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TMD DISCUSSION PAPER NO. 95

A 1998 SOCIAL ACCOUNTING MATRIX (SAM) FOR THAILAND

Jennifer Chung-I Li

**University of North Carolina at Chapel Hill
International Food Policy Research Institute**

**Trade and Macroeconomics Division
International Food Policy Research Institute
2033 K Street, N.W.
Washington, D.C. 20006, U.S.A.**

July 2002

TMD Discussion Papers contain preliminary material and research results, and are circulated prior to a full peer review in order to stimulate discussion and critical comment. It is expected that most Discussion Papers will eventually be published in some other form, and that their content may also be revised. This paper is available at <http://www.cgiar.org/ifpri/divs/tmd/dp.htm>

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List of abbreviations

BOT	Bank of Thailand
CGE	Computable General Equilibrium
C.I.F.	Cost, Insurance, Freight
EIA	Energy Information Administration
GAMS	General Algebraic Modeling System
GDP (f.c.)	Gross Domestic Product at Factor Cost
GDP (m.p.)	Gross Domestic Product at Market Prices
GFCF	Gross Fixed Capital Formation
GNP (f.c.)	Gross National Product at Factor Cost
F.O.B.	Free on Board
macro SAM	Macroeconomic Social Accounting Matrix
micro SAM	Microeconomic Social Accounting Matrix
NESDB	National Economic and Social Development Board
NSO	National Statistics Office
ROW	Rest of the World
SAM	Social Accounting Matrix
SES	Socio-Economic Survey
TDRI	Thailand Development Research Institute
TMD	Trade and Macroeconomics Division
USDA	United States Department of Agriculture

Abstract

This paper documents the features of a 1998 social accounting matrix (SAM) for Thailand. It begins with a description of the overall economy both via a macro SAM and a national accounts balance sheet. The macro SAM was the result of aggregating a micro SAM; a mapping of the final micro SAM to the macro SAM is presented. The micro SAM was a modified version of a SAM obtained from the Thai Development Research Institute (TDRI). The paper describes the modification process in detail. The original dataset obtained from TDRI was a 'balanced' matrix. The converted SAM, after the modification, was still balanced. It was therefore unnecessary to apply any balancing procedure. The final 1998 micro SAM for Thailand has 61 sectors, 3 household types, and 3 factors (labor, agricultural capital, and non-agricultural capital). Particularly helpful for the intended analysis on energy and environmental policy is that it has 8 primary energy sectors, 5 transportation sectors, and a health and medical treatment commodity account.

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1.0 Introduction¹

The author's research aims to study the effects of economy-wide environmental policies (such as a carbon content based energy tax) on economic growth and equity for the country of Thailand. As a first step in the country study, a social accounting matrix (SAM) was constructed, with emphasis on primary energy producers, energy-intensive manufacturing producers, poor households, and their linkages to the rest of the economy. The 1998 SAM for Thailand documented in this paper is intended to provide the benchmark data for economy-wide analyses, particularly for computable general equilibrium (CGE) modeling.

A SAM is a square matrix consisting of row and column accounts that represent the different sectors, agents, and institutions of an economy at the desired level of disaggregation. By convention, each account in the SAM is represented by one row and one column of the table and each cell represents an expenditure by the column account and an income to the row account. The underlying principle of double-entry accounting requires that total revenue (row total) must equal total expenditure (column total) for each account in the SAM. A SAM is a useful framework for preparing consistent, multi-sectoral, economic data that integrates national income, input-output, flow-of-funds, and foreign trade statistics into a comprehensive and consistent dataset. Once a SAM for a particular year is constructed, it provides a static image, or a snapshot, of a country's economic structure. A CGE model baseline is then calibrated to this base.

The 1998 SAM is presented in the following manner:

- i. Macro SAM:* Some features of the Thai economy are better illustrated with a macro SAM, aggregated from the 1998 micro SAM after conversion. The macro SAM reports values that are comparable and consistent with the National Accounts values for 1998 published by the National Economic and Social Development Board (NESDB).
- ii. Micro SAM:* The micro SAM is converted from the 1998 micro SAM obtained from the Thai Development Research Institute who updated the 1995 Input-Output table created by NESDB into a 1998 SAM with additional sources of information including household survey and wage data. The TDRI micro SAM, however, was meant to be used for CGE modeling using *Hercules* software, a software first adopted by the USDA in the early 1970s in running CGE models. Some work was necessary to convert the 1998 SAM obtained from TDRI into the SAM format compatible with the standard CGE model used at TMD. A more detailed description of the conversion process is provided below under section 3.2. From here onwards, the paper refers to the original micro SAM as the TDRI SAM, and the converted SAM as the "final micro SAM."

¹ The author would like to thank Dr. Somchai Jitsuchon and Nuntaporn Methakunavut at TDRI, Thailand for their 1998 micro SAM and generous assistance, as well as Dr. Sherman Robinson, Dr. Hans Lofgren, Marcelle Thomas, and Christen Lungren at TMD, IFPRI for their helpful comments.

2.0 A macro SAM for 1998

A simplified framework for economy-wide analysis is shown in Figure 1. It traces the circular flow of incomes from producers/suppliers through factor payments to households and back to product markets through expenditures on final goods (or sales from activities). Additionally, income flows involving producers, government, rest of the world (ROW), and the capital account are included in the diagram (Dervis et al. 1982).

Most of the economic transactions represented in Figure 1 are quantified in the aggregate form in a country's national accounts.

Figure 1: Economy-wide circular income flow

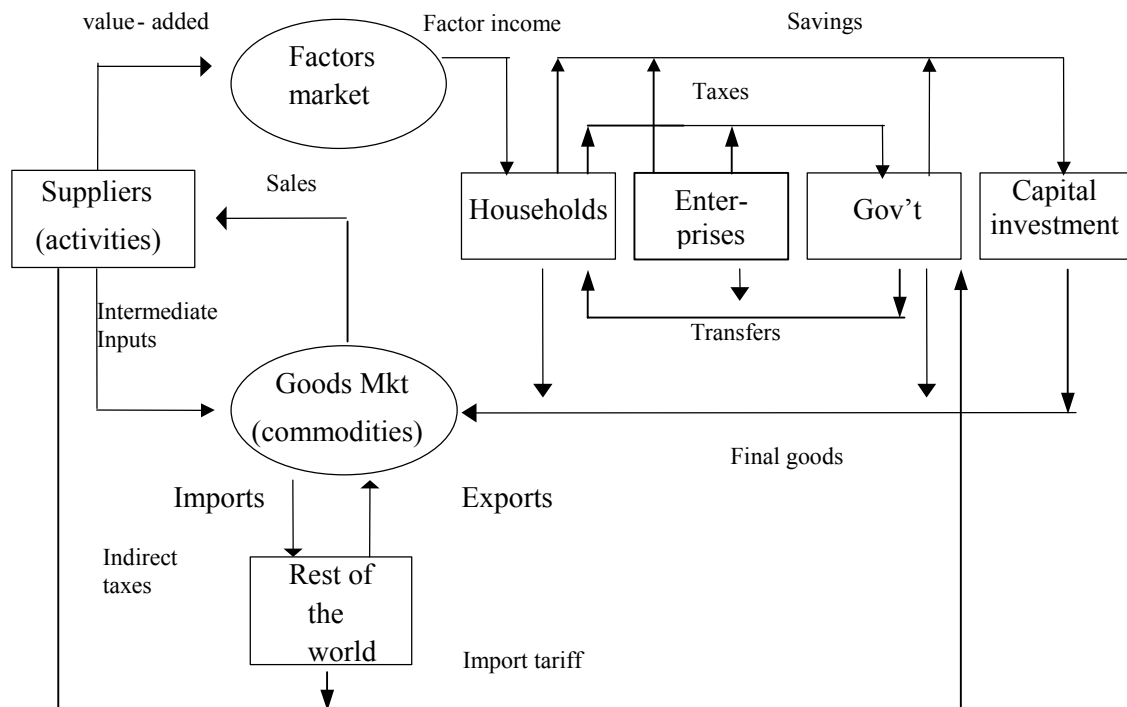


Table 1 on the next page presents the structure of a macro SAM. The cell entries of the macro SAM capture the flows between different sets of accounts. The accounts and flows in this table correspond with the boxed/circled elements and flows in Figure 1.²

Table 2 presents the actual numerical entries for the 1998 Thai macro SAM which contains 24 non-zero entries. The macro SAM presents figures that are aggregated from the final micro SAM.

² Most but not all payment flows in Table 1 are reflected in Figure 1 to preserve clarity in the figure.

Table 1 – Structure of the macro social accounting matrix

	Activities	Commodities	Factors	Enterprises	Households	Government	Capital	ROW	TOTAL
Activities		Sales							Total domestic production
Commodities	Intermediate inputs				Private consumption	Government Consumption	Investment Expenditures	Exports	Total market supply
Factors	Value added				Interest/ insurance payments				Total factor income
Enterprises			Capital income						Total enterprise income
Households			Labor income			Transfers		Remittances	Total household income
Government	Indirect taxes	Import tariffs	Factor income paid to government	Corporate taxes	Income tax			Foreign grants	Total government income
Capital				Corporate saving	Household saving	Government saving			Total Saving
ROW		Imports		Enterprise income paid to ROW			Net investment abroad		Total foreign exchange outlays
TOTAL	Total cost of production	Total absorption	Total value added	Total enterprise expenditure	Total household expenditure	Total government expenditure	Total investment	Total foreign exchange earnings	

Table 2: 1998 macro SAM for Thailand (current 100 million Baht)

	Activities	Commodities	Factors	Enterprises	Households	Government	Capital	ROW	TOTAL
Activities		113675.66							113675.66
Commodities	68821.67				25292.78	5007.05	8845.28	26837.18	134803.97
Factors	41602.89								41602.89
Enterprises			10224.18		437.62				10661.8
Households			30584.67			400.88		588.45	31573.99
Government	3251.09	1505.26	794.05	1195.74	1278.17			198.13	8222.44
Capital				7229.18	4565.42	2814.51			14609.11
World		19623.05		2236.88			5763.83		27623.76
TOTAL	113675.65	134803.97	41602.9	10661.8	31573.99	8222.44	14609.11	27623.76	

Table 3 below presents similar information in the macro SAM in the form of a balance sheet. Typically, countries present their national accounts data using a balance sheet. In this paper, rather than using national accounts data from the Bank of Thailand, figures from the macro SAM were utilized. Entries such as GDP at factor cost, final consumption by households and government, gross capital formation, exports and imports, and foreign saving are reported in the macro SAM as they appear in the balance sheet.

Entries requiring some level of disaggregation are associated with net current account transfer and net factor income flows between domestic institutions and ROW.

Table 3 - Thai National Accounts balance sheet for 1998 (million Baht)

<i>GDP</i>	<i>INCOME</i>		<i>EXPENDITURE</i>
GDP at Factor Cost	4,160,289.4	Government Consumption	500,705.4
Indirect Taxes	475,635.1	Private Consumption	2,529,278.2
		Gross capital formation	884,528.0
		Export	2,683,717.7
		Less imports	-1,962,304.8
Total (GDP m. p.)	4,635,924.5		4,635,924.5
<i>GNP</i>	<i>INCOME</i>		<i>EXPENDITURE</i>
Total GDP m. p.	4,635,924.5	Final Consumption	3,029,983.6
Net factor income payment	-145,030.0	Gross saving	884,528.0
		Current transfers to the rest of the world	576,383.0
Total (GNP)	4,490,894.5		4,490,894.6
<i>Capital Accounts</i>	<i>INCOME</i>		<i>EXPENDITURE</i>
Domestic Saving	1,460,900.0	Gross capital formation	884,528.0
Foreign Saving	-576,383.0		
Total	884,528.0		84,528.0
<i>External Transactions</i>	<i>INCOME</i>		<i>EXPENDITURE</i>
Exports of Goods and Services	2,683,718.0	Imports of Goods and Services	1,962,305.0
Net Factor Income payment from the rest of the world	-164,843.0		
Net Current Transfers from the rest of the world	-556,570.0		
Total	1,962,305.0		1,962,305.0

Source: 1998 Thai macro SAM aggregated from the 1998 micro SAM converted from TDRI data

2.1 Cell entries for the macro SAM

The following provides brief descriptions of the macro SAM cell entries. The cell entries are referenced by their "row-column" location, i.e., intermediate inputs are in the cell "*commodity-activity*" to reflect that the activity account pays to the commodity account for the intermediate inputs. All entries are in 1998 current 100 million Thai Baht.

Intermediate input ("*commodities-activities*")- 68821.67 : Total intermediate input demand is assumed to be inclusive of imports, import tariffs, and marketing and transporting margins.

Value added ("*factors-activities*")- 41602.89 : Total value added is the sum of the value of the primary factors of production, namely labor, agricultural capital and non-agricultural capital.

Indirect taxes ("*government-activities*")- 3251.09 : Total indirect taxes include domestic taxes on goods and services and import tariffs. This cell entry is the domestic tax on production.

Domestic production ("*activities-commodities*")- 113675.66 : Domestic marketed product by all activities which is subject to marketing and transporting margins.

Import tariffs ("*government-commodities*")- 1505.26 : Taxes on international trade and transaction.

Imports ("*ROW-commodities*")- 19623.05 : Total imports of goods and services.

Capital income ("*enterprises-factors*")- 10224.18 : Factor income distributed to enterprises is the non-labor value added of GDP at f. c.

Labor income ("*households-factors*")- 30584.67 : Wages and salaries paid to households, exclusive of compensations to employees paid to the rest of the world and capital income paid to enterprises.

Government factor income ("*government-factors*")- 794.05 : Wages paid to government employees.

Corporate tax and net interest payments ("*government-enterprises*")- 1195.74: Taxes paid by enterprises (public and private) which include corporate income tax and tax on property; and net interest payments or transfers from enterprises to government.

Corporate saving ("*capital-enterprises*")- 7229.18 : Gross savings of public corporations and private financial institutions.

Enterprise income to ROW ("*ROW-enterprises*")- 2236.88 : Net transfer from domestic enterprises to the rest of the world. These could include payments from domestic non-profit organizations to the rest of the world.

Private consumption (“*commodities-households*”)- 25292.78 : Consumption of marketed commodities by households, inclusive of imports.

Inter-household transfer (“*enterprises-households*”)- 437.62 : Transfer from households to enterprises. There is no documentation of these accounts; they could be interest payments and/or insurance installments.

Income tax (“*government-households*”)- 1278.17 : Individual income tax paid by households.

Household saving (“*capital-households*”)- 4565.42 : Total savings by households.

Government consumption (“*commodities- government*”)- 5007.05 : Total government expenditures on goods and services, inclusive of imports.

Government transfers to households (“*households- government*”)- 400.88 : Total government transfers to households in the form of various social welfare programs.

Government saving (“*capital-government*”)- 2814.51 : Residual of government income after taking out government expenditures and transfers.

Investment expenditures (“*commodities-capital*”)- 8845.28 : Sum of gross fixed capital formation and changes in stocks.

Net investment to ROW (“*capital-ROW*”)- 5763.83: Difference between foreign saving/investment at home and domestic saving/investment abroad. The figure indicates a net positive domestic investment abroad.

Exports (“*commodities-ROW*”)- 26837.18 : Total exports of goods and services.

Remittances (“*households-ROW*”)- 588.45 : Difference between the net current transfers from the rest of the world less foreign grants received by the government.

Foreign grants (“*government-ROW*”)- 198.13 : Foreign grants received by the government.

3.0 A micro SAM for 1998

3.1 Data sources

The 1998 micro SAM was converted from a 1998 micro SAM developed by researchers at the Thai Development Research Institute (TDRI). Using mainly the 1995 Input-Output Table published by the NESDB of Thailand, TDRI updated the information using additional data sources listed as follows:

- Thai National Account and current and capital account data for 1998 from the BOT
- 1998 Thai household income and expenditure survey from the NSO
- 1998 Thai Labor Force Survey from the NSO

All data sources were reconciled to resolve the inconsistencies among them, the dataset was therefore “balanced” (TDRI, 2000).

3.2 Converting the 1998 TDRI micro SAM

Under the Standard Model-compatible SAM structure used at TMD, households pay directly to individual commodity accounts and to enterprises/business corporations. The 1998 dataset from TDRI, however, was formulated for running CGE models using *Hercules* software. The SAM carries flows of income and payments that are more “step-wise” than they would be if formulated for a typical SAM at TMD. For instance, households do not pay directly to individual commodity accounts. Instead they pay out of their “current account” first to a “disposal income account” from which payments are then made to three aggregated commodity accounts: “agricultural commodities,” “non-agricultural commodities,” and “service commodities.” From the “current account,” another allocation is made first to the “interest payment account” which then makes payments to the “business corporation accounts.” Intermediate accounts applied to all institutional accounts (households, government, enterprises) as well as most of the remaining accounts.

The main task of converting the 1998 dataset into the final SAM involved removing these intermediate “steps” of payments or accounts to derive the direct payment flows. The final SAM contains only the accounts typically included in the Standard Model at TMD.

The 1998 dataset has fairly disaggregated sectoral wage information by education level and by formal versus informal wages. These wage data, however, are aggregated before mapping to individual households (agricultural, non-agricultural, and government-hired). To be more specific, the original data carry three types of wages (formal, informal, and public) paid by sectors to labor varied by education levels (6 levels). However, the wage information is then aggregated into two aggregate wage types: agricultural equivalent wage and the differential. From the two aggregate wage categories, payments are made to the three households each with 10 income deciles.³ Direct mapping of the three wage types (formal, informal, and public) to the households (preferable by income deciles) would have retained the richness in the wage/labor information. Without sufficient information to link the wage types (by formal, informal, and public and by education level) directly to the households, we were left to retain one labor/wage only mapped to three basic household types.⁴

³ Along with profits from agricultural and non-agricultural capital profits, the agricultural equivalent wage and differentials are traced to the three households.

⁴ The one wage is the summation of the agricultural equivalent wage and the differential.

As alluded to before, on the demand side the dataset aggregates individual consumption into three commodity types. The three commodity aggregates are: agricultural commodity (aggregate of 6 commodities), non-agricultural commodity (aggregate of 20 commodities), and service commodity (aggregate of 17 commodities). The three households have different share compositions for the three aggregate commodities. In order to obtain household consumption information of individual commodities, the author assumes that the aggregate relative shares of the three commodities holds at the lower level commodity consumption.

To sum up, the converted 1998 SAM is more aggregated in terms of wage/labor and household categories than the original dataset obtained from TDRI. In addition, it was assumed that household consumption of individual commodities follows the relative share of the consumption of the three aggregate commodities.

As was the case with the original TDRI SAM, the converted SAM was “balanced,” which is to say a square matrix where the row sums and column sums equal. Therefore the author did not apply any balancing procedure to generate the final 98 SAM for Thailand.

The final micro SAM is presented in the Appendix.

3.3 Dimensions of the micro SAM

The disaggregated structure of the final micro SAM compared to the aggregated macro SAM is presented in Table 4. The primary factors, households, and enterprise accounts are all disaggregated as in the case of activities/commodities sectors. The original dataset carries individual tax accounts distinguished from the government account. We have kept the disaggregation here but the user can choose to integrate the tax accounts with the government account in which case all tax-related flows would flow directly to and from the government account.

Table 4: Macro and micro SAM disaggregation

Macro SAM Accounts	Sectors	Micro SAM Commodities	Micro SAM Activities
Activities/Commodities	Paddy	CPADDY	APADDY
	Other crops	COCROP	AOCROP
	Vegetable and fruits	CVGFRU	AVGFRU
	Other agricultural products	COAGR	AOAGR
	Livestock	CLIVSTK	ALIVSTK
	Fishing	CFISHIN	AFISHIN
	Forest	CFOREST	AFOREST
	Coal and lignite	CCOALIG	ACOALIG
	Crude petroleum and natural gas	CPMPETR	APMPETR
	Other mining	COMINE	AOMINE
	Rice and flour	CRCEFLO	ARCEFLO
	Meat	CMEAT	AMEAT
	Canned food	CCANFDS	ACANFDS
	Other food	COFOOD	AOFOOD
	Other agricultural products	COAGRPD	AOAGRPD

Table 4: Continued

	Beverage	CBEVER	ABEVER
	Tobacco	CTOBACO	ATOBACO
	Textile	CTEXTLE	ATEXTLE
	Apparel	CAPPARL	AAPPARL
	Leather and footwear	CLEAFOT	ALEAFOT
	Wood products	CWOODPR	AWOODPR
	Furniture	CFURNIT	AFURNIT
	Paper	CPAPER	APAPER
	Printing and publishing	CPRNTPB	APRNTPB
	Basic chemical	CBASCHM	ABASCHM
	Gasoline	CGASLNE	AGASLNE
	Diesel	CDEISEL	ADEISEL
	Aviation fuel	CAVIFUL	AAVIFUL
	Fuel oil	CFULOIL	AFULOIL
	Plastic and rubber	CPLASRB	APLASRB
	Non-metal products	CNONMTL	ANONMTL
	Basic metal	CBASMTL	ABASMTL
	Fabric metal	CFABMTL	AFABMTL
	Machine	CMACHIN	AMACHIN
	Electrical manufacturing	CELCMNU	AELCMNU
	Transport equipment	CTRANEQ	ATRANEQ
	Other industry	COINDST	AOINDST
	Electricity	CELCITY	AELCITY
	Gas distribution	CGASDIS	AGASDIS
	Water	CWATER	AWATER
	Construction	CCONSTR	ACONSTR
	Retail trade	CTRADE	ATRADE
	Restaurant	CRESTAU	ARESTAU
	Hotel	CHOTEL	AHOTEL
	Land transportation	CTRANLD	ATRANLD
	Ocean transportation	CTRANOC	ATRANOC
	Inland water transportation	CTRANWR	ATRANWR
	Air transportation	CTRANAR	ATRANAR
	Other transportation	CTRANOT	ATRANOT
	Communication	CCOMMUN	ACOMMUN
	Banking	CBANKIG	ABANKIG
	Insurance	CINSURE	AINSURE
	Real estate	CRESTAT	ARESTAT
	Business service	CBUSISR	ABUSISR
	Public administration	CPUBADM	APUBADM
	Education	CEUCAT	AEDUCAT
	Health care and medical	CHLTHMD	AHLTHMD
	Nonprofit organizations	CNONPRF	ANONPRF
	Recreation	CRCREAT	ARCREAT
	Repairs	CRPAIRS	ARPAIRS
	Personal service	CPERSSR	APERSSR
Factors	Labor	LABOR	
	Agricultural capital	CAPAG	
	Non-agricultural capital	CAPNAG	
Enterprises	Private enterprise	ENT_G	
	Public enterprise	ENT_P	
Household	Agricultural household	HH AGR	
	Non-agricultural household	HH NAG	
	Gov't-employed household	HH GOV	
Government	Government	GOV	
	Excise taxes	ESETX	

Table 4: Continued

	Value added taxes	VAT
	Special business taxes	SPBTX
	Import duty	IMPTAX
	Subsidy	SUBSIDY
	Direct taxes	DIRTAX
Capital	Savings & investment	SAVINV
ROW	Rest of the world	ROW

3.4 The structure of the Thai economy

Traditionally an agrarian economy, the Thai economy today is much more multi-faceted. Several important factors have contributed to Thailand's growth. With its agrarian base as the bedrock, the economy has experienced steady growth. The principal comparative advantage of the economy has been in natural resources intensive productions. Today agricultural products such as tapioca and rice are produced in such quantities that Thailand is the largest supplier in the world. It is also a leader in the production of rubber, frozen shrimp, canned pineapple, and sugar. Thailand's industrial sector produces a wide variety of goods ranging from textiles (including the well-known Thai silk and ready made garments) to integrated circuits, plastics, footwear, and furniture. In recent years, manufacturing has surpassed agricultural products in contributing to Thailand's GNP, while tourism and related service sectors have replaced agricultural products as Thailand's largest source of foreign exchange (Mahidol University, 1998). The country's rich minerals are also eagerly sought after by the rest of the world.

Table 5 on the next page provides a look at the structure of the Thai economy based on the micro SAM perspective. As the table shows, by total output or GDP, energy intensive manufacturing is the largest sector in the economy (contributing about 41.2 percent of total GDP), followed by services and energy non-intensive manufacturing. Agriculture has already dropped to contributing about 9 percent of total output/GDP, though slightly higher than that contributed by primary energy sectors.

Table 5. Structure of the Thai economy in 1998 (percent)

Sector	Output (X)	Value added (VA)	Final demand (Q)	Exports (E)	Imports (M)	Export/ Output (E/X)	Import/ final demand (M/Q)
Agriculture	9.0	12.5	6.2	7.9	2.4	21.1	7.1
Primary Energy	5.8	10.7	3.7	1.9	6.4	7.8	32.2
Energy Intensive industries	41.2	22.3	48.4	54.0	64.2	31.4	24.3
Energy Non-intensive Industries	10.5	5.3	13.1	16.7	11.0	38.1	15.4
Transportation	6.4	6.7	6.1	5.1	3.6	19.3	10.6
Services	27.2	42.6	22.5	14.4	12.5	12.7	10.1
Total	100.0	100.0	100.0	100.0	100.0	-	-

Table 6 presents the composition of value-added by sector in the Thai economy in 1998. It shows that 65 percent of agricultural sector value-added is paid to agricultural capital as opposed to labor. In fact, the share of payable to capital is higher than that to labor across all 6 major sectors. This is especially pronounced for transportation, service, and primary energy sectors.

Table 6. Sectoral value-added by factor (percent)

	Labor	Capital		Total
		Agricultural	Non-Agricultural	
Agriculture	33.0	67.0	-	100.0
Primary Energy	36.3	-	63.7	100.0
Energy Intensive industries	43.5	-	56.5	100.0
Energy Non-intensive Industries	42.0	-	58.0	100.0
Transportation	22.7	-	77.3	100.0
Services	32.1	-	67.8	100.0
Total	35.1	8.9	56.1	100.0

Table 7 allows us to look at the distribution of factors across the major sector categories, in contrast to the within-sector factor composition in the previous table. As we can see, the largest share of labor is paid to 15 service sectors. Energy intensive manufacturing and agricultural sectors are the second and third highest wage earners.

Considering non-agricultural investment, the service sector again tops the chart, receiving in this case more than half of such investment in 1998. Energy intensive manufacturing sectors total second highest investment income, but is a distant second from the service sector.

Table 7. Distribution of factor income by sector (percent)

	Labor	Capital	
		Agricultural	Non-Agricultural
Agriculture	12.5	100.0	-
Primary Energy	5.3	-	5.8
Energy Intensive industries	29.4	-	23.7
Energy Non-intensive Industries	6.8	-	5.9
Transportation	4.6	-	9.8
Services	41.4	-	54.8
Total	100.0	100.0	100.0

Imports and exports

Energy intensive manufacturing makes up more than half of total exports, followed by the other manufacturing and services sectors. Substantial two-way trade between Thailand and ROW is evident for the dominant export sectors, the two types of manufacturing, as well as the service sectors (see Table 5 on page 12).

Import tariffs are lowest for energy inputs (from 0.002 percent for liquefied petroleum gas to 4.5 percent for fuel oil), slightly higher for agriculture (from 0.07 percent for livestock to 1 percent for vegetables & fruits), and highest for several of the energy intensive manufactured goods (from 15.7 percent for apparels to a large 55.8 percent for plastic & rubber).

External transactions

Other transfers between the domestic economy and ROW are factor income and current transfers. Factor income from ROW consists of remittances, payments by foreign non-profit enterprises to domestic households and grants to the government. In 1998 the net factor income was negative, due to the fact that the factor income paid by Thailand to foreign workers exceeded remittances. Current transfers net of factor income payments

equal foreign savings/investment in the domestic economy. In 1998 a current account deficit was recorded, indicating that Thailand's investment abroad exceeded the foreign investment in Thailand.

3.5 Data entries in the micro SAM

In this section we discuss some aspects of the final micro SAM structure further.

Activity/commodity

There are seven agricultural sectors, namely paddy rice, other crops, vegetables and fruit, livestock, other agricultural products, fishing, and forestry. As categorized earlier, the remaining sectors can be divided into five additional aggregate sectors: energy intensive manufacturing (15 total), other or energy non-intensive manufacturing (11 total), primary energy (8 total), transportation (5 total), and service (15 total).⁵

The fifteen energy intensive industries consist of: rice and flour, other agricultural products, other mining, beverages, textile, apparel, paper, basic chemical, plastic and rubber, non-metal, basic metal, machinery, electric equipments, other industry, and construction.

Energy non-intensive industries cover eleven sectors, namely meat, canned foods, other food, tobacco, leather & footwear, wood products, furniture, printing & publishing, fabric metal, transport equipment, and water supply.

There are eight primary energy sectors, producing coal and lignite, crude petroleum and natural gas, gasoline, diesel, aviation fuel, fuel oil, electricity, and liquefied petroleum gas (LPG).

Transportation data are available by five disaggregate categories, namely land transportation, ocean transportation, inland water transportation, air transportation, and other transportation.

Service sectors include as many as fifteen consisting of trade, restaurant, hotel, communications, insurance, real estate, banking, business services, public administration, education, health & medical services, non-profit, recreation, repairs, and personal services.

⁵ Energy intensity is determined by the product of CO₂ emission coefficients for energy inputs and the energy inputs used. The emission coefficients were obtained from the EIA.

Value added

In the micro SAM, value added is distributed among the three primary factors of production: one labor and two types of capital (agricultural and non-agricultural). Agricultural capital is used by the seven agriculture-producing sectors only.

Table 8 provides factor payment decomposition by the six major aggregate sectors. Half of the primary factor, labor, is used by two aggregate sectors - services and energy intensive industries - with the remaining wage paid mostly by transportation and agricultural sectors.

The aggregate transportation sector (an aggregate of 5 transportation sectors) makes the highest payable to non-agricultural capital. The service and energy non-intensive industries are the next highest investors in non-agricultural capital.

Table 8. Share of factor in value-added by sector categories (percent)

	Labor	Capital		Total
		Agricultural	Non-Agricultural	
Agriculture	12.5	100.0	-	13.2
Primary Energy	5.2	-	5.7	5.1
Energy Intensive industries	29.4	-	23.9	23.7
Energy Non-intensive Industries	6.8	-	5.9	5.7
Transportation	14.0	-	37.3	25.8
Services	32.1	-	27.2	26.5
Total	100.0	100.0	100.0	100.0

Income distribution

The original SAM data, as in the cases of most SAMs, are in value term (price times quantity). Therefore for household income, what we have is 'final income' (income multiplied by number of population in each household group) rather than 'real income' (income alone). In order to find the benchmark average income by household type, we needed additional information on population distribution by household group applied in the SAM (see Table 9 below). We obtained this information from TDRI and using this information, average real household incomes were obtained by dividing final income in the SAM by the respective population (see Table 10). Comparing the three average incomes, the relationship among the three household groups (Agricultural, Non-agricultural, and Government-employed) can be represented as 1: 3.47: 8.76. This means that government-employed households, on average, enjoy the highest income - about 8.76 times that of agricultural households and about 2.5 times that of non-agricultural households.

Table 9. Population by household group in the 1998 SAM

	Frequency	Percent	Cumulative Percent
Agricultural Household	25,280,870	41.31	41.31
Non-Agricultural Household	29,857,064	48.79	90.1
Government-Employed Household	6,063,059	9.91	100.0
Total	61,200,993	100.00	-

Source: Macroeconomics Policy Program, Thailand Development Research Institute, Thailand

Table 10. Average household income derived from household frequency and SAM values

	SAM Value (million baht)	Frequency	Average Income
Agricultural Household	534327.8	25,280,870	21135.66
Non-Agricultural Household	2138979	29,857,064	71640.65
Government-Employed Household	497127.2	6,063,059	81992.81
Total	3170434.5	61,200,993	

The main source of household income is unsurprisingly factor income. The remaining sources include government transfers (which has incorporated transfers from enterprises to households and households to households) and foreign remittances. Considering factor income alone, wages form the most important source for non-agricultural households (see Table 11), whereas capital forms the most dominant source for the other two household groups.

Agricultural households receive 80 percent of their factor income from wages and rent from agricultural capital, with an almost even divide between the two. Non-agricultural households, on the other hand, receive 80 percent of their income from wages alone. The profit or rent from non-agricultural capital forms the largest share of income for government-employed households.

Table 11. Share of factor of production in household income by source (percent) (factor endowment)*

	Labor	Capital		Total
		Agricultural	Non-Agricultural	
Agricultural Household	40.5	43.3	16.2	100.0
Non-Agricultural Household	86.8	1.1	12.2	100.0
Government-Employed Household	40.1	0.9	58.9	100.0

*Only factor income; excludes transfers

Table 12 below presents a different look at the factor income distribution. We have considered the household factor composition, here we look at the distribution of factors across institution types: households, enterprises, and government. For capital income, the profit or rent from agricultural capital is mainly divided between private enterprises and agricultural households. Non-agricultural households and public enterprises receive most rent from non-agricultural capital. Wages flow to non-agricultural households mainly.

Table 12. Distribution of factor incomes to institutions (percent)

	Labor	Capital	
		Agricultural	Non-Agricultural
Agricultural Household	13.9	58.7	3.5
Non-Agricultural Household	56.9	5.1	52.2
Government-Employed Household	29.2	1.4	2.6
Public Enterprises	-	-	5.3
Private Enterprises	-	34.7	33.0
Government	-	-	3.4
Total	100.0	100.0	100.0

Household expenditures

Based on the final SAM table, household expenditures are made to the following accounts:

Consumption: Households consume 43 marketed commodities (out of 61 commodities in the SAM). There is no recording of own consumption or informal labor market activity in this dataset.

Income tax: Tax rates derived from the SAM are 0.4 percent, 4 percent, and 8 percent for agricultural, non-agricultural, and government-employed households respectively.

Savings: Household saving rates, derived from the SAM, are -12 percent (dis-saving) for the agricultural household, 10 percent for the government-employed household, and 23 percent for the non-agricultural household.

Payment to Public Enterprises: The payment likely includes interest payments and insurance installments. There is no documented information on this payment flow.

Investment expenditures

Investment expenditures and change-in-stock information by sector are part of the SAM data. Individual sectors that saw the highest new investments in 1998 are construction (49 percent), machineries (19 percent), and electrical manufacturing (10 percent).

Government budget

Government income sources and their shares are as follows:

Factor income to government employees (10 percent)

Direct taxes: Include income tax from households and corporate taxes (28 percent)

Indirect taxes: Include tariffs (7.8 percent), indirect taxes on activities (41 percent), and sales taxes (11 percent)

On the expenditure side, the government pays for commodities (59 percent), makes transfers (8 percent), and saves the remainder (33 percent). The following is a further decomposition of the individual expenditure categories.

Consumption expenditures: The largest single item share in expenditures is compensation to employees (40 percent), attributed to the payment to public administration. The remainders are payments to public education (35 percent), health and medical services (12 percent), and payments for goods and private services (13 percent).

Transfers to other institutions: Include interest payments on the domestic debt and paid to public enterprises (27 percent), transfers to households (72 percent), and transfers to ROW (1 percent).

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APPENDIX

Table A1: 1998 Thailand Final Use: SAM in Current Million Baht

	APADZY	ACCROP	AVGERU	AMGR	ALVSTK	AFISHN	AFORST	ACCALIG	AMPETR	AMINE	ARCEFO	AMEAT	ACANFDS	ACFOOD	AOAGRFG	ABEVER	ATOBACO	ATEXTE	AAPPARL	ALEAFOT	AWOODPR	AFURNIT	APAPER
APADZY																							
ACCROP																							
AVGERU																							
AMGR																							
ALVSTK																							
AFISHN																							
AFORST																							
ACCALIG																							
AMPETR																							
AMINE																							
ARCEFO																							
AMEAT																							
ACANFDS																							
ACFOOD																							
AOAGRFG																							
ABEVER																							
ATOBACO																							
ATEXTE																							
AAPPARL																							
ALEAFOT																							
AWOODPR																							
AFURNIT																							
APAPER																							
APADZY	5664	156	1070	74	1693				157357														164
ACCROP									3474														
AVGERU									61		16108			3352									
AMGR	7050	5496	27050	3449	5010	150	48	25	184		12	10640	20116	352			324	10269					167
ALVSTK									8730		6206			9702									
AFISHN									6027		12560												
AFORST	12	3	231	9	76	5	97		34	67	118		24	212									50
ACCALIG																							514
AMPETR									5002														
AMINE									31				44	213									
ARCEFO									52934				22	9001		7345		4533					
AMEAT									63				562	190		53							
ACANFDS													110240	5061									
ACFOOD									2912				7	260		6817							
AOAGRFG									12015					2670		46825							
ABEVER									2							02597							
ATOBACO									30														
ATEXTE	25	65	273	132	11	42	3		1	100				3	10		36						
AAPPARL									7		48			10	13	64	2333						
ALEAFOT	5	7	1590	33	30	21	5		1	20				1	21		18						
AWOODPR																							
AFURNIT									58	261	24	151	72	21									
APAPER									1443	15	713	2066	2045	3357	3762	2718	9151	2300	369	1272	55826		
APADZY									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ACCROP									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AVGERU									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AMGR									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ALVSTK									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AFISHN									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AFORST									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ACCALIG									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AMPETR									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AMINE									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ARCEFO									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AMEAT									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ACANFDS									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ACFOOD									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AOAGRFG									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ABEVER									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ATOBACO									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ATEXTE									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AAPPARL									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ALEAFOT									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AWOODPR									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AFURNIT									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APAPER									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
APADZY	17436	43017	273029	157924	130450	224512	5650	8652	90290	23334	337760	163606	242555	106594	225190	197734	63874	245440	560210	130198	21085	91537	110864

CEL CITY	GSASDIS	GWATER	GCNSTR	CTRADE	CRESTAT	CHOTEL	CTRANC D	CTRANC C	CTRANC R	CTRANAL	CTRALO	CCOMMUN	CSANKIG	CNSURE	CRESTAT	CRUSRS	CRUSADM	CEUCAT	CHLTHMD	CHONPRF	CREAT	CREARS	CPRSSR	LABOR	
ABADDY																									
ACOROP																									
AVGERU																									
ACAGR																									
AVSTK																									
AFISHN																									
AFORFST																									
ACCALIG																									
AFMPETR																									
AGMBE																									
ARCFI C																									
AMEAT																									
ACANFDS																									
ACOFOD																									
ACAGREFD																									
ABEVER																									
ACOBACO																									
ATEXTLE																									
AAAPPAR																									
ALFAFOT																									
AWOODPR																									
AFURNIT																									
APAPER																									
APRINTPS																									
ABASCHM																									
ACASINF																									
ADICEI																									
AAVIFUL																									
AFJ. OIL																									
API ASRB																									
ABONNTL																									
ABASMTI																									
AFABNTI																									
AMACHIN																									
AELCMNU																									
ATRANCQ																									
ACORIGST																									
ACELCITY	174644																								
AGASDIS		29713																							
AWATER			24353																						
ACONSTR				490324																					
ATRADE																									
ARFSTAL																									
AHOTEL																									
ATRANC D																									
ATRANC C																									
ATRANC R																									
ATRANAR																									
ATRANC T																									
ACOMMUN																									
ACANKIG																									
ACNSURE																									
ACRESTAT																									
ACRUSRS																									
ACRUSADM																									
ACEUCAT																									
ACHLTHMD																									
ACHONPRF																									
ACREAT																									
ACREARS																									
ACPSSR																									
ALABOR																									
ACAPAG																									
ACARVAG																									
AHAGR																								265411	
AHGOV																								125163	
AHNAV																								130051	
AGOV																									
ENT_G																									
ENT_P																									
VATA																									
VATE																									
ESFTVA																								3674	
ESFTXC																								29	
SPBTX																									
SUSSEBY																									
IMP_TAX																									
DIF_TAX																									
SCCTAX																									
S-I																									
DSTK																									
ROW	1267	2463	31																						
TOTAL	175001	32274	31397	490324	854430	182760	127500	744106	40743	51344	202804	41716	4717	286610	56205	211433	76310	207210	215671	273019	5983	79293	16018	60100	1460655

Table with columns: CAPAG, CAPNAG, HH AGR, HH GOV, HH NAG, GOV, ENT_G, ENT_F, VATA, VATc, ESPTXA, ESPTXC, SPBTK, SSSBDY, IMPTX, DIRTX, SBCTAX, S-J, DSTC, ROW, TOTAL. The table lists various economic and social categories with their corresponding values across different rows.

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