisition and Use of Agricultural Inputs in the Context of Senegal's New Agricultural Policy: The Implications of Farmers' Attitudes and Input Purchasing Behavior for the Design of Agricultural Policy and Research Programs." MSU International Development Paper, Reprint No 18, 1988.

Kirchner, J., I. Singh, and L. Squire (1985), "Agricultural Pricing Policies in Malawi: A Multi-Market Analysis," Country Policy Department (CPD) Discussion Paper No 1985 - 17, World Bank.

Krueger, O. Anne, Maurice Schiff, and Alberto Valdes (1988), "Agricultural Incentives in Developing Countries: Measuring the Effects of Sectoral and Economy-wide Policies," in World Bank Economic Review, Vol., 2, No 3, pp 225-271.

Kydd, J. and R. Christiansen (1982), "Structural Change in Malawi Since Independence: Consequences of Development Strategy Based on Large-Scale Agriculture," World Development.

Lele, Uma (1989)." Structural adjustment, agricultural development and the poor: Lessons from the Malawian experience. MADIA discussion paper No 9. World bank.

Lele, Uma, (1975), "The Design of Rural Development: Lessons from Africa," Baltimore, Maryland, John Hopkins University Press.

Lesser, C.E.V., (1963), "Forms of Engel Functions," Econometrica, Vol. 31, pp. 694-703.

Livingston, I. and S. Bose (1993), "The Labor Market and Wages Policy in Malawi." A Government of Malawi Publication.

Malawi Agricultural Research and Extension Trust (Farm Manaagement Section), 1995, "Farm Budgeting Handbook: Indicative Gross Margin Data for Common Crop and Livestock Enterprises." Farm Management Guide No.3, Lilongwe, Malawi.

Ministry of Agriculture, 1978, "Agro-Economic Survey Report No. 24, Thiwi-Lifidzi districts."

Mtawali, Katundu, M.. "Malawi: Current Status of and Reform Proposals for Agriculture," in Valdes, Alberto and Kay Muir-Leresche. **"Agricultural Policy Reforms and Regional Market Integration in Malawi, Zambia, and Zimbabwe."** The International Food Policy Research Institute (1993), pp. 154 -168.

Ngwira, Naomi A. (1994), "The Role of Dimba Land and Small Scale Irrigation in Smallholder Farmers' Food Security in Malawi: An Application of the Safety First Change-Constrained Target Motad Mathematical Programming," Dissertation for the Degree of Ph.D., Michigan State University.

Peters, P. (1992), "Monitoring the Effects of the Grain Market Liberalization on the Income, Food Security and Nutrition of Rural Households in Zomba South, Malawi," Final Report to USAID/Government of Malawi.

Roe, Gillian, (1992), "The Plight of the Urban Poor in Malawi," Centre for Social Research, Malawi.

Sahn, David E. et al., 1990, "Policy Reform and Poverty in Malawi: A survey of a Decade of Experience." Cornell Food and Nutrition Policy Program. Monograph No.7.

Sahn, David E., Yves Van Frausum, and Gerald Shively . "The Adverse Nutrition Effects of Taxing Export Crops in Malawi." Cornell Food and Nutrition Policy Program, Working Paper No 29, May 1992, p. 1.

Scarborough, V. (1993), "Agricultural Pricing and Marketing Issues," Malawi Agricultural Sector Memorandum, World Bank, Working Paper, No 7.

Sheku, M.B Sam (1990/91), "Costs of Producing Flue-Cured and Burley Tobacco on Large and Medium Scale Estates: 1990/91 Season," Tobacco Research Institute of Malawi.

Shoven, B. John and John Whalley, (1992), "Applying General Equilibrium," Cambridge University Press.

Smale, Melinda et al. , 1991, "*Chimanga Cha Makolo*, Hybrids, and Composites: An Analysis of Farmers' Adoption of Maize Technology in Malawi, 1989-91, CIMMYT Economics Working Paper 91/04.

Smale, Melinda and Paul, W. Heisey, 1993, "Maize Research in Malawi revised: An Emerging Success Story? International Maize and Wheat Improvement Center (CIMMYT).

Strauss, John (1982), "Determinant of Food Consumption and Production in Rural Sierra Leone: Application of the Quadratic Expenditure System to the Consumption-Leisure component of a Household-Firm Model, **Journal of Development Economics**, 14:77-103.

Strauss, John (1983), "Socio-Economic Determinant of Food Consumption and Production in Rural Sierra Leone: An Application of an Agricultural Household Model with Several Commodities," Michigan State University International Development Papers, No. 5.

Varian, R. Hal, (1992), "Microeconomics Analysis," Third Edition, W.W. Norton & Company, Inc., pp. 160 – 171.

World Bank, (1994), Vols. I – IV, "Malawi Agricultural Sector Memorandum," Washington, DC.