

Ethiopia

**Input Output Table
and
Social Accounting Matrix**

December 2009

Ethiopian Development Research Institute

Ethiopia: Input Output Table & Social Accounting Matrix



Ethiopian Development Research Institute

in collaboration with the
Institute of Development Studies at the University of
Sussex

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FOREWORD

Reliable quantitative analysis of sectoral and macro-economic policy requires sound data and appropriate analytical tools, as encompassed in the 2005-06 Ethiopia Social Accounting Matrix (SAM) presented in this paper. This SAM provides a coherent, detailed data base on production, incomes, consumption, investment, external trade and other flows in the economy. It also forms the heart of various analytical models including SAM-based fixed price multiplier models and flexible price computable general equilibrium (CGE) models. An additional advantage of the SAM is that it allows the generation of various economic indicators that can assist policy making. Thus, it is hoped that the creation and dissemination of this SAM will open new vistas for economic research on Ethiopia, as well as benefit economic policy making.

The 2005-06 Ethiopia SAM documented here contains 256 separate accounts and is the first comprehensive SAM for Ethiopia. It was prepared as part of *The Data Systems and Economy-Wide Modeling to Support Policy Analysis in Ethiopia* project of EDRI and the Institute of Development Studies (IDS), Sussex, a project with three core objectives: 1) To develop a comprehensive data system, including the creation and regular update of extensive economy-wide databases and a host of other economic indicators; 2) To construct various structural, economy-wide and reduced form empirical models; and 3) To build local capacity to ensure sustainability.

The construction of the SAM involved a team of researchers led by the project's resident coordinator, Hashim Ahmed of EDRI, and Professor Sherman Robinson of the Institute of Development Studies - Sussex, an international authority in the area of policy-oriented economy-wide modeling. A team of researchers and analysts at the Trade and Macro-economic Policy Unit of EDRI compiled data from various sources and conducted the bulk of the statistical work in constructing the SAM. Dirk Willenbockel, Research Fellow of the Institute of Development Studies (IDS) and Paul Dorosh, Senior Research Fellow of the International Food Policy Research Institute (IFPRI) also provided technical assistance.

Finally, thanks are due to the Netherlands government and the European Commission for financial support to the project through pooled funds administered by the United Nations Development Programme (UNDP).

Newai Gebreab
Executive Director of EDRI

ACRONYMS

ADLI	Agriculture Development Led Industrialization
AEZ	Agro-ecological zone
bp	Basic prices
CGE	Computable general equilibrium
cif	Cost, insurance, freight
COMESA	Common Market for Eastern and Southern Africa
CSA	Central Statistical Agency
EDRI	Ethiopian Development Research Institute
EFY	Ethiopian Fiscal year; runs from July through June
EPA	Economic Partnership Agreement
fob	Free on board
FTA	Free Trade Agreement
GDP	Gross domestic product
GTAP	Global Trade Analysis Project / Global Trade, Assistance and Production
HS	Harmonized Commodity Description and Coding System
IDS	Institute of Development Studies at the University of Sussex
IFPRI	International Food Policy Research Institute
ILO	International Labor Office / Organization
IO	Input-Output
ISIC	International Standard Industrial Classification
MDG	Millennium Development Goal
MoFED	Ministry of Finance and Economic Development
NA	National Accounts
NBE	National Bank of Ethiopia
nec	Not elsewhere classified
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
pp	Purchaser prices
RoW	Rest of the World
RTA	Regional Trade Agreement
SAM	Social Accounting Matrix
WTO	World Trade Organization

1. INTRODUCTION

Ethiopia faces a number of serious policy challenges that call for detailed economy-wide analysis to support policy makers in their work. Examples of pressing policy questions include: What specific policies are required to achieve the MDGs and Ethiopia's own overarching development strategy (*PASDEP 2005/06-2009/10*)? What are the potential impacts of different choices of development strategy on economic performance, growth and poverty reduction? Is an "agriculture led industrialization" (ADLI) strategy the best approach? What should be the role of expanded international trade in such a strategy? and What are the implications on Ethiopia's development of different trade negotiations, such as WTO accession and other Regional Trade Agreements like the EPA and the COMESA – Free Trade Agreement?

These issues require economy-wide analyses that trace the impacts of policy changes and "shocks" emanating from the world economy on the macro economy; the sectoral structure of production, employment, and trade; and on household income and poverty. Such multi-level analyses require a comprehensive approach to data generation and analytic support to policy work.

Input Output (IO) Tables and Social Accounting Matrices (SAMs)

Input-Output and Social Accounting Matrices are essential tools for sectoral and macro- to micro policy analysis. These databases incorporate specific details on economic flows and activities. They contain detailed record of the complex activities taking place within the economy and the interaction between different economic agents. The IO table captures the interdependence among various producing and demanding sectors of the economy as they interact as each other's customers. For instance, industries purchase material inputs from other industries and labor and capital inputs from households, while households purchase final goods from industries. Hence, an IO table provides a systematic description of each

sector's interdependence by tracing the flows of goods and services from one sector of the economy to all other sectors (inter-sectoral flows) and to itself (intra-sectoral flows).

The SAM on the other hand is an extension of the IO table. In addition to the income and expenditure flows of industries and their outputs (goods & services or commodities), the SAM also contains detailed information on different institutions. For instance, not only do households earn incomes from the sale of factors of production like labor and capital to industries, but they also receive transfer payments from the government (in the form of safety net assistance, social security paychecks, and pensions) and from the rest of the world (in the form of remittances). Moreover, households also pay taxes to the government, purchase final goods, and save (or dis-save if expenditures exceed incomes).

Similarly, the government receives revenue from households and enterprises in the form of taxes and dividend (from public enterprises), and official transfer payments from the rest of the world in the form of grants and development assistance. It also uses this revenue to finance recurrent consumption expenditures, transfers to households and the rest of the world. The difference between its revenue and recurrent expenditure is the recurrent fiscal surplus or public savings (deficit if recurrent expenditure exceeds revenue).

Finally, the SAM also contains the investment and savings, and the rest of the world accounts. The difference between total investment (which also includes changes in stocks or inventories) and total domestic institutions' (private/non-government and government) savings is the rest of the world's savings or what is commonly known as the current account balance. On the other hand, the current account balance is also equal to the difference between foreign exchange receipts (exports from goods and services and transfers from the rest of the world) and expenditures (imports of goods and services and transfers to the rest of the world).

The SAM therefore incorporates institutional and structural details that capture all transfers and real transactions between industries and institutions in an economy. Moreover, since it also incorporates the IO table, it is a comprehensive economy-wide

database with internally consistent set of accounts for production, incomes and expenditures. While the IO table disaggregates value added in each production activity, the SAM extends to show how payments to primary factors (land, labor, capital) are distributed to different household groups. It disaggregates households into various groups and shows the flow of incomes and expenditures of each household.

Ethiopia SAMs

The first detailed SAM for Ethiopia, based on economic flows in EFY 1994 (2001/02)¹, was completed in 2007. The SAM distinguishes 42 production activities, 61 commodity groups, 5 primary factors, 2 household groups, 17 tax instruments as well as aggregate accounts for trade margins, transport margins, government, investment, and the rest of the world.

Subsequent to the completion of the EFY 1994 (2001/02) SAM, an IO table for the same fiscal year was also developed and for the first time submitted and included into the Global Trade Analysis Project (GTAP) 7 Database. In line with GTAP requirements, the IO table obeys all mandatory splits and is provided in the unified format consisting of six arrays, and supports a 39 sector aggregation of the standard 57 GTAP sectors.² The fact that Ethiopia is now a separate country/region in the GTAP database implies that a world-wide pool of researchers and academics have access to a comprehensive record of the complex activities taking place within the Ethiopian economy, which would in turn spawn research tackling the various development challenges facing the country.

This document describes the construction process and data sources for the EFY 1998 (2005/06) Ethiopian National IO table and Regionalized SAM. The construction is undertaken in stages. First, a highly disaggregated national IO table with an aggregated

¹ Ethiopian Fiscal Year Runs from July through June

² GTAP is a global network of researchers “mostly from universities, international organizations, and the economic ministries of governments” who conduct quantitative analysis of economic policy issues with both local and global dimensions. In order to facilitate such a level of research, GTAP maintains a fully documented, publicly available and consistent global economic database, covering many sectors and several countries in all parts of the world. To be included into the global database, countries must submit a comprehensive and economy-wide database of their own, and presently, the list includes almost all developed and several developing economies.

SAM of only two household groups - from here on simply referred to as the “aggregate” SAM - are constructed. The national IO table is presented here with all its quadrants fully capturing intermediate and final demand of goods and services in the Ethiopian economy.

Based on the detailed industry-commodity disaggregation, the new IO table and the aggregate SAM are extended to incorporate regionally disaggregated agricultural production and income generation for the five main agro-ecological zones of Ethiopia. The disaggregation of the household sector is extended from two to 14 household groups, distinguishing rural households by income class in each of the five regional zones and urban households by income class and size of urban settlement. These extensions require, inter alia, a careful detailed mapping of factor income flows from the regionally differentiated activities to the extended set of households.

Given the importance of the rural economy in providing employment, incomes and food supply on the one hand, and the wide variations in topography and climatic conditions across the country on the other, the regionalized SAM presented here includes considerable detail on agricultural sub-sectors (activities) by region along with a high level of disaggregation for other production activities and commodities in the Ethiopian economy.

The remainder of this document is organized as follows. Section 2 briefly explains the basic accounting logic underlying the structures and data sets of IO tables and SAMs. Section 3 presents an overview of the Ethiopian economy based on a macroeconomic summary representation of the SAM, which also incorporates the IO table. Based on the Macro-SAM, major economic relationships and identities are derived and presented in summary tables, highlighting the main structural characteristics of the economy in EFY 1998 (2005/06). Section 4 provides a detailed documentation of the compilation process and data sources for each of the IO and SAM blocs. Section 5 details the regional disaggregation procedure. Finally, a detailed listing of the data sources and other models and leading economic indicators being produced at EDRI are provided in the “Sources & References” section and the Annex.

A CD is attached at the back of this document containing the national IO table and the regionalized SAM for EFY 1998 (2005/06) in a spreadsheet format. The CD contains two folders labeled “Ethiopian Input-Output for EFY 1998 (2005/06)” and “Ethiopian Regionalized SAM for EFY 1998 (2005/06)”. In the Input-Output folder, there is a spreadsheet file containing the Absorption Matrix, Make Matrix, and a summary. The SAM folder on the other hand contains a spreadsheet file with the Regionalized SAM and a National (aggregated-not regional) SAM.

2. STRUCTURE OF INPUT OUTPUT & SOCIAL ACCOUNTING MATRICES

2.1. Input Output Tables:

The Input-output analytical framework was developed by Wassily Leontief in the late 1930s, work for which he received the Nobel Prize in Economic Science in 1973. As a result, an Input-output model is often referred to as a Leontief model, even though Wassily Leontief himself named it input-output analysis.³ The fundamental purpose of the input-output framework is to analyze the interdependence of industries or sectors in an economy. In its basic form, an input-output model consists of a system of linear equations, each one of which describes the distribution of a sector's outputs throughout the economy.

The basic Leontief model is constructed from observed economic data for a specific timeframe, usually for a given year, and specific geographic area, such as a country, an administrative region, or even a city. The fundamental concept of the input-output analysis concerns the flow of products from a producing sector to all other sectors that consume the product. Thus, captures the activity of all sectors of an economy that both produce (output) as well as consume goods (input) from other sectors in order to produce their products.

The basic information from which an input-output model is developed is contained in an inter-sectoral transactions table. The rows of such a table describe the distribution of a producer's outputs throughout the economy, while the columns describe the composition of inputs required by a particular industry to produce its outputs. These inter-industry exchanges of goods constitute what is known as intermediate demand. The additional columns, labeled final demand, record the sales of outputs by each sector to final demanders. The additional rows labeled value added account for factor inputs (labor, land, and capital), essential for the production of goods & services. The Leontief input-output model is developed from this basic transactions table.

³ Miller, R. E., and Blair, P.D., 1985

Table 1: Basic Input – Output Framework: Transactions Table

Input-Output Transaction Table													
Producers										Final Demand			
Sectors	Agriculture	Mining	Construction	Manufacturing	Trade	Transportation	Services	Other	Personal Consumption Expenditures	Gross private Domestic Investment	Net Exports of Goods and Services	Government Purchases of goods and Services	
Agriculture													
Mining													
Construction													
Manufacturing													
Trade													
Transportation													
Services													
Other													
Producers													
Value Added	Labor	Labor Compensation											
	Capital	profit											
	Land												
	Government	Indirect business taxes											
												Gross National Product	

Source: Adopted from Miller & Blair: Input-Output Analysis. Foundations & Extensions, 1985

To illustrate the concept captured in the transactions table, we assume an economy with only two sectors and denote by X the total output or production of each sector and by Y the total final demand for each sector’s products.⁴

$$X_1 = z_{11} + z_{12} + Y_1 \dots\dots\dots (a)$$

$$X_2 = z_{21} + z_{22} + Y_2 \dots\dots\dots (b)$$

The z term in the two equations represent the inter industry sales. Thus, equation (a) shows the total sales of sector 1’s outputs; to itself and to sector 2 as intermediate inputs, and to final demanders. Now consider the second column in the right hand side of equations (a) and (b).

$$\begin{bmatrix} z_{12} \\ z_{22} \end{bmatrix} \dots\dots\dots (c)$$

⁴ The following discussion is broadly adopted from Miller & Blair, 1985

Matrix (c) shows sector 2's purchases of the products produced by sector 1 and itself as an intermediate input. The column therefore provides the sources and magnitude of sector 2's inputs.

If the three equations are presented in a table and looked at together, from the column point of view, matrix (c) provides the sources and magnitude of sectors inputs in the economy, while from the row point of view, equations (a) and (b) provide the destinations (uses) and magnitude of sales of each sector's outputs in the economy. Hence, the name input-output table is used to refer to this analytical framework.

In addition to the purchases of goods and services produced by other sectors in the economy, each sector may also purchase imported goods and services as intermediate inputs in order to produce its outputs. We denote these imported intermediate inputs by M_1 and M_2 as the purchases of sectors 1 and 2, respectively.

Production also requires factor inputs and the aggregate of factors of production (labor, land, capital) is known as value-added. Thus, sectors 1 and 2 pay employee compensation or wages for the labor, profits for the capital, and rent for the land they use in the production of their outputs. We denote these value-added inputs W_1 and W_2 as the wage payments from sectors 1 and 2, respectively. We also denote payments for all other factor inputs as K_1 and K_2 .

Total expenditures on inputs (total inputs) by sectors 1 and 2 constitute the sum of all domestically produced and imported goods and services (intermediate inputs), value-added inputs, as well as any taxes paid. We denote these indirect taxes T_1 and T_2 .

On the other hand, the final demand for sectors 1 and 2's outputs include consumption purchases by households (C), purchases for investment (I), government purchases for consumption (G), and purchases by the rest of the world or exports (E). Hence, the total final demand for each sector's outputs is the sum of purchases (C + I + G + E) of the sector's outputs. Since Y represent's the total final demand, each sector's outputs purchased as a final demand is

$$Y_1 = C_1 + I_1 + G_1 + E_1 \dots\dots\dots (d)$$

$$Y_2 = C_2 + I_2 + G_2 + E_2 \dots\dots\dots (e)$$

Table 2: Simplified Input-Output Table for a Two Sector Economy

		Sectors		Final Demand (Y)				Total Output(X)
		1	2	C	I	G	E	
Commodities (Goods & Services)	1	z_{11}	z_{12}	C_1	I_1	G_1	E_1	x_1
	2	z_{21}	z_{22}	C_2	I_2	G_2	E_2	x_2
	Imports	M_1	M_2					M
Value-added	Labor	W_1	W_2					W
	Kapital	K_1	K_2					K
Indirect Taxes	Taxes	T_1	T_2					T
Total Inputs (X)		x_1	x_2	C	I	G	E	X

Source: Table framework adopted from Miller & Blair, 1985 but re-formulated by author

Table 2 presents a simplified two-sector economy input-output table. One of the cornerstones of economic thought has been the supply – demand balance. Hence, the sum of the row totals (total inputs) must, of necessity, balance with the sum of the column totals (total outputs). Summing down the total output column, total gross output (X) in the two sector economy is

$$X = X_1 + X_2 + M + W + K + T \dots\dots\dots (f)$$

The same value can also be obtained by summing across the total inputs row, where

$$X = X_1 + X_2 + C + I + G + E \dots\dots\dots (g)$$

Equations (f) and (g) provide the economy’s domestic income and product accounting. Equating the two equations results in Equation (h);

$$M + W + K + T = C + I + G + E \dots\dots\dots (h)$$

which can also be re-written to yield the identity represented by Equation (i)

$$W + K + T = C + I + G + (E - M) \dots\dots\dots (i)$$

The left hand side of Equation (i) is gross domestic income, which is the total factor payments in the economy and is called value-added at market prices. The right hand side represents gross domestic product – which is the total value of goods and services spent on private (household) consumption, investment, government purchases, and net exports from the economy. The right hand side of Equation (i) is therefore GDP at market prices.

The individual sectors’ input and output accounting can also be setup in a similar fashion by equating the row and column of each sector’s inputs and outputs. Section three provides a detailed treatment of the income and product accounting of the Ethiopian economy in EFY 1998 (2005/06).

2.2. Social Accounting Matrices (SAMs):

A social accounting matrix (SAM) is a comprehensive, economy-wide set of accounts that quantify economic flows (incomes and expenditures) in an economy for a given period of time (usually one year). It owes its development to a long tradition of pioneers, including Erik Thorbecke, whose career is punctuated by an “extensive work on SAMs, both from the perspective of data generation and as providing the underpinnings for a wide range of empirical models”.⁵ Thorbecke’s work is complemented by a large body of literature, including seminal contributions by Richard Stone (for which he was awarded the Nobel Prize in Economic Science in 1984) and Graham Pyatt, as well as a great deal of work from modelers like Sherman Robinson, that in the aggregate have improved and refined the SAM both as a comprehensive and detailed economic database, and as a logical framework for economy-wide empirical models.

⁵ Robinson, S., 2003

Mathematically, a SAM is a square matrix in which each account is represented by a row and a column. Each cell shows the payment from the account of its column to the account of its row. Thus, the incomes of an account appear along its row and its expenditures along its column. The underlying principle of double-entry accounting requires that for each account in the SAM, total revenue (row total) equals total expenditure (column total).

Most SAMs have four major types of accounts: activities, commodities, factors of production, and institutions (households, government and the Rest of World), including an aggregate savings-investment account. The activity accounts show the value of commodities (goods and services) produced by each activity and the cost of inputs into each production activity consisting of intermediate input purchases along with payments to primary factors of production.

Commodity accounts show the components of total supply in value terms (domestic production, imports, indirect taxes and marketing margins) and total demand (intermediate input use, final consumption, investment demand, government consumption and exports). Factor accounts describe the sources of factor income (value added in each production activity) and how these factor payments are further distributed to the various institutions in the economy (households of different types, government and the Rest of World). Accounts for institutions record all income and expenditures of institutions, including transfers between institutions. Savings of the different institutions and investment expenditures by commodities are given in the savings-investment account.

Table 3: Basic Structure of a SAM

	Activities	Commodities	Margins	Factors	Government	Households	Indirect Taxes	Direct Taxes	Investment	Rest of World	Total
Activities		Output/Supply (bp)									Domestic production (bp)
Commodities	Intermediate input demand		Demand for margin services		Government consumption	Household final consumption			Investment demand	Exports(f.o.b)	Total market demand (pp)
Margins		Marketing margins									Total margins
Factors	Value Added									Factor income from RoW	Factor income total
Government							Indirect tax revenue	Direct tax revenue		Transfers to government from RoW	Government income total
Households				Household Factor income	Government transfers to households	Inter-Household transfers				Transfers to Households from RoW	Household income total
Indirect Taxes		Indirect taxes on products									Indirect tax revenue
Direct Taxes						Direct taxes					Direct tax revenue
Investment					Government savings	Household savings				Foreign savings	Total savings
Rest of World		Imports c.i.f		Factor income to RoW							RoW account total (foreign exchange outflow)
Total	Activity expenditure (bp)	Total market supply (pp)	Total margins	Total Value added	Government expenditure Total	Total household expenditure	Indirect tax revenue	Direct tax revenue	Total investment	RoW account total (foreign exchange inflow)	

A SAM can also be seen as an extension of Leontief’s input-output accounts, filling in the links in the circular flow from factor payments to household income and back to demand for products.⁶ The SAM delineates flows across product and factor markets, and provides the statistical underpinnings for multi-sector, multi-factor, computable general equilibrium (CGE) models, much as the national accounts provide the data framework for macro-econometric models. Since a SAM includes all economic flows, indeed provides the organizing framework for the system of national accounts and is organized around the accounts of all economic agents in an economy, the aggregate national accounts and macro models based on them are necessarily embodied in the SAM framework.

Table 4 presents a simple macro SAM - “macro” because it includes only macro aggregates and excludes intermediate inputs (the input-output table). The SAM is square, entries represent payments from column accounts to row accounts, and the corresponding row and column sums must balance since they represent the double-entry, receipt-expenditure accounts of the various economic actors explained above. For the macro SAM, the row and column balances represent the various macro balances in the national income and product accounts (presented below).

Table 4: Macro-SAM

	Activities	Commodities	Factors	Households	Government	S-I	World
Activities		D					E
Commodities				C	G	I	
Factors	X						
Households	Tx		Y				
Government				Th			
S-I				Sh	Sg		Sf
World		M					

Source: Adopted from Robinson, S.: Macro Models and Multipliers: Leontief, Stone, Keynes, and CGE Models, 2003

⁶ The discussion on the theoretical structure and macro relations of the SAM is adopted from Robinson, S., 2003

Definition of Terms used in Table 4:

D: production sold domestically	C: consumption
E: exports	G: government demand
X: production (GDP at factor cost)	I: investment demand
Tx: indirect taxes	Sh: household savings
Th: direct taxes on households	Sg: government savings
M: imports	Sf: foreign savings
Y: factor payments to households	S-I: savings-investment account

Balances in the Macro SAM

$$\text{GDP} = X + \text{Tx} = D + E \quad \dots\dots\dots (j)$$

$$D + M = C + G + I \quad \dots\dots\dots (k)$$

$$\text{GDP} + (M - E) = C + G + I \quad \dots\dots\dots (l)$$

$$Y = X = \text{GDP (factor cost)} \quad \dots\dots\dots (m)$$

$$Y = C + \text{Th} + \text{Sh} \quad \dots\dots\dots (n)$$

$$\text{Tx} + \text{Th} = G + \text{Sg} \quad \dots\dots\dots (o)$$

$$I = \text{Sh} + \text{Sg} + \text{Sf} \quad \dots\dots\dots (p)$$

$$M = E + \text{Sf} \quad \dots\dots\dots (q)$$

The SAM is a compact way to present the national accounts, and nicely traces out the circular flow from production activities to factor payments to incomes of institutions, households, government, savings-investment (“S-I”) and back to demand for commodities. GDP at market prices (equation j) equals the value of production (X, or GDP at factor cost)

plus indirect taxes. The “commodity” account represents total “absorption” - the total supply of commodities for use in the economy- and its sum (equations k and l) provides a measure of aggregate welfare. As an “actor” in the economy, the commodity account can be seen as a department store which buys domestically produced goods and imports (down the column) and then sells them to other actors in commodity markets (across the row). The “rest of the world” is included as a separate actor, providing imports, buying exports, and financing the difference through foreign savings.

The SAM incorporates the three macro balances: government deficit, trade deficit, and savings-investment balance. The macro balances are expressed as flows - the SAM does not include asset account - and any macro relationship in this framework will be in flow terms. In particular, the savings-investment (S-I) account should be seen as representing the “loanable funds” market. The account collects savings from various sources (government, private, and foreign) and spends the accumulated savings on capital goods (*I*). The SAM provides no information about who “owns” the capital goods or in which sectors they are installed. Investment demand in the SAM is by sector of origin, not sector of destination, so the SAM cannot provide information about changes in sectoral capital stocks, or their valuation.

3. OVERVIEW OF THE ETHIOPIAN ECONOMY – A SOCIAL ACCOUNTING APPROACH

Table 5: EFY 1998 (2005/06) Ethiopian Macro SAM in billion birr

Accounts	Activities		Commodities		Transaction Costs	Factors				Households				Public Enterprises	Government	Taxes			Gross Capital Formation	Rest of the World	Total	
	Agriculture	Non-Agriculture	Marketed	Non-Marketed	Trade & Transport Margins	Agriculture Labor	Agriculture Capital-Land	Non-Agriculture Labor	Non-Agriculture Capital-Land	Rural Poor	Rural Non-Poor	Urban Poor	Urban Non-Poor			Domestic Indirect	Import Duties & Taxes	Direct Taxes	Investment			
Agriculture			32.11	32.80																		64.91
Non-Agriculture			116.09	6.18																		122.27
Marketed	6.17	58.79			23.11					10.85	37.80	4.02	23.11		15.91					31.89	16.77	228.42
Non-Marketed										10.21	27.89	0.29	0.59									38.98
Margins			23.11																			23.11
Agriculture Labor	44.21																					44.21
Agriculture Capital-Land	13.94																					13.94
Non-Agriculture Labor	0.08	15.98																				16.05
Non-Agriculture Capital-Land	0.52	47.50																			0.45	48.48
Rural Poor						16.21	2.71	0.28	3.76						0.30						1.58	24.84
Rural Non-Poor						28.00	11.22	1.36	28.22						0.31						4.02	73.14
Urban Poor								3.14	0.40						0.19						1.26	4.99
Urban Non-Poor								11.28	9.19						0.74						8.92	30.13
Public Enterprises									6.69													6.69
Government														5.37		3.11	6.99	4.05			3.73	23.26
Domestic Indirect			3.11																			3.11
Import Duties & Taxes			6.99																			6.99
Direct										0.04	0.10		2.59	1.32								4.05
Savings										3.74	7.36	0.68	3.75		5.37						11.00	31.89
Rest of the World			47.01						0.21				0.09		0.43							47.75
Total	64.91	122.27	228.42	38.98	23.11	44.21	13.94	16.05	48.48	24.84	73.14	4.99	30.13	6.69	23.26	3.11	6.99	4.05		31.89	47.75	

Note: To read table 5, the (row account, column account) convention must be followed, since all the cell entries represent expenditure from the column account and income to the row account. For example, the value of intermediate inputs of marketed commodities purchased by the agriculture sector or activity (6.17 billion birr), is located at the intersection of the marketed row of commodities and the agriculture column of Activities.

3.1. Structure of the Ethiopian Economy in EFY 1998 (2005/06)

This sub-section discusses some of the structural characteristics of the Ethiopian economy in EFY 1998 (2005/06) based on the SAM presented in table 5.

Value-Added

As explained earlier, the total value-added is the earnings received by factors of production, such as employee compensation and gross operating surplus – GOS. Total value-added is also called GDP at factor cost. Table 6 provides a breakdown of factor earnings in 19 major sub-sectors and four aggregate sectors, where total value added is also disaggregated into four factors of agriculture and non-agriculture labor and capital-land.

Table 6: Value Added at Factor Cost in Billion birr

Sectors	Factors							Sector Value-added at Factor Cost
	Total Labor	Agriculture Labor	Non-agriculture Labor	Total Capital-Land	Agriculture Capital-Land	Livestock Capital	Non-agriculture Capital-Land	
Agriculture & Related Activities	44.29	44.21	0.08	14.46	8.46	5.47	0.52	58.74
Cereals	13.91	13.88	0.02	2.98	2.98			16.88
Cash Crops	4.34	4.34	0.01	3.22	3.22			7.57
Livestock	12.13	12.11	0.02	5.47		5.47		17.60
Other Agricultural Activities	13.90	13.88	0.02	2.78	2.26		0.52	16.69
Manufacturing	2.38	0.00	2.38	3.37	0.00	0.00	3.37	5.75
Milling Services (Small Scale)	0.12		0.12	0.39			0.39	0.51
Food Processing	0.88		0.88	1.39			1.39	2.27
Other Manufacturing Activities	1.38		1.38	1.59			1.59	2.97
Other Industries	2.21	0.00	2.21	6.08	0.00	0.00	6.08	8.29
Utility	0.66		0.66	1.63			1.63	2.29
Mining & Quarrying	0.19		0.19	0.48			0.48	0.67
Construction	1.36		1.36	3.97			3.97	5.33
Services	11.38	0.00	11.38	38.06	0.00	0.00	38.06	49.44
Wholesale & Retail Trade	2.85		2.85	11.00			11.00	13.85
Transport & Communication	0.61		0.61	5.75			5.75	6.36
Hotels & Restaurants	1.28		1.28	1.26			1.26	2.54
Financial Services	0.34		0.34	1.94			1.94	2.29
Real Estate	0.05		0.05	9.61			9.61	9.66
Public Administration	1.85		1.85	4.10			4.10	5.95
Education	1.99		1.99	2.30			2.30	4.29
Health	0.55		0.55	0.52			0.52	1.06
Other Service Activities	1.86		1.86	1.57			1.57	3.43
Total Value-added at Factor Cost	60.26	44.21	16.05	61.96	8.46	5.47	48.03	122.22

By calculating the share of GDP generated by each sector, we are determining which sectors contributed the most to total value-added. As table 7 and 8 show (aggregated and more disaggregated versions), Ethiopia is largely an agricultural economy with 48 percent of total GDP at factor cost being generated within the agricultural sectors.

Table 8 shows the importance of each sub-sector in generating total value-added in the economy. The single largest agricultural activity in Ethiopia is crop production, accounting for more than 30 percent of total value-added, and is therefore an important component of both agricultural and national production. Other large sectors within crop agriculture include cereals production (13.8 percent) and cash crops (6.2 percent). Livestock on the other hand accounts for 14.4 percent of total value-added.

Among the non-agriculture sectors, services are important source of value-added and together account for a relatively large share of GDP (about 40.4 percent). Within these sectors, it is the wholesale & retail trade that contributes the most (about 11.3 percent), followed by health, education and public administration (9.3 percent). The real estate and transport and communications sub-sectors also contribute 7.9 percent and 5.2 percent to total value-added, respectively.

By contrast, the manufacturing sector made the least contribution to total value-added in EFY 1998 (2005/06). In fact, none of the major manufacturing sub-sectors account for more than 2.5 percent of total value-added, with total manufacturing value-added equal to only 4.7 percent of GDP at factor cost. The “Milling Services” sub-sector, perhaps the most widespread non-agricultural activity in the economy accounts for less than half a percent of total value-added. Although the sub-sector is classified under manufacturing in the Ethiopian national accounts (hence its classification here), it actually represents the value of milling services rendered by small millers all over the country. The difference between the “Milling Services” and major flour millers (classified under the “Food Processing” sub-sector) is that they are small scale and that they often do not purchase the grain they mill, but only provide the service.

Table 7: Share of GDP Generated by Sectors - Aggregated

Sectors	Factors		Sector Value-added
	Total Labor	Total Capital-Land	
Agriculture & Related Activities	73.5%	23.3%	48.1%
Manufacturing	4.0%	5.4%	4.7%
Other Industries	3.7%	9.8%	6.8%
Services	18.9%	61.4%	40.4%
Total Value-added at Factor Cost	100.0%	100.0%	100.0%

Table 8: Share of GDP Generated by Sectors – More Disaggregated

Sectors	Factors							Sector Value-added at Factor Cost
	Total Labor	Agriculture Labor	Non-agriculture Labor	Total Capital-Land	Agriculture Capital-Land	Livestock Capital	Non-agriculture Capital-Land	
Agriculture & Related Activities	73.5%	100.0%	0.5%	23.3%	100.0%	100.0%	1.1%	48.1%
Cereals	23.1%	31.4%	0.1%	4.8%	35.2%	0.0%	0.0%	13.8%
Cash Crops	7.2%	9.8%	0.0%	5.2%	38.1%	0.0%	0.0%	6.2%
Livestock	20.1%	27.4%	0.2%	8.8%	0.0%	100.0%	0.0%	14.4%
Other Agricultural Activities	23.1%	31.4%	0.1%	4.5%	26.7%	0.0%	1.1%	13.7%
Manufacturing	4.0%	0.0%	14.8%	5.4%	0.0%	0.0%	7.0%	4.7%
Milling Services (Small Scale)	0.2%	0.0%	0.8%	0.6%	0.0%	0.0%	0.8%	0.4%
Food Processing	1.5%	0.0%	5.5%	2.2%	0.0%	0.0%	2.9%	1.9%
Other Manufacturing Activities	2.3%	0.0%	8.6%	2.6%	0.0%	0.0%	3.3%	2.4%
Other Industries	3.7%	0.0%	13.8%	9.8%	0.0%	0.0%	12.7%	6.8%
Utility	1.1%	0.0%	4.1%	2.6%	0.0%	0.0%	3.4%	1.9%
Mining & Quarrying	0.3%	0.0%	1.2%	0.8%	0.0%	0.0%	1.0%	0.5%
Construction	2.3%	0.0%	8.5%	6.4%	0.0%	0.0%	8.3%	4.4%
Services	18.9%	0.0%	70.9%	61.4%	0.0%	0.0%	79.2%	40.4%
Wholesale & Retail Trade	4.7%	0.0%	17.8%	17.8%	0.0%	0.0%	22.9%	11.3%
Transport & Communication	1.0%	0.0%	3.8%	9.3%	0.0%	0.0%	12.0%	5.2%
Hotels & Restaurants	2.1%	0.0%	8.0%	2.0%	0.0%	0.0%	2.6%	2.1%
Financial Services	0.6%	0.0%	2.1%	3.1%	0.0%	0.0%	4.0%	1.9%
Real Estate	0.1%	0.0%	0.3%	15.5%	0.0%	0.0%	20.0%	7.9%
Public Administration	3.1%	0.0%	11.6%	6.6%	0.0%	0.0%	8.5%	4.9%
Education	3.3%	0.0%	12.4%	3.7%	0.0%	0.0%	4.8%	3.5%
Health	0.9%	0.0%	3.4%	0.8%	0.0%	0.0%	1.1%	0.9%
Other Service Activities	3.1%	0.0%	11.6%	2.5%	0.0%	0.0%	3.3%	2.8%
Total Value-added at Factor Cost	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

On the other hand, the most labor intensive sector is agriculture, where about 75.4 percent of the sector’s value-added is paid to labor (tables 9 & 10). It is also the least capital intensive, where only 24.6 percent of the sector’s value-added is paid to capital-land. By contrast, the most capital intensive sectors are Services and the “Other Industries”, which

includes utilities like electricity and water, and construction and mining. Among the services, real estate, transport and communications and financial services are the most capital intensive.

Table 9: Relative Factor Shares in Production - Aggregated

Sectors	Factors		Sector Value-added
	Labor	Capital-Land	
Agriculture & Related Activities	75.4%	24.6%	100.0%
Manufacturing	41.4%	58.6%	100.0%
Other Industries	26.7%	73.3%	100.0%
Services	23.0%	77.0%	100.0%
Total Value-added at Factor Cost	49.3%	50.7%	100.0%

Table 10: Relative Factor Shares in Production – More Disaggregated

Sectors	Factors							Sector Value-added at Factor Cost
	Total Labor	Agriculture Labor	Non-agriculture Labor	Total Capital-Land	Agriculture Capital-Land	Livestock Capital	Non-agriculture Capital-Land	
Agriculture & Related Activities	75.4%	75.3%	0.1%	24.6%	14.4%	9.3%	0.9%	100.0%
Cereals	82.4%	82.2%	0.1%	17.6%	17.6%	0.0%	0.0%	100.0%
Cash Crops	57.4%	57.3%	0.1%	42.6%	42.6%	0.0%	0.0%	100.0%
Livestock	68.9%	68.8%	0.1%	31.1%	0.0%	31.1%	0.0%	100.0%
Other Agricultural Activities	83.3%	83.2%	0.1%	16.7%	13.6%	0.0%	3.1%	100.0%
Manufacturing	41.4%	0.0%	41.4%	58.6%	0.0%	0.0%	58.6%	100.0%
Milling Services (Small Scale)	23.7%	0.0%	23.7%	76.3%	0.0%	0.0%	76.3%	100.0%
Food Processing	38.7%	0.0%	38.7%	61.3%	0.0%	0.0%	61.3%	100.0%
Other Manufacturing Activities	46.5%	0.0%	46.5%	53.5%	0.0%	0.0%	53.5%	100.0%
Other Industries	26.7%	0.0%	26.7%	73.3%	0.0%	0.0%	73.3%	100.0%
Utility	28.8%	0.0%	28.8%	71.2%	0.0%	0.0%	71.2%	100.0%
Mining & Quarrying	28.3%	0.0%	28.3%	71.7%	0.0%	0.0%	71.7%	100.0%
Construction	25.6%	0.0%	25.6%	74.4%	0.0%	0.0%	74.4%	100.0%
Services	23.0%	0.0%	23.0%	77.0%	0.0%	0.0%	77.0%	100.0%
Wholesale & Retail Trade	20.6%	0.0%	20.6%	79.4%	0.0%	0.0%	79.4%	100.0%
Transport & Communication	9.7%	0.0%	9.7%	90.3%	0.0%	0.0%	90.3%	100.0%
Hotels & Restaurants	50.3%	0.0%	50.3%	49.7%	0.0%	0.0%	49.7%	100.0%
Financial Services	15.0%	0.0%	15.0%	85.0%	0.0%	0.0%	85.0%	100.0%
Real Estate	0.5%	0.0%	0.5%	99.5%	0.0%	0.0%	99.5%	100.0%
Public Administration	31.1%	0.0%	31.1%	68.9%	0.0%	0.0%	68.9%	100.0%
Education	46.4%	0.0%	46.4%	53.6%	0.0%	0.0%	53.6%	100.0%
Health	51.3%	0.0%	51.3%	48.7%	0.0%	0.0%	48.7%	100.0%
Other Service Activities	54.1%	0.0%	54.1%	45.9%	0.0%	0.0%	45.9%	100.0%
Total Value-added at Factor Cost	49.3%	36.2%	13.1%	50.7%	6.9%	4.5%	39.3%	100.0%

Finally, in spite of agriculture's importance in the economy and its labor intensive characteristics, the national capital – labor coefficient estimates (table 9) show that almost half of GDP (49.3 percent) is generated by labor, while the other half (about 50.7 percent) is generated by capital-land.

Intermediate Demand & Factor Inputs

As discussed earlier, intermediate demand and factor inputs represent the goods and services as well as of factors used by sectors in the production processes. The structure of inputs reveals differences in production technologies across sectors. For instance, table 12 shows which sectors use more “Petroleum Products” per value-unit of output. This information is useful to determine the implications of policies and external shocks like a surge in international crude oil prices have on the economy. Information on sectors production technologies are drawn from the input-output table, which is also contained in the full SAM. There, the information is contained in the Commodities (row), Activities (column) cells for the intermediate demand and Factors (row), Activities (column) cells for the factor inputs.

From the Macro-SAM in table 5, however, (which is the aggregation of the detailed “Micro-SAM”), we can also obtain the national ratio of spending on factor to non-factor inputs. As table 11 shows, total factor inputs account for 90.5 percent of the agriculture sector's spending, and about 52 percent of the non-agriculture sector's spending on inputs.

Table 11: National Ratio of Spending on Factor & Non-factor Inputs of Production

Inputs	Activities	
	Agriculture Sectors	Non-Agriculture Sectors
Goods & Services (Commodities)	9.5%	48.1%
Total Factor Inputs	90.5%	51.9%
Agriculture Labor	68.1%	
Agriculture Capital-Land	21.5%	
Non-Agriculture Labor	0.1%	13.1%
Non-Agriculture Capital-Land	0.8%	38.9%
Total Inputs = Gross output	100.0%	100.0%

Table 12: Production Technology Coefficients

Commodity & Factor Inputs	Agriculture & Related Activities	Manufacturing	Other Industries	Services	Total Inputs
Total Intermediate Demand	9.5%	67.9%	67.3%	37.7%	34.7%
Primary Agricultural Products	4.2%	16.1%	4.6%	1.6%	4.3%
Manufactured Goods	3.7%	35.4%	38.9%	9.1%	13.8%
Fertilizer	3.0%	0.0%	0.0%	0.0%	1.0%
Petroleum Products	0.0%	5.0%	13.1%	3.7%	3.8%
Utilities & Other services	1.5%	11.3%	10.7%	23.2%	12.8%
Electricity, Water & Communication	0.0%	2.2%	1.7%	2.3%	1.4%
Transport Services	0.4%	1.9%	2.5%	11.1%	5.3%
Financial Services	0.2%	1.5%	2.7%	1.6%	1.3%
Other Services	0.9%	5.8%	3.8%	8.2%	4.8%
Total Factor Inputs	90.5%	32.1%	32.7%	62.3%	65.3%
Agriculture Labor	68.2%	0.0%	0.0%	0.0%	23.7%
Non-agriculture Labor	0.1%	13.3%	8.8%	14.6%	8.7%
Rural Capital-Land	13.0%	0.0%	0.0%	0.0%	4.5%
Rural Livestock Capital	8.4%	0.0%	0.0%	0.0%	2.9%
Non agriculture Capital-land	0.8%	18.8%	23.9%	47.7%	25.4%
Total Inputs = Gross output	100.0%	100.0%	100.0%	100.0%	100.0%

By calculating the shares of each factor and commodity (goods & services) payment in the value of gross output, we can determine sectors production technologies. Table 12 shows the share of each input required to produce a unit of each sector's outputs. Among the commodities (goods & services) inputs, manufactured goods are the most important intermediate inputs, accounting for more than 13 percent of the total inputs. In

manufacturing sector itself, manufactured inputs account for 35.4 percent of the sector's gross output. This implies that for each 100 birr worth of manufactured output, about 35.4 birr must be spent on manufactured inputs.

Among the primary non-agricultural commodities, petroleum products account for about 3.8 percent of the total inputs or gross output in the economy. On the other hand, primary agricultural products account for 4.3 percent of gross output.

Trade Shares

The trade shares shed light on the structure of imports and exports. Similar to several sub-Saharan countries, Ethiopia relies on primary exports (41 percent), and uses these export earnings to pay for imported goods. A large share of imports is in machinery, transport, electronic and other equipment, accounting for 26.8 percent of the total imports in EFY 1998 (2005/06).

Table 13: Structure of Trade values in billion birr

Goods & Services	Exports of Goods & Services	Shares in Total Exports	Gross Domestic Output	Export Intensity (EI)	Imports of Goods & Services	Shares in Total Imports	Total Demand	Import Penetration Ratios (IPR)
Primary Agricultural Products	6.88	41.0%	53.79	12.8%	2.22	4.7%	63.33	3.5%
Processed Food Products	0.90	5.4%	15.53	5.8%	1.50	3.2%	19.62	7.7%
Tobacco & Beverage Products	0.19	1.1%	2.21	8.6%	0.23	0.5%	4.60	5.1%
Textile & Leather Products	0.68	4.1%	3.62	18.8%	2.21	4.7%	8.60	25.7%
Wood & Paper Products	0.08	0.5%	0.81	9.8%	1.02	2.2%	2.40	42.5%
Minerals & Mineral Products	0.01	0.0%	1.90	0.3%	0.35	0.7%	3.81	9.2%
Petroleum Products					5.69	12.1%	8.24	69.1%
Fertilizers					1.30	2.8%	1.80	72.2%
Chemicals, Rubber & Plastic Products	0.32	1.9%	1.60	20.0%	4.46	9.5%	9.09	49.1%
Metals & Metal Products	0.57	3.4%	1.97	28.7%	4.01	8.5%	9.40	42.7%
Machinery, Transport, Electronic & Other Equipment	0.39	2.3%	2.31	16.7%	12.62	26.8%	20.47	61.7%
Electricity, Water & Communication Services	0.56	3.3%	4.71	11.9%	0.31	0.7%	5.22	5.9%
Trade & Repair Services	0.34	2.0%	25.75	1.3%	0.08	0.2%	26.22	0.3%
Hotel & Restaurant Services	0.40	2.4%	8.02	4.9%	0.48	1.0%	8.61	5.6%
Transport Services	4.61	27.5%	8.69	53.1%	8.04	17.1%	16.73	48.0%
Financial Services	0.24	1.4%	3.47	6.8%	0.57	1.2%	4.05	14.2%
Construction, Real Estate & Renal Services	0.10	0.6%	32.10	0.3%	0.03	0.1%	32.41	0.1%
Public, Social & Other Business Services	0.51	3.1%	20.69	2.5%	1.86	4.0%	22.78	8.2%
Total	16.77	100.0%	187.18	9.0%	47.01	100.0%	267.40	17.6%

Another way of measuring the relative importance of commodities in the overall economy is by estimating import penetration ratios (IPR) and export intensities (EI). The IPR is the share of imports in the value of total demand, i.e.,

$$\text{Import Penetration Ratio (IPR)} = \frac{\text{Imports}}{\text{Total Demand}}$$

On the other hand, EI is the share of exports in the value of gross output and is represented by the equation,

$$\text{Export Intensity (EI)} = \frac{\text{Exports}}{\text{Gross Output}}$$

The estimated IPR for EFY 1998 (2005/06) reveals that Ethiopia's manufacturing sector faces the most import competition, with 34.7 percent of total demand supplied by foreigners. Overall, about 17.6 percent of the total demand in the economy is supplied by foreigners.

On the other hand, the EI shows that more than 53 percent of the transport service output is sold abroad, while 12.8 percent of the primary agricultural products' outputs are exported. Although it may come as a surprise, the estimated EI for EFY 1998 (2005/06) shows that the service sector in general, and the transport sector in particular is the most export intensive sector in the economy. Overall, only 9 percent of the total output is exported abroad.

Finally, the total trade deficit in EFY 1998 (2005/06) was 30.24 billion birr, accounting for about 22.8 percent of the GDP (table 14). On the other hand, Ethiopia was a moderately open economy in EFY 1998 (2005/06), where the value of its total trade was almost half of its gross domestic product at market prices.

Table 14: Trade Related Indicators Values in billion birr

Other Trade Indicators	Ratios & Values
Trade Surplus (Deficit)	30.24
Trade Deficit as a Share of GDP	22.8%
Oppenes of the Economy	
Total Trade	63.78
Trade to GDP Ratio	48.2%
GDP at Market Prices	132.32

The Structure of Demand**Table 15: Demand for Goods & Services by Users in billion birr**

Goods & Services	Intermediate Demand		Household Demand	Public Demand	Investment Demand	Rest of the World	Total
	Agriculture	Non-Agriculture	Total Private Consumption	Government Consumption	Gross Capital Formation	Exports	
Intermediate Demand	6.17	58.79					64.95
Final Demand			114.75	15.91	31.89	16.77	179.33

Tables 15 and 16 show the demand for goods and services. Total intermediate demand by the productive sectors of the economy in EFY 1998 (2005/06) was 64.95 billion birr, of which about 58.79 billion birr or 90.5 percent was demanded by non-agriculture sectors. On the other hand, about 179.33 billion birr worth of goods and services were demanded for final consumption, with households' consumption accounting for 64 percent of the total final demand. While government purchases and exports were fairly close, investment demand was the second largest, accounting for 17.8 percent of the total final demand.

Table 16: Demand Shares for Goods & Services by Users

Goods & Services	Intermediate Demand		Household Demand	Public Demand	Investment Demand	Rest of the World
	Agriculture	Non-Agriculture	Total Private Consumption	Government Consumption	Gross Capital Formation	Exports
Share in Intermediate Demand	9.5%	90.5%				
Share in Final Demand			64.0%	8.9%	17.8%	9.4%

As table 17 shows, about 34 percent of households' consumption is non-marketed or home consumed outputs. Overall, consumption of non-marketed goods accounted for about 21.7 percent of the total final demand in the economy in EFY 1998 (2005/06) – table 18.

Although the share of total consumption for poorer households, both urban and rural, is small (18.3 percent for rural poor and 3.8 percent for the urban), their share of own consumption is the largest (48.5 percent for rural poor and 6.7 percent for the urban).

Table 17: Household Consumption Distribution

Goods & Services	Consumption Demand by Households				Private Consumption
	Rural Poor	Rural Non-Poor	Urban Poor	Urban Non-Poor	
Share in Total Marketed	14.3%	49.9%	5.3%	30.5%	100.0%
Share in Total Non-Marketed (Home Consumed Outputs)	26.2%	71.5%	0.7%	1.5%	100.0%
Share in Total Private Consumption	18.3%	57.2%	3.8%	20.7%	100.0%
Composition of Consumption by Households					
Marketed	51.5%	57.5%	93.3%	97.5%	66.0%
Non-Marketed (Home Consumed Outputs)	48.5%	42.5%	6.7%	2.5%	34.0%

Since non-marketed, home consumed outputs are primarily food products, with limited manufactured outputs like traditional cloths and so on, the large share of non-marketed consumption among poor households show the disparity in consumption patterns across

income groups. These differences can influence the distributional impacts of policies and external shocks on maximizing welfare.

Table 18: Private Consumption Shares in Final Demand

Goods & Services	Shares in Final Demand
Marketed Consumption Shares	42.3%
Non-Marketed (Home Consumed Outputs) Shares	21.7%
Total Private Consumption Shares in Final Demand	64.0%

The Structure of Supply

In EFY 1998 (2005/06), total supply to the economy was valued at 267.4 billion birr, of which total domestic output accounted for about 70 percent. On the other hand, imports accounted for 17.6 percent, which is equivalent to the IPR calculated above. This is because total supply must equal total demand, and indeed, total supply in EFY 1998 (2005/06) was equal to the total demand, also valued at 267.4 billion birr. In fact, total demand is the sum of intermediate and final demand (from table 15) and trade and transport margins or transactions cost (see also table 23 in sub-section 3.2 for a demand-supply accounting of the Ethiopian economy).

Table 19: Total Supply Breakdown in billion birr

Sectors	Good & Services (Commodities)		
	Marketed	Non-Marketed	Total
Agriculture & Related Activities	32.11	32.80	64.91
Non-Agriculture Sectors	116.09	6.18	122.27
Total Domestic Output	148.20	38.98	187.18
Trade & Transport Margins	23.11		23.11
Indirect	10.10		10.10
Domestic indirect taxes	3.11		3.11
Import duties & taxes	6.99		6.99
Imports of Good & Services	47.01		47.01
Total Supply of Goods & Services	228.42	38.98	267.40

Household Income & Expenditure

Table 20: Distribution of Households' Income Shares

Households	Factor Income					Government Transfers	Remittances from the Rest of the World	Total Household Income
	Agriculture Labor	Agriculture Capital-Land	Non-Agriculture Labor	Non-Agriculture Capital-Land	Total Factor Income			
Rural Poor	36.7%	19.5%	1.7%	9.1%	19.8%	19.2%	10.0%	18.7%
Rural Non-Poor	63.3%	80.5%	8.5%	67.9%	59.4%	20.3%	25.5%	55.0%
Urban Poor			19.5%	1.0%	3.1%	12.5%	8.0%	3.8%
Urban Non-Poor			70.3%	22.1%	17.7%	48.1%	56.5%	22.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Income by Source	33.2%	10.5%	12.1%	31.2%	87.0%	1.2%	11.9%	100.0%

Since the macro-SAM (table 5) separates households by residence and income groups (rural-urban, poor-non-poor), it is possible to analyze how the different household groups earn and spend their incomes.

Total household income in the macro-SAM comprise factor incomes (labor wages and capital profits), and non-factor incomes mainly from the government transfers in the form

of food & related relief aid, pensions and other transfers, remittances from the rest of the world, and factor income from investments abroad.

In the earlier discussion on production had revealed that the agriculture sector is mostly labor intensive. Not surprisingly therefore, rural households (both poor and non-poor) earn about 33.2 percent of their incomes from agriculture labor. In fact, earning from agriculture labor is the largest source of income across the economy. Among rural households, about 80.5 percent of agricultural capital, which includes livestock, goes to the non-poor, explaining in fact why they are non-poor in the first place. This may also suggest that non-poor households disproportionately possess capital like livestock, farm implements, as well as relatively large tracts of land, enabling them to derive the lion's share of income from the factor.

Finally, even though the share of the poor in the total population was about 40 percent in 2005, their income was only about 22.4 percent of the total earned by Ethiopian households.⁷

Table 21: Distribution of Households' Expenditure Shares

Expenditures	Households				Total Expenditure
	Rural Poor	Rural Non-Poor	Urban Poor	Urban Non-Poor	
Marketed Goods & Services	43.7%	51.7%	80.5%	76.7%	56.9%
Non-Marketed Home Produced Outputs	41.1%	38.1%	5.8%	2.0%	29.3%
Direct Tax Payment	0.2%	0.1%	0.0%	8.6%	2.1%
Household Savings	15.0%	10.1%	13.7%	12.4%	11.7%
Transfers to the Rest of the World	0.0%	0.0%	0.0%	0.3%	0.1%
Total Household Expenditure	100.0%	100.0%	100.0%	100.0%	100.0%
Gross Domestic Product at Market Prices					132.32
Household Savings as a Share of GDP	2.8%	5.6%	0.5%	2.8%	11.7%

⁷ Woldehanna, et. al., 2008

On the expenditure side, about half of the consumption expenditures of rural poor households are accounted for on non-marketed or home produced outputs. This implies that they produce about half of what they consume. Perhaps because of this reason, their savings relative to their overall expenditure is the largest among all other households.

In general, about 86.2 percent of households' expenditure goes towards acquiring goods and services, while 2.1 percent goes towards paying direct taxes. In EFY 1998 (2005/06), overall households' savings in the economy was about 11.7 percent of GDP.

Factor Income & Distribution

As table 22 shows, in EFY 1998 (2005/06), gross national income was about 122.68 billion birr, of which 122.22 billion or 99.6 percent was accounted for by domestic value-added at factor cost. However, about 450 million birr in investment income was earned from the rest of the world.

Concerning the distribution, about 115.77 billion or 94.4 percent was earned by households, while public enterprises earned about 6.7 billion or 5.5 percent of the total earnings. Finally, about 210 million birr or 0.2 percent of the total was transferred out of the country in the form of investment income earned by foreigners.

Table 22: Factor Income and Distribution

Factor Income & Spending	Billion Birr	Shares
Factor Income		
Total Value-added at Factor Cost (GDP)	122.22	99.6%
Factor Income from RoW	0.45	0.4%
Gross National Income (GNI)	122.68	100.0%
Factor Income Distribution		
Households	115.77	94.4%
Government Enterprises	6.69	5.5%
Investment Income to the RoW	0.21	0.2%
Total Factor Spending	122.68	100.0%

Note: GNI = Value Added at Factor Cost + Net Factor Income from RoW

3.2. Basic Macro-Economic Relations & Identities:

A Social Accounting Matrix (SAM) captures the complete relationship that links the income and expenditure of each category of economic agent in a given economy. Here we derive basic economic relations and identities from the Macro-SAM.⁸

I. Gross Domestic Product and Absorption

Table 23: Accounting Summary of the Ethiopian Economy EFY 1998 (2005/06) in Billion Birr

Input-Output Accounting			
Total Intermediate Inputs at Basic Prices	64.95	Agriculture Sector Output	64.91
Primary Agricultural Commodity Inputs	8.11	Non-Agriculture Sectors Output	122.27
Non-Agriculture Commodity Inputs	32.85		
Service Inputs	23.99		
Factor Inputs - Value Added at Factor Cost	122.22		
Total Inputs at Basic Prices	187.18	Total Domestic Outputs at Basic Prices	187.18
GDP Accounting			
Income Approach		Expenditure Approach	
Compensation to Labor (wages)	60.26	Total Private Consumption	114.75
Gross Operating Surplus	61.96	Total Government Consumption	15.91
Value Added at Factor Cost	122.22	Total Investment	31.89
Total Indirect Taxes	10.10	Exports of Goods & Services	16.77
		Less Imports of Goods & Services	47.01
Value-Added at Market Prices	132.32	GDP at Market Prices	132.32
Demand & Supply Accounting			
Intermediate Demand	64.95	Total Domestic Output at Basic Prices	187.18
Trade & Transport Margins (Transaction Costs)	23.11	Trade & Transport Margins (Transaction Costs)	23.11
Final Demand	179.33	Indirect Taxes	10.10
		Imports of Goods & Services	47.01
Total Demand at Market Prices	267.40	Total Supply at Market Prices	267.40
Average Exchange Rate (Birr/USD)			8.681

⁸ As explained earlier, SAMs do not contain asset accumulation accounts and any macro relationship is in flow terms. However, to better illustrate the flow of certain macro relations implicit in the SAM, changes in some asset positions are introduced in this sub-section. For instance, in order to explain the flow budget constraint of the external sector, net foreign exchange reserves or ΔR is introduced, even though conventionally, if a decrease in reserves results from the foreign exchange used by the economy, the reserves are then aggregated to net foreign savings. The analysis is therefore extended to draw on the methodological approaches followed in consistency macro-economic accounting matrices. For detail, see Easterly, W., 1989 and Agenore, P-R., 2004

Two different approaches can be adopted for estimating GDP: the expenditure approach & the value-added (income) approach. From the above summary table (table 23), we obtain values for private consumption (C) & government consumption (G), investment (I), factor incomes (wage compensations (W) and gross operating surplus -GOS), indirect taxes (Indtax), and imports (M) and exports (E) of goods & services. Hence, the following equation can be constructed, where

$$C + G + I + E = W + GOS + (\text{Indtax}) + M \quad \dots\dots\dots (1)$$

GDP at market prices; $Y = W + GOS + \text{Indtax}$ is thus equal to final demand net of exports of goods & services; $E - M$. Therefore,

$$Y = C + G + I + E - M \quad \dots\dots\dots (2)$$

GDP at factor cost is given by the sum of factor incomes of wages and gross operating surplus. Hence;

$$\text{Value-added at factor cost} = W + GOS \quad \dots\dots\dots (3)$$

Substituting Equations (2) and (3) into Equation (1) yields; $Y = \text{Value-added at factor cost} + \text{Indtax}$. This implies that GDP at market prices is equal to GDP at factor cost plus indirect taxes. However, Equation (2) can also be re-written as

$$Y + M - E = C + G + I = A \quad \dots\dots\dots (4)$$

Equation (4) equates total supply of goods & services to domestic absorption. But Equation (4) can also be re-written as

$$M - E = A - Y = I - S \quad \dots\dots\dots (5)$$

where net domestic savings $S = Y - (C+G)$

Equation (5) relates net imports (M-E) to an excess of domestic absorption over output ($A - Y$), or equivalently to an excess of investment over savings ($I - S$). As tables 24 and 25

show, in EFY 1998 (2005/06), GDP at market prices and domestic absorption were 132.32 and 162.56 billion birr respectively, while net domestic savings was 1.66 billion birr. Hence, from Equation (5), net imports (trade deficit) in EFY 1998 (2005/06) was 30.24 billion birr.

Table 24: Macro- Values in EFY 1998 (2005/06) in billion birr

Y	C	G	I	E	M	A	S
GDP at Market Prices	Total Private Consumption	Government Consumption	Gross Capital Formation	Exports	Imports	Absorption	Net Domestic Savings
132.32	114.75	15.91	31.89	16.77	47.01	162.56	1.66

Table 25: Trade Deficit, Absorption & GDP and Investment & Savings Difference in billion birr

M - E	A - Y	I - S
30.24	30.24	30.24

The implications of Equation (5) is that a reduction of the trade deficient requires either a reduction in absorption relative to output, or an increase in net domestic savings.

II. General Government's Budget Constraint

As the tables (26 and 27) on government consumption and revenue show, the values of the components that make up its revenue and expenditure must be equal; i.e., revenue = recurrent expenditure.

Table 26: EFY 1998 (2005/06) General Government Revenue in Billion birr

Government Revenue	Non-Tax Revenue	Tax Revenue			Transfers from the Rest of the World	Total Revenue
		Domestic Indirect Taxes	Import Duties & Taxes	Direct Taxes		
Revenue by Source	5.37	3.11	6.99	4.05	3.73	23.26

Note: Non-tax Revenue Includes Dividend Income from Public Enterprises

Table 27: EFY 1998 (2005/06) General Government Recurrent Expenditure in Billion birr

Items	Expenditures
Total Expenditures	17.89
Consumption of Goods & Services	15.91
Transfers	1.98
Rural Poor	0.30
Rural Non-Poor	0.31
Urban Poor	0.19
Urban Non-Poor	0.74
External Interest Payments	0.43
Government Savings/Recurrent Budget Surplus	5.37
Final Government Recurrent Expenditure	23.26
Gross Domestic Product at Market Prices	132.32
Recurrent Budget Surplus as a Share of GDP	4.1%

Note: Government transfers include assistance (food & related relief aid), pensions, and other safety-net programs, and domestic & external interest payments on public debt

In the EFY 1998 (2005/06), the revenue components for the general government budget of Ethiopia were non-tax Revenue (ntrev), tax Revenue (tax), and transfers from Row (rowgovtran). For convenience, we rename the total revenue as govrev. On the other hand, the recurrent expenditure comprised of consumption of goods & services (Cgov), domestic transfers (govhhtran) (to households + interest payments on domestic public debt), transfers to the rest of the world (govrowtran) (interest payment on foreign public debt). Rename total recurrent expenditures as govexp.

Hence, govrev = ntrev + tax + rowgovtran; and

$$\text{govrexp} = \text{Cgov} + \text{govhhtran} + \text{govrowtran}$$

Since revenue = recurrent expenditure, Equation (6) can be setup as

$$\text{govrev} = \text{govrexp} + \text{Sgov} \dots\dots\dots (6)$$

where the recurrent budget surplus or government’s savings (Sgov) is added on the total recurrent expenditures.

Equation (6) can also be re-written as

$$\text{govrev} - \text{govrexp} = \text{Sgov} \dots\dots\dots (7)$$

Equation (7) simply restates that Revenue – Recurrent Expenditure = Government Savings or recurrent budget surplus. However, in addition to the recurrent expenditure, the government also has a corresponding capital expenditure, i.e., the financing of asset acquisitions. Hence, the sources of financing of government investment (govI) are its savings, net domestic borrowing (govdb), and net foreign borrowing from the rest of the world (govRoWb). Hence, government investment is

$$\text{govI} = \text{Sgov} + \text{govdb} + \text{govRoWb} \dots\dots\dots (8)$$

Equation (8) simply relates the government’s budget constraints, where savings and net foreign and domestic borrowings must equal to the flow of physical assets acquired by the government or government investment (govI).

In EFY 1998 (2005/06), the general government’s budget deficit financing was 6.06 billion birr, comprising of a 2.74 billion net domestic borrowing and a 1.51 billion net foreign borrowing as well as a 1.82 billion residuals.⁹ Therefore, the government’s investment can be obtained by solving Equation (8). Accordingly, it was 11.43 billion birr or about 35.8 percent of the total investment in the economy for that fiscal year.

⁹ The residuals are the result of a mismatch between the monetary survey and the budget accounting. A methodological synchronization between the two institutions, NBE and MOFED, would eliminate such problems. In the meantime, it is reported here as a separate transaction along with “known” foreign and domestic borrowings

Table 28: Breakdown of Gross Capital Formation in billion birr

Gross Capital Formation	Value	Share in Total Investment
Total Investment	31.89	
Government Investment	11.43	35.8%
Non-government Investment	20.46	64.2%

Note: Non-government Includes households and public enterprises

Substituting Equation (7) into Equation (8), the sources of financing of the government's overall budget deficit are equal to its recurrent expenditures plus investment less its current revenue.

$$\text{govrexp} + \text{govI} - \text{govrev} = \text{govdb} + \text{govRoWb} \dots\dots\dots (9)$$

The expression on the left hand side of Equation (9) is the overall fiscal deficit of the government, while the expression on the right hand side provides the sources and magnitude of the deficit financing.

Table 29: Overall General Government Budget Deficit & Financing in billion birr

Revenue & Expenditure	Value	Sources of Financing	Value
Current Expenditure	17.89	Net External Borrowing	1.51
Government Investment	11.43	Net Domestic Borrowing	2.74
Total Revenue	23.26	Other and residual	1.82
Total Fiscal Deficit	6.06	Total Deficit Financing	6.06
Gross Domestic Product at Market Prices			132.32
Fiscal Deficit as a Share of GDP	4.6%		

III. Non-Government Sectors' Budget Constraint

The non-government sectors' budget constraint can be derived in the same way as that of the government's. From the Macro-SAM, the incomes of households and public enterprises

consist of factor incomes in the form of wages and GOS, transfers from the government in the form of net transfers and interest payments on domestic public debt, and remittances and factor income from the rest of the world. The expenditures consist of consumption of goods and services, direct taxes, transfer of dividend to the government (in the case of public enterprises), transfers to the rest of the world, and savings.

Table 30: Non-government Sectors Income by Source in billion birr

Sources of Non-Government Sectors Income	Income
Total Factor Income	122.46
Agriculture Labor	44.21
Agriculture Capital-Land	13.94
Non-Agriculture Labor	16.05
Non-Agriculture Capital-Land	48.26
Government Transfers	1.55
Remittances from the Rest of the World	15.79
Total Income	139.80

Table 31: Non-government Sectors Expenditure by Source in billion birr

Non-government Current Expenditure	Expenditures
Consumption of Goods & Services	114.75
Dividend Paid to Government	5.37
Direct Taxes	4.05
Transfers to the Rest of the World	0.09
Total Expenditures	124.27
Savings	15.53
Total Current Expenditures	139.80

From tables 30 and 31, we obtain total non-government income; $HHinc = W + GOS + govtran + RoWtran$, and total non-government expenditure as $HHexp = C + dirtax + trangov + tranRoW$

Similar to the government’s budget constraints, the expenditures and incomes of the non-government sectors must be equal. Thus, we set up the following equation, where

$$W + GOS + govtran + RoWtran = C + dirtax + trangov + tranRoW + Shh \dots\dots\dots (10)$$

Given the income and expenditure expressions and following the derivation of Equation (6), Equation (10) can be re-written as

$$HHinc = HHexp + Shh \dots\dots\dots (11)$$

where total non-government income is equal to total expenditure plus savings.

In addition to current expenditures, the non-government sectors also expend on asset acquisitions, which is financed by their savings and net domestic and foreign borrowings. However, foreign borrowing by non-government sectors is restricted in Ethiopia to special circumstances where the government guarantees the loans for major projects of public enterprises only. In this discussion, foreign borrowing and foreign direct investment (FDI) inflows to the non-government sectors through the capital and financial account are considered together, although it is possible to differentiate the two once the magnitude of borrowings by public enterprises for the specific year is known.¹⁰

Asset acquisitions by non-government sectors consists of investment on physical assets, inventories and working capital, and intangible non-financial assets; net lending to the government (acquisition of government securities); and increases in holdings of monetary assets, which are also liabilities issued by the financial sector. These liabilities include the issuance of new domestic currency, demand and time deposits.

Therefore, the non-government sectors savings (Shh) plus net domestic (HHdb) and foreign borrowings (FDI) must be equal to their investments (HHI) plus net lending to the government (ΔB_{gov}) and increases in holdings of monetary assets (ΔM). Equation (12) captures this relationship.

¹⁰ There are no transactions involving derivatives and other financial assets between domestic residents and the rest of the world. Hence, the consideration of only foreign borrowing and foreign direct investment (FDI) inflows through the capital and financial account of the BOP

$$Shh + HHdb + FDI = HHI + \Delta Bgov + \Delta M \dots\dots\dots (12)$$

Substituting the savings (Shh) term in Equation (12) by Equation (11) where

$Shh = HHinc - Hhexp$; Equation (13) yields the non-government sectors budget constraint.

$$HHinc - HHexp + HHdb + FDI = HHI + \Delta Bgov + \Delta M \dots\dots\dots (13)$$

Equation (13) states that non-government sectors' income plus their net domestic and foreign borrowings less their current expenditures is equal to the total value of their asset acquisitions in the form of physical investments, net lending to the government, and increases in money holdings (currency plus demand and time deposits). Since the non-government sectors' investment was 20.46 billion birr (table 28), the net foreign borrowing, including FDI inflow for EFY 1998 (2005/06) can be determined by rewriting Equation (13). Accordingly,

$$FDI = HHI + \Delta Bgov + \Delta M - HHinc + HHexp - HHdb \dots\dots\dots (14)$$

Table 32: Non-government Sectors budget constraints in billion birr

Foreign Borrowing & FDI	Non-Gov. Investment	Government Securities	Broad Money	Total Income	Total Expenditures	Domestic Borrowings
9.20	20.46	2.74	7.03	139.80	124.27	5.51

Note: Government securities represent net claims on government other than by the National Bank

IV. The Rest of the World's Budget Constraint

From the Macro-SAM, the current income components of the external sectors are imports (M), investment income (RoWlinc), households (tranRoW) transfers to foreign residents as well as and government's (govrowtran) interest payments on public debt. The expenditure components are exports (E), factor income from the rest of the world (fRoW), remittances (RoWtran) and official government transfers (rowgovtran).

Table 33: Income Accruing to the Rest of the World in billion birr

Sources of Transfers	Imports	Investment Income	Household Transfers	External Interest Payment on Public Debt	Total Current Transfers to the RoW
	47.01	0.21	0.09	0.43	47.75

Table 34: Income Accruing from the Rest of the World in billion birr

Sources of Transfers	Exports	Factor Income	Remittances	Transfer to Government	Total Current Transfers from the RoW
	16.77	0.45	15.79	3.73	36.75

Income accruing to and from the rest of the World is balanced by its savings, which is the current account balance (CA); an 11 billion birr deficit in EFY 1998 (2005/06).

Table 35: Foreign Savings (Current Account Deficit) in billion birr

Foreign Savings (Current Account Deficit)	GDP at Market Prices	Current Account Deficit as a Share of GDP
11.00	132.32	8.3%

The current account budget constraint for the Rest of the World is therefore;

$$M + RoWlinc + tranRoW + govrowtran = E + fRoW + RoWtran + rowgovtran + CA \dots\dots\dots (15)$$

However, in addition to current transactions, domestic economic actors (the government and non-government sectors) also invest by borrowing from the rest of the world. The capital account transactions are captured by setting up the rest of the world's budget constraint. From the current account, the net resource inflow in terms of goods and services is the current account balance or foreign savings. Therefore, following a similar approach in the government and non-government sectors' budget constraints, the total

foreign savings (CA) plus acquisition of net foreign exchange reserves ΔR by the financial system must be equal to net foreign borrowings and FDI inflows by the government and non-government sectors. Thus, the budget constraints is expressed as

$$CA + \Delta R = \text{govRoWb} + \text{FDI} \dots\dots\dots (16)$$

Equation (16) can also be re-written as

$$CA = \text{govRoWb} + \text{FDI} - \Delta R \dots\dots\dots (17)$$

Equation (17) implies that a current account deficit (or a positive savings of 11 billion birr by the Rest of the World in the Macro-SAM) must be financed either by increasing the net capital inflows or by a drawdown of the stock of foreign exchange reserves. Moreover, the capital inflow can only be increased either by an increase in net foreign borrowing and FDI inflows of the non-government sectors or by increasing the government’s foreign borrowings, which also imply an increase in national foreign debt burden. Table 36 shows the sources and magnitude of the current account deficit financing for EFY 1998 (2005/06).

Table 36: Table Current Account Deficit Financing in billion birr

Current Account Deficit	Net External Borrowing by Government	Non-government Foreign Borrowing & FDI	Reserve Drawdown
11.00	1.51	9.20	-0.29

V. The Savings-Investment Balance of the Economy in EFY 1998 (2005/06)

The saving-investment balance is a macro-economic budget constraint of the entire economy obtained by summing up the sectoral budget constraints. First, we add the budget constraints for the government and non-government sectors, which are represented by Equations (9) and (13). Adding these two equations and using Equations (7) and (11), we obtain Equation (18);

$$S_{gov} + S_{hh} + govdb + HHdb + govRoWb + FDI = govI + HHI + \Delta M \quad \dots\dots\dots (18)$$

Equation (18) states that the government and non-government savings plus their respective domestic and foreign borrowings (including FDI) equals to their investments plus the change in broad money supply in the economy.

Aggregating the saving and investment terms, Equation (18) can be simplified to

$$S + govdb + HHdb + govRoWb + FDI = I + \Delta M \quad \dots\dots\dots (19)$$

From Equation (16), net foreign borrowings and FDI inflows by the government and non-government sectors equal to the current account balance plus the change in net foreign exchange reserves. Therefore, substituting $govRoWb + FDI$ with $CA + \Delta R$, Equation (19) is re-written as

$$S + govdb + HHdb + CA + \Delta R = I + \Delta M \quad \dots\dots\dots (20)$$

However, aggregate net domestic credit (domestic government and non-government borrowings) and net foreign assets (reserves) must equal to broad money, and are in fact the assets and liabilities of the financial system. This implies that

$$govdb + HHdb + \Delta R = \Delta M \quad \dots\dots\dots (21)$$

which is also the same as; $govdb + HHdb + \Delta R - \Delta M = 0 \quad \dots\dots\dots (22)$

Therefore, Equation (20) can be re-written as

$$I = S + CA \dots\dots\dots (23)$$

Equation (23) yields the savings – investment balance of the economy and states that aggregate domestic investment I, is financed by domestic and foreign savings.

From the Macro-SAM, the savings – investment balance of the Ethiopian economy can be obtained for EFY 1998 (2005/06) and is presented in table 37.

Table 37: Savings-Investment Balance of the Ethiopian Economy in EFY 1998 (2005/06) in billion birr

Gross Domestic Savings	Private/Non-Government Savings	Government Savings	Foreign Savings (Current Account Deficit)	Total Savings		Total Investment	Gross Capital Formation
	15.53	5.37	11.00	31.89			31.89

Equation (23) can also be re-written as

$$I - S = CA \dots\dots\dots (24)$$

And further disaggregated as

$$(S_{gov} - govI) + (Shh - HHI) = ctRoWexp - ctRoWinc \dots\dots\dots (25)$$

Here, ctRoWexp & ctRoWinc represent total current transfers, ¹¹ i.e., inflows (expenditure by the rest of the world) and outflows (income accruing to the rest of the world) and can be estimated from tables 33 and 34. Accordingly, in EFY 1998 (2005/06), the difference between total inflows and outflows was -11 billion birr. The left hand side of Equation (25) simply disaggregates savings and investments by government and non-government sectors and the two sides of the equation are equal.

Table 38: Savings, Investment and Net Current Inflows in billion birr

Government		Non-Government		Net Inflows
Savings	Investment	Savings	Investment	
5.37	11.43	15.53	20.46	-11.00

Equation (25) implies that an improvement in the current account balance can occur only to the extent that government and private savings rise relative to their respective investments.

¹¹ the negative of the current account balance if you will

4. SAM COMPILATION AND DATA SOURCES

Construction of the SAM (which also includes that of the IO table) involved three major steps. First, a “proto-SAM” was constructed using available data sources. This primarily involved creating a highly aggregated macro-SAM that provides control totals for various economic flows. Detailed information on production, inputs, factor payments, consumption and other economic flows were then used to disaggregate the macro-SAM and create the proto-SAM. Given that the data comes from various sources, often with different sampling frames for surveys, the initial proto-SAM was, as expected, not balanced. After utilizing all information available to judge which data was most reliable and making adjustments accordingly, there still remained inconsistencies between total supply and total use for various accounts in the SAM. Thus, a third step was required, in which the final SAM was created using a statistical cross-entropy approach to balance supply and use with minimal adjustments to individual cells (values) in the proto-SAM.¹² This document focuses, however, on the construction of the proto-SAM.

To identify individual SAM blocs or cells in the following documentation, the notation (row account, column account) is used – e.g. (Commodities, Activities) refers to entries at the intersection of commodity rows and activity columns. The cell entries represent expenditure from the column account and income to the row account.

(Commodities, Activities): The Intermediate Use Matrix

Information on intermediate input use of commodities by activities was taken from the CSA annual agriculture survey, the CSA manufacturing industries surveys, and from MoFED data.

- **Intermediate Input Use by Agricultural Activities**

¹² Robinson, Cattaneo and El-Said, 2001

The inputs used for crop production are fertilizers, seeds (local and improved), and agro-chemicals (herbicides, insecticides and fungicides). To estimate the value of fertilizers, two sources of data were used: CSA (2007) Agricultural Sample Survey 2005/06 data for quantities of different fertilizer types, and Ministry of Agriculture data for application rate and price of fertilizers by crop type.

To value the improved seeds, the CSA (2007) Agricultural Sample Survey was used since the survey includes the quantity and price of improved seed for each crop type. However, for local seeds only quantity data was available. Hence, the value of the local seeds was calculated using the retail price for each crop type. For the valuation of agro-chemicals, information on total coverage of agro-chemicals was collected from the CSA (2007) Agricultural Survey, while information regarding the application rates of each agro-chemical per hectare by crop type was provided by the Ministry of Agriculture. To calculate the prices of the various types of agro-chemicals, unit prices at cif valuation plus domestic transport and trade margins were used.

- **Intermediate Input Use by Industrial Activities**

Except for the mining activity, inputs use by large and medium industries was derived from the CSA (2006) Large and Medium Scale Industries Survey. For the mining activity, the estimates of intermediate inputs were taken from MoFED data. Information on total raw material use by activity is available from the Small and Cottage Industries Survey, but the survey lacks information on commodity level input use. Hence, the shares of commodity level inputs for large and medium industries were used in order to distribute the total raw materials for each commodity.

- **Intermediate Inputs Use by Service Activities**

For service activities, the value of intermediate inputs was estimated based on MoFED figures and company statements of different service providers.

(Factors, Activities): The Value Added Matrix

Most of the total value added figures at basic price for broad industry groups were directly taken from MoFED National Accounts data. For the construction of the micro SAM, the value added account was disaggregated for the 45 activities and 5 factors of production.

For agricultural commodities, there was a mismatch between the total value added figure in the Annual Agricultural Survey and the National Accounts data. To establish consistency with the National Accounts, the survey data were rescaled by 3 percent. The total value added figures for service activities, small scale and cottage manufacturing industries were taken from the National Accounts, data while for large and medium scale industries the data were directly taken from the large and medium scale industries survey.

The factors of production in the aggregate 2005/06 Ethiopian SAM consist of four types of labor and one capital/land account. The four types of labor by occupational category in the SAM and their mapping to the occupational categories of the Labor Force Survey are

- flab1: Administrative workers – Legislation & Senior Officials & Managers
- flab2: Professional workers – Professionals, and Technical & Associate Professionals
- flab3: Unskilled workers – Workers who are engaged in jobs which only require little skill or lowest level of education; that is, workers engaged in elementary occupation.
- flab4: Skilled workers – Workers that have some skill. Here skills do not only comprise skills obtained through formal education and training but also skills acquired through experience and informal training. This category includes: Service, Shop and Market Sales Workers, Skilled Agricultural Workers,¹³ Crafts and Related Trade Workers, Plant Machine Operators and Assemblers, and Clerks.

¹³ Farmers who farm their own land (owner-operators) are considered skilled workers in the ILO occupation classification codes and the Ethiopia Labor Force Survey.

The concordance between the four categories of labor in the SAM and the ILO occupation classification codes is as follows. ILO code 01 corresponds to administrative workers, code 02-03 to professional workers, code 04-08 to skilled workers and code 09 to unskilled workers.

To arrive at the value of labor for agriculture and service sectors, the 2004/05 National Labor Force Survey was taken while for manufacturing sector the value of labor by labor type was obtained from the manufacturing survey.

Information gathered from the 2004/05 National Labor Force Survey shows that from the total employed population only 8 percent were paid workers while the remaining 92 percent were unpaid family workers and self-employed.

This survey contains information about wages and salaries paid to different types of labor. Based on this information, an attempt was made to impute the labor income of self-employed and unpaid family workers. The imputation was done by assuming the corresponding prevailing monthly mean wage for paid employees could be applied to self-employed and unpaid family workers.

In order to determine wage differentials, two steps are followed. First the total labor was broadly divided into rural and urban by labor type and economic sector. Then for each ISIC the prevailing mean wage was applied to arrive at the value of labor for agriculture, services and other industries.

Earnings for capital (non-agricultural activities) and land (for agricultural activities) were estimated as the difference between total value added and the value of labor.

(Activities, Commodities): The Supply Matrix

The entries in the supply matrix, which show the domestic production of commodities by activities at basic prices, are determined by deducting the value of imports, margins and indirect commodity taxes from the commodity totals at market prices. Household home

production of commodities for home consumption is distinguished from market production and separately identified by introducing a corresponding separate sub-set of commodities (see Table). The information on home production for home consumption is drawn from the Household Survey.

(Taxes, Commodities): Indirect Taxes on Products

Indirect taxes by commodity type were obtained from inland government revenue data provided by MoFED and from Customs Authority data.

(Margins, Commodities): The Marketing Margins

Information on the prevailing producer and retail prices has been used to determine the trade and transport margin rates. In situations where the initial estimates of margin rates led to significant initial SAM imbalances, the rates have been adjusted accordingly.

(RoW, Commodities): Imports

Data on merchandise imports measured at cif value by commodity type were obtained from the Customs Authority. Figures on imports of services were drawn from the balance of payments data reported on the CSA (2006) Statistical Abstract.

(Households, Factors): Household Factor Income

The distribution of factor income across rural and urban household is based on the shares derived from Household Income, Consumption, and Expenditure Survey and the National Labor Force Survey. Since there is no a direct link between the factor income categories identified in Household survey and in the SAM, some subjective judgment was required for the mapping.

(Row, Factors): Factor Income to the Rest of the World

The value of factor income to the rest of the world is the sum of net income to the RoW and gross investment income from the RoW. Information on net income to the Row was obtained from the MoFED (National Account) and the data for gross investment income

from the RoW is derived from the balance of payments statistics reported in the CSA (2006) Statistical Abstract.

(Commodities, Government): Government Final Consumption

The value of government consumption expenditure is taken from the National Accounts. In the micro SAM, the government spending for the purchase of the services commodity is distributed to the public administration, education and health commodities according to each commodity's share of value added.

(Households, Government): Government Transfers to Households

This figure was drawn from the Household Income, Consumption and Expenditure survey.

(Investment from Government): Government Saving

The entry is calculated as a residual balancing item.

(Commodities, Household): Household Final Market Consumption

Information on household final market consumption is obtained from the Household Survey expenditure data. Here only household's cash expenditures are treated as the household final market expenditure.

(Taxes, Households): Direct Taxes

Figures on direct taxes by type of tax are obtained from inland government revenue data provided by the Ministry of Finance. The distribution of taxes between rural and urban household was based on the shares derived from the Household Survey except in the case of taxes that are clearly identified either as a rural tax or urban tax.

(Investment, Households): Household Savings

Household savings are determined residually as total household income less the subtotal of all (non-savings) household expenditures.

(Commodities, RoW): Exports

To derive the value of exports both balance of payments information and raw data from Customs Authority were used.

(Factors, RoW): Factor Income from Rest of World

Information on factor income from rest of the world was obtained from the balance of payments data in CSA (2006) Statistical Abstract.

(Government, RoW): Foreign Transfers to Government

The aggregate sum of foreign net transfers to the government and private households is obtained from the National Accounts. This aggregate figure was distributed between the government and household sector based on their respective shares in the Balance of Payments.

(Households, RoW): Foreign Transfers to Households

The combined foreign net transfers figure for government and private households was taken from the National Accounts and the figure was allocated between these two sectors based on the shares available in the Statistical Abstract, Balance of Payments. The foreign net transfer allocated for the household was further distributed between rural and urban households based on the shares derived from the Household Survey.

(Investment, RoW): Foreign Savings

Foreign savings are calculated as a residual balancing item.

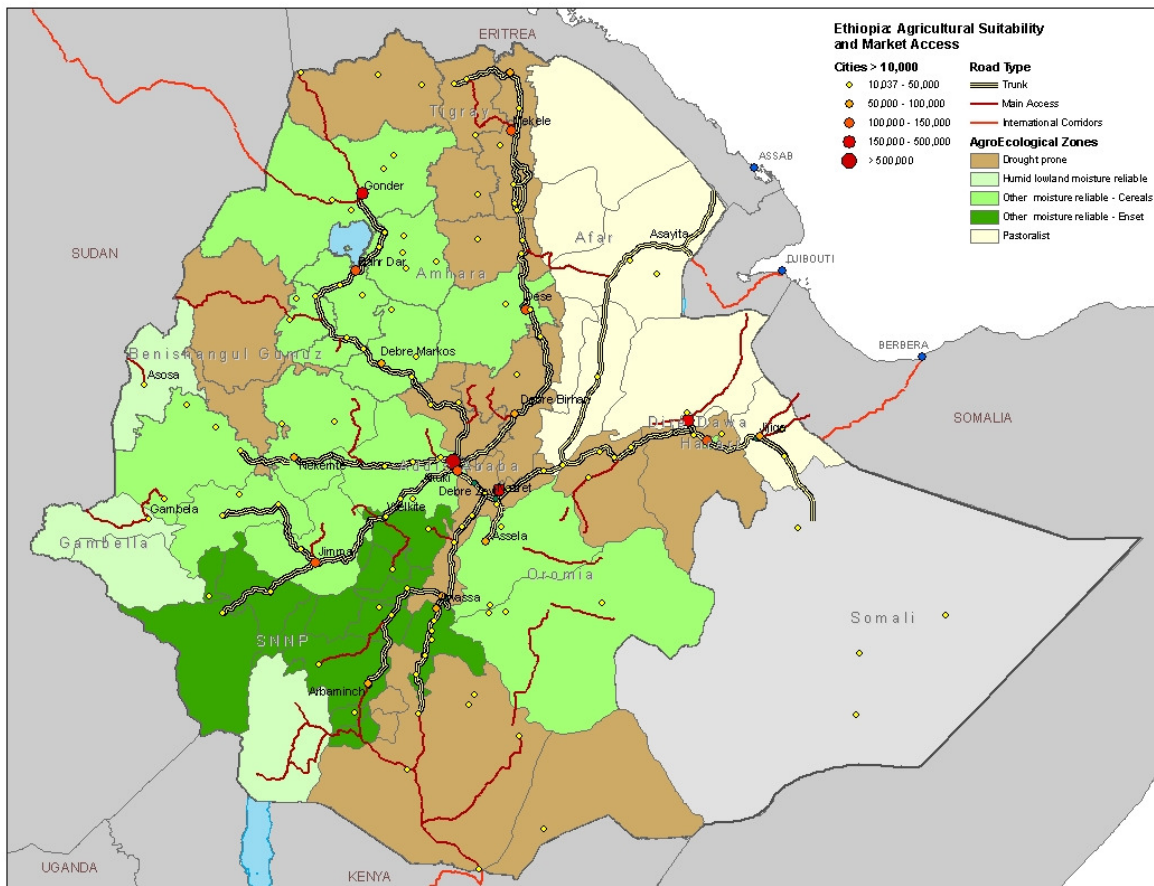
5. REGIONAL DISAGGREGATION OF THE SAM ACCOUNTS

The SAM disaggregates agricultural activities, land and rural households geographically by agro-ecological zone (AEZ). The five AEZs distinguished in the SAM differ in terms of climate, moisture regime and land use (Table 39, Map 1 and Table 40 below). Table 40 shows the concordance between the five zones and Ethiopia’s administrative regions and zones.

Table 39: Characterization of the Five Agro-Ecological Zones

SAM Region	Temperature and Moisture Regime
Zone 1	Humid Lowlands Moisture Reliable
Zone 2	Moisture Sufficient Highlands – Cereals Based
Zone 3	Moisture Sufficient Highlands – Enset Based
Zone 4	Drought-Prone (Highlands)
Zone 5	Pastoralist (Arid Lowland Plains)

Map 1: Ethiopia: Agro-Ecological Zones in EFY 1998 (2005/06) Regional SAM



The regional disaggregation of crop production for each activity is based on value shares derived from the Agricultural Sample Survey for 2005/06.¹⁴ For the meher season output, smallholder production data are available by administrative zone and activity. For belg season output, the information on total production by administrative zone in this source is allocated to the five zones using the concordance in Table 40 and then split by crop activity using 2001/02 Agricultural Census data. Livestock production is split by zone using quantity shares reported in the Agricultural Sample Survey 2005/06.

The capital account of the aggregate SAM is split accordingly into the regionally differentiated capital-land and livestock capital accounts listed in Table 43 below. The

¹⁴ CSA, 2007

agricultural labor account (flab0) in the regionalized SAM corresponds with the sum of semi and unskilled labor (flab3 and flab4) in the aggregate SAM.¹⁵

The allocation of household expenditure across the 14 regionally differentiated household categories listed in Table 44 below is based on shares derived from the Household Income and Expenditure Survey.¹⁶ In calculating these shares, consumption for Somali region households has been adjusted because of under-reporting of the number of Somali households in the survey. The same source is used to disaggregate own consumption as well as to estimate direct tax payments of non-poor non-farm households.

Savings of rural households in the aggregate SAM are split across the various rural households in the new SAM according to their respective shares in total rural consumption. Savings of urban households are allocated across the urban household classes of the new SAM in the same manner.

The disaggregation of labor income by household uses labor employment shares by labor type from the Household Survey separately for rural and urban areas. The split of income from the livestock activity by household is based on livestock population numbers from the CSA's Welfare Monitoring Survey for 2004/05. Data on land areas owned and rented from the same source are used to allocate capital- land income from crop production across households.

Transfers received from the rest of the world are allocated across households according to the corresponding shares in the household survey. The available data sources do not allow identifying inter-household transfers among the 14 SAM household groups. With respect to trade and transport margins, the same rates are applied across all SAM regions.

¹⁵ Ahmed et al, 2009

¹⁶ CSA, 2006

Table 40: Mapping from Administrative Divisions to Agro-Ecological Zones

Region	Administrative Divisions	Agro-ecological Zone
Tigray	North Western Tigray	4
	Central Tigray	4
	East Tigray	4
	South Tigray	4
	Western Tigray	4
Afar	Zone 1	5
	Zone 3	5
Amhara	North Gonder	2
	South Gonder	2
	North Wollo	4
	South Wollo	2
	North Shewa	4
	East Gojam	2
	West Gojam	2
	Waghamera	4
	Awi	2
	Oromia Zone	4
Oromia	West Wellega	2
	East Wellega	2
	Illubabor	2
	Jimma	2
	West Shewa	2
	North Shewa	2
	East Shewa	4
	Arssi	2
	West Harereghe	4
	East Harereghe	4
	Bale	2
	Borena	4
	South West Shewa	2
	Guji	4

Table 40: Mapping from Administrative Divisions to Agro-Ecological Zones
...continued

Region	Administrative Divisions	Agro-ecological Zone
Somalia	Shinile	5
	Jijiga	5
	Liben	4
Benishangul Gumuz	Metekel	4
	Asosa	1
	Kemashi	4
SNNPR	Guraghe	3
	Hadiya	3
	Kembata-Tembaro	3
	Sidama	3
	Gedeo	3
	Wolayta	3
	South Omo	1
	Sheka	3
	Keffa	3
	Gamo Gofa	3
	Bench- Maji	3
	Yem Special	3
	Amaro Special	4
	Burji Special	4
	Konso Special	3
	Derashe Special	3
	Dawro	3
	Basketo Special	3
	Konta Special	3
	Silte	3
Alaba Special Woreda	3	
Harari	Harari	2
Addis Ababa	Zone 3	2
	Zone 6	2
Dire Dawa	DireDawa	5

6. DETAILED STRUCTURE OF THE MICRO SAM

The disaggregated Micro SAM distinguishes 99 activity accounts, including 65 regionally differentiated agricultural activities belonging to 13 distinct agricultural activity groups and one aggregate forestry and fishing activity, 21 industrial activities and 12 service activities (Table 41). As shown in Table 42, the 91 commodities are broadly divided into marketed commodities and own-consumed commodities. The agricultural sector produces 25 marketed and 20 own-consumed commodities. The industry sector produces 30 marketed commodities and the service sector generates two own-consumed and 14 marketed service commodities.

Factor income flows are recorded in 25 factor accounts (Table 43). There are 14 household accounts, distinguishing rural households by income class in each of the five regional zones and urban households by income class and size of urban settlement (Table 45). To facilitate potential future uses of the database for tax reform analysis and to enable tracing the fiscal revenue impacts of exogenous shocks in a realistic manner, the SAM features a detailed representation of the tax system, which separately identifies eight indirect commodity tax categories and nine types of direct taxes (Table 46). The SAM is completed by accounts for marketing margins - which records the sum of trade and transport margins - the government, changes in stocks of finished and semi-finished goods, saving-investment flows, and transactions between the Ethiopian economy and the rest of the world.

Thus, the fully disaggregated SAM is a square matrix with 255 rows and columns. It is available electronically in both EXCEL spreadsheet format and compressed GAMS-readable GDX format.

Table 41: Activity Accounts and Concordance with ISIC Rev. 3.1

Sector	Code	Description	ISIC
Industry			
15	aming	Mining and quarrying	1010-1429
16	aofood	Production, processing and preserving of meat and meat products	1511
		Production and preserving of fish and fish products	1512
		Processing and preserving of fruit and vegetables	1513
		Manufacture of vegetables and animal oils and fats	1514
		Manufacture of prepared animal feeds	1533
		Manufacture of bakery products	1541
		Manufacture of macaroni, noodles, couscous and similar farinaceous products	1544
		Manufacture of other food products n.e.c.	1549
17	adairy	Manufacture of dairy products	1520
18	agmill	Manufacture of grain mill products	1531
19	agmillserv	Manufacture of grain mill services	1532
20	asug	Manufacture of sugar	1542
		Manufacture of cocoa, chocolate and sugar confectionery	1543
21	abev	Distilling, rectifying and blending of spirits; ethyl talc production from fermented materials	1551
		Manufacture of wines	1552
		Manufacture of malt liquors and malt	1553
		Manufacture of soft drinks; production of mineral waters	1554
22	amtob	Manufacture of tobacco products	1600
23	atext	Preparation and spinning of textile fibers; weaving of textiles	1711
		Finishing of textiles	1712
		Manufacture of made-up textile articles, except apparel	1721
		Manufacture of carpets and rugs	1722
		Manufacture of cordage, rope, twine and netting	1723
		Manufacture of other textiles n.e.c.	1729
		Manufacture of knitted and crocheted fabrics and articles	1730
24	aapar	Manufacture of wearing apparel except fur apparel	1810
25	aleath	Tanning and dressing of leather	1911
		Manufacture of luggage handbags and the like, saddler and harness	1912
		Manufacture of footwear	1920
26	awood	Wood and wood products	20
27	apaperp	Manufacture of paper and paper products; publishing; printing	21,22
28	achem	Manufacture of chemicals, rubber and plastic products	24, 25
29	aminprod	Manufacture of mineral products	26
30	abmetalp	Manufacture of basic iron and steel	2710
		Manufacture of metal products	28
31	amach	Manufacture of ovens, furnaces and furnace burners	2914
		Manufacture of machinery for food, beverage and tobacco processing	2925
32	aeleqc	Manufacture of office, accounting and computing machinery	3000
		Manufacture of accumulators, primary cells and primary batteries	3140
33	aveh	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	3420
		Manufacture of parts and accessories for motor vehicles and their engines	3430
34	aomanu	Manufacture of furniture	3610
		Manufacture of jewelry and related articles	3691

Table 41: Activity Accounts and Concordance with ISIC Rev. 3.1 ...
continued

Sector	Code	Description	ISIC
Agriculture			
	1 atef 1-5	Growing of Teff	in 011
	2 abar 1-5	Growing of Barley	in 011
	3 awhea 1-5	Growing of Wheat	in 011
	4 amaiz 1-5	Growing of Maize	in 011
	5 asorg 1-5	Growing of Sorghum	in 011
	6 apul 1-5	Growing of Pulses	in 011
	7 avegfr 1-5	Growing of Vegetables and Fruits nec	in 011
	8 aoils 1-5	Growing of Oil seeds	in 011
	9 acash 1-5	Growing of Cash crops nec: Sugar cane and beet, tea, chat, plant-based fibers, cotton	in 011
	10 aenset 1-5	Growing of Enset	in 011
	11 acrop 1-5	Growing of crops nec	in 011
	12 acoff 1-5	Growing of Coffee	in 011
	13 alivst 1-5	Livestock farming, dairy farming, production of animal products	0121,0122
	14 afisfor	Forestry and fishing	
Services			
	35 aelect	Electricity, gas, steam and hot-water supply	40
	36 afwater	Activity of collecting(fetching) free water-(own consumption by HH)	41
	37 awater	Collection purification and distribution of Water	41
	38 acons	Construction	45
	39 atrad	Wholesale and retail trade; repair of Motor vehicles, motorcycles and personal and household goods.	50,51,52
	40 ahotel	Hotels and Restaurants	55
	41 atrncom	Transport, Storage and communications	60-64
	42 afserv	Financial intermediation	65,66,67
	43 arest	Real Estate, Renting and Business Activities	70,71
	44 apadmin	Public administration	75
	45 aeduc	Education	80
	46 aheal	Health and Social Work	85
	47 aoserv	Business Activities	72,73,74
		Other Community, Social and Personal Service activities	90-93
		Private Households with Employed Persons	95

Table 42: Commodity Accounts

No.	Code	Description
Agricultural Marketed Commodities		
1	ctef	Teff
2	cbar	Barley
3	cwhea	Wheat
4	cmaiz	Maize
5	Csorg	Sorghum
6	cpul	Pulses
7	cveg	Vegetables nec
8	coils	Oil seeds
9	ccotts	Cotton Seed
10	ccane	Sugar cane sugar beet
11	cfruit	Fruit Crops
12	ctea	Tea
13	cchat	Chat
14	ccoff	Coffee
15	Censet	Enset
16	ccrop	Cereal grains and other crops nec
17	cfibre	Plant-based fibers
18	ccatt	Cattle
19	cpoul	Poultry; Other small livestock
20	cmilk	Raw milk
21	ccott	Raw cotton, Wool, silk-worm cocoons
22	caprod	Animal products nec
23	cfors	Forestry products
24	cflower	Flowers
25	cfish	Fish
Marketed Services		
56	celect	Electricity
57	cwater	Water
58	ccons	Construction
59	ctrad	Trade and repair services
60	chotel	Hotels and restaurants
61	ctrans	Transport services
62	ccomm	Communication
63	cfserv	Financial services
64	cbserv	Business services nec
65	cpadmin	Public administration and defense
66	ceduc	Education
67	cheal	Health
68	coserv	Recreation and other services
69	crest	Real estate and renting services

Table 42: Commodity Accounts ... continued

No.	Code	Description
Marketed Industrial Commodities		
26	ccoal	Coal
27	cngas	Gas
28	cmin	Minerals nec
29	cmeat	Meat products
30	cvprod	Vegetable products; animal oils and fats
31	cdairy	Dairy products
32	csug	Sugar and sugar confectionary
33	cgmill	Grain mill products
34	cgmillserv	Grain mill services
35	cfood	Food products nec; animal feeds
36	cbev	Beverages
37	ctob	Tobacco Products
38	cmtea	Manufacturing of tea
39	cmtob	Manufacturing of tobacco
40	clcott	Lintel Cotton
41	ctext	Textiles
42	capar	Wearing apparel
43	cleath	Leather products
44	cwood	Wood products
45	cpaper	Paper products publishing
46	coilptrl	Petroleum coal products
47	cfert	Fertilizers
48	cchem	Chemicals, rubber and plastic products
49	cminprod	Mineral products nec
50	cmetal	Metals nec
51	cmprod	Metal products
52	cveh	Motor vehicles and parts; other transport equipment
53	celecq	Electronic equipment
54	cmach	Machinery and equipment nec
55	comanu	Manufactures nec

Table 42: Commodity Accounts ... continued

No.	Code	Description
Own-Consumed Agricultural Commodities		
70	ctefo	Teff
71	cbaro	Barley
72	cwheao	Wheat
73	cmaizo	Maize
74	cpulo	Pulses
75	cvego	Vegetables nec
76	coilso	Oil seeds
77	ccaneo	Sugar cane sugar beet
78	cfruito	Fruit Crops
79	cchato	Chat
80	ccoffo	Coffee
81	ccropo	Cereal grains and other crops nec
82	cpoulo	Poultry; Other small livestock
83	cmilko	Raw milk
84	ccotto	Raw cotton, Wool, silk-worm cocoons
Own-Consumed Processed Commodities		
85	caprodo	Animal products nec
86	cforso	Forestry products
87	cfisho	Fish
88	cmeato	Meat products
89	cdairyo	Dairy products
Own-Consumed Services		
90	cfwatero	Water collection
91	cresto	Housing

Table 43: Factor Accounts

Code	Description
flab0	Agricultural labor
flab1	Administrative workers
flab2	Professionals
flab3	Unskilled workers
flab4	Skilled workers
Capital_Land_RuralEZ1P	Capital_Land used by poor rural households in Zone 1
Capital_Land_RuralEZ1NP	Capital_Land used by non-poor rural households in Zone 1
Capital_Land_RuralEZ2P	Capital_Land used by poor rural households in Zone 2
Capital_Land_RuralEZ2NP	Capital_Land used by non-poor rural households in Zone 2
Capital_Land_RuralEZ3P	Capital_Land used by poor rural households in Zone 3
Capital_Land_RuralEZ3NP	Capital_Land used by non-poor rural households in Zone 3
Capital_Land_RuralEZ4P	Capital_Land used by poor rural households in Zone 4
Capital_Land_RuralEZ4NP	Capital_Land used by non-poor rural households in Zone 4
Capital_Land_RuralEZ5P	Capital_Land used by poor rural households in Zone 5
Capital_Land_RuralEZ5NP	Capital_Land used by non-poor rural households in Zone 5
Capital_Livst_RuralEZ1P	Livestock capital used by poor rural households in Zone 1
Capital_Livst_RuralEZ1NP	Livestock capital used by non-poor rural households in Zone 1
Capital_Livst_RuralEZ2P	Livestock capital used by poor rural households in Zone 2
Capital_Livst_RuralEZ2NP	Livestock capital used by non-poor rural households in Zone 2
Capital_Livst_RuralEZ3P	Livestock capital used by poor rural households in Zone 3
Capital_Livst_RuralEZ3NP	Livestock capital used by non-poor rural households in Zone 3
Capital_Livst_RuralEZ4P	Livestock capital used by poor rural households in Zone 4
Capital_Livst_RuralEZ4NP	Livestock capital used by non-poor rural households in Zone 4
Capital_Livst_RuralEZ5P	Livestock capital used by poor rural households in Zone 5
Capital_Livst_RuralEZ5NP	Livestock capital used by non-poor rural households in Zone 5
Non_Ag_capital	Non-agricultural capital

Table 44: Other Accounts

Code	Description
Margins	
Total Margin	Transport and Trade Margins
Non-Household Institutions	
Enterprises	Public Enterprises
Government	Government
Dstk	Stock Changes
S-I	Savings and Investment
RoW	Rest of the World

Table 45: Household Accounts

Code	Description
HH-Rural_EZ1P	Poor rural households in Zone 1
HH-Rural_EZ2P	Poor rural households in Zone 2
HH-Rural_EZ3P	Poor rural households in Zone 3
HH-Rural_EZ4P	Poor rural households in Zone 4
HH-Rural_EZ5P	Poor rural households in Zone 5
HH-Rural_EZ1NP	Non-poor rural households in Zone 1
HH-Rural_EZ2NP	Non-poor rural households in Zone 2
HH-Rural_EZ3NP	Non-poor rural households in Zone 3
HH-Rural_EZ4NP	Non-poor rural households in Zone 4
HH-Rural_EZ5NP	Non-poor rural households in Zone 5
HH-SmallurbanP	Poor households in small urban settlements
HH-BigurbanP	Poor households in large urban settlements
HH-SmallurbanNP	Non-poor households in small urban settlements
HH-BigurbanNP	Non-poor households in large urban settlements

Table 46: Tax Accounts

Code	Description
Indirect Taxes	
LocEcsTx	Local Excise Tax
LocalVAT	Local Value Added Tax
ServTx	Service Tax
ImpDuty	Import Duty
ImpWTx	Import Withholding Tax
ImpEcsTx	Import Excise Tax
ImpVAT	Import Value Added Tax
Impsur	Import Surtax
Direct Taxes	
HHIncTx	Personal Income Tax
AgIncTx	Agricultural Income Tax
ProfitTx	Profit Tax (Household and Corp)
DivTx	Dividend Tax
RentIncTx	Rental Income Tax
IntIncTax	Interest Income Tax
CapGainTx	Capital Gains Tax
LandTx	Land Use Fee
OEntTx	Other Direct Enterprise Taxes

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ANNEX

List and Description of Leading Economic Indicators and Models Available at EDRI:

Consistent with its objectives, the *Data Systems and Economy-wide Modeling to Support Policy Analysis in Ethiopia* project at EDRI has focused on assembling economy-wide databases, creating a set of quantitative economic indicators, and developing various models for policy analysis and research purposes. These two strands of work, the construction and maintenance of the data system along with model development and analysis, have and are proceeding in parallel.

This annex lists and describes the leading economic indicators and models that are currently being produced under the project on a regular basis and are available for use.

Economy-Wide Databases:

A. 2001/02 Based Social Accounting Matrix (SAM):

The 2001/02 SAM, the first for Ethiopia, distinguishes 42 production activities, 61 commodity groups, 5 primary factors, 2 household groups, 17 tax instruments as well as aggregate accounts for trade margins, transport margins, government, investment, and the rest of the world.

B. An Input-Output Table Included in the GTAP Database:

The 2001/02 Input-Output (I-O) table submitted and eventually included into the Global Trade Analysis Project - GTAP 7 Database supports a 39 sector aggregation of the standard 57 GTAP sectors. In line with GTAP requirements as outlined in Huff, McDougall, and Walmsley (2000), the Ethiopian Input-Output table obeys all mandatory splits and is provided in the unified format consisting of six arrays:

- UF: Use matrices for domestic products, imports and factors, commodity taxes excluded (dimension 78+3, 39+5)
- UP: Use matrices for domestic products, imports and factors, commodity taxes inclusive (dimension 78+3, 39+5)
- OP: output (dimension 39,1)
- MF: Imports, import duties excluded (dimension 39,1)

- SSET: Sector names (dimension 39,1)
- SMAP: Map from standard GTAP sectors (dimension 39,2)

C. 2005/06 Based Input-Output (I-O) Table:

This is a complete and new construction, separate from the 2001/02 database. Given the importance of the rural economy in providing employment, incomes and food supply in Ethiopia, the EFY 1998 (2005/06) I-O table includes considerable detail on agricultural sub-sectors (activities), along with a high level of disaggregation for other production activities and commodities in the economy. It distinguishes 45 activities and 89 commodities. Among the production sectors, 12 activities are in agriculture, 21 activities belong to the industry sector, and the remaining 12 activities are in the services sector. Commodities are also broadly divided into marketed commodities and own-consumed commodities (non-marketed commodities that are produced and consumed by farmers). In general, there are 62 marketed and 27 own-consumed/non-marketed commodities. There is one marketing margin account which records the sum of trade and transport margins and five factor accounts - five types of labor disaggregated based on occupational category and one capital/land account. The institution accounts include government, rural and urban households, the rest of the world, and a Savings and Investment account. The 2005/06 I-O table also features a detailed representation of the existing tax system by separately identifying nine types of direct taxes and eight indirect commodity taxes.

D. 2005/06 Based Regionalized Social Accounting Matrix (SAM):

Although based on the same reference or base year, the 2005/06 regionalized SAM is an improvement on the earlier database. The matrix disaggregates agricultural production and income generation regionally for the five main agro-ecological zones of Ethiopia. In total, it distinguishes 99 productive sectors or activities and 93 commodities, including 24 distinctly identified own-consumed commodities (non-marketed commodities that are produced and consumed by farmers). In order to enable analysis on the impacts of pro-poor policies and MDG related initiatives, the disaggregation of the household sector is extended to 14 household groups, distinguishing rural households by different income levels in each of the five regions (agro-ecological zones). Urban households are also distinguished by income and size of urban settlement.

The SAM also distinguishes 26 factors of production. These are five labor types disaggregated based on occupational category, i.e. agriculture labor, administrative workers, professional workers, unskilled and skilled workers. There are also 10 rural capital and land factor disaggregation- two for each agro-ecological zone, and another 10 rural livestock capital that explicitly take into account livestock that is used in production in each agro-ecological zone. Finally, a non-agricultural capital/land factor of production is

also distinguished. This level of disaggregation of the factors of production in the economy not only fully captures the production heterogeneity of the country, but also traces factor income flows from the regionally differentiated activities to the different households. Finally, the regionalized SAM also distinguishes other final demanders like the government, rest of the world, savings and investment, and “stock change” accounts. It also has a detailed accounting of the existing tax system by separately identifying nine direct and eight indirect taxes.

Leading Economic Indicators:

Leading economic indicators, also known as coincident indicators, have long been used as key policy tools in developed countries and are in recent years gaining popularity in many developing countries as well. The goal at EDRI has been the development of a system that enables a regular output of leading economic indicators and their continued use in policy analyses. Two main criteria, economic and statistical, are used to identify a set of leading economic indicators for Ethiopia. The **economic criteria** are based on theoretical and empirical rationale that include;

- Production Time: Indicators that record current production levels
- Market Indicators: Indicators that reflect current price developments (hence lead to anticipations of future economic activities), and
- External Shocks: Indicators of external factors that affect performance

The statistical criteria are:

- High correlation with overall economic activities
- Availability and timely release of data
- Data quality, including clear trends instead of high volatility

Based on the above criteria, about 23 leading economic indicators are identified and most are presently being produced on a regular basis, while a few indicators are under construction.

Price Indicators:

- a. Seasonally Adjusted Consumer Price Index (CPI)

(Currently Being Produced on a Monthly Basis using X-12 ARIMA Procedures)

- b. Core CPI (Core Inflation)
(Currently Being Produced on a Monthly Basis)
- c. Producer Price Index for Agriculture (Ag-PPI)
(Currently Being Produced on a Monthly Basis)
- d. Seasonally Adjusted Producer Price Index for Agriculture (Ag-PPI)
(Currently Being Produced on a Monthly Basis using X-12 ARIMA Procedures)
- e. National Wholesale Price Index (WPI) for Major Grains
(Currently Being Produced on a Monthly Basis)
- f. Addis Ababa Wholesale Price Index (WPI) for Major Grains
(Currently Being Produced on a Monthly Basis)
- g. Export Price Index (XPI)
(Currently Under Construction-Planned for Release by September 2009)
- h. Import Price Index (MPI)
(Currently Under Construction-Planned for Release by Early 2010)
- i. Terms of Trade Index (TTI)
(Can only be Constructed Based on the Import & Export Price Indices)
- j. Import Weighted Real Effective Exchange Rate Index (IREERI)
(Currently Being Produced on a Monthly Basis)
- k. Export Weighted Real Effective Exchange Rate Index (EREERI)
(Currently Being Produced on a Monthly Basis)
- l. Total Trade Weighted Real Effective Exchange Rate Index (REERI-Total)
(Currently Being Produced on a Monthly Basis)
- m. Total Trade Weighted Nominal Effective Exchange Rate Index (NEERI-Total)
(Currently Being Produced on a Monthly Basis)

Other Indicators:

- a. Quarterly GDP Estimates
(Completed – Planned for Release by October 2009)
- b. Gross Industrial Output (Quarterly - Based on Input/output Analysis)
(To be Released along with Quarterly GDP Estimates – October 2009)
- c. Total Freight Traffic Index - Monthly
(Methodology Being Designed - Planned for Release by mid- 2010)
- d. Classification of Imports and Exports by Major Categories - Monthly
(Being Produced – Imports Classified into 109 Categories & Exports into 32 Categories)
- e. Seasonally Adjusted Imports and Exports – Including by Major Classification
(Currently Being Produced on a Monthly Basis using X-12 ARIMA Procedures)

Quantity Indicators:

- a. Quantity Index of Agricultural Produce Marketed by Producers - Monthly
(Methodology Being Finalized in Collaboration with CSA)
- b. Electricity Consumption by Consumer Type
(Data Being Collected & Analyzed on a Quarterly Basis)
- c. Tourist/Visitor Arrivals
(Data Being Collected & Analyzed on a Monthly Basis)
- d. Building and Construction Permits – Monthly Basis
(Arrangements Underway to Gather Data from Municipalities)
- e. Petroleum Products Consumption Index
(Currently Being Produced on a Monthly Basis)

Models Developed and are Currently Being used for Analysis:

a. Computable General Equilibrium (CGE) Models

A static and dynamic CGE models for Ethiopia have been constructed and used to study the economy-wide effects of various shocks and policies that encompass important structural changes requiring major adjustments. These include an assessment of the economy-wide effects of domestic petroleum price adjustments, proposed free trade agreements, and major relative price readjustments like real exchange rate movements, terms of trade effects, and foreign currency rationings. In recent months, together with the World Bank, a Dynamic CGE model for Ethiopia was constructed to assess the impacts of climate change on the macro and various sectors of the economy in the coming 30 years.

b. Partial Equilibrium Models

Partial Equilibrium models are mathematical models that focus on a limited set of factors caused by variable changes in an economy. As their name suggests, they help to analyze the “partial” effects of variable changes. One advantage of using partial equilibrium models is their empirical simplicity and the fact that they often allow for relatively rapid and transparent analysis of a wide range of policy issues. Another is in the first round effect of variable changes they measure. Although subsequent secondary effects may be best handled by a more complex general equilibrium models, a partial equilibrium analysis helps in tracing out the impacts and is often a reliable first order approximation of the total effects.

Presently, a trade focused and price focused (multi-market) models are available. The trade focused model takes into account two way (import and export) trades between Ethiopia (or any country) and multiple partners. On the import side, the model captures net welfare effects by quantifying the gains and losses to consumers, producers and the government (tariff revenue) that are likely to result from trade liberalizations. On the other hand, it also quantifies potential effects (gains/losses) on exports that may be realized from the same trade liberalization.

The market focused partial equilibrium model quantifies the likely or potential impacts of different scenarios of changes in the quantity of supply have on domestic market prices.

c. Multiplier Model

A multiplier model is constructed and used to analyze how shocks to investment, foreign trade, and government tax and spending policies affect output and employment in the Ethiopian economy. For instance, the model is used to estimate the effects of increasing agriculture output has on production levels of other sectors in the economy, income earned by different households, value-added and employment generated. Additionally, the effects of various government programs have in inducing imports, exports, and domestic consumption as well as price levels is analyzed.

d. Macro-Econometric Model

The macro-econometric model for Ethiopia constructed under this project came about as a consequence of the attempt to update the “old” macro-econometric model for Ethiopia that existed at the National Bank. The attempt to update the coefficients and parameters of the old model has in fact resulted in the construction of a new model with enhanced structural characteristics and analytic capabilities. The new macro-econometric model for Ethiopia was constructed using E-views and has 16 equations and 40 variables. This model was further expanded and used for policy analysis and decision making on inflation in Ethiopia.

e. Other In-House Models and Programs

In order to facilitate the ongoing work at EDRI, the following in-house programs and models are constructed and being used:

I. Trade Data Aggregator

This model is constructed to aid in the analysis of trade data. Often trade data comes in the standard ASCIUDA++ format with more than ten variables (columns). This level of detail, while most needed, cannot also be readily used without further work. For instance, a particular product may be imported or exported by several firms and or by the same firm but in segments. This means that the product may have multiple entries within a given month or even day. Moreover, that same product may also be traded with multiple countries. In this case, in order to analyze the level of trade for a particular product in general or differentiated by partners, it has to be aggregated based on the desired format. Furthermore, every product in the trade data is assigned HS code (Harmonized System Code that is the specific identifier of a product) and the codes run from 1 to 12 digits. At each digit level, the type of product and hence its descriptions change. For example, while

an aggregated product called coffee is identified at the fourth digit level, it is only at the sixth and eight digits one can differentiate whether it is roasted or decaffeinated and so on. Depending on the issue at hand, it may be necessary to specify the level of digits at which a product is analyzed. For instance, if the investigation is concerned with balance of payments and revenue issues and wants to analyze the level of animal products' imports and their domestic substitutionary effects, then it is sufficient to aggregate at the one digit (section) level. On the other hand, if the focus is on estimating the total domestic supply of fish and other aquatic invertebrates, the animal products' sections of the import and export data must then be disaggregated at the two digits (chapter) level.

The Trade Data Aggregator Model facilitates the manipulation of trade data, offering maximum flexibility to users to specify desirable levels of aggregation. This model, along with the Partial Equilibrium Trade model, is also offered to analysts at the Egyptian ministry of foreign trade

II. Trade Data Classifying Program

Classifying trade data based on the economic characteristics of the country is enormously important for a variety of reasons. First, the information itself can be readily used in policy analysis. For instance, classifying imports as consumer goods, intermediates, energy, capital, and raw materials provides policy makers and analysts with an important snapshot of the structure of trade and hence on the productive sectors of the economy. Obviously the increasing use of foreign currency to import consumer goods does not only reveal the weak productive sectors of the economy, but also its sustainability prospects especially if the country has constrained resource inflow environment. Second, the information can be used for forecasting and in the construction of trade indices. For example, by taking the shares of each classification in total imports, not only can one analyze the state of investment demand in the economy, but also use it to forecast short term GDP growth prospects. This program is constructed at EDRI in order to classify trade data based on the structural characteristics of the economy. Accordingly, imports are classified into 109 categories and exports into 32 categories