

Social Accounting Matrix for India¹

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Abstract

This paper provides the latest SAM for Indian economy with wide variety of disaggregation for Energy sector and sectors that are relevant for environmental and climate policy evaluation. Social accounting matrix (SAM) for India 2003-04 shows the interaction between production, income, consumption and capital accumulation. It can be used to provide an analysis of the interrelationship between the production structure of an economy and the distribution of incomes and expenditures of different household groups. It shows 9 household groups and can be used as basic data base for CGE modeling of the Indian economy. This SAM consists of 36 sectors of the economy, 3 factors of production and 9 categories of occupational households. Indian economy is becoming structurally biased towards capital intensive sectors like service and energy production. Most energy intensive sector is the energy production sector itself followed by transport and manufacturing as of 2003-2004.

Key words: SAM, India, Climate sensitive sectors, CGE model, Energy intensity, energy consumption by household category

Social Accounting Matrix for India

1. Introduction

Social accounting matrix (SAM) is a technique related to national income accounting, providing a conceptual basis for examining both growth and distributional issues within a single analytical framework in an economy. It can be seen a means of presenting in a single matrix the interaction between production, income, consumption and capital accumulation.

There is only one fundamental law of economics: for every income there is corresponding outlay or expenditure. It plays a similar role in defining the completeness of a model or analytic formulation: no theory or model can be correct unless it is complete in the sense that all incomes and outlays are accounted for. A social accounting matrix, or SAM, is a simple and efficient way of representing this fundamental law.

A social accounting matrix is simply defined as a single entry accounting system whereby each macroeconomic account is represented by a column for outgoings (payments) and a row for incomings" (receipts) (Round, 1981a:). It is represented in the form of a square matrix with rows and columns, which brings together data on production and income generation as generated by different institutional groups and classes, on the one hand, and data about expenditure of these incomes by them on the other. In a SAM, incomings are indicated as receipts for the row accounts in which they are located and outgoings are indicated as expenditure for their column accounts. Since all incomings must be, in a SAM, accounted for by total outgoings, the total of rows and columns must be equal for a given account. Taylor (1983) sees the SAM as a tabular presentation of the accounting identities, stating that incomings must be equal to outgoings for all sectors of the economy.

SAM is a data system, including both social and economic data for an economy. The data sources for a SAM come from input-output tables, national income statistics, and

household income and expenditure statistics. Therefore, a SAM is broader than an input-output table and typical national account, showing more detail about all kinds of transactions within an economy. However, an input-output table records economic transactions alone irrespective of the social background of the transactors. A SAM, on the contrary the national accounts, "... attempts to classify various institutions to their socio-economic backgrounds instead of their economic or functional activities" (Chowdhury & Kirkpatrick, 1994:58).

At this point, it would be good to describe the various components of a hypothetical SAM in a schematic diagram as shown in Table 1. As this table shows, the receipts of the production account are from the intermediate demand and final demand consisting of expenditures of households and government, investment and net exports (export minus imports). The cost of production includes gross value added and indirect taxes. The inter-industry flows are presented by A11 in the Table 1. The IO flow table however, does not show the interrelationships between value added and expenditures. By extending an IO flow table, one captures the entire circular flow of income at macro level as shown in the various accounts in Table 1.

As Table 1 shows that there are 4 agents in our model economy, namely, the households, the private corporate, the public non-departmental enterprises and the government. This table indicates that the factor incomes generated through production process (A21) are transferred to institutions according to the ownership of their factors of production (A32, A42, A52, and A62). In addition, a household gets its income from current transfers from the government as well as from interest on public debt (A36) and the net current transfers from the rest of the world (A39). The households spend on consumption of goods and services (A13), and pay income taxes (A63) and indirect taxes on purchase (A73) and they keep the residual income as savings (A83).

The income of the private corporate sector comes from its operating profit (A42) and interest on holding public debt (A46). After payment of corporate tax (A64), the residual is its saving (A84).

The receipts and expenditures of the other two institutions, public-non-departmental enterprises and government administration including departmental enterprises, are specified in this table. The income of the first category is only the operating surplus (A52), which is also its saving (A85). The receipts of the government consists of income from its entrepreneurship (A62), direct taxes of the households and private corporations (A63, A64), the total indirect taxes of the economy (A67) and the net capital transfer from rest of the world (A69). On the other hand, its outlay includes its final consumption expenditure on goods and services (A16), transfers and interest payments to households (A36) and interest payments to private corporate sector (A46).

The receipts of the capital account are from the net savings of the different institutions (A83, A84, A85 and A86), foreign savings (A89) and depreciation (A82). The expenditure is equal to gross domestic capital formation (A18) and indirect taxes paid on purchases of the investment goods (A78).

The rest of the world (ROW) represents the equality between foreign exchange expenditures on one the hand and foreign exchange earnings on the other.²

² Note: Foreign exchange expenditure = Imports (A91).

Foreign exchange earnings = Exports (A19) + net factor income from abroad (A29) + net current transfers (A39) + net capital transfer (A69) + net export taxes (A79) + foreign savings (A89).

Table 1: A schematic Social Accounting Matrix (SAM) for India.

Expenditures									
Receipts	Production Account	Factors of Production	Households	Private Corporate	Public Non-Departmental	Government	Indirect Taxes	Capital Account	Rest of the World (ROW)
Production Account	Input-Output Table A11		Private consumption A13			Govt. Consumption A16		Investment A18	Exports A19
Factors of Production	Value added (VA) A21								Net factor Income A29
Households		VA income A32				Govt. transfers, interest on debt A36			Net Current Transfers A39
Private Corporate		Operating Profits A42				Interest on Debt A46			
Public Non-Departmental		Operating Surplus A52							
Government		Income from Entrepreneurship A62	Income and Wealth taxes A63	Corporate Taxes A64			Total indirect taxes A67		Net Capital Transfer A69
Indirect Taxes	Taxes on intermediate A71		Taxes on purchases A73			Taxes on purchases A76		Taxes on investment goods A78	Taxes on exports A79
Capital Account		Depreciation A82	Households Savings A83	Corporate Savings A84	Public non-departmental Savings A85	Government savings A86			Foreign Savings A89
Rest of the World (ROW)	Imports A91								

Application of SAM

It is clear from above discussion that, a SAM depicts the entire circular flow of income for an economy in a (square) matrix format. It shows production leading to the generation of incomes which, in turn, are allocated to institutional sectors. In addition, it shows the redistribution of income leading to disposable income of institutional sectors. These incomes are either spent on products or saved. Expenditures by institutions lead to production by domestic industries as well as supply from imports. Hence the format given in Table 1 identifies who pays, how much is paid, and to whom the payment is made. Hence, a SAM can be used to provide an analysis of the interrelationship between the production structure of an economy, and the distribution of incomes and expenditures of different household groups.

Another advantage of a SAM is that it can use a disaggregated household sector when it is used for modeling the impact of exogenous changes on the system. Unlike a closed input-output model that uses a simple household sector, a SAM is capable of modeling inter-sectoral impacts that incorporates a complex household sector with different types of households (e.g. households with different occupation) displaying different induced expenditure patterns. Theory suggests that an inter-industry analysis, which omits these considerations, can be seriously misleading.³

Last but not least, a SAM can be used as the database of Computable General Equilibrium (CGE) Models. Nowadays these models are widely used to analyse the impact on economy of a range of policy issues, such as trade liberalisation policies, fiscal issues, various modes of taxation, structural adjustment programmes, impact assessment studies, and environmental policy and negotiation related studies etc.

³ See Roland Holst (1990), p 125.

Review of Indian Literature of SAM

India was an early leader in SAM based model. To our best knowledge, Sarkar and Subbarao (1981) of National Council of Applied Economic Research (NCAER) constructed the first SAM for India was back in the 1980s, which provided the consistent database for their CGE model. Subsequently a number of SAMs were constructed over the years by the different researchers. Table 2 gives a brief outline of these SAM and their salient features.

Table 2: Stylized Facts of SAMs of India.

Serial No.	Name of researchers and their SAM based study	Salient Features of SAM.
1.	Sarkar, H. and Subbarao, (1981).	Base year: 1979-80. Sectors (3 in all): agriculture, industry and services. Agents: non-agricultural wage income class, non-agricultural non-wage income class, agricultural income class, and government.
2.	Sarkar, H. and M. Panda, (1986).	Base year: 1983-84. Sectors (6 in all): agriculture (2), industry (2), infrastructure and services. Agents: non-agricultural wage income class, non-agricultural non-wage income class, agricultural income class, and government.
3.	Bhide, S. and S, Pohit. (1993).	Base year: 1985-86. Sectors (6 in all): agriculture (2), livestock & forestry, industry (2), infrastructure and services. Agents: government, non-agricultural wage income earners, non-agricultural profit income earners, and agricultural income earners.
4.	Pradhan, B. and A. Sahoo, (1996).	Base year: 1989-90. Sectors (8 in all): agriculture (2), mining and quarrying, industry (2), construction, electricity combined with water and gas distribution, and services (3). Agents: government, agricultural self-employed, agricultural labour, and non-agricultural self-employed and other labour.
5.	Pradhan, B. Sahoo, A. and M.R. Saluja, (1999).	Base year: 1994-95. Sectors (60 in all): agriculture (4), livestock products (2), forestry sector, mining (4), manufacturing (27), machinery and equipment (6), construction, electricity, transport (2), gas and water supply, other services (11). Agents: government, self employed in agriculture (rural & urban), self employment in non-agriculture (rural & urban), agricultural wage earners (rural & urban), other households (rural & urban), private corporate, and public non-departmental enterprises.
6.	Pradhan, B. K. M.R. Saluja and S. K. Sing (2006).	Base year: 1997-98. Sectors (57 in all): agriculture (4), livestock products (2), forestry, mining, manufacturing (27), machinery and equipment (6), construction, electricity, transport (2), gas and water supply, other services (11). Agents: government, self employed in agriculture (rural & urban), self employment in non-agriculture (rural & urban), agricultural wage earners (rural & urban), other households (rural & urban), private corporate, and public non-departmental enterprises.
7.	Sinha, A. Siddiqui. K.A, and Munjal. P (2007).	Base year: 1999-2000. Sectors (13 in all): agriculture (informal), formal manufacturing (9), construction (informal), other services (formal & informal), and government service. Agents: casual labour (rural & urban), regular wage earner (rural & urban), own account worker (rural & urban), employer (rural & urban), and government.
8.	M.R.Saluja and Yadav.B (2006),.	Base year: 2003-04. Sectors (73 in all): agriculture (12), livestock products (4), forestry, mining (4), manufacturing (28), machinery and equipment (7), construction, energy, gas distribution, water supply, transport (2), other services (10). Agents: 5 rural households' expenditure classes, 5 urban households expenditure classes, private corporation, public enterprises and government.

It is clear from the Table 2 that the SAMs constructed before 1996 were highly aggregated in nature and most of them have three households classes. Not only that, these SAMs are quite old and their socio-economic classifications are based on data for the 1970. To some extent, SAM constructed in the post 1996 period addressed these shortcomings.

A lacuna of the constructed SAMs of India is the aggregate treatment of energy sectors. For example, in the SAM constructed by Pradhan and Saluja (2003), the electricity sector is modeled as a single entity. Thus, the above SAMs do not reveal us the cost structure of different forms of electricity, viz. nuclear, hydro, non-hydro etc. According to Plan document, biomass constitutes nearly 30 percent of primary energy supply in India.⁴ However, in the existing SAMs, biomass is embedded in the agriculture, livestock, forestry, food and beverages industry and paper industry sectors.

Our interest in SAM is for constructing an environment related CGE model for India. Given the lacunae of the existing SAMs as mentioned earlier, it is clear that the above SAMs are not suitable for our purpose. In this context we plan to construct a detailed SAM for India, which can be used as the consistent database for our CGE model. The same SAM may be used by other researchers for constructing SAM based models for analysing policy related issues in the area of environment. After looking at the data availability, our need, and time constraint, we have decided to construct a SAM for the Indian economy for the year 2003-04. This SAM consists of 36 sectors of the economy, 3 factors of production and 9 categories of occupational households. The description of the sectors of our SAM and its concordance map with 130 sectors of IO flow table are shown in Table 3.

Table 3: Mapping between SAM sectors and sectors of IO flow Table

⁴ See Planning Commission (2003), pp 923.

Serial No.	Sector Code	Sectors for SAM	Sectors of IO flow table
1	PAD	Paddy Rice	1
2	WHT	Wheat	2
3	CER	Cereal, Grains etc, other crops	Part of (3-7,18,19, 20)
4	CAS	Cash crops	8,9,10-17
5	ANH	Animal husbandry & prod.	Part of (21, 22, 23, 24)
6	FOR	Forestry	Part of 25
7	FSH	Fishing	26
8	COL	Coal	27
9	OIL	Oil	29
10	GAS	Gas	28
11	MIN	Minerals n.e.c.	30-37
12	FBV	Food & beverage	Part of (38-45)
13	TEX	Textile & Leather	46-54, 59, 60
14	WOD	Wood	56
15	PET	Petroleum & Coal Prod.	63,64
16	CHM	Chemical, Rubber & Plastic prod.	58,61,62,65,66, 69-73
17	PAP	Paper & Paper prod.	Part of 57
18	FER	Fertilizers & Pesticides	67,68
19	CEM	Cement	75
20	IRS	Iron & Steel	77,78, 79
21	ALU	Aluminum	80
22	OMN	Other manufacturing	55, 74, 76, 81, 82, 95-105
23	MCH	Machinery	83-94
24	HYD	Hydro	107
25	NHY	Thermal	107
26	NUC	Nuclear	107
27	BIO	Biomass	Part of (3-7,18,19, 20), Part of (21, 22, 23, 24), Part of 25, Part of (38-45), Part of 57
28	WAT	Water	108
29	CON	Construction	106
30	RTM	Road Transport motorised	110, 113
31	RNM	Road Transport non motorised	110, 113
32	RLY	Rail Transport	109, 113
33	AIR	Air Transport	112, 113
34	SEA	Sea Transport	111, 113
35	HLM	Health & medical	122
36	SER	All other services	114-121, 123, 124-126, 127-130

Note: The description of 130 sectors of IO flow table is given in Appendix I.

As Table 3 shows, some of the sectors of this SAM match with the sectors of the same constructed by Pradhan and Saluja (2003). The important aspect of our SAM is the decomposition

of electricity sector into three separate energy sectors viz. hydro, nuclear and non-hydro. The non-hydro energy sector includes thermal, wind power, solar energy, etc. However given India's energy balance, thermal is the main constituent of this group.⁵ Another salient feature of this SAM is the incorporation of biomass as a sector. The biomass is an alternative source of commercial and domestic fuel. On the other hand the transport sector has also been decomposed in our SAM into 5 transport services sectors viz. road transport motorised, road transport non-motorised, rail transport, water transport, and air transport.

We have considered 4 economic agents in our proposed SAM viz. households, government, public non-departmental enterprises, and private corporate. Moreover, the households sector is decomposed into 9 occupational households group. This household's classification is based on the household's classification given by National Sample Survey Organisation (NSSO).⁶ Thus our SAM consists of 12 economic agents. The description of these 12 economic agents is given in Table 4.

Table 4: Description of Economic Agents

Agent code	Description
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⁵ In future, we will plan to decompose it further

⁶ See NSSO (2000-01), Households Consumption Expenditure on Various Commodities, pp A-20.

RNASE	Rural non-agricultural self employed
RAL	Rural agricultural labour
ROL	Rural other labour
RASE	Rural agricultural self employed
ROH	Rural other households
USE	Urban self employed
USC	Urban salaried class
UCL	Urban casual labour
UOH	Urban other households
PVT	Private corporate
PUB	Public non-departmental enterprises
GOV	Government

Following this introductory section, section 2 describes the methodology of construction of SAM. The aggregation of IO flow table is discussed in section 3. The section 4 deals with the extension of IO flow table and finally, section 5 provides concluding remarks.

2. Methodology of Construction of SAM

The core of a SAM is an input-output table. The Central Statistical Organisation (CSO) has prepared 130 sectors commodity X commodity inter-industry flow matrix, make matrix and absorption matrix for the year 2003-04. Since we have made an attempt to construct a SAM in a commodity X commodity framework for the year 2003-04, we have used the inter-industry flow (IO flow) matrix to serve our purpose.

But the concordance map (shown in Table 3) of our sectors with the 130 sectors of IO flow table indicates that sectors like biomass, hydro electricity, nuclear electricity, non-hydro electricity, road transport mechanised, and road transport non-mechanised do not have a one to one mapping with 130 sectors. To complete our exercise we need to construct rows and columns for these sectors. The procedure is given below.

2.1. Expansion of electricity sector (hydro, non-hydro and nuclear)

The Hydro Electricity Corporation of India (HECI) and Nuclear Power Corporation of India (NPCI) published their annual accounts for every year. The informations from these have been used to construct the columns of hydro and nuclear electricity sectors. Once we get the column of hydro and nuclear electricity sectors, we subtract them from aggregate electricity sector to obtain the column of non-hydro electricity sector. Thus we get the total output (i.e. column sum) of each electricity sector and their corresponding share with aggregate electricity sector's output. We apply this share to the row of aggregate electricity sector to obtain the rows of these electricity sectors separately.

2.2. Construction of Biomass sector

The biomass supplies originate in a) agricultural residuals b) animal husbandry residual c) fire wood d) food & beverages industry residuals and e) paper & paper industry residuals. According to CSO (1989), only the 5 percent of agricultural residuals are taken as biomass and rests of the part are considered to be consumed by the entire livestock population.⁷

The use of biomass can be divided into two parts viz. non-commercial purpose and commercial purpose. Non-commercial biomass is mainly used as cooking fuels, which comes from agriculture, animal husbandry and forestry sectors. On the other hand, commercial biomass use has two parts viz. commercial non-modern biomass use and modern biomass use. The commercial non-modern biomass use considers the use of charcoal and commercial fuel wood and these are available from forestry sector. The paper and sugar industry are the main contributors of modern biomass. This modern biomass is used mainly for biofuels. Apart from this the biomass can also be used for the production of chemicals, plastic, as well as reducing agent for steel production (charcoal) and for construction purpose.

Now the data on agricultural residuals, animal husbandry residuals and firewood are available from National Accounts Statistics (NAS) of India. On the other hand the Annual Survey

⁷ See CSO (1989), National Accounts Statistics India, p 45.

of Industries (ASI) gives the data on commercial non-modern biomass use as well as modern biomass use statistics for the year 2000-01. We use ASI data on biomass use to obtain total biomass output originating from industries for the year 2000-01. Again, this industrial biomass is mainly originated from paper industry and food and beverages industry. We use their ratio of output of the year 2000-01 to split up this industrial biomass according to their origin. To obtain the industrial biomass output for the year 2003-04 we first estimate the share of paper and food and beverages industries in biomass production and apply this to their total output of the year 2003-04. Thus we get the total biomass output of the year 2003-04.

Once we have derived total output data on biomass, we need to estimate its row and column. But, as there is no available data on input structure of biomass sector, it is very difficult to make a column of this sector. In this case we have considered these 5 types of residual viz. agricultural residual, animal husbandry residual, firewood, food and beverages industry residuals and paper industry residuals as by products of their mother sectors and apply the input structure of their mother sector to these by-products.⁸

To make a row of biomass sector, we first make separate rows for the agricultural residuals, animal husbandry residuals, firewood, and industrial residuals. As we mentioned earlier, the agricultural and animal husbandry residuals are mainly used as cooking fuel. But in the agricultural production process, these residuals are also used as organic fertiliser. So we distribute these residuals into the agriculture related sectors on the basis of the rows of their mother sectors and the rest of the part is treated as Private Final Consumption Expenditure (PFCE). Since the firewood is mainly used as cooking fuel, we have treated the fire wood output as PFCE. As the industrial biomass use statistics for the year 2000-01 is available from the ASI, we use this ratio to distribute the industrial biomass output of the year 2003-04.

⁸ See Pradhan, Saluja and Sing (2006), p 141-143.

The point to be noted is that these residuals are included under their corresponding mother sectors described in IO flow table 2003-04. So after obtaining the columns and rows of these residuals, we have subtracted them from the columns and rows of their corresponding mother sectors to obtain the independent rows and columns of these residuals. At last, we add up these columns and rows to get a column and row of biomass sector.

2.3. Expansion of transport service sector

The transport service comprises of transport activities and services incidental to transport. The IO flow table 2003-04 includes 4 transport activities viz. lands transport, railway, water, and air transport. On the other hand the lands transport sector has been broken up into two road transport sectors in our SAM and they are viz. mechanised road transport and non-mechanised road transport sectors. . So to complete the expansion of IO flow table we have to break up the land transport activity of IO flow table 2003-04 into mechanised road transport and non-mechanised road transport activities. The relevant data sources and the procedure followed by us are given below.

The mechanised road transport includes buses, trucks, taxies, auto rikshaws and tramways. The total material consumption of mechanised road transport is estimated separately for public and private sectors. For the public sector undertakings, input structure is estimated by analysing the annual reports of State Road Transport Corporations and Budget Documents of Centre, States and Local bodies. As regards private sector, material consumption is estimated separately for passenger and freight traffic. The input cost and item-wise details of the inputs are estimated separately on the basis of norms obtained from the results of the latest Enterprise Survey (ES) 1993-94. The column of mechanised road transport activities thus obtained is subtracted from the road transport activity's column of IO flow table 2003-04 to obtain the column of non-mechanised road transport activity.

Our next task is to construct the rows of these two road transport activities. To do this we estimate the output share of each road transport activities in total land transport activity's output. Using this share to the land transport activity's row of IO flow table 2003-04 we obtain the different rows of mechanised and non-mechanised road transport activities.

The services incidental to transports described in IO flow table 2003-04 comprises of packing, crating, operations of travel agencies etc. These services are associated with shipping, air, railways and mechanised road transport. In our SAM there is no separate account of this sector rather it has been merged with sea, air, railways and mechanised road transport sectors. Therefore we have to break-up the row and column of this services incidental to transport sector according to transport activities in which these services are associated. To do this we have applied the share of output of each transport sector to the row and column of this services incidental to transport sector. The rows and columns thus obtained are added to the row and column of sea, air, railways and mechanised road transport sectors and hence we get the five transport sectors exactly match with transport sectors described in our SAM.

3. Aggregation of IO flow table

After expanding the 130 sectors IO flow table 2003-04 we obtain a 134 sectors IO flow table of India for the same year.⁹ According to our sectoral scheme we aggregate the 134-sector IO flow table to obtain 36 sector IO flow table. The next step is to extend the accounts of 36 sector IO flow table into accounts for the 36 sectors SAM. This involves primarily decomposition of gross value added into depreciation, wage and non-wage income, and of PFCE and personal income into economic categories of households which is given in the following section.

4. Extension of IO flow table to SAM

This section deals with the methodology and the data sources for the decomposition of gross value added into depreciation, wage and non-wage income. The PFCE and personal

⁹ To be specific, the added four new sectors are hydro electricity, nuclear electricity, road transport non-motorised and biomass.

incomes are divided into households according to their occupation. The other relevant accounts for the SAM are also discussed in this section.

4.1. Decomposition of Gross value added into depreciation, Wage and Non-Wage Income

The decomposition of gross value added into wage (including imputed) and non-wage income (capital income) has been done for 36 sectors of the economy for 2003-04. The sources of data and methods used are given below by broad sectors of our SAM.

4.1.1. Agriculture and Allied Activities (Sectors 1 to 7 of SAM)

The aggregate Net Value Added (NVA) for agriculture, forestry and fishing sector is available from NAS. We first calculate the net value added (NVA) separately for these sectors by using the depreciation to Gross Value Added (GVA) ratio for the entire agricultural sector, as available from the NAS. As we have considered 4 sectors under agriculture and an animal husbandry sector as separate activity in our SAM, we divide the aggregate NVA of agricultural sector into these five sectors on the basis of above-mentioned method. The NAS also gives the breakdown of the NVA into compensation to employees (CE) and operating surplus/mixed income. The Central Statistical Organisation (CSO) divides the mixed income under the unorganised part of agriculture and animal husbandry sectors into the income of family labour and operating surplus for 1980-81 to 1989-90. We use the proportion of 1989-90 to disaggregate the mixed income of 2003-04 into the above two categories. The wage income due to family labour, obtained this way, has been added to the actual wage income from the organised and unorganised components to get the total income due to labour. After obtaining the total labour income of the aggregate agriculture sector we distribute this labour income into 4 agriculture-related sectors by using the proportion of NVA as obtained earlier. The remaining part of the net domestic product is the operating surplus. We add depreciation with this operating surplus to obtain the sector specific capital income.

On the other hand, due to non-availability of relevant data for forestry and fishing , the mixed income of unorganised part is divided into wage income and operating surplus by using the same ratio as in agriculture. Total value added in each of these sectors is divided into its components by applying the same method as used for agriculture.

Since land is an important part of the capital in crop husbandry, non-wage income is divided into income from land and other capital. This is done by using information from the publication of Ministry of Agriculture.¹⁰

4.1.2 Mining and Quarrying (Sectors 8 to 11 of SAM)

In our SAM 2003-04 there are 4 sectors under mining. They are namely coal, crude petroleum, natural gas and minerals n.e.c. The IO flow table 2003-04 gives the GVAs of these 4 sectors. Now we have to decompose these GVAs into depreciation, wage and non-wage income with the help of data available from NAS. The NAS divides the GVA into NVA and depreciation of the aggregate mining and quarrying sector and also gives the decomposition of NVA into wage and non-wage income of the same sector. We first apply the ratio between GVA and depreciation of the aggregate mining and quarrying sector to the independent GVA of Coal, crude petroleum and minerals sectors to obtain the NVAs of these sectors. Next we decompose these NVAs into wage and non-wage income by using the ratio of wage and non-wage income of the aggregate mining and quarrying sector. The depreciation of each of these sectors is added with their non-wage income to obtain the gross capital income of these sectors respectively. Now we have to estimate the wage and non-wage income of the natural gas sector.

As the natural gas sector of the IO flow table 2003-04 is merged with gas distribution sector, we have subtracted the GVA of gas distribution sector from the GVA of natural gas sector of the IO flow table 2003-04. Once we have obtained the GVA of independent natural gas sector we apply the same method as applied for the coal, crude petroleum and minerals sectors to obtain

¹⁰See Ministry of Agriculture (2000), Cost of Cultivation of Principal Crops in India (CCS).

the depreciation, wage and non-wage income of the independent natural gas sector. Now we have to decompose the GVA of gas distribution sector into depreciation, wage and non-wage income. The data on depreciation and NVA of the gas distribution sector is directly available from the NAS. The NAS also divides the NVA into wage and non-wage income of the organised as well as unorganised part of the combined electricity, gas and water supply sector. We have subtracted the wage and non-wage income of the electricity and water supply sectors from the same of the organised part of the combined sector to obtain the wage and non-wage income of the organised gas distribution sector.¹¹ The wage and non-wage income of unorganised part of the combined sector is treated as wage and non-wage income of the gas distribution sector.¹² The wage and non-wage income thus obtained for the gas distribution sector is added with the same of independent natural gas sector. Finally we add up the depreciation of independent natural gas and gas distribution sectors with the non-wage income of the natural gas sector of IO flow table 2003-04 to obtain the gross capital income of the gas sector.

4.1.3. Manufacturing Industries (Sectors 12 to 23 of SAM)

The output of manufacturing industries comprises of the outputs of the registered and unregistered sectors. The GVA at two-digit level of industrial classification for 2003-04 given in NAS is divided into wage and non-wage income on the basis of ASI data for 2003-04. For unregistered manufacturing, the NSSO gives estimate of GVA, emoluments, number of hired and total workers for the year 2000-01.¹³ In case of self-employed workers, the imputed values based on the data for hired workers are used. Using the proportion of different components of GVA for 2000-01 for the registered sectors to the 2003-04 GVA of the unregistered sector, we obtain the

¹¹ See the section 4.1.6 and 4.1.7, the method of estimation of wage and non-wage income of the electricity and water supply sectors.

¹² Note: The unorganised part of the combined electricity, gas and water supply sector is mainly deals with gas distribution sector.

¹³ See NSSO (2001), Unorganised Manufacturing sector of India.

components of GVA at the 2-digit level industrial classification for the year 2003-04. Adding these values for registered and unregistered sector we obtain the components of the GVA for the entire manufacturing sector at 2-digit level. Finally we use the ratios for each 2-digit level industrial group for all the sectors under that group to obtain the wage and non-wage incomes for different sectors under manufacturing. Since the sectors like cement, fertilisers, etc; have output mainly from the organised sector, we have directly used the ASI ratios.

4.1. 4. Transport (Sectors 30 to 34 of SAM)

The estimates of wage and non-wage income for the organised part of the transport sector are available from the NAS. Since the organised transport sector contains three-transport sector, the NVA of these sectors are divided by the same ratio that is used for entire organised transport sector. To divide the GVA into wage and non-wage income of the unorganised transport sector we use the information available from Enterprise Survey of CSO 1993-94.

4.1.5 Other Services sector (Sectors 35 & 36 of SAM)

Besides these transport sectors there are another two services sector described in our SAM, i.e. health and medical services and other services. The net value added data on different service sectors are available from NAS. We add up the wage and non-wage income of different services to obtain the value added of these two sectors. We have treated mixed income as non-wage income of service sectors.

4.1.6. Electricity (Sectors 24 to 26)

The electricity sector comprises of three different electricity sectors (i.e. hydro, non-hydro and nuclear) in our SAM. The data on GVA and depreciation for the hydro and nuclear electricity sectors are available respectively from the annual accounts of HECI and NPCI. On the other hand the NVA and depreciation of aggregate electricity sector is available from NAS. As we have NVA and depreciation of hydro and nuclear electricity sectors, we can easily estimate the NVA

and depreciation of the non-hydro electricity sector.¹⁴ Now we have to decompose the NVAs of these electricity sectors into wage and non-wage income. The NAS gives the decomposition of NVA for the aggregate electricity, gas and water supply sectors. Using this ratio of wage and non-wage income we obtain the wage and non-wage income of these 3 electricity sectors. Next we add the depreciation with the non-wage income of these electricity sectors to obtain the total non-wage income of these separate electricity sectors.

4.1.7. Water Supply (Sector 28 of SAM)

The decomposition of GVA into NVA and depreciation is given in NAS for water supply sector. Now we have to decompose the NVA of water supply sector into wage and non-wage income. In this case the NAS data does not provide the data on wage and non-wage income of the water supply sector separately. Therefore, to decompose the NVA of water supply sector we have used the ratio of wage and non-wage income of the combined electricity, gas and water supply sector. The non-wage income of the water supply sector thus obtained is added with the depreciation of this sector to obtain the gross non-wage income of this sector.

4.1.8. Biomass (Sector 27 of SAM)

As discussed in section 2, we have estimated the GVAs of the sectors under biomass sector. Now we have to divide the GVA into wage and non-wage income of the sectors under biomass. In this case we first decompose the GVA of each sector under biomass (like agriculture residual, fire wood, animal husbandry residual, food and beverages industry residual and paper industry residual) and then we add up their wage and non-wage income to obtain the same for biomass sector. To do this we have used the ratio of wage and non-wage income (inclusive of depreciation) of their corresponding mother sectors like agriculture, forestry, animal husbandry, food and beverages, and paper industry sectors.

¹⁴ Note: $NVA(\text{non-hydro}) = NVA(\text{electricity}) - NVA(\text{Hydro}) - NVA(\text{non-hydro})$, $Depreciation(\text{non-hydro}) = Depreciation(\text{electricity}) - Depreciation(\text{hydro}) - Depreciation(\text{non-hydro})$.

4.1. 9. Construction (Sector 29 of SAM)

The whole of mixed income, excluding the interest payments under unorganised sector is assumed as wage income. For organised sector the wage and non-wage income are separately available from NAS.

4.2. Distribution of sector-wise Consumption Expenditure by occupational categories of households

In the updated IO flow table we have obtained the sector (commodity) wise private final consumption expenditure (PFCE) for the year 2003-04. Now we have to decompose these PFCEs into the 9 households classes. The NSSO in its 61st round gives the distribution of per capita household expenditure for more detailed level of classification of commodities for 2004-05. A map of concordance between our sectors and NSSO's item is shown in Table 5. On the other hand the NSSO also gives the distribution of rural population among the five rural occupational households classes and the urban population among the four urban occupational households classes for the year 2000-01.¹⁵ We use this ratio to distribute the total number of rural and urban populations into different occupational categories for the year 2004-05. Once we have the number of population belonging to the different occupation classes, we can easily estimate the sector wise consumption expenditure of different households classes for the year 2004-05. Then we have estimated the share of each households classes on total consumption expenditure of each of these 28 sectors (shown in Table 5) of our SAM for the year 2004-05.¹⁶ Using these shares to the PFCEs of these sectors of the year 2003-04, we have derived the consumption expenditure of each of the households classes of our SAM.

¹⁵ See NSSO (2002), Household consumer expenditure and employment situation in India, p A-24.

¹⁶ Note: The output of 9 sectors (like forestry, crude oil, natural gas, minerals, fertiliser, cement, iron and steel, aluminum, and construction) of our SAM 2003-04 are not consuming by the households. The biomass consumption includes fire wood consumption, so forestry output is not appearing in the consumption flow

The total of indirect taxes on PFCE is divided into taxes paid by different households categories in proportion to the total expenditures of these categories on non-agricultural commodities.¹⁷ The total of the expenditures on different sectors and the taxes paid is equal to the total expenditure for each category.

Table 5: Mapping between SAM sectors and NSSO items

SAM Sectors	Item Code
Paddy Rice	101-106
Wheat	107-114
Cereals,Grains etc,Other crops	115-153
Cash crops	234, 250-257, 290, 291-293, 297, 310-330
Animal husbandry & prod.	160, 162-167, 180, 182-186
Fishing	181
Coal	347
Food & beverages	161,195-286, 294-326
Textile & Leather	362-394
Wood	494
Petroleum & coal prod.	344, 345, 508, 510, 511
Chemical, Rubber & Plastic prod.	452, 453, 456, 461, 465, 467
Paper & Paper prod.	400,401,403,
Other manufacturing	440-451, 454, 455, 457, 458, 460, 462, 550-557
Machinery	560-568, 590-608, 610-614, 620, 621, 630-634, 640-643
Hydro	342
Non hydro	342
Nuclear	342
Biomass	341, 343
Gas Manufacture & Distribution	348, 353
Water	540
Road Transport Motorised	502, 503
Rail Transport Non motorised	505, 506
Rail Transport	501
Air Transport	500
Sea Transport	504
Health & medical	410-424
All other services	430-435, 402, 404-406, 480-494

4.3. Distribution of Household Income by source of Income and by wage and other Components

¹⁷ Note: there is no such tax on agricultural commodities.

As noted earlier we have considered 9 households classes in our SAM. So we have to first estimate the total personal income of each of these 9 households classes. The households receive income from different sources like labour income, income from capital owned by households, land income, and transfer income from government and rest of the worlds.

The households receive wage income due to supply of their labor force to the production sectors of the domestic markets as well as international markets. In the sub section 4.1 we have estimated the payment for wage for each of the domestic sectors of our SAM. On the other hand the net wage income from rest of the world for the year 2003-04 is available from NAS. We have added up these wages payments of the domestic production sectors and the net wage income from rest of the world is treated as the households total labour income. Now we have to distribute this labour income among the 9 households classes and this has been done with the help of SAM of the year 2002-03. In that SAM the total labour income has been distributed among the 9 households classes for the year 2002-03. As the households classes are same with our households classes, we have used the share of each households labour income of the year 2002-03 to the total labour income of the year 2003-04.

In the sub section 4.1 we have estimated the payment of the domestic production sectors for the capital use for the year 2003-04. This payment for capital along with net capital income from rest of the world is treated as gross capital income of the economy where the data on net capital income from rest of the world is available from NAS. We subtract the depreciation from the gross capital income to obtain the net capital income of the economy. Now this net capital income is not only received by the households classes alone but there are some economic agents like private corporate sector, public non-departmental enterprises, and government also receive a part of that capital income. The private corporate sectors receives the capital income in the form of operating profits, the public non-departmental enterprises receives the same in the form of operating surplus and the government receives capital income in the from of entrepreneurship

income. The data on operating surplus, operating profit and the income from entrepreneurship are available from NAS for the year 2003-04. So the remaining part of the capital income is capital income of the households. We have distributed this capital income among the households classes by using the share of each households capital income as available from SAM of the year 2002-03.

Next we have to estimate the land income received by the households classes. The point to be noted here that, only the rural agricultural self- employed class households receives the income from land. In this case we have taken the total payment for land factor (as obtained in the section 3.1) as the total land income of that class.

The another sources of households income are transfer income from government and the net current transfer from the rest of the world. The NAS gives data on current transfer from government and also the net current transfer from the rest of the world. Now the government transfer includes direct government transfer to the households and the other is interest payment for debt. A part of this interest payment of the government goes to the private corporate sectors due to their holding of public shares, bonds etc. With the help of SAM 2002-03 we have estimated the interest income received by the private corporate sector. Now the remaining part of the government transfer is distributed among the households classes by using the ration given in SAM 2002-03.

Thus we have obtained the households personal income from different sources i.e. row total of each households classes in our SAM. The households personal income obtained in the above way did not match with the column total of each of the households classes of our SAM. A pro-rata adjustment has been made to obtain the control total i.e. row total of each households classes in our SAM.

4.4. Construction of Tax Account (Direct and Indirect taxes)

Though indirect taxes are part of the government activities, we have made it a separate account in order to simplify the presentation of the detail structure of taxes. The indirect taxes reported in the SAM are net of subsidies (net indirect taxes). The net indirect taxes on household consumption and government consumption are inclusive of sale taxes and excise for domestic production, and taxes on imported commodities (custom) used for consumption. The decomposition of net indirect taxes across production sectors is done with the help of the IO flow table.

Total direct taxes as obtained from the NAS are distributed among different categories of households in the following manner. Land revenue is paid by self employed agricultural households. The other direct taxes are distributed among different categories of households in proportion to their personal income, assuming no direct tax to be paid by agricultural and non-agricultural labour households and self employed rural agricultural households.

4.5. Construction of Capital Account

This account represents the macro balancing of savings and investments. Net savings include those by the households, the private corporate sector, the public non-departmental enterprises, the government and the rest of the world. Net saving along with the depreciation equals gross domestic capital formation. In the case of households the savings of different categories are derived by subtracting their consumption and direct taxes from their total personal income.

Retained earnings of the private corporate sector and the non-departmental public enterprises are treated as their savings. The difference between the revenue and current expenditure of the government is its saving. Foreign savings meet the difference between gross domestic capital formation and gross domestic saving.

4.6 Treatment of Foreign Trade

The record of foreign trade is given under the row and column head of Rest Of the World (ROW) in our SAM. According to the Table 1, the column of ROW describes the exports of goods and services, net factor income from abroad, net capital transfer to the government, other current transfer to the households and private corporate and foreign savings. The data on exports are directly available from IO flow table 2003-04 and the data other than exports are available from NAS and the published statistics of Reserve Bank of India (RBI).¹⁸ We put these data under the column of ROW in such a manner that the column total of ROW must be equal to the total imports. In the IO FLOW table 2003-04 the imports are recorded in the column of imports with negative entries. But in our SAM we put this data under the row head of ROW with positive entry.

The SAM for India 2003-04

The SAM computed for India, consists of 36 producing sectors, 3 factors of production, and 4 economic institutions including household sector, which are classified into 9 broad categories according to their occupation. The IO flow table for 2003-04 has been, first expanded to match with sectors of our SAM and then we extend the various accounts (viz. GVA, PFCE, personal income, etc) of IO flow table to make these as accounts of a SAM. This SAM is given in Appendix III.

The commodity X commodity part of this matrix gives the inter industry flow of intermediate inputs. The rows with heads Labour, Capital and Land give the primary input into each sector. Only the agricultural sectors are using these three as primary inputs, and the rest of the sectors are using only labour and capital as primary inputs in their production process. Interestingly, the net factor income from abroad (under column head *ROW* and rows *Labour* and

¹⁸ See Reserve Bank of India (2006), Hand Book of Statistics on Indian Economy.

Capital) are seen to be substantially negative. This shows that there is a net repatriation outside the country.

The factors of production receive their factor payments, which in turn go to the different household categories as their income. The values can be read from the rows for rural and urban households and the columns under *Labour*, *Capital* and *Land*. The households also receive transfer payments from the government and from rest of the world.

The private and public enterprises earn gross profits on account of capital and the private firms also receive net transfers from the government. The row under *Capital A/C* gives the savings. These are calculated as residuals and hence are balancing entries. The government is seen to be a net dissaver.

The imports of various commodities are given by the entries in the row for the Rest of the World (“ROW”). Under the column ROW, we have exports of the commodities, net factor income from abroad, transfers to the rural and urban households, net indirect taxes and foreign savings.

Description of the Indian Economic Structure: Preliminary Analysis

As of 2003-2004 Indian Economy is emerging as a service sector led growth path. Service sector has the highest contribution to the GDP with 47% share compared to manufacturing sector’s contribution at 20%, agriculture at 20% followed by transport at 7%, Energy at 5% and Forestry with 0.14%.

Table 6.1 Sectoral Share of GDP in total GDP of the year 2003-04 (Unit: Rs.Lakh).

	Agri	Fors	Energy	Manu	Transport	Service	Total
--	------	------	--------	------	-----------	---------	-------

GDP at factor costs	50490489	356870	13134019	51992230	18510546	120457647	254941801
Sector wise Share	19.8%	0.14%	5%	20.4%	7.3%	47.5%	1.0000

Source: Authors' estimate

The activity composition defines the development pathway and has important implication for energy consumption and hence emission. Indian economic structure with service sector bias positions the economy in an advantageous position in the current climate change debate. Because of relatively low energy intensity of service sector (Table 4.2) from production side or supply side Indian economy enjoys the benefit of relatively low energy intensity. Over all energy intensity of Indian economy is 0.84.

Figure 6.1. Labour, Capital and Energy Intensity

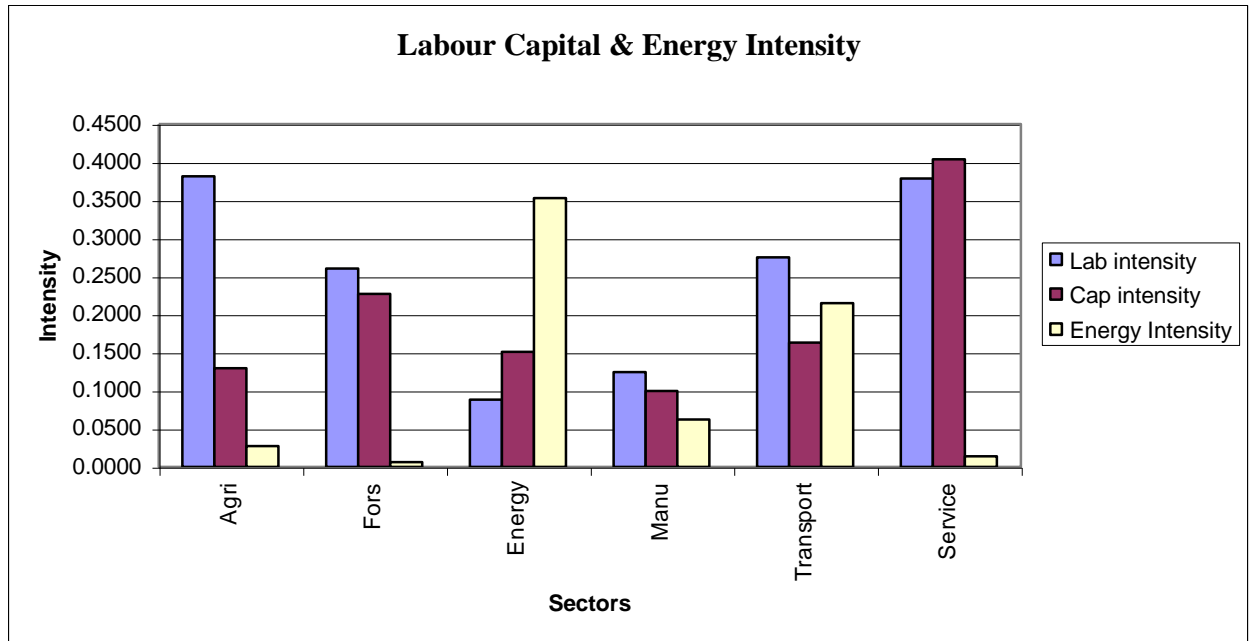
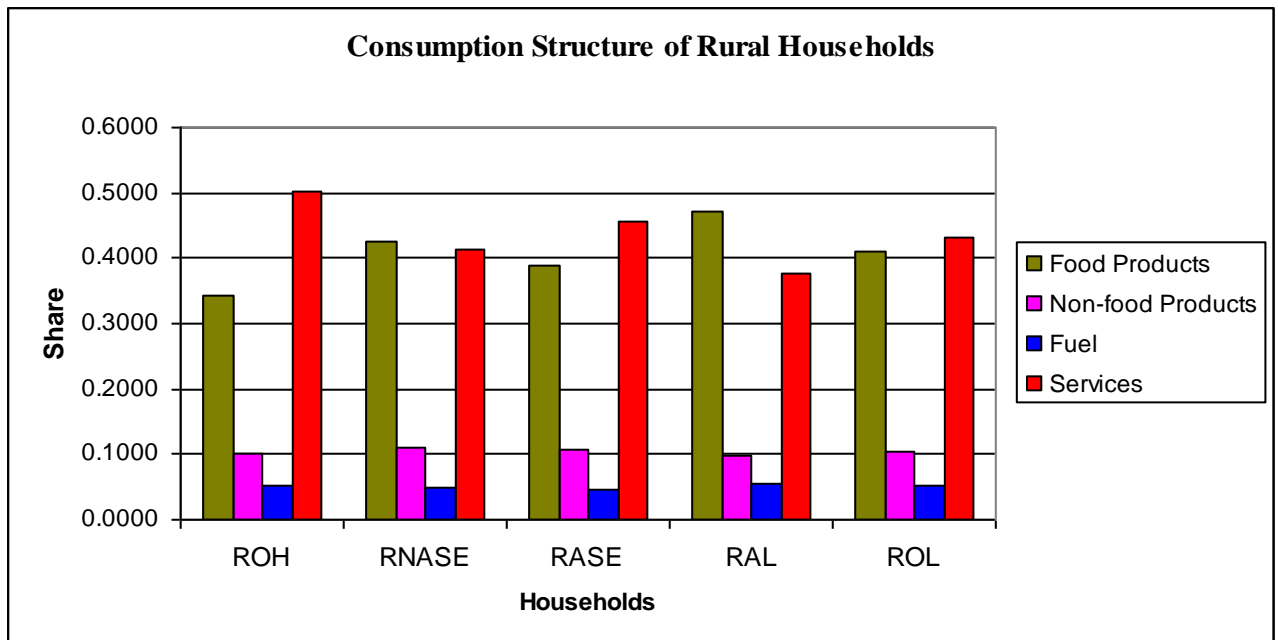
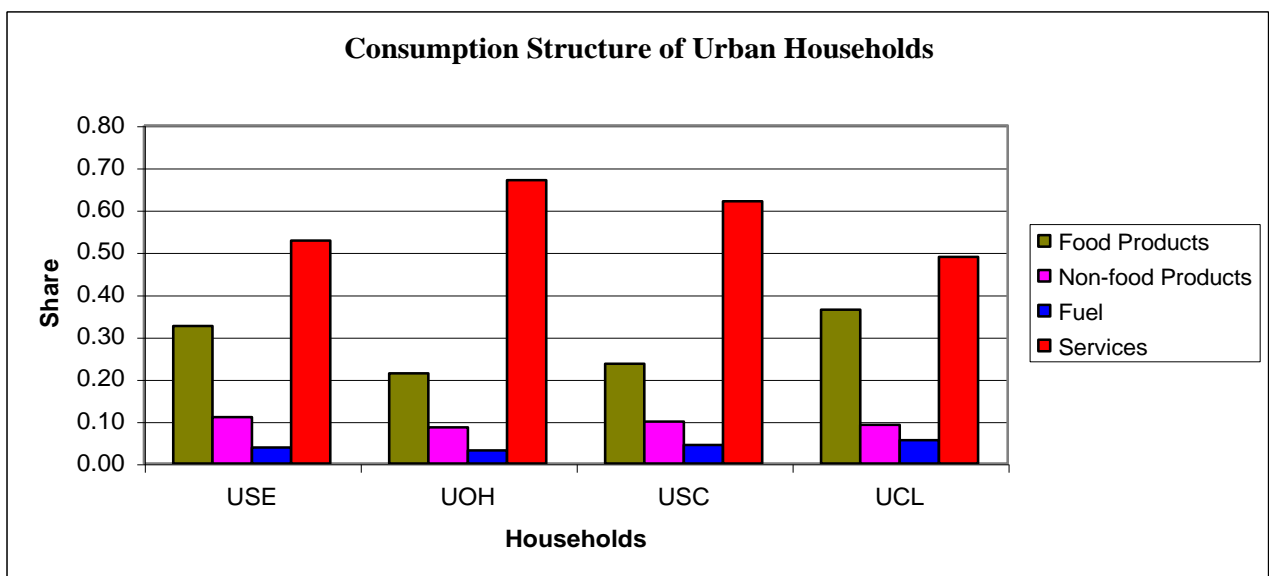


Diagram 6.2. Rural Households Consumption Expenditure.



If we look at consumption expenditure of households from SAM 2003-04 it is also interesting to see that an average Indian spends 36% of private consumption expenditure on service sector output, followed by agricultural output 24.11%, 23.96% in manufacturing output, 10% on transport sector output. Though an average rural (Diagram 4.3) household spends almost equal if not more on food followed by services for urban (Diag 4.4) Indian spending is more on service sector output compared to food items.

Diag. 6.3 Urban Households Consumption Expenditure.



This indicates that lifestyle of average Indian is also less energy intensive. But one clear indication is that Indian economic structure both from production and consumption side as of 2003-04 is on low energy low emission pathway. This does not rule out existence of potential of efficiency enhancement and hence further reduction of emissions but all these need further analysis.

5. Conclusion

In this paper, we have focused on the constructional aspect of SAM and some observations on the economic structure for India based on preliminary analysis. The SAM highlights the income distribution across the occupational classes, which has an important role as an information system. We could observe how consumption structure is varying across various social groups. SAM itself is not a model. Once the closure rule is specified, SAM becomes a model. With the help of multiplier model, one can compute income and employment effects at the sectoral level of various policies shocks.

Although the SAM has significantly extended the multi-sectoral framework of the input-output table, it still falls short in representing elements such as pollutants, environmental quality, natural resources, and most of their interactions with economic activities in the real world. Neither the impact of economic activities on the environment nor the constraints of the environmental quality on production and welfare have been reflected directly in a SAM framework. So our upcoming study will extend the SAM to account for pollution-related activities.

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Appendix I: Description of 130 Sectors of IO flow table

1 Paddy	48 Woolen textiles	95 Ships and boats
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2	Wheat	49	Silk textiles	96	Rail equipments
3	Jowar	50	Art silk, synthetic fiber textiles	97	Motor vehicles
4	Bajra	51	Jute, hemp, mesta textiles	98	Motor cycles and scooters
5	Maize	52	Carpet weaving	99	Bicycles, cycle-rickshaw
6	Gram	53	Readymade garments	100	Other transport equipments
7	Pulses	54	Miscellaneous textile products	101	Watches and clocks
8	Sugarcane	55	Furniture and fixtures-wooden	102	Medical, precision&optical instruments
9	Groundnut	56	Wood and wood products	103	Jems & jewelry
10	Coconut	57	Paper, paper prods. & newsprint	104	Aircraft & spacecraft
11	Other oilseeds	58	Printing and publishing	105	Miscellaneous manufacturing
12	Jute	59	Leather footwear	106	Construction
13	Cotton	60	Leather and leather products	107	Electricity
14	Tea	61	Rubber products	108	Water supply
15	Coffee	62	Plastic products	109	Railway transport services
16	Rubber	63	Petroleum products	110	Land tpt including via pipeline
17	Tobacco	64	Coal tar products	111	Water transport
18	Fruits	65	Inorganic heavy chemicals	112	Air transport
19	Vegetables	66	Organic heavy chemicals	113	Supporting and aux. tpt activities
20	Other crops	67	Fertilizers	114	Storage and warehousing
21	Milk and milk products	68	Pesticides	115	Communication
22	Animal services(agricultural)	69	Paints, varnishes and lacquers	116	Trade
23	Poultry & Eggs	70	Drugs and medicines	117	Hotels and restaurants
24	Other liv.st. produ. & Gobar Gas	71	Soaps, cosmetics & glycerin	118	Banking
25	Forestry and logging	72	Synthetic fibers, resin	119	Insurance
26	Fishing	73	Other chemicals	120	Ownership of dwellings
27	Coal and lignite	74	Structural clay products	121	Education and research
28	Natural gas	75	Cement	122	Medical and health
29	Crude petroleum	76	Other non-metallic mineral prods.	123	Business services
30	Iron ore	77	Iron, steel and ferro alloys	124	Computer & related activities
31	Manganese ore	78	Iron and steel casting & forging	125	Legal services
32	Bauxite	79	Iron and steel foundries	126	Real estate activities
33	Copper ore	80	Non-ferrous basic metals	127	Renting of machinery & equipment
34	Other metallic minerals	81	Hand tools, hardware	128	O.com, social&personal services
35	Lime stone	82	Miscellaneous metal products	129	Other services
36	Mica	83	Tractors and agri. implements	130	Public administration
37	Other non metallic minerals	84	Industrial machinery(F & T)		
38	Sugar	85	Industrial machinery(others)		
39	Khandsari, boora	86	Machine tools		
40	Hydrogenated oil(vanaspati)	87	Other non-electrical machinery		
41	Edible oils other than vanaspati	88	Electrical industrial Machinery		
42	Tea and coffee processing	89	Electrical wires & cables		
43	Miscellaneous food products	90	Batteries		
44	Beverages	91	Electrical appliances		
45	Tobacco products	92	Communication equipments		
46	Khadi, cotton textiles(handlooms)	93	Other electrical Machinery		
47	Cotton textiles	94	Electronic equipments(incl.TV)		

Appendix II: The Social Accounting Matrix of India – 2003-04 (Unit Rs. Lakh)

	Sctors	PAD	WHT	CER	CAS	ANH	FRS	FSH	COL	OIL
1	PAD	3331710	43731	306117	306	43344	10	472	0	0

2	WHT	28451	2480473	440074	1	21668	0	1	0	0
3	CER	35697	95264	1823594	8	2659873	25	9	0	0
4	CAS	3683	6473	44342	954620	17639	0	0	0	0
5	ANH	584311	91559	934262	609930	17914	1	89	0	0
6	FRS	58	1	8	0	3971	738	0	0	0
7	FSH	263	1049	2069	0	0	0	44072	0	0
8	COL	33	24	54	17	820	0	0	9303	9
9	OIL	0	0	0	0	73	0	0	0	12150
10	GAS	0	0	0	0	682	0	0	0	0
11	FBV	29285	4816	13631	12	375709	0	14369	0	0
12	TEX	53484	29146	36417	1554	59102	507	109977	59	0
13	WOD	75	219	1805	19	285	11	3991	19253	2
14	MIN	1	5	9	0	321	0	0	0	41
15	PET	279959	124433	283441	145415	1018	4157	123243	28077	69553
16	CHM	2032	2017	5455	985	20990	1337	7572	200617	57051
17	PAP	604	898	3467	260	656	658	0	3009	3
18	FER	915908	695705	1032577	707396	104	54	128	0	0
19	CEM	0	0	0	0	50	1	0	0	394
20	IRS	0	0	1	0	224	1	5006	0	608
21	ALU	1	1	1	0	255	23	276	0	0
22	OMN	7206	3714	5703	2588	1318	4167	69361	69168	90425
23	MCH	46215	37745	63367	8501	9794	752	6	135041	116966
24	HYD	43700	29397	22687	11381	193	47	6	16885	5541
25	NHY	291046	204530	157842	79183	1341	329	41	117477	38550
26	NUC	4666	3279	2530	1269	22	5	1	1883	618
27	BIO	48863	8249	90692	50432	0	0	0	0	0
28	WAT	40	32	45	25	3	36	0	1210	0
29	CON	136760	102795	110751	41646	5015	4733	19	10198	156051
30	RTM	241703	137817	246468	127976	366469	11747	38975	86883	35111
31	RNM	27105	15268	28048	14652	40802	1453	4475	10415	4075
32	RLY	84785	36698	50036	23468	30741	1248	2528	18027	8190
33	AIR	23443	15640	11978	6222	4394	71	2067	656	960
34	SEA	2342	2066	4476	838	46719	69	214	1200	865
35	HLM	0	0	0	0	0	0	0	0	0
36	SER	571783	377705	590583	280670	1785079	11932	44961	129261	134541
	LAB	3219729	2061039	10746217	4126770	6384318	190531	1664810	820954	82456
	CAP	576477	369005	1823804	659076	5072752	166339	1075929	1787368	185224
	LAN	2008623	1285724	6796308	2619908	0	0	0	0	0
	RNASE									
	RAL									
	ROL									
	RASE									
	ROH									
	USE									
	USC									
	UCL									
	UOH									
	PVT									
	PUB									
	GOV									
	ITX	-932836	-1310473	-911691	-696140	21063	3254	-40955	37219	1535728
	CAC									
	ROW	51	536	524624	50051	31076	328050	9111	500866	8608702
	Total	11667256	6956579	25291793	9829039	17025799	732289	3180753	4005030	11143813

Appendix II: The Social Accounting Matrix of India – 2003-04 (Unit Rs. Lakh) Contd.

	Sctors	GAS	FBV	TEX	WOD	MIN	PET	CHM	PAP	FER
1	PAD	0	408066	69	5	2	0	5184	1415	183
2	WHT	0	760527	124	14	0	0	7393	193	384

3	CER	0	2502277	3404	418	28	1547	185361	15590	4494
4	CAS	1	4035759	1665219	266	25	89	780014	1833	6281
5	ANH	0	1332474	244462	284	25	574	97934	502	1873
6	FRS	9	7958	149	31917	1	79	8387	28750	38
7	FSH	0	408114	74	1	0	0	4270	193	199
8	COL	872	23802	35219	4478	14236	138232	134977	46257	36176
9	OIL	936	37	2	28	14	10974659	80472	322	0
10	GAS	3	9307	24300	93	1133	1705	204696	627	254495
11	FBV	2	2948925	8609	465	249	1085	260069	7492	8223
12	TEX	11	72260	4066141	1546	255	2569	247956	7651	6480
13	WOD	1837	143308	55496	11641	1378	5749	213794	43670	17391
14	MIN	147	3948	2064	288	17843	2303	120622	2313	110027
15	PET	9324	292899	306411	5403	35918	673676	704069	56116	526632
16	CHM	24465	856423	1574617	30531	57791	252632	9753915	272303	808200
17	PAP	297	344350	112736	16162	1016	8665	695234	507741	3530
18	FER	2	36748	333	5196	0	0	145971	14	343433
19	CEM	50	47	307	7	623	1967	4402	23	46
20	IRS	73	792	7672	2984	2897	1195	132418	7476	2212
21	ALU	11	4168	3609	1203	23160	5534	130673	3597	3715
22	OMN	15497	81807	105472	9795	27256	9565	269664	8329	16911
23	MCH	23699	225031	402535	9847	14842	21581	279285	12930	21637
24	HYD	2141	48762	89214	1985	5835	32606	105470	13639	11521
25	NHY	14896	339261	620698	13809	40595	226853	733801	94894	80155
26	NUC	239	5439	9950	221	651	3637	11763	1521	1285
27	BIO	0	239011	22580	163699	26	593	66671	163597	604
28	WAT	115	4078	2583	20	206	133	7712	24	1271
29	CON	15834	236527	238588	892	19339	19980	178702	9062	7234
30	RTM	11669	1010941	1280019	29127	24560	74643	991679	126020	162303
31	RNM	1386	114641	142926	3277	2887	8488	111181	14114	18327
32	RLY	2509	110440	57660	4430	13997	292081	165885	21164	33419
33	AIR	158	69249	10629	2504	839	11347	25649	4453	9722
34	SEA	197	23460	42911	586	282	4597	59154	5846	1685
35	HLM	0	0	0	0	0	0	0	0	0
36	SER	25234	4421386	3236962	89345	102980	697159	2818778	236781	427326
	LAB	383573	1950234	2931855	215649	411354	99714	2224308	91166	597192
	CAP	311009	2405442	2355171	121685	895446	1350157	3917204	127928	1447104
	LAN	0	0	0	0	0	0	0	0	0
	RNASE									
	RAL									
	ROL									
	RASE									
	ROH									
	USE									
	USC									
	UCL									
	UOH									
	PVT									
	PUB									
	GOV									
	ITX	35976	383603	325161	68416	111128	3275707	3257242	453665	-987334
	CAC									
	ROW	247456	1205193	980137	118432	4351393	2111355	3811983	484189	270246
	Total	1129627	27066692	20966068	966651	6180211	20312455	32953942	2873400	4254621

Appendix II: The Social Accounting Matrix of India – 2003-04 (Unit Rs. Lakh) Contd.

	Sectors	CEM	IRS	ALU	OMN	MCH	HYD	NHY	NUC	BIO
1	PAD	0	3	1	907	415	0	0	0	6018
2	WHT	0	0	1	1640	777	0	0	0	6174

3	CER	84	55	51	10612	4293	0	0	0	206572
4	CAS	2	967	237	11108	3345	0	0	0	12478
5	ANH	28	65	391	13177	5773	0	0	0	11110
6	FRS	4	95	14	21738	2564	0	0	0	5562
7	FSH	0	0	1	970	482	0	0	0	1121
8	COL	141134	1209124	260454	321494	54328	0	1430397	45166	597
9	OIL	0	4111	204	52580	678	0	0	0	9
10	GAS	21384	170025	21088	36247	31654	0	311482	0	80
11	FBV	122	1209	1015	16754	3941	0	0	0	34995
12	TEX	5730	5773	2928	93276	85801	0	4870	0	6917
13	WOD	17369	9117	2620	97422	105646	0	1750	0	911
14	MIN	211899	269458	265917	727217	70799	0	4005	0	57
15	PET	68273	370565	71762	496204	257464	0	1276211	40297	21418
16	CHM	82060	146738	123311	1163719	1171510	0	48825	58504	12516
17	PAP	23636	12120	5306	113124	114446	4640	22379	257	9156
18	FER	0	0	0	5110	0	0	0	0	6379
19	CEM	806	2405	581	56796	2742	16	76	1	8
20	IRS	56	1723422	87004	2111352	3024855	1328	6408	74	100
21	ALU	104	1692461	490565	1008905	1988736	1678	8093	93	170
22	OMN	93650	417091	105946	4503151	1588635	7971	181703	2960	18803
23	MCH	2996	126108	47187	1463513	5215304	26443	602814	9821	5123
24	HYD	25830	98963	19178	107382	69246	82	475510	240	626
25	NHY	179709	688528	133429	747103	481777	573	3308330	1669	4358
26	NUC	2881	11038	2139	11977	7723	9	53036	27	70
27	BIO	318	670	192	114259	0	0	2444	0	10713
28	WAT	3	115	53	14143	548	0	17457	124	169
29	CON	5568	27164	10930	392576	390817	14344	177138	5518	22600
30	RTM	77543	324092	86993	799531	590603	7351	301222	853	84514
31	RNM	8703	36249	9765	91453	67412	264	34122	70	9921
32	RLY	94084	443813	92227	400856	134660	7990	445133	157	7599
33	AIR	9053	30266	6810	29231	7512	561	46198	95	747
34	SEA	969	4913	1176	36734	33656	267	7687	27	3581
35	HLM	0	0	0	0	0	0	0	0	0
36	SER	240335	1790736	353395	3786436	3653732	91835	1752198	6967	197123
	LAB	26208	844821	1017	3170058	2455853	196231	1616765	30558	1614337
	CAP	60007	1261013	3021	3779935	2749996	1483961	1882053	126	1289532
	LAN	0	0	0	0	0	0	0	0	0
	RNASE									
	RAL									
	ROL									
	RASE									
	ROH									
	USE									
	USC									
	UCL									
	UOH									
	PVT									
	PUB									
	GOV									
	ITX	495235	2018258	771842	2030504	1594586	-21581	-1364216	-388	0
	CAC									
	ROW	928	987196	3741485	10198851	5076843	0	0	0	0
	Total	1896713	14728747	6720236	38038045	31049153	1823964	12654091	203215	3612165

Appendix II: The Social Accounting Matrix of India – 2003-04 (Unit Rs. Lakh)

Contd.

	Sctors	WAT	CON	RTM	RNM	RLY	SEA	AIR	HLM	SER
1	PAD	2	93	0	12	0	80	0	7460	417179
2	WHT	0	50	0	510	6	81	0	2791	220523

3	CER	84	346623	6	520092	0	904	1	32319	1434013
4	CAS	585	1143	0	0	0	0	3	0	48513
5	ANH	2	27034	0	0	0	0	0	6678	857535
6	FRS	143	176123	0	0	26	0	0	0	14800
7	FSH	0	29	0	0	0	0	0	0	9926
8	COL	222	1399	0	0	8186	0	0	0	14115
9	OIL	43	8	1	0	0	0	1	0	7870
10	GAS	103	222	0	0	0	0	0	0	4550
11	FBV	388	240	0	7896	0	611	0	0	1408851
12	TEX	81	43127	128955	0	651	679	71	12577	106770
13	WOD	62	572023	305	345	86	10	10	0	37628
14	MIN	16	1812892	0	0	0	0	0	0	8176
15	PET	1494	1552782	7870528	0	148203	29206	116236	43248	722006
16	CHM	4030	606369	1466040	46035	18880	127811	150523	1490846	895271
17	PAP	1070	17658	113501	0	6446	1067	1804	9449	243623
18	FER	802	10392	0	0	4	0	0	0	9197
19	CEM	0	1909074	0	0	0	0	0	0	467
20	IRS	1320	4376434	552	0	249	2	2	0	103459
21	ALU	39	1571	209	0	0	0	0	0	42925
22	OMN	2692	3754754	1147048	52261	1196897	59585	94982	84230	1835391
23	MCH	2596	951728	578864	26399	30935	13249	6687	60057	1373333
24	HYD	3432	112465	35675	0	74265	1065	1868	2314	160457
25	NHY	23881	782468	248207	0	516694	7407	13000	16098	1116374
26	NUC	383	12544	3979	0	8283	119	208	258	17896
27	BIO	0	0	0	0	0	0	0	0	0
28	WAT	104283	82394	10125	0	214	12961	1271	564	49306
29	CON	76297	1069613	167379	824	530354	15400	32698	78388	1691642
30	RTM	3865	1779705	412180	631441	79888	46805	66148	132877	2645772
31	RNM	465	199568	44678	78043	9698	5692	8037	14617	319633
32	RLY	2523	313585	111907	0	281101	1439	2525	12551	193910
33	AIR	37	60541	23402	77941	2285	406	1583	1254	37606
34	SEA	196	23361	27939	77940	2623	460	808	41829	119066
35	HLM	0	0	0	0	60886	0	0	0	104775
36	SER	60513	5521578	5294417	228576	225093	131748	127213	435624	13297162
	LAB	257994	13966095	7561781	1355266	1864184	465082	377181	3384342	54617227
	CAP	235423	3982468	4526389	811246	1045249	278393	225776	1430806	60531855
	LAN	0	0	0	0	0	0	0	0	0
	RNASE									
	RAL									
	ROL									
	RASE									
	ROH									
	USE									
	USC									
	UCL									
	UOH									
	PVT									
	PUB									
	GOV									
	ITX	1084	79176	-38382	-5326	-256926	1723	1721	490	-45333
	CAC									
	ROW	0	0	267227	34732	0	0	0	0	1226756
	Total	786150	44147329	30002913	3944234	5854460	1201983	1230359	7301667	145900226

Appendix II: The Social Accounting Matrix of India – 2003-04 (Unit Rs. Lakh)

Contd.

Sctors	LAB	CAP	LAN	RH1	RH2	RH3	RH4	RH5	UH1	
1	PAD	0	0	0	692803	1452234	349060	1943093	511296	656798
2	WHT	0	0	0	293650	615539	147951	823592	216716	278387
3	CER	0	0	0	1419119	2790965	734365	3802592	1177843	1902016

4	CAS	0	0	0	179114	375453	90244	502357	132188	169805
5	ANH	0	0	0	1017143	1303688	477346	3391979	1008440	1751265
6	FRS	0	0	0	34361	64910	17039	100701	27649	23132
7	FSH	0	0	0	240027	503139	120935	673201	177143	227553
8	COL	0	0	0	5328	9906	2861	14410	4684	8118
9	OIL	0	0	0	0	0	0	0	0	0
10	GAS	0	0	0	1150	2138	618	3110	1011	1752
11	FBV	0	0	0	1823412	3346310	974993	5158848	1615841	2451150
12	TEX	0	0	0	877335	1501519	431280	2627008	845228	1260202
13	WOD	0	0	0	2987	2905	1584	9655	3145	6140
14	MIN	0	0	0	0	0	0	0	0	0
15	PET	0	0	0	195703	324260	134714	632103	364959	405722
16	CHM	0	0	0	318726	439419	166771	1085592	350250	639238
17	PAP	0	0	0	19901	26306	9742	68498	18756	39638
18	FER	0	0	0	0	0	0	0	0	0
19	CEM	0	0	0	0	0	0	0	0	0
20	IRS	0	0	0	0	0	0	0	0	0
21	ALU	0	0	0	0	0	0	0	0	0
22	OMN	0	0	0	319813	353053	166429	980475	341515	669724
23	MCH	0	0	0	147425	162748	76719	451973	157429	308725
24	HYD	0	0	0	15780	29338	8474	42677	13871	24042
25	NHY	0	0	0	107731	200297	57851	291364	94700	164143
26	NUC	0	0	0	1760	3272	945	4760	1547	2682
27	BIO	0	0	0	296217	559567	146883	868112	238352	199417
28	WAT	0	0	0	13045	24253	7005	35280	11467	19875
29	CON	0	0	0	6523	10749	3445	20531	6893	11216
30	RTM	0	0	0	1011738	1337376	495272	3482399	953565	2015189
31	RNM	0	0	0	120306	159027	58893	414092	113388	239626
32	RLY	0	0	0	90923	120187	44509	312956	85695	181101
33	AIR	0	0	0	41564	54938	20345	143053	39171	82782
34	SEA	0	0	0	24535	32432	12010	84449	23124	48869
35	HLM	0	0	0	341111	830225	225448	1343294	748954	587811
36	SER	0	0	0	3441857	4962217	1933243	11903485	4538862	8099314
	LAB	0	0	0						
	CAP	0	0	0						
	LAN	0	0	0						
	RNASE	10908643	8465153	0						
	RAL	21086940	64181	0						
	ROL	6560516	380259	0						
	RASE	18334841	20854448	12710563						
	ROH	4632049	12390234	0						
	USE	13399380	13766962	0						
	USC	48110468	2967587	0						
	UCL	6942972	941819	0						
	UOH	1718458	4464563	0						
	PVT	0	8479049	0						
	PUB	0	5522666	0						
	GOV	0	4963087	0	224068	0	0	2611516	894857	0
	ITX	0	0	0	478261	785005	254303	1518481	516645	837753
	CAC	0	25451964.75	0	8806842	1226314	275071	14871387	5452256	10949427
	ROW	0	0	0						
	Total	131694266	108711972	12710563	22610257	23609687	7446350	60217025	20687440	34262612

Appendix II: The Social Accounting Matrix of India – 2003-04 (Unit Rs. Lakh) Contd.

Sctors	UH2	UH3	UH4	PVT	PUB	GOV	ITX	CAC	ROW
1	PAD	720502	219187	114235	0	0	25640	54315	355308
2	WHT	305389	92904	48419	0	0	24338	-87651	225487
3	CER	2158199	506988	347380	0	0	89414	95667	383946
4	CAS	186275	56667	29534	0	0	0	285667	227110

5	ANH	2028139	337499	325200	0	0	120424		249118	177573
6	FRS	25376	7720	4023	0	0	46		13986	110211
7	FSH	249624	75939	39577	0	0	0		4148	396635
8	COL	9221	3649	1632	0	0	5126		-6740	15711
9	OIL	0	0	0	0	0	0		-1337	10953
10	GAS	1990	788	352	0	0	13784		1508	7551
11	FBV	2904737	686174	490741	0	0	293427		495216	1676879
12	TEX	1526948	272659	256152	0	0	281704		317874	5574836
13	WOD	8320	798	1194	0	0	77		-454141	18758
14	MIN	0	0	0	0	0	0		-39806	2589648
15	PET	1077700	118355	115216	0	0	274112		-1484579	1398547
16	CHM	1172099	141448	170204	0	0	822513		2574236	3531523
17	PAP	65750	8178	10405	0	0	79281		21532	106444
18	FER	0	0	0	0	0	0		195463	143705
19	CEM	0	0	0	0	0	0		-140269	56093
20	IRS	0	0	0	0	0	0		1711714	1416857
21	ALU	0	0	0	0	0	0		898357	410103
22	OMN	924387	96173	141255	0	0	493934		12123939	5481651
23	MCH	426118	44333	65115	0	0	412228		14564918	2258490
24	HYD	27310	10807	4832	0	0	17226	0	0	0
25	NHY	186451	73779	32991	0	0	119876	0	0	0
26	NUC	3046	1205	539	0	0	1910	0	0	0
27	BIO	218759	66550	34697	0	0	0		0	0
28	WAT	22576	8933	3995	0	0	328458		0	0
29	CON	17596	2627	3132	0	0	1658811		36402428	0
30	RTM	3342683	415743	528980	0	0	528799		1123005	1692670
31	RNM	397478	49436	62901	0	0	62819		122105	642251
32	RLY	300400	37362	47538	0	0	186579		484109	459739
33	AIR	137314	17078	21730	0	0	12846		28036	67618
34	SEA	81060	10082	12828	0	0	57587		152276	110366
35	HLM	1154664	202913	502710	0	0	1198876		0	0
36	SER	15551207	1698045	2847295	0	0	23396017		2727358	11624178
	LAB								0	-312600
	CAP								0	-1512400
	LAN								0	
	RNASE						2816962		0	419500
	RAL						1933269		0	525297
	ROL						457336		0	48238
	RASE						7493631		0	823541
	ROH						2330771		0	1334386
	USE						3661815		0	3434455
	USC						5451455		0	2741347
	UCL						322971		0	146260
	UOH						867953		0	2416358
	PVT						3338651		0	0
	PUB						0		0	0
	GOV	1500237	2506616	399903	6356200		0	21607300	0	-257200
	ITX	1333662	196853	243394	0	0	553450		4981018	17274
	CAC	21205637	386535	2559231	5461500	5522666	-18927534		0	-5827828
	ROW						0		0	
	Total	59270858	8354022	9467332	11817700	5522666	40806582	21607300	77413470	45167469

Appendix II: The Social Accounting Matrix of India – 2003-04 (Unit Rs. Lakh) Contd.

Sctors	Total
1 PAD	11667256
2 WHT	6956579
3 CER	25291793
4 CAS	9829039
5 ANH	17025800

6	FRS	732289
7	FSH	3180753
8	COL	4005030
9	OIL	11143813
10	GAS	1129627
11	FBV	27066692
12	TEX	20966068
13	WOD	966651
14	MIN	6180211
15	PET	20312455
16	CHM	32953942
17	PAP	2873400
18	FER	4254621
19	CEM	1896713
20	IRS	14728747
21	ALU	6720236
22	OMN	38038045
23	MCH	31049153
24	HYD	1823964
25	NHY	12654091
26	NUC	203215
27	BIO	3612165
28	WAT	786150
29	CON	44147329
30	RTM	30002913
31	RNM	3944234
32	RLY	5854460
33	AIR	1201983
34	SEA	1230359
35	HLM	7301667
36	SER	145900226
	LAB	131694266
	CAP	108711972
	LAN	12710563
	RNASE	22610257
	RAL	23609687
	ROL	7446350
	RASE	60217025
	ROH	20687440
	USE	34262612
	USC	59270858
	UCL	8354022
	UOH	9467332
	PVT	11817700
	PUB	5522666
	GOV	40806583
	ITX	21607300
	CAC	77413470
	ROW	45167469
	Total	

