A New Social Accounting Matrix for China

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Abstract

This document explains the structure, data sources, and estimation methods used to build a new social accounting matrix for the Peoples Republic of China. The SAM was estimated in a collaborative project sponsored by AusAID and the World Bank, joining researchers from NDRC and NBS with a team of leading international experts. The current version of the SAM details income and expenditure data from independent household surveys, and also includes information about differential taxation of domestic and foreign enterprises.

[1] All the information contained in this document is proprietary to the government of the PRC, and may not be disseminated or used without official consent. This documentation includes translated materials from a Chinese report (NDRC:2002) prepared for the same project. We are grateful to Min Zhao and Dominique van der Mensbrugghe for insightful comments and suggestions.

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1. Introduction

1.1. An Overview of Social Accounting Matrices

Data collection is part of the foundation of effective economic policy analysis. The quality and timeliness of data is an essential determinant of good economic modeling, economic analysis and, ultimately, sound economic policy. Since the establishment of the first Social Accounting Matrix (SAM) in the 1960's under the leadership of Sir Richard Stone as part of the Cambridge Growth Project, more than 40 countries have established their SAMs with support from the World Bank and other multilateral and bilateral institutions.[2] In these countries, the SAM is used to extend Input and Output Analysis, tax research, income allocation analysis, international trade, and etc. The SAM has also become the standard data structure for computable general equilibrium models and provides a coherent data framework which consistently and completely organizes all the input and output relationships between different decision-making agents in an economywide model.

Simply put, the SAM has two main functions: on the one hand, it provides a complete accounting framework to describe all economic agents; on the other, it has been widely used as a tool for modeling and policy analysis.

The SAM supplements and expands the macroeconomic accounting system, and combines diverse data sources into a more comprehensive information set. It puts different sources of data (including input and output table, economic circulation accounts, capital flow table, household survey, etc.) into a unified framework and can be used to reconcile diverse estimates of economic activity. According to the analytical need, the SAM can describe an economy at different levels (world, multi-national, single country or regional). One of its biggest advantages is that it describes the circulation process of the whole economy, linking production, income allocation and consumption together. In fact, it also details production, income formation and allocation, and consumption among different sectors, factors of production, households, and other domestic and international stakeholders. Once data is organized in the form of the SAM, it can, to a great extent, elucidate the static economic structure of an economy in a specific time period, sometimes called a "snapshot" of this economy.

It is the combination of diverse data that makes possible the analysis of economic linkages.

[2] The first primary references on the SAM were produced under UN (1968) and World Bank (Pyatt and Round:1982) sponsorship.

First, macro-policy targets are clearly shown in the SAM, such as employment, income allocation, GDP, the balance of international accounts, etc. Second, within the SAM, the combination of different data (household survey, population census, input and output table, government account, international accounts and financial data, etc.) provides cross-validation, which increases the reliability of economic descriptive work. Third, if we classify the households within the SAM by their economic characteristics, it is can be very helpful in the analysis of poverty and its causes and results. Finally, combined with commodity prices and quantity indexes, the SAM can also be used to analyze the relationship between productivity change and income allocation in different industries and sectors, including the calculation of CPI weights for different income classes in the total CPI.

Currently, the SAM is mainly used primarily to support economic modeling. It provides a simple linear-model framework, which is built upon the inverse "multiplier" matrix $(I-A)^{-1}$ based on the endogenous (inner) part of the SAM. If we consider the outer part of the SAM as the commodity demand, its inner part includes production, factor, and household income. Then this model describes an economy's whole circulation process, in which commodity demand leads to the demand for production factors, which leads further to the household income, which, in turn, leads to the demand for commodities and services. Compared to the input and output model, it includes the relationship between initial income and final expenditure, which makes the analysis of employment more complete and makes possible the analysis of the exogenous effects of government expenditure and foreign trade.

An important application of the SAM is serving as the fundamental data set for Computable General Equilibrium Model (CGE). The theoretical basis for CGE is neoclassical general equilibrium theory. As early as 1776, Walras suggested to use a system of equations to describe an economic system, trying to show that there exists a series of interacting prices, which coordinates production and consumption so that the whole economic system reaches the equilibrium of supply and demand, instead of any single market equilibrium. After him, Arrow and Debreu used Fixed-point Theorems to prove the existence of general equilibrium. Scarf designed the algorithm to solve GE model computationally, and all three received Nobel prizes for their work in this field. With the continual innovation of mathematical methods and the rapid development of computer technology, CGE modeling techniques and computation methods have developed very quickly and more and more CGE models have been established and used in policy analysis. This approach has many attractive features compared with other economic models: (1) there are multiple interacting economic agents and markets; (2) Agents' behavior as derived from optimization; (3) Prices are

endogenous; (4) It's frequently used in policy analysis. Because of the detailed interactions they capture, CGE models require a consistent and complete data set that includes production, income allocation, consumption and etc. SAM provides an ideal and conformal framework for this, and has emerged as the standard data format of such models.

1.2. The Development of China's SAM

Because of the SAM's advantages, SAM research in China and the construction of China's own the SAM will serve many purposes, not only helping to verify current statistical data, but also supporting more coherent data development and modeling for policy analysis. These functions will enhance China's capacity for quantitative economic analysis.

In China, direct study of SAMs started in the 1990's. At that time, Xiangdong Zhu in NBS led a group to translate *Social Accounting Matrix,* which introduced more than 10 cases of other countries' SAMs. SAM related work actually began when China's national accounting system was changed to SNA. *China's National Accounting Matrix (Trial Version)* required that the SAM should be included in China's national accounting system, which can be considered as China's first attempt at establishing SAM.

In mid 1990's, some research institutions also started their own research on the SAM. Shantong Li and Fan Qu, of the Department of Development Forecasting in the Development Research Center of the State Council began researching SAMs and submitted a research report in 1995, *SAM: Theory and Structure.* However, for various reasons, NBS never published China's SAM structure and data. Recently, with the development of CGE models in China, more and more attention has been paid to SAM methods. Until now, there has been no systematic research on the SAM structure and theory, nor any papers that integrate China's national accounting practices in ways that can be used to help establish Chinese SAMs. Research on the SAM can be found sparsely in papers on CGE models, from which we can see the present NBS research on the SAM is still confined to the learning stage, with relatively little in the way of unique Chinese characteristics being integrated into this system. Additionally, China's national accounting has undergone a lot of change for the past 10 years, most of which are harmonious with wide establishment of SAM methods in China.

2. Theory and Structure of the SAM

The UN (accounting standard 1993 SNA) defines SAM as SNA accounts expressed in tabular, double entry, or matrix form. This layout represents a system that links all economic transactions (production, income allocation, consumption, saving, investment and etc.), characterizing the mutual dependency between production, factor use, factor to household income allocation, and expenditure. Some scholars think of the SAM is an extension of input-output analysis. It supplements input and output tables with explicit and detailed accounting of linkages between value-added and final outlays, which makes the input and output table more complete in terms of characterizing the economic process. These two opinions only differ in their angels: one is from the whole national accounting accounts and the other from input and output table, but both accurately characterize SAM's structure and characteristics.

This section introduces the basic SAM characteristics and accounting rules, then explains different accounts in the SAM and finally discusses methods to balance the SAM.

2.1. Matrix Expression of the SAM

National Economic Accounting mainly uses traditional accounting layouts like balance sheets. One side represents uses and the other resources. This comes from the double-accounting rule in industrial accounting, which requires that any transaction be accounted symmetrically in both lending and borrowing sides in each transaction partners' own accounts, respectively. This is also the fundamental rule in national accounting. Generally, a transaction happens between two agents, who both need to take account of it, and thus every transaction is accounted four times in the whole accounting system. For example, accounting a production sale happens not only in seller's production account but also in his/her financial account and the values accounted are identical. It's the same with buyer. So this transaction is actually accounted four times. Thus in balance sheets, this double-accounting rule is actually quartet accounting.

National accounting can also be expressed in tableau or matrix form, where every account is comprised of one row (income) and one column (outlay). This is shown schematically in Table 2.1 below.

Double accounting is still the fundamental rule for accounting in matrix form, but one transaction need not be accounted separately in two accounts. Instead, it is accounted at the intersection of one row and one column. In the row it represents one account's resource and in the

column it is a use of another account. Thus matrix accounts substitute single for double entry bookkeeping.

Table 2.1 Matrix Expression of Accounts

Use / Resource		Column Account					Sum
		1	⋯	k	⋯	N	
Row Account	1	$T_{1,1}$		$T_{1,k}$		$T_{1,n}$	$\sum_j T_{1,j}$
	⋮						
	k	$T_{k,1}$		$T_{k,k}$		$T_{k,n}$	$\sum T_{k,j}$
	⋮						
	n	$T_{n,1}$		$T_{n,k}$		$T_{n,n}$	$\sum T_{n,j}$
Sum		$\sum_i T_{i,1}$		$\sum_i T_{i,k}$		$\sum_i T_{i,n}$	

According to the input-output convention, rows of a SAM represent income and columns represent expenditures. The column and row accounts should be in the same order. Let i denote row accounts and j denotes column accounts. Then $T_{i,j}$ represents the expenditure for column j and income for row i. Income and outlays should be equal for every account, so:

$$\sum_j T_{k,j} \equiv \sum_k T_{i,k}$$

Table 2.2 shows how to use one matrix to describe the whole economy, commodities and services and international trade in a unified economic account. This matrix includes commodities and service accounts, production accounts, income initial allocation accounts, secondary income allocation accounts, income use accounts, capital accounts and foreign (Rest of World) accounts. Every account is expressed using symmetric rows and columns so that we can deduce the properties of every transaction from its position in the matrix.

Table 2.2: A SAM for China - Generic Accounts[3]

Receipts	Expenditures								
	1. Activities (69)	*2. Commodities (45)*	*3. Factors (6)*	*4. Private Households (12)*	*5. Enterprises (3)*	*6. Recurrent State (1)*	*7. Investment Savings (1)*	*8. Rest of World (1)*	*9. Total*
1. Activities (69)		Marketed Production							Total Sales
2. Commodities (45)	Intermediate Consumption			Private Consumption		State Consumption	Investment	Exports	Total Commodity Demand
3. Factors (6)	Value Added								Value Added
4. Private Households (12)			Wages, Salaries and Other Benefits		Distributed Profits	Social Security and Other Current Transfers to Households		Net Foreign Transfers to Households	Private Household Income
5. Enterprises (3)			Gross Profits			Enterprise subsidies		Net Foreign Transfers to Enterprises	Enterprise Income
6. Recurrent State (1)	Value Added Taxes	Trade Taxes	Produc-tion Taxes	Income Taxes	Enterprise Income Taxes			Net Foreign Transfers to State	State Revenue
7. Investment Savings (1)				Household Savings	Retained Earnings	State Savings			Total Savings
8. Rest of World (1)		Imports			Enterprise Remittances	Government Remittances			Imports
9. Total	Total Payments	Total Commodity Supply	Total Factor Payments	Allocation of Private Household Income	Total Enterprise Expenditure	Allocation of State Revenue	Total Investment	Total Foreign Exchange	

[3] Numbers in parenthesis correspond to accounts in the NBS/NDRC 1997 SAM for China.

2.2. Accounts in SAM

As has already been explained, SAM accounting uses a matrix to link both sides of transactions: sources and uses. This characteristic enables the SAM to clearly describe the economic circulation process: production---income allocation---consumption---production.

While the SAM matrix includes important national accounting information, it doesn't convert all SNA accounts into matrix form. SAM construction entails some reconciliation and simplification, making national accounts data clearer for the purpose of analysis. Currently, the most common accounts in SAM include the following:

- Production Accounts
- Commodity Accounts
- Production Factor Accounts
- Institution Accounts
- Accumulation Accounts

Every account can be further disaggregated if needed. This is an important source of flexibility in SAM methods, which can refine economic activities to focus on detailed incidence as needed for the policy issue at hand. To explain the contents of the SAM, we give three examples of Macro SAMs, from simple to complex.

2.2.1. The Macro SAM

A closed economy has three generic kinds of economic activities: production, consumption and accumulation. Expressing these three accounts in matrix form will give us a closed private economy Macro SAM (Table 2.3).

Table 2.3 Closed Private Economy Macro SAM

	1. Production	2. Consumption	3. Accumulation
1. Production		C	I
2. Consumption	Y		
3. Accumulation		S	

C＝Consumption　　I＝Investment

Y＝Income　　S＝Saving

The production sector obtains income C by selling private consumption goods and I by selling capital goods. These incomes will flow into the consumption sector through production factor income, which are then divided between consumption and savings. And savings will become investment demands. All these comprise a closed-economy's Income-expenditure Macroeconomic circulation. In this closed private economy (ignoring government for the moment), according to this macroeconomic circular flow there are three accounting identities:

1. Y＝C＋I
2. C＋S＝Y
3. I＝S

The first means that the total production is used in consumption and investment; the second means that national income is used in consumption and saving; the last means that investment is equal to saving.

Table 2.4 presents an extension to an open economy Macro SAM with government accounts. First, it redefines production and consumption accounts as supply and household, respectively; second it adds a government account to SAM; finally foreign (Rest of World) accounts have been added to account for the economic activities between this economy and others.

Table 2.4 Open Economy Macro SAM

		Expenditure				
		1.Supply	**2.Household**	**3.Government**	**4.Capital Formation**	**5. ROW**
Income	**1.Supply**		C	G	I	E
	2.Household	Y				
	3.Government		T			

	4.Capital Formation		S_h	S_g		S_f
	5. ROW	M				

S_h＝private saving　S_g＝government saving　S_f＝foreign saving

E＝export　M＝import　G＝government expenditure　　T＝tax

Supplying sectors sell final consumption goods (C+G), capital goods (I) and exports (E) to obtain income. The resulting incomes are allocated to households (Y) and imports (M). Private consumption (C), tax (T) and private saving (S_h) comprise households' expenditure. Government consumption (G) and government saving (S_g) comprise government's expenditure. The difference between export (E) and import (M) is foreign saving. This open economy has the following identities:

1. $Y+M = C+G+I+E$
2. $C+T+S_h = Y$
3. $G+S_g = T$
4. $I = S_h+S_g+S_f$
5. $E+S_f = M$

Government and foreign institutions have been added to this Macro SAM. So government budget balance and international accounting balance have been added to the accounting identities correspondingly.

2.2.2. Decomposition of the Macro SAM

Accounts in Macro SAM can be refined or disaggregated into different sub-accounts. The setup of sub-accounts in SAM varies across countries and policy applications within the same country, and there is no standard approach to this. Different countries have different statistical resources. The goals of policy analysis and modeling strategy also vary with the context and over time, and the data and analytical requirements must evolve accordingly.

The most common disaggregation covers sectors and goods/services. Production activities are classified according to industrial sectors and commodity account according to product sectors. Then these two accounts represent the traditional input-output relationship. In another common area,

factor accounts are often disaggregated to capture different functional distributions of income, including labor by occupation and capital/land by a variety of characteristics. Firms can be divided into state-owned, domestic private, and foreign invested firms according to firm ownership, and/or according to their scale of operation. There are other classification methods based on different countries' accounting situation and research goals. Another essential refinement if the SAM is household disaggregation, where detailed incidence of income and employment effects is of great policy interest. These may be divided either by region into rural and urban, by income level, asset ownership, occupation status, or any combination of these. Next, the ROW account sometimes is divided into different countries or country groups. Government accounts can be extensively disaggregated to include different fiscal accounts/instruments and even agencies. This significantly increases the scope for policy research, and SAMs and CGEs have been extensively used in public finance. Finally, if we refine the capital account and introduce financial disaggregation, the SAM can incorporate financial sector and monetary balance sheets.

2.3. Balancing the SAM Accounts

According to the economic balance constraints represented by SAM accounting, expenditure must be equal to income, i.e. each row sum in the matrix should equal its corresponding column sum. However, in practice constructing a SAM from diverse data sources can lead to inconsistencies and statistical errors. In a situation such as this, one can add an errors and omissions account or attempt to balance the table with numerical and/or statistical methods.

When developing SAMs for policy modeling, errors and omissions contain no useful information, so we choose in the case of the China SAM to balance the table. This is accomplished in three steps. The first is to construct a Macro SAM. Using the Macro SAM data as control totals for sub-matrices in detailed SAM, we can make the sum of the sub-matrix data equal the corresponding control. The second step can use ancillary information to manually adjust data. As SAMs include different accounts, their data sources may be quite different. In principle, for example, expenditure of one account must be some other account's income. Our analysis of these data inconsistencies also provides an indirect test of original statistical data.

To complete the SAM estimation procedure, the final step is to balance the table statistically. Because of the diversity of available data, it was necessary to reconcile the many sources mentioned above into one consistent economy-wide set of tabular accounts. This was done using a sophisticated matrix balancing algorithm developed by Sherman Robinson and a variety of

collaborators (see e.g., Robinson et al., 1998 and Robinson and El-Said (2000)). This technique, referred to as Cross Entropy Estimation, permits the estimation of detailed accounts that are consistent with exogenously specified accounting constraints. Included among the constraints were the necessary consistency of row (income) and column (expenditure) totals. Moreover, however, the larger sub-tables of the detailed SAM were balanced to be consistent with their aggregate counterparts in the Macro SAM.

2.4. Characteristics of the SAM

Comparing table 2.2 with table 2.5, we find that the matrices in the SAM and SNA accounts are almost identical. In theory, it's possible for SAM structure to completely comply with SNA central framework, but due to differing goals there arise differences in the order and the aggregation of accounts.

As mentioned above, there are many advantages to expressing accounting data in a SAM, including the following:

(1) The Macro SAM gives an overall picture of the economy, expressing the aggregate flow relationships in just one table. The income source and expenditure flow of every transaction is reflected in just one transaction type.

(2) The SAM can be classified by both sector and agent type. A more refined SAM can provide very detailed information on income formation and allocation at the sector level.

(3) SAMs can be analyzed with a variety of matrix methods, including multiplier decomposition, which gives very detailed information about extensive chains of income-expenditure linkages.

(4) A detailed SAM gives a classification of transactions by detailed payor and sector, making explicit and transparent the sources and uses of income.

(5) SAM is very amenable to consistency checking for reconciliation of balances between different accounts.

As was said in the original 1968 SNA report, SAM is "an exquisite and economical expression, a clever expression" and through SAM "we not only see the forest but also the trees."

3. A New 1997 China SAM

It should be borne in mind that there is no detailed standard for the structure of a SAM. Because of the flexibility of SNA system and the differences in statistical practices in different countries, as well as their differing research and policy goals, generally different countries and contexts call for somewhat different SAM structures.

We begin by examining the basic framework of the China SAM as a national economic accounting system. Then we describe how to progress from the Macro and to Micro or disaggregated SAM.

3.1. China's National Economic Accounting System

The object of national economic accounting is the entire economy, as reflected in national income and product accounts. The national economic accounts are a macroeconomic information system that describes aggregate flow relationships across the entire economy. The establishment and development of China's national economic accounting system has followed a long and difficult path. Through decades of effort, China's new national economic accounting system was established as one that is appropriate to a socialist market economy.

3.1.1. History and Current Development of China's National Economic Accounting System

China's traditional national economic accounting system was built upon the material production system (MPS) standards established in the former Soviet Union and eastern European countries, and as such was designed to meet the needs of central planning. This approach was appropriate to historical policy emphasis on economic infrastructure and the need of productivity development, contributed in important ways to China's socialist economic construction and scientific planning.

With the deepening of economic reform and the development of China's national economy, this old MPS system began to exhibit defects and became unable to meet the needs of policies oriented toward macroeconomic control and foreign trade. Its scope was also restricted to material production and did not include non-material services. Thus the main indicators of national economic activities, national income, did not reflect non-material production, leading to increasing

disparities with the increasing proportion of non-material services in the expanding Chinese economy. Ineffectiveness also arose in terms of the mutual relationship between market participants, because of its non-market accounting principle, its inappropriateness to measuring activity in a more open economy, and its relative inflexibility seriously limited its usefulness in a socialist market economy.

Since 1985 China has begun to change to SNA standards, with the objective of establishing a national economic accounting system based on GDP. At first, MPS and SNA coexisted. During this transition phase, NBS published not only accounting data based on MPS (national income) but also data on SNA (GDP accounts). In 1992, "China's National Economic Accounting System (Trial Version)" was published, reflecting these transition characteristics.

To meet the emergent needs of reform, opening, and macroeconomic control since 1993, China gradually eliminated MPS and adopted SNA to build a new system. This was based largely on UN 1968 SNA and 1993 SNA, but incorporated characteristics to take account of China's own situation. SNA arose from national accounting theory and actual practices in western advanced market economy countries. Its most distinguishing feature is that it reflects the general characteristics of market economics. This system has become an important tool for economists to explain complex market economy phenomena and for governments to understand their economies and anticipate economic adjustment challenges.

3.1.2. Main Components of China's National Economic Accounting System

China's new national economic accounting system includes GDP and its use table, input and output table, capital flow table, asset and liability table, international income and expenditure balance table and a set of national economic circulation accounts, including national economic accounts, institution accounts and industrial sector accounts.

National economic accounts include GDP balances, disposable national income and expenditure accounts, investment accounts, foreign trade accounts and asset and liability accounts. GDP accounts center on the aggregate indicator GDP and reflect the three calculation methods for GDP, production, income, and expenditure. Disposable national income and expenditure accounts reflect the whole economy's initial income allocation, secondary allocation, consumption and saving, and their interactions. The investment account reflects different kinds of financial allocations across the economy and their corresponding funding sources. The foreign trade account reflects commercial and capital transactions between residential institutions and non-residential

institutions. Asset and liability accounts reflect stocks of assets and liabilities, respectively, and their difference.

Industrial sectors account reflects the production process of these sectors, that is, the value of commodity and service converted, used and created during the production process, and value added by these institutions.

The input and output table is an extension and expansion of GDP and its use table. It put the uses of different commodities and services by different product sectors and initial sources of intermediate input and labor into a balance sheet with rows and columns intersecting with each other, reflecting the mutual relationship between different product sectors and between product sectors and the final use sectors.

Capital flow table reflects the movement of capital across different sectors. The whole table can be divided into two parts: "material" and "financial." The material part reflects how income is allocated and transferred between these sectors and how these sectors allocate their disposable income between consumption and saving and their non-financial investment and funding sources. The financial part also reflects the net increase of different types of financial assets and liabilities of these sectors.

The international income and expenses balance sheet systematically reflects the trade and non-trade interactions, capital flow and other transfers between our country and other countries (regions). It comprises international income and expenditure, structure and the changes in asset reserve.

Besides the above accounts and tables, household surveys and government budget information are also indispensable in constructing SAM.

3.1.3. The Differences between China's National Economic Accounting System and 1993 SNA Standards

China's national economic accounting system is adapted to the SNA standards, having adopted the fundamental accounting principles, accounting methods and accounting framework from 1993 SNA, but due to a variety of reasons it differs from 1993 SNA in fundamental concepts, classification, accounting contents and accounts structure. The following points are of particular relevance in constructing China's SAM.

1. Classification of Institutional Sectors

The first two levels of classification of domestic institutional sectors in 1993 SNA are shown below:

- Non-financial Firms
  - State-owned
  - Domestic private
  - Foreign Control
- Financial Firms
  - Central Bank
  - Other Deposits Institutions
  - Other Financial Intermediaries (Not including insurance companies and Pension Funds)
  - Ancillary Financial Institutions
  - Insurance Companies and Pension Funds
- General Government (Alternative One)
  - Central Government
  - State Government
  - Local Government
  - Social Security Funds
- General Government (Alternative Two)
  - Central Government (Including its Social Security Funds)
  - State Government (Including its Social Security Funds)
  - Local Government (Including its Social Security Funds)
- Household
  - Employer Household
  - Self-employed Household
  - Employee Household
  - Recipient Household of Property Income and Transfer Income
- Non-profit Organization serving households

Classification of Domestic Institutional Sectors in economic circulation account in China's accounting system:

- Non-financial Enterprises
- Financial Enterprises
- Government
- Household

China's accounting system does not include non-profit organizations serving households, and in China these organizations are mostly stated-owned, with only a small portion funded and controlled by private companies. Thus they are classified into government and enterprise sectors

respectively.

2. Social Transfer of Material Goods

According to 1993 SNA standards, social transfer of material goods means the government (including social security and non-profit organizations serving households) transfers material goods to households for their consumption and services. They include those goods and services produced by both the government and non-profit organizations, and purchased in the market by the same agents. This transfer has two forms: one is direct transfer to relevant households and the other is reimbursement to these households after they purchases. Whichever form it is, the government and non-profit organizations are the real cost-bearers. With these transfers disposable income becomes adjusted disposable income with final consumption included, which becomes actual final consumption. However, China's accounting system does not have the concept of social transfer of material goods. Nor does it have concepts of adjusted disposable income and actual final consumption.

3. Labor Compensation and Employee Compensation

It is also difficult to differentiate labor compensation of the self-employed from their profit income as owners. So 1993 SNA introduced a new concept "mixed income", which in fact includes the above two kinds of income. China's accounting system not only treats the cash or material compensation of employees as "labor compensation" but also assigns the deserved compensation of both self-employed and his/her household members who work with him/her, and ownership benefits to labor compensation.

4. Tax

Taxes are compulsory payments of cash or material goods from organizations to the government. The 1993 SNA standard divides taxes into three categories: "production and import tax", "earnings, property and etc. tax" and "capital tax". Production and import tax includes the product tax arising from production, sales, transfers and other ways to deal with commodities and services, and import tax arising from either importing goods or paying residential organizations' services by non-residential ones. Other production taxes include tax arising from the proprietary rights to land, buildings and other assets used in production, from the use of these assets and from hiring labor or paying employee compensation. Earnings, property, etc., tax includes mainly income

tax and other common taxes. Income tax includes individual or household income tax, firm profit tax, capital gain tax and income tax from lottery and gambles. Other common taxes include capital frequent tax (capital asset/net value tax) and headcount tax, expenditure tax, households' payment for certain certificates, etc. Capital tax is comprised of capital taxation and capital transfer tax.

The NBS accounting system divides tax into two types: production tax and income tax, among which production tax is similar to production and import tax in 1993 SNA, and income tax is almost the same as income and property tax in 1993 SNA. Capital tax is not defined in China's accounting system because China has not implemented significant capital taxation. Tax of this kind, when it occurs, belongs to either income tax or capital transfer.

5. Transfers

The 1993 SNA standard divides constant transfer into constant taxations such as income and property tax, social taxation and welfare and other constant transfers.

China's constant transfers exclude income tax. It is further divided into constant funding from state budget, social security payment, social subsidies and other constant transfers. Income tax in China's accounting system corresponds to the income and property tax in the 1993 SNA. Social security payments and social subsidies correspond to the social taxation and welfare in SNA. Transfers from the state budget are an important source of funding for both administrative government agencies but also most of the non-firm agencies. Thus it is important in macroeconomic policy analysis and is treated as a sub-category of transfer payments.

6. Output, Input and Value-added

In 1993 SNA, output is valued at either basic price or producer price. Basic price is the unit price charged by producers minus product tax plus subsidy in production or sales. It does not include transportation cost listed separately in the receipt. Producer price is the unit price charged by producers minus value-added tax or similar deductible tax, not including transportation costs. Input is valued at purchase price, which is the price that the purchaser pays for the unit product or service, excluding any deductible value-added tax or other similar deductible tax. The total value-added is defined to be the value of output minus the value of input. The corresponding value-added is sometimes valued at producer price, i.e., output valued at producer price minus input valued at purchase price, and sometimes valued at basic price, i.e., output valued at basic price minus input valued at purchase price. However it is valued, value-added does not include

value-added tax.

In China's national economic accounts, output is valued at producer prices and China does not use basic prices to value output. Since 1994, China has begun to use value-added tax. NBS requires that output be valued by including value-added tax, and it is the same requirement for intermediate inputs.

3.2. Construction the SAM

In constructing the 1997 SAM, the operating principle for collecting data was to use official published statistical data as the standard, some internal data when public data was not sufficient, and to estimate some data without doing additional data collection if both sources were not sufficient. Because of the potential inconsistencies arising from the differing sources of data and the consistency requirements in SAM, an ad hoc priority of "aggregate first, details second" was implemented, In other words, we first construct the Macro SAM entries as control data and then use these macro balances as controls for consistency among the detailed SAM elements.

3.2.1. Structure of Macro SAM

Taking into account the availability of statistical data and the priorities for analysis, China's SAM was designed as follows:

Table 3.1 shows the general structure of the SAM, which does an initial refinement of factor accumulation accounts to produce a 10-account Macro SAM. Below is an explanation of the differences between this SAM and the one in Table 2.4.

1. Refinement of the Factor Account

Factor account is divided into capital and labor. In some countries land is listed separately as a production factor in SAM. But China's accounting for land rent is incomplete, which explains why land is not an independent account.

After disaggregation, factor compensation becomes labor compensation and capital return. Foreign factor income is divided into foreign labor's compensation and labor's foreign compensation. Similarly foreign factor expenditure is divided into foreign capital gain and domestic capital's gain from abroad.

2. The Sum of Revenue Surplus

Both firms and households have investment allocation. This is due to the fact that, according to the organization classification in China's accounting system, as long as firms owned by households are not semi-companies, they will be considered as part of households, instead of independent economic agents. So the household sector includes some firms that have production and therefore have investment allocation item in SAM.

However, the government sector does not have investment allocation. The non-profit organizations, companies and semi-companies owned by the government are classified into firm sector but their investment gain should be considered as transfer income. Since the government is not market producer, it has no investment gain. This is consistent with international practice. But the government account in China's economic circulation account has revenue surplus, which is not completely consistent.

3. Sum Value and Net Value

The constant transfers between organizations and between sectors are very large, but there is no need to detail every single transfer and sometimes data sources do not permit this. Thus we simplify these inter-institution constant transfers by accounting only their net values in the income side of the account.

Table 3.1: Dimensions of the 1997 China SAM

Receipts	Expenditures								
	1. Activities (69)	*2. Commodities (45)*	*3. Factors (6)*	*4. Private Households (12)*	*5. Enterprises (3)*	*6. Recurrent State (1)*	*7. Investment Savings (1)*	*8. Rest of World (1)*	*9. Total*
1. Activities (69)		69 x 45							69 x 1
2. Commodities (45)	45x69			45 x 12		45 x 1	45 x 1	45 x 1	45 x 1
3. Factors (6)	6 x 69								6 x 1
4. Private Households (12)			12 x 6		12 x 3	12 x 1		12 x 1	12 x 1
5. Enterprises (3)			3 x 6					3 x 1	3 x 1
6. Recurrent State (1)	1 x 69	1 x 45	1 x 6	1 x 12	1 x 3			1 x 1	1 x 1
7. Investment Savings (1)				1 x 12	1 x 3	1 x 1			1 x 1
8. Rest of World (1)		1 x 45			1 x 3	1 x 1			1 x 1
9. Total	1 x 69	1 x 45	1 x 6	1 x 12	1 x 3	1 x 1	1 x 1	1 x 1	

To clarify the accounting contents of the SAM accounts, below we will explain the accounts shown in the previous SAM:

Table 3.2 Extended Description of Detailed SAM accounts

1. Production activities	Along the rows, this account captures commodities produced and the sum of the row comprises total output; from column it expresses production inputs, i.e., expending on "factor" and "commodity" to obtain intermediate and initial inputs and pay production tax to the government. The sum of the column represents the total cost.
2. Commodities	This accounts for supply sources and use of different commodities. From row it reflects domestic and foreign purchase or use of different commodities, which include intermediate inputs and final use and exports. The sum of the row comprises the total demand for commodities; from column we can see sources of domestic or foreign commodities, which combine the domestic supply with imports to form total domestic supply. Production activity account and commodity account here are the make and use table in input-output table respectively.
3. Labor	This account accounts for labor income formation and labor compensation allocation in different household classes. The row represents labor compensation formation and the column represents its allocation. In detailed SAM, labor is classified by some standard.
4. Capital	This account accounts for the formation of capital return and its allocation in different sectors. Land is not listed separately and its income and expenditure is shown in capital account. Labor and capital accounts account for income formation and are very important in accounting system.
5. Enterprise	This includes enterprise profits and its allocation. Row shows enterprises' total revenue surplus and transfer income; column shows enterprises' profit allocation, transfer payments and savings.

6. Government	This includes the government's income and expenditure. Row shows the income obtained by the government through taxation, including production tax, import and export tax, income and property tax; column shows government expenditure and savings.
7. Household	This calculates households' income sources and use. Households get income from 4 accounts: wages from factor account, allocated profit from enterprise account, transfer payment from government account and from abroad. In detailed SAM households are usually divided by different income levels and used to study income allocation.
8. Capital formation	This explains the sources and use of total social capital. Row reflects the fact that capital comes from saving and the sum of the row shows total savings; column reflects total social investment (including stock). Capital formation account is a general reflection of capital and financial account for different sectors and a simplification of capital and financial transactions. Financial SAM actually is a refinement of capital formation account with sector capital and finance account being added.
9. Abroad	This calculates transactions with foreign countries, including constant transactions and capital transfers. Row reflects imports and column show exports and net income and capital transfer from other countries.

3.2.2. Data Sources of Initial Macro SAM

The data in Macro SAM comes from national accounts, input and output table, public finance statistical yearbook, and a small amount of internal data, with national accounts being the primary source. When there is any inconsistency between different sources, national accounts are used as the standard. The table below is the Macro SAM before balancing.

Table 3.2 Initial Macro SAM Units.1 billion RMB

	Production activities	Commodities	Labor	Capital	Enterprise	Government	Household	Capital formation	abroad	Sum
	1	2	3	4	5	6	7	8	9	10
Production activities		198907.15								198907.15
Commodities	124754.55					8724.87	34854.57	28457.63	17180.90	213972.52
Labor	43716.50								13.80	43730.30
Capital	19497.21									19497.21
Enterprise				18517.90					-1334.38	16173.19
Government	10938.89	310.00		1010.33	1100.89		2220.83		41.50	15622.44
Household			43730.30	979.31	4503.70	2744.34			384.50	52342.15
Capital formation					10568.60	4153.23	15266.75		-1962.62	28025.96
Abroad		14323.7								14323.7
Sum	198907.15	213540.85	43730.30	19497.21	16173.19	15622.44	52342.15	28457.63	14323.7	602594.62
Row-column difference	0.00	-431.67	0.00	0.00	0.00	0.00	0.00	431.67	0.00	
percentage	0.00%	-0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	1.52%	0.00%	

To describe detailed data sources and data processing, we will use Cell (i, j) (i, j=1, 2, …9) to denote the data entry in the i^{th} row and j^{th} column.

Cell (1, 2) "production, commodity": Total Output

Total output comes from input and output table. The inconsistency of the value-added in input and output table with the one in GDP accounting is removed by adjusting the value-added and corresponding total output in input and output table because GDP is the core indicator in our

accounting system. This adjustment is explained more in the construction of detailed SAM. According to the row-column balance of the SAM, we get total output of 19890.725 billion RMB from the sum of the column corresponding to production activities.

Cell (2, 1) "Commodity, production": Intermediate Input

Data on intermediate input comes from the adjusted 1997 input and output table, 12475.455 billion RMB. Soon we will see the adjustment of input and output table.

Cell (2, 6) "commodity, government": government consumption

Government consumption comes directly from national economic circulation account, derived from government consumption in the government account. It is 872.487 billion RMB.

Cell (2, 7) "commodity, household": household consumption

Household consumption comes directly from the household consumption in general economy account in national economic circulation account, 3485.457 billion RMB.

Cell (2, 8) "Commodity, capital formation": investment

It comes from the sum of capital formation in the general economy account in national economic circulation account, 2845.763 billion RMB.

Cell (2, 9) "commodity, abroad": export

Exports are given in FOB (or off-shore) prices, which come from the export data in the general economy account in national economic circulation account, 1718.090 billion RMB.

Cell (3, 1) "labor, production activities": labor compensation

Labor compensation is not consistent between the input and output tables and the general economy data in national accounts. We use the latter, 4371.650 billion RMB, because it is usually consistent with the often-quoted GDP data. Here labor compensation does not include labor compensation from abroad.

Cell (3, 9) "labor, abroad": Net labor compensation from abroad

This entry comes from the national economic circulation account, 1.380 billion RMB.

Cell (4, 1) "capital, production activities": capital return

Capital return is given by the sum of revenue surplus in China's accounting system, including

revenue surplus and fixed capital depreciation. This data is not consistent between input and output table and national economic circulation account. We still adopt the latter, 1949.721 billion RMB.

Cell (5, 4) "firm, capital": investment return

This is the sum of revenue surplus, which comes from the enterprise account (including financial and non-financial) in the national economic circulation account. Financial firms have 45.20 billion RMB and non-financial ones 1705.55 billion RMB. So the enterprises' investment return is 45.207+1705.55=175.757 billion RMB.

Cell (5, 9) "Enterprise, abroad": net gain of domestic capital from abroad

This entry comes from the national economic circulation account, -133.438 billion RMB. It is negative, meaning the outflow of capital gain.

Cell (6, 1) "government, production activities": net production tax

Here the net production tax is different from that in the input and output table. Net production tax in the input and output table is comprised of different tax minus production subsidy and returned export tax, including tariff. But here it does not include tariff. The data entry here comes from the net production tax from input and output table, 1124.889 billion RMB minus tariff, 31 billion RMB, which is 1093.889 billion RMB.

Cell (6, 2) "government, commodity": tariff

This entry comes from China Statistical Yearbook, 31 billion RMB.

Cell (6, 4) Government, capital": operating surplus

This is operating surplus of Government sector which comes from the national economic circulation account.

Cell (6, 5) "government, enterprise": enterprise profit tax

This figure includes income and property tax from non-financial sectors and financial institutions, other transfers to the government under constant transfer, payment from firm to government and revenue surplus given to the government by state-owned enterprises and semi-companies. Among these, revenue surplus is 101.033 billion RMB and all the other is 110.089 billion RMB. We will see the details later (property income and constant transfer).

Cell (6, 7) "government household": individual income tax

This amount includes households' income tax, social security payment and other transfers to the government. This data comes from capital flow table (transaction of material goods) and NBS internal data, the sum being 222.083 billion RMB. We will see the details later. (property income and constant transfers)

Cell (6, 9) "government, abroad": net transfer from abroad to the government

No reliable data source. It is estimated to be 4.150 billion RMB. See later (property income and constant transfers).

Cell (7, 3) "household, labor": labor compensation

There is some difference between labor compensation here and Cell (3, 1). Here labor compensation is all the labor compensation income of households, including both domestic and from abroad: 4371.65+1.38=4373.03 billion RMB. Data source is the national economic circulation account.

Cell (7, 4) "household, capital": investment return

In national accounting, household sector also has a production account, which includes the production activities of both peasants and self-employed small business. In this sense, the household sector also has its own investment return. Data comes from the total revenue surplus from the production account in the household sector in the national economic circulation account, 97.931 billion RMB.

Cell (7, 5) "Household, firm": profit share and transfer payment

This is the sum of the constant transfer and property payment from firms to households. In national economic balance accounts, Firm's constant transfer in the firm account (including financial and non-financial firms) includes income tax, social subsidies and others, among which social subsidies and part of others flow to the households. Firms' property payment includes interest, dividend and others. This comes from the capital flow table (for transaction of material goods) and NBS' internal data, the sum being 450.370 billion RMB. We will see details later. (Property income and constant transfers)

Cell (7, 6) "Household, government": transfer and payment from government to household

This figure includes social security payments, social subsidies and part of others that flow to households. It also includes the interest payment from government to households. This data is from capital flow table (transaction of material goods) and NBS internal data, the sum being 274.434 billion RMB.

Cell (7, 9) "Household, abroad": constant transfers to the households from abroad

This is only contained in the "others" account in the capital flow table. It also comes from NBS internal data, the total being 48.450 billion RMB.

Cell (8, 5) "Capital formation, enterprise": enterprise savings

This amount comes from the total savings in the firm account (financial and non-financial) in the national economic circulation account. 1028.086+28.774=1056.860 billion RMB.

Cell (8, 6) "Capital formation, government": government savings

This data comes from government saving in the national economic circulation account, 415.323 billion RMB.

Cell (8, 7) "Capital formation, household": household saving

This is from the household account in the national accounting account, 1526.675 billion RMB.

Cell (8, 9) "Capital formation, abroad": net inflow of foreign capital

This result comes from the total savings in the foreign sector account in the national accounting account, -196.262 billion RMB, which means that China is a net capital inflow country.

Cell (9, 2) "Other countries, commodity": import

This amount is from the foreign sector account in the national accounting account, 1432.37 billion RMB.

Property Income and Constant Transfer

This figure is from the capital flow table (transaction of material goods), the data on constant transfer is the following:

Table 3.3

	Enterprise		Government		Household		Abroad		Sum	
	Use	Source	Use	Source	Use	Source	Use	Source	Use	Source
Income tax	**1032.03**			**1291.96**	**259.93**				**1291.96**	**1291.96**
Social security payment			**1311.76**	**1453.40**	**1453.40**	**1311.76**			**2765.16**	**2765.16**
Social subsidies	**87.31**		**705.58**			**792.89**			**792.89**	**792.89**
Others	**2235.50**	**672.50**	**228.64**	**549.00**	**565.60**	**2234.24**	**453.60**	**27.60**	**3483.34**	**3483.34**
Sum	**3354.84**	**672.50**	**2245.98**	**3294.36**	**2278.93**	**4338.89**	**453.60**	**27.60**	**8333.35**	**8333.35**

To convert an account like this into matrix form, extra information is needed. We obtained more detailed data from the Capital Flow Division in NBS, which gave us the following constant transfer matrix:

Table 3.4

	Enterprise	Government	Household	Abroad	Sum
Enterprise	642		30.5		672.5
Government	1032.03		2220.83	41.5	3294.36
Household	1680.81	2245.98		412.1	4338.89
Abroad			27.6		27.6
Sum	3354.84	2245.98	2278.93	453.6	

In Capital Flow Table (transaction of material goods), the data on property income and expenditure is the following:

Table 3.5

	Enterprise		Government		Household		Abroad		Sum	
	Use	Source	Use	Source	Use	Source	Use	Source	Use	Source
Interest	**9821.21**	**6994.50**	**575.82**	**146.32**	**25.00**	**3281.21**			**10422.03**	**10422.03**
Dividend	**1650.97**	**262.31**				**54.28**	**248.74**	**1583.12**	**1899.71**	**1899.71**
Others	**50.06**	**8.80**				**41.26**			**50.06**	**50.06**
Sum	**11522.24**	**7265.61**	**575.82**	**146.32**	**25.00**	**3376.75**	**248.74**	**1583.12**	**12371.80**	**12371.80**

Converting the above account into matrix form gives us the following table:

Table 3.6

	Enterprise	Government	Household	Abroad	Sum
Enterprise	6914.41	77.46	25	248.74	7265.61
Government	146.32				146.32
Household	2878.39	498.36			3376.75
Abroad	1583.12				1583.12
Sum	11522.24	575.82	25	248.74	

Combining the above two matrices gives a capital inflow and outflow relation between firms, government, households, and foreign (ROW) sectors. An aggregated table follows:

Table 3.7

	Enterprise	Government	Household	Abroad	Sum
Enterprise	7556.41	77.46	55.5	248.74	7938.11
Government	1178.35	0	2220.83	41.5	3440.68
Household	4559.2	2744.34	0	412.1	7715.64
Abroad	1583.12	0	27.6	0	1610.72
Sum	14877.08	2821.8	2303.93	702.34	

As firms' internal property income and constant transfers are transactions between financial institutions and non-financial firms and we do not differentiate these two when constructing Macro SAM, they are ignored here.

As the inter-sector income and expenditure data is hard to obtain, when further refining Macro SAM, we try to use the net value data of some inter-sector transfers. Besides, some transaction data is small and we just simplify them. We deduct transactions that are from government to firms, from household to firms, from household to abroad and from firms to abroad, from those that are from firms to government, from firms to household, from abroad to household and from abroad to firms.

Table 3.8

	Enterprise	government	household	abroad	sum
Enterprise				-1334.38	-1334.38
Government	1100.89		2220.83	41.5	3363.22
Household	4503.7	2744.34		384.5	7632.54
Abroad					0
sum	5604.59	2744.34	2220.83	-908.38	

3.2.3 Data Adjustment

During the process of collecting Macro SAM data, to guarantee the balance of the matrix, two adjustments were needed.

1. Adjustment of Input and Output Accounts

The value-added and its composition in national accounting account and input and output table are different. (See below)

Table 3.9 Data differences: input-output table and capital flow table

	Input-output table	Capital flow table
Labor compensation	41540.4	43716.50
Net production tax	10244.9	11248.89
Total revenue surplus	23918.8	19497.21
Value added	75704.1	74462.60

From NBS, we know that this difference is due to three reasons: one is the differences of data sources; input and output data is from surveys carried out every five years but national accounting account data is from annual statistical report; the second is that input and output data has special treatment for financial services, estimating households' final consumption of financial products, which, however, are considered intermediate input and not included in households' final consumption in national accounting account; the third is that the intermediate input in input and output table includes tariff, which is therefore not included in the corresponding value-added. As our data is mainly based on national accounting account, we have to adjust input and output table. Of the above three reasons, the first reason is due to statistical practice that we cannot adjust here. As for financial services, we deduct it from the final consumption in input and output table and add it to the intermediate input. As for tariff, we deduct it from intermediate input in input and output table and add it to the import tax in government sector. How we adjusted the intermediate inputs is shown in the section about the construction of detailed SAM.

2. Statistical Error Adjustment

Statistical discrepancies in the Macro SAM accounts, arising from official errors and omissions, were reconciled individually by an NDRC expert. The use and sources of abroad account are not balanced, which NRDC concluded was due to rounding errors. To balance it, they changed the

commodity imports 1432.371 billion RMB to 1432.370 billion RMB. In the capital flow table the total capital formation is not equal to total saving and the error is 43.17 billion RMB, which caused the imbalance between commodity account and capital formation account in Macro SAM, with expenditure greater than income by 43.17 billion RMB in capital formation account and income greater than expenditure by the same amount in commodity account. To balance it, NDRC did the following adjustment: Add 43.17 billion RMB to household saving, households' investment return, capital surplus (Chinese here is ambiguous.) and total output in Capital formation account. The reasons for doing this were the following: (1) expenditure data is usually more accurate than income and the column in capital formation account accounts for investment expenditure, which is more reliable than saving. Therefore the adjustment is made in the row (income) of capital formation account. (2) Households' investment return is partly private, for example unofficial fund-raising is hard to include in the national economic accounting; besides, the household survey data reveal that household income is usually underestimated. So NDRC added households' investment return and saving in SAM. (3) Adjusting production activities and commodities accounts is due to the need to balance SAM. All the above adjustment gives a balanced Macro SAM.

Table 3.10 Adjusted Macro SAM Units：0.1 billion RMB

	1. production activities	2. Commodities	3. labor	4. capital	5. Enterprise	6. government	7. Household	8. Capital formation	9. Abroad	10. sum
1. Production activities		199338.82								199338.82
2. commodities	124754.55					8724.87	34854.57	28457.63	17180.9	213972.52
3. labor	43716.50								13.8	43730.30
4. capital	19928.88									19928.88
5. Enterprise				17507.57					-1334.38	16173.19
6. government	10938.89	310		1010.33	1100.89		2220.83		41.5	15622.44
7. household			43730.30	1410.98	4503.7	2744.34			384.5	52773.82
8. Capital formation					10568.6	4153.23	15698.42		-1962.62	28457.63
9. abroad		14323.7								14323.7
10. sum	199338.82	213972.52	43730.30	19928.88	16173.19	15622.44	52773.82	28457.63	14323.7	604321.3
Row-column-difference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Percentage	0	0	0	0	0	0	0	0	0	

3.3 Refining the Macro SAM

To reveal more detailed information in SAM, we have to refine Macro SAM, that is, decompose Macro SAM accounts, which is shown below:

1. Production activities: divided into 69 sectors.
2. Commodities: divided into 45 sectors, the same as the above.
3. Labor: 4 categories: agricultural labor, production labor, skilled labor and highly skilled labor.
4. Government: separately list the government tax from government account, which is further divided into production tax, import tax, export tax and income and property tax. To guarantee the row-column balance, the sum of the above four taxes should be accounted respectively at the intersection of the column accounts of the above four taxes and the row accounts of the government.
5. Households: divided into rural and urban households. The former is further divided into 5 categories by their income levels, while the latter has 7 categories divided also by income.
6. Capital Formation: separate stock increase from the total capital formation and list it as an account.

After the decomposition, transaction data in Macro SAM is expanded to a series of sub-matrices. In table 3.1 we already listed the dimensions of all sub-matrices in detailed SAM. Below we will explain first the input-output table adjustment and then the data source and adjustment in each sub-matrix.

3.3. Input-output Table Adjustment

To construct SAM we need input-output table and GDP-based income formation, income allocation and reallocation data. However, there is inconsistency between these two kinds of data.

To solve this problem, let us take a further look at the characteristics of China's input-output table and its difference from GDP accounting.

3.3.1. Overall Estimation strategy

Many countries adopted UV method for intermediate input when constructing input-output

table, i.e., they obtain Use matrix (U) and Make matrix (V) through surveys, then calculate intermediate input matrix. However, in China we get the structure of input-output table directly from surveys. This method is determined by China's situation but it is also inconsistent with the surveys by sector in GDP accounting. There is no way to use these two data together, which is the main reason why there is a big gap between input-output data and GDP accounting data.

3.3.2. Tariff calculation is different from yearly GDP accounting

In yearly GDP accounting, customs tariff is all treated as foreign trade tariff, i.e., customs tariff is included in the value-added in foreign trade industry. But in input-output table, tariff is included in different sectors' value of imports of intermediate inputs respectively, and import tariff is included in the import column in the second quadrant to offset the import tariff included in the consumed imports in the first quadrant. So the final consumption part of input-output table is less than yearly GDP accounting by some part of tariff and correspondingly the net production tax in the value-added of input-output table is less than yearly GDP accounting.

3.3.3. Difference in treating financial services

In financial industry total output is equal to service income, that is, total interest income minus total interest expenditure plus actual service income. As the sum of the net interest expenditure in all industrial sectors is bigger than the difference of total interest income and total interest expenditure in financial industry, to guarantee that the total GDP will not be underestimated, yearly GDP accounting adds an "other" sub-sector in financial industry whose revenue surplus comes from the interest income from household savings and whose intermediate input is the negation of this same amount. And in the input-output table, this household interest income is spread across all sectors' value-added, using the output allocation factor in financial industry.

In input-output table, household consumption includes financial service, which means all the financial services received by these households when they deposit and borrow. This is a virtual service, estimated using households' interest as a reference in input-output table. The formula is:

Households' consumption of financial service=financial industry total output * households' saving interest / sum of the absolute value of both deposit interest expenditure and loan interest income in financial sectors

Yearly GDP accounting does not include this part, which makes the household consumption data bigger than the one in GDP calculated using expenditure method.

3.3.4. Others

In GDP accounting, agricultural product tax collected by commercial sectors is treated as part of their value-added, but in input-output table, it is considered as agricultural sector's value-added. The sector classification is different between GDP accounting and input-output table. This difference does not change intermediate input, value-added and the total final consumption but affects their internal inter-industry allocation. So it is not the reason that creates the difference between GDP accounting and input-output table.

Additionally we should pay attention to the difference between this difference in sector classification between GDP accounting and input-output table. In the 69-sector classification, most of the difference is acceptable but there are three points requiring more attention: one is that the agricultural sector in GDP accounting includes agriculture, forestry, animal husbandry and fishery, which, however, are included in general technical service industry in input-output table; second is that GDP accounting does not differentiate freight from passenger; third is that in input-output classification, Geological prospecting and water conservancy industry is included in general technical service industry.

From the above we can see that the differences between input-output table and yearly GDP data are due to the differences in statistical survey methods and data processing. We are not supposed to comment on their comparative advantages. But we have to do something to unify these two data, as they are needed for SAM. Finally we decide to use GDP accounting data as our standard because it is currently the most important and widely used indicator.

3.4. Finance and Tariff Adjustment in the Input-Output Table

3.4.1. Finance Adjustment

(1) Deduct households' final consumption in financial sector, 87.568354 billion RMB from the second quadrant in input-output table. (In SAM final consumption needs further adjustment based on capital flow table.)

(2) In the first quadrant, use the intermediate consumption of financial products as the structure to add proportionately households' final consumption of financial products to different sectors' intermediate input.

(3) In the third quadrant deduct corresponding data from the total revenue surplus of different sectors. (In SAM the value-added in input-output table has to be adjusted based on the value-added in capital flow table.

3.4.2. Tariff Adjustment

We need to take out the tariff from the intermediate input in input-output matrix and add it to the net production tax in the value-added and deduct tariff (negative) from the import column in the second quadrant. The actual steps are the following:

(1) Obtain tariff data (used in constructing input-output table by NBS) and construct tariff matrix according to the intermediate input structure in the intermediate input matrix in input-output table.

(2) Deduct the tariff matrix (from the first step) from the intermediate input matrix in input-output table.

(3) Add tariff data to the net production tax. (In fact this never happens because SAM requires that tariff be listed separately.)

(4) Add tariff column from import (negative). (In fact final consumption data is from capital flow table.)

Cell (1, 2) "production activities, commodities": make table

In national economic accounting and economic analysis there are two relevant input-output tables: (a) make and use table, (b) symmetric input-output table. One of the advantages of using make table is that it separates production classification from product classification so that we could express different products from one production activity and different production activities that deliver the same product. In China's social accounting practice, people are more interested in the

symmetric input-output table, which is formed directly from survey data. This is different from the international standard: make and use table first, symmetric input-output table second. To simplify, we assume that every production activity produces only one product and every product comes from just one production activity. Then this make table will become a diagonal matrix. According to the row-column balance of the SAM, we obtain make table data from the column sum of production activities.

Cell (2, 1) "commodities, production activities": intermediate inputs

This data comes from adjusted 1997 input-output table and the total is 12475.455 billion RMB.

Cell (2, 6) "commodities, government": government consumption

Government consumption includes both the government expenditure on public services and the net expenditure on providing households with free or cheap commodities and services; the former is equal to the total output value of government services (equal to operation expenditure plus fixed asset depreciation) minus government's operation income, and the latter is equal to the market value of goods and services provided by the government minus households' payment.

This data comes from *1997 China Input-Output Table*. In 1997 input-output table the total government consumption (872.487 billion RMB) is consistent with that in capital flow table (872.487 billion RMB). So this data does not need any adjustment and is applied to input-output table directly.

Cell (2, 7) "commodities, households": household consumption

Household consumption means residential households' total final consumption of goods and services in a certain period of time. It includes both monetary purchase of goods and services and the consumption obtained in other ways. We call the former direct consumption and the latter virtual one.

We divide households into 12 groups. According to household per capita expenditure, urban households are divided first into 5 quintile groups; then the first and fifth quintile groups are further equally divided. So finally we have urban households in the following groups: lowest income, lower income, medium and lower income, medium income, medium and higher income, higher income and highest income groups. Rural households are divided by household per capita net income into five groups: below 1000 Yuan, 1000-2000 Yuan, 2000-3000 Yuan, 3000-5000 Yuan

and above 5000 Yuan.

Data in this matrix cannot be obtained directly, so we have to combine the following data sources:

1. "1997 China Input-Output Table", Input-Output Division, Department of National Accounting, NBS
2. "China Statistical Yearbook on Prices and Urban Households' Income and Expenditure", 1998, Division of Urban Social Economic Survey, NBS.
3. China 1997 Rural Households Survey Data, NBS internal data, unpublicized.

This column data is calculated as follows:

1. Households' final consumption (from rural households survey) is grouped by the above 45 commodities.
2. Further group the above data by the previous 12 household groups.
3. Magnify the above data (step 2) using the number of rural and urban permanent residents.
4. Then we get a 45*12 matrix. Summing up data by columns gives a 45*1 matrix, which is generally lower than the household consumption column in input-output table.
5. Use the household consumption column data in input-output table as control data for row sums and then magnify the 45*12 matrix from step 3.

Cell (2, 8) "commodities, capital formation": investment

Taking out stock increase from the total capital formation gives a 45*2 sub-matrix. Its first column is the total fixed capital formation; its second column is stock increase. This data can be obtained directly from fixed capital formation and stock increase in the second quadrant in input-output table. To balance rows and columns we have to account the sum of stock increase column---330.343 billion RMB in the cell (total fixed capital formation, stock increase).

Cell (2, 9) "commodities, abroad": export

Export is valued at FOB (or off-shore) prices. The export data in input-output table is inconsistent with that from national economic circulation account. We use the export data in the adjusted input-output table as the structure and use the export data in Macro SAM as control to obtain a column of export data.

Cell (3, 1) "labor, production activities": labor compensation

Labor is classified as follows: agricultural and non-agricultural labor, which is further grouped into production worker, skilled worker and highly skilled worker. Agricultural labor only works in agricultural sector. They are generally less educated or illiterate. Production workers include people working in service and industrial industries; skilled workers are people who have certain skills. So

this cell is a 4*45 sub-matrix.

In practice, it is very hard to classify labor. As it is hard to quantitatively measure labor's professional skill and proficiency, it is difficult to classify labor by skills. A feasible way to do this is to use their education levels as their skill measure. This includes a hypothesis that there is positive correlation between education levels and skill and proficiency levels. But this hypothesis has been questioned. Someone argues that labor experience and labor heterogeneity will also affect labor's skill and proficiency; but in statistical practice, using experiences or professional titles to classify labor is very difficult. We consider all labor in agricultural sector (not including agricultural, forestry, animal husbandry and fishery service industry) as agricultural labor, and non-agricultural labor is classified by their education attainment: middle school and below are production workers, high school, vocational high school and vocational training school are skilled workers, and associate degree and beyond are highly skilled workers. We need two groups of data by industry and by labor type: labor compensation and labor force.

This kind of data is mainly from three sources:

1. Labor Statistical Yearbook 1998
2. October 1997 Wage Survey in 14 Cities
3. 2000 National Labor Statistical Survey

In China's statistical practice, wages and labor force in urban working units are the most complete data but data on non-work unit labor force is less complete. There is a gap between the available employment data by industry and the one required by input-output sectors. (1) The total employment of industry-specific data is not equal to the total in the same table, which exists in several tables by industry. (2) Industry classification is not the same as the 69-sector classification. We have to do some decomposition and classification.

Employment and labor compensation are calculated as follows:

1. Calculate urban employment and wages by industry

In Labor Statistical Yearbook the sum of employment by industry is not equal to the national sum in the same table, which is due to the fact that employment data are calculated based on sampling and in years without any sampling it is deduced from the time series, and no balancing between industry-specific employment and national sum has been done. We use the national sum as an aggregate to either magnify or shrink industry-specific data by the same ratio. The urban sector industry-specific employment data comes from "Urban Industry-specific Employment and Wages Table", "Mining Industry Detailed Employment and Wages Table", "Manufacture Industry

Detailed Employment and Wages Table" and "Electricity, Gas and Water Production and Supply Industry Detailed Employment and Wages Table". In "Urban Employment and Wages by Industry Table", there is no detailed classified data on mining, manufacture and electricity, gas and water industry, so we process employee survey data instead to obtain it. As employment is bigger than the number of employees, we multiply the ratio of employment and the number of employees with the number of employees in detailed classification to obtain the actual detailed classified data on employment. Maintenance and repair of machinery and equipment industry is not available in current industry-specific statistics. So we use the average wage of machinery, transport equipment, electronic equipment and machinery, electronic and telecommunication equipment, instruments, meters, cultural and office machinery and other manufacture industries as the average wage for maintenance and repair of machinery and equipment industry; we also multiply the total labor force in the above industries with the ratio between the labor compensation in maintenance and repair of machinery and equipment industry and the total labor compensation in the above industries. Scrap and waste industry is not an actual production sector and there is no labor compensation in input-output table. So its employment and labor compensation are both zero.

2. Compute total industry-specific employment

This comes from both "industry- and region- specific employment table" and "industry-specific employment table" from the first step. The industry classification in the total employment is done by bigger industry classification so has to be decomposed. Here we assume that the structure of urban industry-specific employment is consistent with the structure of total employment so we use the first as the structure to decompose the second.

3. Compute average labor compensation for industry-specific employment

This is computed through "adjusted input-output table" and "industry-specific employment" from the second step, and is further adjusted by referring to the industry-specific wages in the first step. It is obtained by dividing industry-specific labor compensation by industry-specific employment.

4. Decompose industry-specific employment and labor compensation by labor types

Agricultural employment and labor compensation can be obtained directly from the agricultural labor data in the previous step. There is no data on industry- and labor-type-specific employment in 1997. Assume that the employment structure has not changed since 1997. We obtain national

industry- and education-specific employment from table 4-5 in Labor Statistical Survey of 2000, which is used as the structure and combined with the industry-specific labor in the previous step as a control to get industry- and labor-type-specific employment.

There is no direct data on labor compensation by labor types in 1997. We assume that the wage structure in 14 cities in October 1997 is representative of national labor compensation structure. Then we use the labor compensation structure including three types of labor: 0.285369、0.316036 and 0.398595, to obtain industry-specific and labor-type-specific average compensation, which is finally multiplied with total employment to get industry- and labor-type-specific total labor compensation.

Cell (3, 9) "labor, abroad": net compensation for labor exports

This data is a 4*1 matrix. Our labor exports are mainly people studying abroad and skilled workers. We assume that half of their total compensation, 690 million RMB is obtained by skilled workers and the other half-690 million RMB by highly skilled workers.

Cell (4, 1) "capital, production activities": capital return

This is also called total revenue surplus in China's accounting system, including revenue surplus and fixed capital depreciation. We use 1949.721 billion RMB from the economic circulation account as a total control and the total revenue surplus in input-output table as the structure to obtain this 1*69 matrix.

Cell (6, 1) "government, production activities": net production tax

This is different from the net production tax in input-output table, which is computed by deducting production subsidies and export tax return from the total tax and includes tariff. But here it does not include tariff and is obtained by deducting tariff from the net production tax in input-output table.

Cell (6, 2) "government, commodities": tariff

This is a 1*45 matrix. To obtain tariff data, please see the tariff matrix in "input-output table adjustment". We can sum up the columns of this matrix to obtain a row of tariff by production actitivities.

Cell (6, 7) "government, household": individual income tax and other constant transfers

Income tax and others item means the constant transfers made from households to government. It mainly includes household income tax and social security payment. Household income tax includes individual income tax and the non-productive taxation part of the household real estate tax; social security payment includes both the payment made from household sector to the government and the one made from enterprise sector to the government (This part is virtually accounted as part of labor compensation in accounting and then paid to the government by the labor.) This is a 1*12 matrix.

There are three sources:

1. "China Statistical Yearbook of Prices and Urban Household Survey", 1998, Division of Urban Social and Economic Survey, NBS.
2. China 1997 Rural Household Survey, NBS internal data, unpublicized.
3. Other relevant tax rules.

Only individual income tax is included in rural household survey. The unproductive taxation part of household real estate tax is not included. Social security payment made to the government by enterprise sector is not included either. So we have to use indirect methods to compute this part. Department of Labor and Social Security documents that China has 5 types of social security: unemployment insurance, pension insurance, workers' injury insurance, medical insurance and pregnancy insurance. According to 1993-1999 "Rules for State-owned Enterprises Unemployment Insurance", unemployment insurance covers only state-owned enterprises, requiring that employers should pay a premium equivalent to 0.6% of each employee's total wages; according to "Notice about furthering reform on enterprise pension insurance" (State Council [1995] #6), pension insurance payers are enterprise employees and pension account is divided into individual and social accounts. 16% of employees' wage income is put into individual account and around 4% into social account; premium for workers' injury insurance varies across industries; medical insurance has not started in 1997; actual expenses determine premium for pregnancy insurance.

The calculation was as follows:

1. Individual income tax

According to per capita income tax and employment proportions by group, we magnify by rural and urban employment to get individual income tax data at group level.[4]

2. Unemployment Insurance

[4] 根据分组人均个人所得税的数据和从业人员比例，按农村和城镇从业人员数放大，得到个人所得税分组数据。

Average wage income of state-owned enterprise employees = per capita yearly wage income of state-owned enterprise employees * household size / # of state-owned enterprise employees in the household

(1) # of state-owned enterprise employees at group level = proportion of state-owned enterprise employees at group level * total # of state-owned enterprise (SOE) employees.

(2) Social security payment = average wage income of SOE employees * # of SOE employees at group level * 0.6%.

3. Pension Insurance

(1) Average wage income = per capita yearly wage income * household size / # of employees in the household

(2) # of SOE employees at group level = proportion of SOE employees at group level * total # of SOE employees (rural and urban separately).

(3) Pension payment = average wage income * # of SOE employees at group level * 20%.

4. Other

Other income tax and social security payment is tiny and we don't have data at the group level. So we ignore this part.

5. Aggregations and Adjustment according to Macro SAM

Pre-adjustment income tax and others = individual income tax + unemployment insurance payment + pension insurance payment

Post-adjustment income tax and others = pre-adjustment proportion of income tax and others * income tax and others in Macro SAM

Cell (7, 3) "household, labor": labor compensation

The scope of labor compensation here is different from the one in cell (3, 1). Here labor compensation is households' total labor income, which includes not only domestic labor compensation but also labor compensation from abroad. The total is 4371.65＋1.38＝4373.03 billion RMB. The data source is national economic circulation account.

In national economic accounting, the way to compute labor compensation in household sector is quite different across industries and between rural and urban areas. For example, labor compensation for urban self-employed also includes their revenue surplus, so the total is called mixed income; individual housing construction is calculated by proportional method, i.e., we assume the proportion of value added in all construction industries is the same. Because of the limits of household survey, we assume that 80% of rural household operation income is labor compensation and 60% for urban households. The actual calculation was the following:

A. Labor compensation calculation for urban households by group

1. Average labor compensation

   Average labor compensation=labor compensation * household size / number of employees

   Labor compensation=actual income - property income - transfer income - self-employed income*40%

2. Number of workers

   Number of workers= Number of employees per household * number of households

   Proportion of workers in groups=number of workers per group / total number of workers

   Total number of workers

3. Total labor compensation

   Total labor compensation=average labor compensation*number of workers

Among which: number of households, labor compensation, household size, number of employees, actual income, property income, transfer income and self-employed income are obtained from urban household survey. In 1997 Urban Household Cash Income and Expenditure Table all data is measured at yearly per capita. To accurately measure average labor compensation, we convert labor compensation to the average by employment number from the above calculation.

B. Labor compensation calculation for rural households by group

1. Convert survey data into 5-group format

   Note: as original data is an average, we cannot use simple sum to convert it into 5-group data.

2. Average labor compensation

   Average labor compensation=labor compensation*number of permanent residents / number of workers

   Labor compensation=labor income + household operation income*90%

3. number of workers

   number of workers=number of workers per household *number of households

4. Total labor compensation

   Total labor compensation=average labor compensation*number of workers

Among which: number of households, labor compensation, permanent residents, number of employees, actual total income, property income and transfer income are obtained from rural households. Original data is measured at yearly per capita. To accurately measure average labor compensation, we convert labor compensation to the average by employment number from the above calculation. Labor compensation includes household operation income.

C. Adjustment according to Macro SAM

Use labor compensation from Macro SAM as control to magnify the above rural and urban labor compensation by the same ratio.

Divide the final labor compensation by number of employees in each group, which gives adjusted average labor compensation.

Cell (7, 4) "household, capital": investment return

Household sector's investment return means the investment return of self-employed small business and household operation. In national economic accounting, there is also a production account in household sector. This account includes the production activities of both peasants and self-employed small businessmen. So household sector also has investment return.

This data is a 12*1 matrix and it comes from the following sources:

1. "China Statistical Yearbook of Prices and Urban Household Survey", 1998, Division of Urban Social and Economic Survey, NBS.
2. China 1997 Rural Household Survey, NBS internal Data, unpublicized.

It is hard to distinguish investment return from labor compensation for household operation and self-employed small business. We made following assumptions: 90% of rural household operation income is labor compensation and the other 10% is investment return; 60% of urban self-employed business income is labor compensation and the other 40% is investment return. Based on these assumptions, we calculate investment return for each group of households, which is used as the structure and combined with household investment return from Macro SAM which is treated as a total amount to give group-specific investment return. We calculate it as follows:

A. Investment return for urban groups

1. Average investment return

   Average investment return=investment return*household size / number of employees

   Investment return = self-employed business income * 40%

2. number of workers

   number of workers by group=number of employees per household*number of households

   Group weight for urban workers=number of workers per group /the total number of labor

   number of urban workers per group= the total number of urban labor* group weight for urban workers

3. Total investment return

   Total investment return=average investment return * number of urban workers per group

B. Computation of investment return for rural households by group

1. Convert survey data into 5-group format

   Note: as original data is average, we cannot obtain 5-group data by simply summing them up.

2. Average investment return

   Average investment return=investment return*number of permanent residents / number of workers

   Investment return=household operation income*10%

3. number of workers

   number of workers = number of workers per household * number of households

4. Total investment return

   Total investment return=average total investment return * number of workers

Among which: number of households, labor compensation, permanent residents, number of employees, actual total income, property income and transfer income are obtained from rural household survey. Original data is measured at yearly per capita. To accurately measure average labor compensation, we convert labor compensation to the average by employment number from the above calculation. Labor compensation includes household operation income.

C. Adjustment based on Macro SAM

Use the investment return from Macro SAM as a control and adjust the above rural and urban households' investment return by the same ratio. Divide the final labor compensation by number of employees in each group to obtain adjusted average investment return.

Cell (7, 5) "household, enterprise": profit allocation and transfer payment

Cell (7, 6) "household, government": transfer payments from government to households

Cell (7, 9) "household, abroad": constant transfer to households from abroad

Cell (7, 5) is the sum of property expenditure and constant transfers from enterprises to households, a 12*1 matrix. In national economic balance account enterprise constant transfer in enterprise account (financial and non-financial enterprises) includes income tax, social subsidies and others, among which social subsidies and part of "others" are given to the households. Enterprise property expenditure includes interest, dividend and others.

Cell (7, 6) is the transfer payment from government to households, which includes social security payment, social subsidies and part of "others" item that is given to households. This cell

also includes government's interest payment to households. This cell is a 12*1 matrix in detailed SAM.

Cell (7, 9) is constant transfer to domestic households from abroad. In capital flow table there is only data in "others" item and the sum is 48.450 billion RMB. It is a 12*1 matrix in detailed SAM.

The above data comes from Macro SAM and household survey. They are calculated as follows:

A. Property income

Use the weights for property income from household survey as the weights for property income that households obtain from enterprises, government and abroad. Then use the property income in Macro SAM as the total amount to calculate group-specific property income.

1. Household property income by group

Household property income by group = per capita property income per group * number of persons each group

number of persons each group = population proportion of each group from household survey * total population

The weight of property income for each group = property income for that group / the sum of total property income

2. Property income that households obtain from enterprises, government and abroad

Property income from enterprises in a household group = total property income from enterprises * the weight of property income for this group

Property income from the government in a household group = total property income from the government * the weight of property income for this group

Property income from abroad in a household group = total property income from abroad * the weight of property income for this group

B. Compute transfer income

The same as computing property income.

C. Sum up property income and transfer income

Profit allocation and constant transfers = households' property income from enterprises + households' constant transfer from enterprises

Property expenditure and constant transfers from the government to households = households' property income from the government + households' transfer income from the government

Property income and constant transfers from abroad to households = households' property income from abroad + households' transfer income from abroad

Cell (8, 7) "capital formation, household": household saving

This data is a 1*12 matrix, obtained by residuals calculation according to the row-column balance principle.

Cell (9, 2) "other countries, commodities": exports

This is a 1*45 matrix. We can get a column of import data from adjusted input-output table and then transpose it to get this cell.

3.4.3. Decomposition of Factor Income Distributed to Households

This section will be completed on the basis of expected contributions from NBS colleagues.

3.4.4. Decomposition of Industry and Profit Taxation between Domestic and Foreign Funded Enterprises

As an initial application of its new research capacity, the NDRC decided to conduct a special research analysis of enterprise profits taxation in China, with particular reference to differential taxes on profits between domestic and foreign funded enterprises (FFE). For this purpose, the SAM was further disaggregated to split 26 industrial sectors into domestic and FFE activity components. For these estimates, intermediate use was divided according to domestic output shares calculated with NBS data. The output shares thus derived are presented in Table 3.11 below.

Finally, it was necessary to obtain data on profit tax payments and divide this by sector and ownership. Capital operating surplus and profit tax payments were also split between domestic and FFE with the corresponding value added shares. These figures are presented in Table 3.12 below. In the SAM, we assume the profit tax to be debited directly against sectoral capital accumulation.

Table 3.11: Share of Foreign Funded Enterprises in Domestic Output and Total Assets

		FFE Shares	
		Gross Output	Total Assets
1	**Coal mining and processing**	.001	.002
2	**Crude petroleum and natural gas products**	.077	.020
3	**Metal ore mining**	.010	.005
4	**Non-ferrous mineral mining**	.023	.023
5	**Manufacture of food products and tobacco processing**	.212	.216
6	**Textile goods**	.184	.184
7	**Wearing apparel, leather, furs, down and related product**	.459	.447
8	**Sawmills and furniture**	.268	.332
9	**Paper and products, printing and record reproduction**	.254	.263
10	**Petroleum processing and coking**	.044	.050
11	**Chemicals**	.190	.178
12	**Nonmetal mineral products**	.113	.166
13	**Metals smelting and pressing**	.065	.049
14	**Metal products**	.278	.317
15	**Machinery and equipment**	.128	.123
16	**Motor vehicule**	.231	.185
17	**Other transport equipment**	.231	.185
18	**Electric equipment and machinery**	.269	.263
19	**Electronic and telecommunication equipment**	.631	.473
20	**Instruments, meters, cultural and office machinery**	.473	.294
21	**Maintenance and repair of machinery and equipment**	.000	.000
22	**Other manufacturing products**	.327	.362
23	**Scrap and waste**	.000	.000
24	**Electricity, steam and hot water production and supply**	.152	.157
25	**Gas production and supply**	.054	.029
26	**Water production and supply**	.002	.006
	Total	.209	.176

Table 3.12: Operating Surplus and Profit Taxes by Ownership and Sector of Activity

		Operating surplus(10000 Yuan)			Income Tax		Effective Ra	
		Domestic	FFE	% FFE	Domestic	FFE	Dom	FFE
1	**Agriculture**	6,718,177	-	0	79,651	-	1.2	0.0
2	**Forestry**	453,407	-	0	5,376	-	1.2	0.0
3	**Livestock**	1,672,291	-	0	19,827	-	1.2	0.0
4	**Fishery**	1,559,664	-	0	18,491	-	1.2	0.0
5	**Other Agriculture**	677,241	-	0	8,029	-	1.2	0.0
6	**Coal mining and processing**	2,644,281	2,647	0	182,364	136	6.9	5.1
7	**Crude petroleum and natural gas products**	6,927,429	250,510	3	385,400	-	5.6	0.0
8	**Metal ore mining**	1,239,824	9,369	1	68,979	205	5.6	2.2
9	**Non-ferrous mineral mining**	1,850,358	34,109	2	49,980	1,575	2.7	4.6
10	**Manufacture of food products and tobacco processing**	10,142,226	2,005,607	17	725,458	86,290	7.2	4.3
11	**Textile goods**	7,250,491	1,592,650	18	144,830	22,186	2.0	1.4
12	**Wearing apparel, leather, furs, down and related produ**	2,713,403	2,231,746	45	104,941	32,668	3.9	1.5
13	**Sawmills and furniture**	1,403,315	432,283	24	34,446	8,357	2.5	1.9
14	**Paper and products, printing and record reproduction**	3,127,430	909,005	23	145,141	28,238	4.6	3.1
15	**Petroleum processing and coking**	2,019,119	64,165	3	196,487	1,368	9.7	2.1
16	**Chemicals**	10,823,841	2,645,349	20	602,618	126,818	5.6	4.8
17	**Nonmetal mineral products**	7,332,541	880,431	11	210,587	14,750	2.9	1.7
18	**Metals smelting and pressing**	3,565,483	169,571	5	328,669	8,661	9.2	5.1
19	**Metal products**	2,491,632	741,315	23	94,228	17,333	3.8	2.3
20	**Machinery and equipment**	8,415,579	1,185,766	12	312,418	53,396	3.7	4.5
21	**Motor vehicule**	2,238,423	454,636	30	95,093	91,807	4.2	20.2
22	**Other transport equipment**	1,356,486	582,896	17	69,020	12,793	5.1	2.2
23	**Electric equipment and machinery**	3,006,864	908,323	23	207,597	27,618	6.9	3.0
24	**Electronic and telecommunication equipment**	1,818,448	2,884,030	61	127,367	106,145	7.0	3.7
25	**Instruments, meters, cultural and office machinery**	544,867	352,772	39	21,292	9,929	3.9	2.8
26	**Maintenance and repair of machinery and equipment**	908,605	-	0	-	-	0.0	0.0
27	**Other manufacturing products**	1,722,507	882,615	34	37,743	11,411	2.2	1.3
28	**Scrap and waste**	4,450,690	-	0	-	-	0.0	0.0
29	**Electricity, steam and hot water production and supply**	6,770,059	1,217,269	15	437,398	61,857	6.5	5.1
30	**Gas production and supply**	41,630	12,309	23	3,505	97	8.4	0.8
31	**Water production and supply**	866,448	2,346	0	23,456	9	2.7	0.4
32	**Construction**	9,110,548	323,195	3	351,280	8,405	3.9	2.6
33	**Transport and warehousing**	6,985,716	776,191	10	324,660	9,775	4.6	1.3
34	**Post and telecommunication**	6,114,180	679,353	10	284,156	8,555	4.6	1.3
35	**Wholesale and retail trade**	12,786,178	352,389	3	1,200,094	38,928	9.4	11.0
36	**Eating and drinking places**	1,254,518	1,153,882	48	219,986	7,136	17.5	0.6
37	**Passenger transport**	2,371,266	263,474	10	110,204	3,318	4.6	1.3
38	**Finance and insurance**	5,298,146	588,683	10	1,417,292	19,826	26.8	3.4
39	**Real estate**	6,236,575	2,955,325	32	171,583	58,320	2.8	2.0
40	**Social services**	5,267,651	929,585	15	394,476	39,320	7.5	4.2
41	**Health services, sports and social welfare**	638,823	-	0	7,574	-	1.2	0.0
42	**Education, culture and arts, radio, film and television**	1,653,977	-	0	19,610	-	1.2	
43	**Scientific research**	170,126	-	0	2,017	-	1.2	0.0
44	**General technical services**	2,020,619	1,347,079	40	39,928	21,367	2.0	1.6
45	**Public administration and other sectors**	2,806,843	-	0	33,278	-	1.2	0.0
	Total	169,467,925	29,820,875	15	9,316,529	938,596	5.5	3.1

3.5. Decomposition of Trade and Tariff Incidence by Firm Type and Trading Partner

Patterns of competitiveness and profitability can vary across industries for many reasons, including differing resource costs, managerial standards, market access, etc. In China, there are systematic differences between costs for domestic and FFE firms because of fiscal interventions. In particular, these two types of firms currently face different tax rates on profits and on imported intermediate goods. We have already discussed the first kind of tax discrimination above, and it will also be the focus of more detailed examination in future applications of this SAM and the new CGE model.

Duty drawbacks are an important part of the current Chinese trade policy regime. When some firms are permitted to import intermediate or capital goods without paying tariffs, this has two effects of relevance to the present study. First, differential treatment of firms confers a competitive advantage on the one with the lower net tariff burden. This is an obvious form of static discrimination, and its effects can be assessed with simply tax equalization experiments. More complex is the effect of tariff discrimination under trade liberalization scenarios, like WTO accession.

When nominal tariffs are abolished, two effects arise from the prior drawbacks. Firstly, the aggregate and average gains from tariff removal are less than those that would be predicted from a counterfactual reducing all import prices by the amount of nominal tariffs.[5] Assuming uniform nominal tariff application in the baseline situation overstates the aggregate tariff burden and its composition between firms, even in the same sectors and with the same technologies. The first effect will overestimate the import price reduction and government revenue effects, which vary with the scope of the drawback scheme and (empirically) with any de facto exemptions from nominal tariffs.

A second effect is more subtle, but can be quite significant. We consider only firms who are paying for imports, not those who compete against them in the domestic market. For the former, reducing tariffs across the board is more advantageous to firms facing higher prior protection against their imported components. Within the same sector, domestic and FFE firms can experience

[5] Ianchovichina and Martin (2001) have estimated the effects of WTO liberalization with and without drawbacks, and found the difference quite important in the aggregate and among sectors.

shifts in their competitive position because the domestic firm will gain more in cost reduction when tariffs are abolished. At the same time, FFE firms might have had higher prior import intensity in response to the drawback regime, and in this case the competitive effect will be more neutral.

Finally, since investment goods are imported duty free, one assumes there would be no first-order effect on their demand when tariffs are abolished. In traditional SAM and CGE applications, however, baseline tariffs are usually imputed uniformly across each product category, regardless of the destination of the imports. In this case, prior protection is overestimated for capital goods, and there will be a first order demand response when tariffs are abolished. Even if baseline tariff rates are estimated from collections data so they are (lower) effective rather than nominal rates, these compositional effects will not be captured and structural adjustments will not be estimated with reasonable accuracy.

A third source of ambiguity in tariff data concerns differential rates by country of origin. Although the WTO and many regional agreements contain non-discrimination clauses, the de facto tariff burdens on imports can vary for many reasons. These include variations in local and regional application national he standards, classification problems, and a many kinds of temporary and persistent exceptions. Regardless of the causes, empirical evidence indicates that tariff collections in similar customs categories vary bilaterally for most importing countries. While the distortion this causes for research on revenues and domestic response can be minimized by calculating effective tariffs from collection data, bilateral trade flows will respond differently if a model is calibrated to national average tariffs by origin.

For all these reasons, tariff variation needs to be taken account of in the underlying data for the CGE model experiments and others, and in this section we explain how detailed data on trade composition and tariff incidence have been included in the SAM. Unfortunately, data on trade patterns and tariff collections that would precisely fit the SAM time period and commodity aggregation are not available directly. For this reason, we have used secondary sources to estimate the information we need to capture the workings duty drawback mechanisms. In particular, we rely on two sources of data, obtained directly from NBS and one obtained indirectly from official sources via an international trade research project.

Table: Imports into China by Type of Firm, 1997

(all figures in 1997 USD thousands)

		Domestic Private and Other		Foreign Funded Enterprises			State Owned Enterprises			
	Sectors	Ordinary trade	Processing trade	Equipment as part of FDI	Ordinary trade	Processing trade	Equipment as part of FDI	Ordinary trade	Processing trade	Total
1	**AGRIC**	32,881	26,008	921	257,290	857,981	-	1,612,983	617,310	3,405,373
2	**FORST**	101,836	4,352	269	60,482	183,926	-	240,804	110,541	702,211
3	**LVSTK**	31,440	6,254	641	56,822	245,886	-	131,080	109,884	582,007
4	**FSHRY**	7,128	466	1,378	9,513	11,905	-	28,227	2,844	61,460
5	**OTHAG**	1	7	0	22	292	-	112	47	481
6	**COALM**	1,380	-	7,187	6,562	17	-	53,324	27,262	95,732
7	**OILGS**	412	7	694	264,485	334,497	-	4,012,242	886,004	5,498,342
8	**METLM**	5,114	3,844	19	76,260	174,074	-	1,039,822	1,152,149	2,451,282
9	**NFMTM**	23,765	10,417	6,926	200,856	469,701	-	379,922	108,755	1,200,342
10	**FDPTB**	133,193	53,343	359	738,533	1,467,483	-	2,623,297	498,429	5,514,637
11	**TEXTL**	68,390	199,568	12,752	124,690	6,608,545	-	149,520	3,069,512	10,232,978
12	**WAPLT**	9,616	64,260	3,605	41,611	2,808,830	-	40,064	862,117	3,830,105
13	**WOODP**	34,818	4,616	165,840	73,966	552,096	-	310,688	249,085	1,391,109
14	**PAPPB**	218,232	36,905	111,150	459,671	1,712,376	-	1,750,074	1,041,256	5,329,663
15	**REFOL**	262,417	2,627	203,038	1,149,146	139,951	-	2,896,367	53,780	4,707,325
16	**CHEMC**	713,928	181,391	319,993	2,248,801	9,640,872	-	6,713,343	4,755,373	24,573,700
17	**NMTMN**	7,247	3,303	248,549	148,127	529,583	-	189,044	108,215	1,234,068
18	**IRNST**	339,522	135,965	685,837	692,876	3,677,530	171	2,234,683	2,004,610	9,771,194
19	**METPR**	38,247	7,392	1,283,911	188,562	1,120,987	-	748,001	561,999	3,949,098
20	**MCHEQ**	255,839	20,222	11,697,311	1,322,569	1,176,710	-	5,721,624	628,195	20,822,470
21	**MTVEH**	34,033	107	75,606	840,661	48,064	-	672,648	19,852	1,690,973
22	**TRTEQ**	63,887	186	292,831	171,629	132,812	-	3,040,467	61,807	3,763,620
23	**ELEEQ**	64,163	30,944	1,224,974	315,870	2,257,009	-	1,170,752	956,403	6,020,114
24	**ELTEQ**	173,106	145,361	763,002	2,387,381	11,323,774	-	2,710,540	2,518,634	20,021,799
25	**INSTR**	38,493	4,872	793,273	238,271	1,366,703	-	795,972	793,276	4,030,860
26	**EQREP**	-	-	-	-	-	-	-	-	-
27	**OTHMN**	29,558	27,040	18,858	33,857	809,405	-	33,424	340,655	1,292,798
28	**SCRAP**	-	-	-	-	-	-	-	-	-
29	**ELECT**	-	-	-	-	-	-	2,288	-	2,288
30	**GASPR**	-	-	1	0	-	-	0	-	2
31	**WATPR**	-	-	-	-	-	-	-	-	-
32	**CONST**	-	-	-	-	-	-	-	-	-
33	**FTNSP**	-	-	-	-	-	-	-	-	-
34	**TLCOM**	4	-	-	-	-	-	1,683	-	1,686
35	**TRADE**	-	-	-	-	-	-	-	-	-
36	**RSTNT**	-	-	-	-	-	-	-	-	-
37	**PTNSP**	-	-	-	-	-	-	-	-	-
38	**FNCIN**	-	-	-	-	-	-	-	-	-
39	**RLEST**	-	-	-	-	-	-	-	-	-
40	**SOCSV**	-	-	-	-	-	-	-	-	-
41	**HLTSV**	-	-	-	-	-	-	-	-	-
42	**EDCLT**	7,471	72	10,596	12,865	24,902	-	123,470	13,117	192,494
43	**SCRES**	-	-	-	-	-	-	-	-	-
44	**GTCSV**	-	-	-	-	-	-	-	-	-
45	**PUBAD**	-	-	-	-	-	-	-	-	-
Others		0	3	1	10	64	-	0	23	102
Total		2,696,123	969,532	17,929,521	12,121,390	47,675,975	171	39,426,464	21,551,136	142,370,312

Source: World Bank from NBS data.

Table: Exports from China by Type of Firm, 1997

(all figures in 1997 USD thousands)

		Domestic Private and Other		Foreign Funded Enterprises		State Owned Enterprises		
	Sectors	Ordinary trade	Processing trade	Ordinary trade	Processing trade	Ordinary trade	Processing trade	Total
1	**AGRIC**	52,638	3,944	409,703	54,131	2,851,638	43,760	3,415,813
2	**FORST**	10,938	2	34,159	8,133	328,596	6,897	388,724
3	**LVSTK**	6,308		36,290	24,833	874,659	1,952	944,042
4	**FSHRY**	15,269	162	78,346	29,047	234,249	10,066	367,138
5	**OTHAG**	4,139	1,463	53,525	10,666	111,713	513	182,020
6	**COALM**	4,564		496		1,128,169		1,133,228
7	**OILGS**	32,259		217,080	1,764	2,758,918	2,403	3,012,424
8	**METLM**	3,105		15,461	9,789	95,418	209	123,983
9	**NFMTM**	27,048	9,288	152,383	177,585	723,978	54,565	1,144,848
10	**FDPTB**	476,854	71,032	1,551,933	1,813,533	4,850,059	890,472	9,653,881
11	**TEXTL**	548,954	190,233	941,314	5,233,702	12,261,614	3,660,254	22,836,070
12	**WAPLT**	557,980	442,692	1,056,206	11,878,946	10,254,532	5,883,960	30,074,316
13	**WOODP**	85,130	13,164	687,967	1,099,506	1,748,660	506,180	4,140,608
14	**PAPPB**	96,731	120,807	333,874	3,792,725	2,055,659	2,967,987	9,367,783
15	**REFOL**	91,879	2,835	155,262	76,876	1,395,294	625,812	2,347,959
16	**CHEMC**	323,766	118,799	1,324,657	5,947,481	8,926,083	2,640,136	19,280,923
17	**NMTMN**	147,785	16,472	828,683	570,089	2,398,626	158,957	4,120,612
18	**IRNST**	68,427	20,186	112,621	530,435	1,893,354	3,448,621	6,073,644
19	**METPR**	207,279	40,213	578,316	2,440,432	3,992,956	1,078,879	8,338,076
20	**MCHEQ**	240,226	71,713	411,195	1,470,647	3,192,595	792,409	6,178,785
21	**MTVEH**	30,838	15,240	65,096	223,201	386,873	54,033	775,280
22	**TRTEQ**	33,732	9,427	135,990	708,572	500,383	1,629,791	3,017,895
23	**ELEEQ**	134,889	210,750	366,324	5,911,533	1,887,567	2,591,778	11,102,841
24	**ELTEQ**	42,252	287,685	670,050	16,804,382	1,256,746	3,997,309	23,058,424
25	**INSTR**	29,127	13,056	151,334	3,021,606	635,311	1,660,852	5,511,287
26	**EQREP**							
27	**OTHMN**	78,324	86,602	254,984	1,844,799	1,869,078	1,326,481	5,460,269
28	**SCRAP**							
29	**ELECT**	13,763		429,193	17,063	732		460,750
30	**GASPR**	1						1
31	**WATPR**							
32	**CONST**							
33	**FTNSP**							
34	**TLCOM**	3			6	12,762		12,770
35	**TRADE**							
36	**RSTNT**							
37	**PTNSP**							
38	**FNCIN**							
39	**RLEST**							
40	**SOCSV**							
41	**HLTSV**							
42	**EDCLT**	216	11	42,632	143,664	37,185	30,762	254,468
43	**SCRES**							
44	**GTCSV**							
45	**PUBAD**							
	Total	3,364,426	1,745,773	11,095,072	63,845,145	68,663,407	34,065,040	182,778,863

Source: World Bank from NBS data.

The above tables present data on imports and exports, respectively. The decompose trade by type of firm in China which is importing or exporting the goods the goods in question. These data were compiled by the World Bank resident office using official statistics supplied by NBS and other sources. The data on import patterns by type of firm were used to disaggregate both trade and the baseline tariff burden of protection, using methods that are explained in the next paragraph. The data on export patterns are for reference only since we are not considering export patterns by type of firm.

To estimate import and tariff patterns, we need to classify absorption of externally produced goods and services. Imports in the baseline SAM were divided into seven generic destinations groups:

1. Imports pf intermediates by agricultural sectors
2. Imports of intermediates by domestic manufacturing firms
3. Imports of intermediates by FFE manufacturing firms
4. Imports of intermediates by service sectors
5. Imports of investment goods
6. Imports of final goods purchased by government
7. Imports of final goods purchased by households

For categories 2 and 3, intermediate import absorption was further divided into manufacturing sectors in accordance with the baseline SAM. For each resulting sector, it was then assumed that imports represented the same share of intermediate demand as they did in aggregate demand for each type of commodity, providing an initial estimate of intermediate import intensity. Using the data on imports by firm type, we then adjusted the shares of intermediate imports, by commodity and manufacturing activity, for composition between domestic and FFE producers. The result, with generally higher import intensity for FFEs, is our estimate of imported intermediates by commodity, activity, and firm type. These disaggregated estimates do not fit conveniently in the SAM tableau framework and are maintained in separate spreadsheets to be read in by the model, but they aggregate consistently to the observed aggregate imports in the baseline SAM.[6] Imports of

[6] In the master SAM spreadsheet SAM97-Data.xls, these two worksheets are XM-Init and XM-fin, respectively.

final investment goods were imputed for all sectors together, since this entire category is exempt from tariffs.

With this compositional information, we distributed import demands according to observed intermediate use for each sector and final demand by government, investment, and households. Tariff collections were then used to estimate applied ad valorem rates for those absorption categories (1,2,4,6,7) above who were required to pay tariffs, and allocated individually in tables for the model to use as input. Total imports and tariff collections remained consistent with the baseline SAM, but the allocation was changed to reflect new information on differential import demand and tariff incidence.

Finally, we disaggregated imports and exports to a variety of China's individual and regional trading partners. It was felt that this information would extend the modeling capacity in directions of independent interest, and also enrich the analysis of trade reform. In particular, we designated six partners for detailed trade flow analysis:

1. ASEAN (asn) – Association of Southeast Asian Nations
2. Japan (jpn)
3. NIE (nie) – Newly Industrialized Economies – Korea and Taipei,China
4. USA (usa) – United States of America
5. EU (eur) – European Union (as of 1997)
6. ROW (row) – Rest of the World

To estimate these trade patterns, we extracted China's import and export tables from the Global Trade Analysis Project (GTAP) world trade database (Version V).[7] After aggregating to make GTAP commodities conformal with our own SAM, and combining trading partners (there are 66 in the GTAP database), we calculated share parameters to imput SAM imports and exports across the trading partners. The results of this imputation are presented in the next six tables. Again, the results were retroactively aggregated to check for consistency with the baseline SAM. These tables are not incorporated into the SAM, but input separately to the model.

[7] See Hertel et al (2000) for more detail, or consult www.gtap.org directly. An earlier version of this data was also the source used by Ianchovichina and Martin for their detailed analysis of China's WTO accession.

Table: Imports from ASEAN into China by Type of Firm, 1997

(all figures in 1997 USD)

13	**WOODP**	32,916	8,632	2,287	43,835	34,010	8,632	2,287	44,929
14	**PAPPB**	408,502	140,171	7,173	555,845	423,024	140,171	7,173	570,368
15	**REFOL**	1,605,244	255,786	40,287	1,901,317	1,623,992	255,786	40,287	1,920,064
16	**CHEMC**	1,261,333	661,408	17,801	1,940,542	1,311,798	661,408	17,801	1,991,006
17	**NMTMN**	246,625	51,230	18,788	316,643	257,461	51,230	18,788	327,479
18	**IRNST**	700,407	472,238	74,126	1,246,771	716,325	472,238	74,126	1,262,689
19	**METPR**	194,558	65,144	68,423	328,125	201,853	69,819	68,452	340,125
20	**MCHEQ**	699,316	176,030	823,868	1,699,213	736,703	176,030	823,868	1,736,600
21	**MTVEH**	97,044	57,830	4,920	159,794	99,860	57,830	4,920	162,610
22	**TRTEQ**	361,097	29,052	27,944	418,093	378,968	29,052	27,944	435,965
23	**ELEEQ**	462,258	154,391	73,507	690,156	482,137	154,391	73,507	710,035
24	**ELTEQ**	1,518,283	1,454,277	80,928	3,053,489	1,566,667	1,454,277	80,928	3,101,873
25	**INSTR**	315,540	111,721	55,219	482,481	329,724	111,721	55,219	496,665
26	**EQREP**	-	-	-	-	-	-	-	-
27	**OTHMN**	19,403	13,521	302	33,226	21,340	13,521	302	35,163
28	**SCRAP**	-	-	-	-	-	-	-	-
29	**ELECT**	15	-	-	15	16	-	-	16
30	**GASPR**	0	0	0	0	0	0	0	0
31	**WATPR**	-	-	-	-	-	-	-	-
32	**CONST**	8,736	6,146	1,241	16,124	8,736	6,146	1,241	16,124
33	**FTNSP**	-	-	-	-	-	-	-	-
34	**TLCOM**	5,166	-	-	5,166	5,167	-	-	5,167
35	**TRADE**	-	-	-	-	-	-	-	-
36	**RSTNT**	52,660	6,136	1,239	60,035	52,660	6,136	1,239	60,035
37	**PTNSP**	33,015	254	51	33,321	33,015	254	51	33,321
38	**FNCIN**	15,060	3,793	766	19,619	15,060	3,793	766	19,619
39	**RLEST**	-	-	-	-	-	-	-	-
40	**SOCSV**	165,668	15,721	3,176	184,564	165,668	15,721	3,176	184,564
41	**HLTSV**	16,890	143	29	17,062	16,890	143	29	17,062
42	**EDCLT**	25,290	143	40	25,473	25,501	143	40	25,684
43	**SCRES**	-	-	-	-	-	-	-	-
44	**GTCSV**	-	-	-	-	-	-	-	-
45	**PUBAD**	7,876	-	-	7,876	7,876	-	-	7,876
	Total	11,117,056	4,555,336	1,303,961	16,976,353	11,454,477	4,555,336	1,303,961	17,313,774

Source: GTAP Version V combined with NBS/WB data.

Table: Imports from Japan into China by Type of Firm, 1997

(all figures in 1997 USD)

13	**WOODP**	293,041	76,852	20,358	390,250	302,778	76,852	20,358	399,988
14	**PAPPB**	357,810	122,777	6,283	486,869	370,530	122,777	6,283	499,589
15	**REFOL**	107,759	17,171	2,704	127,635	109,018	17,171	2,704	128,893
16	**CHEMC**	1,780,694	933,746	25,130	2,739,570	1,851,938	933,746	25,130	2,810,814
17	**NMTMN**	262,469	54,521	19,996	336,985	274,001	54,521	19,996	348,518
18	**IRNST**	1,512,595	1,019,843	160,081	2,692,520	1,546,971	1,019,843	160,081	2,726,896
19	**MFTPR**	217,097	77,909	76,383	371,388	225,240	77,909	76,383	379,532
20	**MCHEQ**	1,223,988	308,099	1,441,987	2,974,073	1,289,425	308,099	1,441,987	3,039,510
21	**MTVEH**	138,637	82,617	7,028	228,282	142,661	82,617	7,028	232,306
22	**TRTEQ**	241,981	19,469	18,726	280,176	253,957	19,469	18,726	292,152
23	**ELEEQ**	527,333	176,126	83,855	787,314	550,010	176,126	83,855	809,991
24	**ELTEQ**	3,278,876	3,140,650	174,772	6,594,298	3,383,366	3,140,650	174,772	6,698,787
25	**INSTR**	681,439	241,273	119,251	1,041,962	712,071	241,273	119,251	1,072,595
26	**EQREP**	-	-	-	-	-	-	-	-
27	**OTHMN**	64,924	45,241	1,012	111,176	71,403	45,241	1,012	117,655
28	**SCRAP**	-	-	-	-	-	-	-	-
29	**ELECT**	0	-	-	0	0	-	-	0
30	**GASPR**	0	0	0	0	0	0	0	0
31	**WATPR**	-	-	-	-	-	-	-	-
32	**CONST**	65,902	46,364	9,365	121,630	65,902	46,364	9,365	121,630
33	**FTNSP**	-	-	-	-	-	-	-	-
34	**TLCOM**	28,339	-	-	28,339	28,343	-	-	28,343
35	**TRADE**	-	-	-	-	-	-	-	-
36	**RSTNT**	113,723	13,251	2,677	129,651	113,723	13,251	2,677	129,651
37	**PTNSP**	135,245	1,040	210	136,494	135,245	1,040	210	136,494
38	**FNCIN**	55,647	14,016	2,831	72,494	55,647	14,016	2,831	72,494
39	**RLEST**	-	-	-	-	-	-	-	-
40	**SOCSV**	378,213	35,891	7,250	421,354	378,213	35,891	7,250	421,354
41	**HLTSV**	36,476	308	62	36,846	36,476	308	62	36,846
42	**EDCLT**	54,615	310	87	55,012	55,071	310	87	55,468
43	**SCRES**	-	-	-	-	-	-	-	-
44	**GTCSV**	-	-	-	-	-	-	-	-
45	**PUBAD**	31,527	-	-	31,527	31,527	-	-	31,527
	Total	18,233,655	8,459,562	2,186,962	28,880,178	18,829,613	8,459,562	2,186,962	29,476,136

Source: GTAP Version V combined with NBS/WB data.

Table: Imports from NIE into China by Type of Firm, 1997

(all figures in 1997 USD)

12	**WAPLT**	83,790	23,805	30	107,626	87,927	23,805	30	111,762
13	**WOODP**	96,439	25,292	6,700	128,431	99,644	25,292	6,700	131,636
14	**PAPPB**	198,524	68,120	3,486	270,130	205,582	68,120	3,486	277,188
15	**REFOL**	424,578	67,654	10,656	502,888	429,537	67,654	10,656	507,847
16	**CHEMC**	923,205	484,103	13,029	1,420,337	960,142	484,103	13,029	1,457,274
17	**NMTMN**	192,275	39,940	14,648	246,863	200,723	39,940	14,648	255,311
18	**IRNST**	887,350	598,281	93,910	1,579,541	907,516	598,281	93,910	1,599,708
19	**MFPRD**	91,257	32,749	32,188	156,194	94,680	32,749	32,108	159,538
20	**MCHEQ**	422,570	106,368	497,831	1,026,769	445,161	106,368	497,831	1,049,361
21	**MTVEH**	278,499	165,962	14,119	458,580	286,581	165,962	14,119	466,662
22	**TRTEQ**	81,299	6,541	6,291	94,131	85,322	6,541	6,291	98,155
23	**ELEEQ**	206,191	68,867	32,788	307,846	215,058	68,867	32,788	316,713
24	**ELTEQ**	1,923,522	1,842,432	102,528	3,868,482	1,984,820	1,842,432	102,528	3,929,780
25	**INSTR**	399,759	141,540	69,958	611,257	417,730	141,540	69,958	629,228
26	**EQREP**	-	-	-	-	-	-	-	-
27	**OTHMN**	16,132	11,241	251	27,625	17,742	11,241	251	29,235
28	**SCRAP**	-	-	-	-	-	-	-	-
29	**ELECT**	0	-	-	0	0	-	-	0
30	**GASPR**	0	0	0	0	0	0	0	0
31	**WATPR**	-	-	-	-	-	-	-	-
32	**CONST**	7,388	5,198	1,050	13,635	7,388	5,198	1,050	13,635
33	**FTNSP**	-	-	-	-	-	-	-	-
34	**TLCOM**	11,597	-	-	11,597	11,599	-	-	11,599
35	**TRADE**	-	-	-	-	-	-	-	-
36	**RSTNT**	66,715	7,773	1,570	76,058	66,715	7,773	1,570	76,058
37	**PTNSP**	31,668	243	49	31,960	31,668	243	49	31,960
38	**FNCIN**	16,293	4,104	829	21,226	16,293	4,104	829	21,226
39	**RLEST**	-	-	-	-	-	-	-	-
40	**SOCSV**	195,912	18,591	3,755	218,258	195,912	18,591	3,755	218,258
41	**HLTSV**	21,398	181	37	21,615	21,398	181	37	21,615
42	**EDCLT**	32,039	182	51	32,272	32,307	182	51	32,540
43	**SCRES**	-	-	-	-	-	-	-	-
44	**GTCSV**	-	-	-	-	-	-	-	-
45	**PUBAD**	8,201	-	-	8,201	8,201	-	-	8,201
	Total	10,696,517	4,700,381	910,002	16,306,900	10,979,752	4,700,381	910,002	16,590,135

Source: GTAP Version V combined with NBS/WB data.

13	**WOODP**	361,115	94,705	25,087	480,907	373,115	94,705	25,087	492,907
14	**PAPPB**	1,170,868	401,764	20,559	1,593,192	1,212,494	401,764	20,559	1,634,817
15	**REFOL**	51,050	8,135	1,281	60,466	51,646	8,135	1,281	61,062
16	**CHEMC**	3,637,416	1,907,359	51,334	5,596,109	3,782,946	1,907,359	51,334	5,741,639
17	**NMTMN**	93,659	19,455	7,135	120,249	97,774	19,455	7,135	124,364
18	**IRNST**	798,011	538,046	84,455	1,420,513	816,147	538,046	84,455	1,438,649
19	**METPR**	600,753	215,590	211,369	1,027,711	623,287	215,590	211,369	1,050,246
20	**MCHEQ**	2,209,471	556,162	2,602,991	5,368,624	2,327,595	556,162	2,602,991	5,486,748
21	**MTVEH**	265,325	158,112	13,451	436,888	273,025	158,112	13,451	444,588
22	**TRTEQ**	507,563	40,836	39,279	587,678	532,684	40,836	39,279	612,799
23	**ELEEQ**	1,209,099	403,831	192,268	1,805,199	1,261,095	403,831	192,268	1,857,194
24	**ELTEQ**	1,729,861	1,656,936	92,206	3,479,003	1,784,988	1,656,936	92,206	3,534,130
25	**INSTR**	359,512	127,290	62,914	549,716	375,673	127,290	62,914	565,877
26	**EQREP**	-	-	-	-	-	-	-	-
27	**OTHMN**	324,001	225,771	5,049	554,821	356,333	225,771	5,049	587,154
28	**SCRAP**	-	-	-	-	-	-	-	-
29	**ELECT**	274	-	-	274	275	-	-	275
30	**GASPR**	0	0	0	0	0	0	0	0
31	**WATPR**	-	-	-	-	-	-	-	-
32	**CONST**	30,523	21,474	4,337	56,334	30,523	21,474	4,337	56,334
33	**FTNSP**	-	-	-	-	-	-	-	-
34	**TLCOM**	89,304	-	-	89,304	89,320	-	-	89,320
35	**TRADE**	-	-	-	-	-	-	-	-
36	**RSTNT**	59,998	6,991	1,412	68,401	59,998	6,991	1,412	68,401
37	**PTNSP**	186,307	1,432	289	188,029	186,307	1,432	289	188,029
38	**FNCIN**	84,434	21,267	4,296	109,997	84,434	21,267	4,296	109,997
39	**RLEST**	-	-	-	-	-	-	-	-
40	**SOCSV**	751,711	71,334	14,409	837,454	751,711	71,334	14,409	837,454
41	**HLTSV**	19,244	163	33	19,439	19,244	163	33	19,439
42	**EDCLT**	28,814	163	46	29,023	29,054	163	46	29,264
43	**SCRES**	-	-	-	-	-	-	-	-
44	**GTCSV**	-	-	-	-	-	-	-	-
45	**PUBAD**	47,007	-	-	47,007	47,007	-	-	47,007
	Total	17,839,607	7,906,537	3,437,487	29,183,630	18,531,297	7,906,537	3,437,487	29,875,321

Table: Imports from USA into China by Type of Firm, 1997

(all figures in 1997 USD)

Source: GTAP Version V combined with NBS/WB data.

Table: Imports from EU into China by Type of Firm, 1997

(all figures in 1997 USD)

13 **WOODP**	151,949	39,850	10,556	202,355	156,999	39,850	10,556	207,405
14 **PAPPB**	809,174	277,655	14,208	1,101,037	837,941	277,655	14,208	1,129,804
15 **REFOL**	336,088	53,553	8,435	398,076	340,013	53,553	8,435	402,001
16 **CHEMC**	3,543,680	1,858,207	50,011	5,451,898	3,685,460	1,858,207	50,011	5,593,678
17 **NMTMN**	79,929	16,603	6,089	102,621	83,441	16,603	6,089	106,133
18 **IRNST**	771,299	520,036	81,628	1,372,964	788,828	520,036	81,628	1,390,493
19 [illegible]	[illegible]	204,090	200,094	[illegible]	[illegible]	204,090	200,094	994,226
20 **MCHEQ**	1,813,927	456,597	2,136,997	4,407,520	1,910,903	456,597	2,136,997	4,504,497
21 **MTVEH**	122,622	73,073	6,216	201,911	126,181	73,073	6,216	205,470
22 **TRTEQ**	647,662	52,108	50,121	749,891	679,716	52,108	50,121	781,945
23 **ELEEQ**	878,322	293,354	139,669	1,311,345	916,093	293,354	139,669	1,349,116
24 **ELTEQ**	1,671,957	1,601,473	89,119	3,362,549	1,725,238	1,601,473	89,119	3,415,831
25 **INSTR**	347,478	123,029	60,808	531,315	363,098	123,029	60,808	546,935
26 **EQREP**	-	-	-	-	-	-	-	-
27 **OTHMN**	173,763	121,082	2,708	297,553	191,103	121,082	2,708	314,893
28 **SCRAP**	-	-	-	-	-	-	-	-
29 **ELECT**	861	-	-	861	865	-	-	865
30 **GASPR**	1	0	0	1	1	0	0	1
31 **WATPR**	-	-	-	-	-	-	-	-
32 **CONST**	156,347	109,994	22,218	288,559	156,347	109,994	22,218	288,559
33 **FTNSP**	-	-	-	-	-	-	-	-
34 **TLCOM**	96,784	-	-	96,784	96,801	-	-	96,801
35 **TRADE**	-	-	-	-	-	-	-	-
36 **RSTNT**	57,990	6,757	1,365	66,111	57,990	6,757	1,365	66,111
37 **PTNSP**	362,404	2,786	563	365,753	362,404	2,786	563	365,753
38 **FNCIN**	133,115	33,528	6,772	173,416	133,115	33,528	6,772	173,416
39 **RLEST**	-	-	-	-	-	-	-	-
40 **SOCSV**	1,234,327	117,133	23,660	1,375,120	1,234,327	117,133	23,660	1,375,120
41 **HLTSV**	18,600	157	32	18,789	18,600	157	32	18,789
42 **EDCLT**	27,849	158	44	28,051	28,082	158	44	28,284
43 **SCRES**	-	-	-	-	-	-	-	-
44 **GTCSV**	-	-	-	-	-	-	-	-
45 **PUBAD**	82,966	-	-	82,966	82,966	-	-	82,966
Total	16,429,891	7,250,030	2,914,624	26,594,546	17,037,864	7,250,030	2,914,624	27,202,519

Source: GTAP Version V combined with NBS/WB data.

Table: Imports from ROW into China by Type of Firm, 1997

(all figures in 1997 USD)

12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	**WOODP**	75,059	19,685	5,214	99,959	77,554	19,685	5,214	102,453
14	**PAPPB**	611,454	209,810	10,737	832,001	633,192	209,810	10,737	853,738
15	**REFOL**	1,265,986	201,727	31,773	1,499,486	1,280,771	201,727	31,773	1,514,271
16	**CHEMC**	2,990,136	1,567,943	42,199	4,600,278	3,109,769	1,567,943	42,199	4,719,911
17	**NMTMN**	64,360	13,369	4,903	82,632	67,188	13,369	4,903	85,460
18	**IRNST**	801,264	540,239	84,800	1,426,303	819,474	540,239	84,800	1,444,512
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	166,117	162,864	809,238
20	**MCHEQ**	1,204,780	303,264	1,419,358	2,927,401	1,269,190	303,264	1,419,358	2,991,811
21	**MTV[illegible]**	169,658	101,102	8,601	279,361	174,581	101,102	8,601	284,285
22	**TRTEQ**	814,542	65,534	63,035	943,111	854,856	65,534	63,035	983,425
23	**ELEEQ**	413,407	138,075	65,739	617,221	431,185	138,075	65,739	634,999
24	**ELTEQ**	1,736,912	1,663,689	92,581	3,493,182	1,792,263	1,663,689	92,581	3,548,534
25	**INSTR**	360,977	127,809	63,171	551,956	377,204	127,809	63,171	568,183
26	**EQREP**	-	-	-	-	-	-	-	-
27	**OTHMN**	94,130	65,592	1,467	161,189	103,524	65,592	1,467	170,583
28	**SCRAP**	-	-	-	-	-	-	-	-
29	**ELECT**	1,063	-	-	1,063	1,068	-	-	1,068
30	**GASPR**	0	0	0	1	1	0	0	1
31	**WATPR**	-	-	-	-	-	-	-	-
32	**CONST**	54,145	38,093	7,694	99,933	54,145	38,093	7,694	99,933
33	**FTNSP**	-	-	-	-	-	-	-	-
34	**TLCOM**	53,522	-	-	53,522	53,532	-	-	53,532
35	**TRADE**	-	-	-	-	-	-	-	-
36	**RSTNT**	60,242	7,019	1,418	68,679	60,242	7,019	1,418	68,679
37	**PTNSP**	207,978	1,599	323	209,900	207,978	1,599	323	209,900
38	**FNCIN**	108,098	27,227	5,500	140,825	108,098	27,227	5,500	140,825
39	**RLEST**	-	-	-	-	-	-	-	-
40	**SOCSV**	1,001,111	95,002	19,189	1,115,302	1,001,111	95,002	19,189	1,115,302
41	**HLTSV**	19,322	163	33	19,518	19,322	163	33	19,518
42	**EDCLT**	28,931	164	46	29,141	29,173	164	46	29,383
43	**SCRES**	-	-	-	-	-	-	-	-
44	**GTCSV**	-	-	-	-	-	-	-	-
45	**PUBAD**	52,377	-	-	52,377	52,377	-	-	52,377
	Total	15,933,353	7,266,886	2,095,153	25,295,393	16,517,076	7,266,886	2,095,153	25,879,116

Source: GTAP Version V combined with NBS/WB data.

3.6. Reconciliation of the Macro and detailed SAM Tables

The final stage of SAM estimation always focuses on numerical and statistical reconciliation. Because of the great diversity of data sources used in any SAM, even when relying exclusively official data, numerical inconsistencies inevitably arise when the final table is assembled.[8] Putting all the above data sub-matrices into their corresponding positions in detailed SAM will give us an initial detailed SAM matrix. While the Macro SAM entries were used to decompose many of the sub-matrices, the detailed row and column totals cross many of these macro constraints and may not be consistent. A simple algebraic (RAS) balancing of the detailed row and column totals can be done, but this in turn will not be consistent with the Macro SAM matrix sub-totals.

For these reasons, we completed the 1997 China SAM estimation procedure by using a nonlinear statistical technique, maximum entropy methods, to reconcile the detailed with both Macro SAM and row-column controls. The resulting 145x145 table is presented in Annex 1.

[8] See Reinert and Roland-Holst (1997) for more on this important practical issue.

4. References

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