A Social Accounting Matrix for Pakistan, 2001-02: Methodology and Results

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ABSTRACT

This paper describes the structure and construction of a social accounting matrix (SAM) for Pakistan for 2001-02. A SAM is an internally consistent extended set of national accounts that disaggregates value-added in each production activity into payments to various factors (e.g., land, labour, capital), and disaggregates household incomes and expenditures according to various household types. Because this Pakistan SAM is designed for analysis of the links between growth and rural poverty, agricultural activities, agricultural factors of production, and rural household accounts are more disaggregated than are those for urban activities and households. Rural household groups in the SAM are split according to three regions (Punjab, Sindh, and Other Pakistan) to capture the large differences in the structure of agricultural production and incomes across Pakistan. On average, household incomes in the SAM are 2.1 times greater than household expenditures in the HIES Survey, reflecting the apparent substantial under-reporting of expenditures (particularly on services) and informal sector incomes in the HIES and other household surveys. Agricultural factor incomes as calculated in the SAM account for only 23 percent of total factor incomes in Pakistan, but 60 percent of total factor incomes for agricultural households. 91 percent of agricultural incomes derive from land, water, own-farm labour, or livestock; earnings of hired labour and (non-livestock) agricultural capital account for only 9 percent of agricultural incomes. Incomes of large- and medium-farm rural households, calculated using land area cultivated, data from the Agricultural Census, and other data, are significantly higher than indicated in household surveys.

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I. INTRODUCTION

Pakistan's economy has enjoyed substantial economic growth over the past three decades: per capita real GDP increased by 2.5 percent per annum between 1975 and 2003. The agricultural sector has also performed well, as agricultural GDP increased by an average of 4.1 percent per year from 1975 to 2000. Nonetheless, rural poverty remains high: 38.9 percent of the rural population was poor in 2001-02 (81.0 percent of the total number of poor in Pakistan), and rural poverty rates are approximately the same as those in the early 1990s.

This paper examines the links between agricultural growth and rural poverty by constructing an internally consistent set of accounts for production, incomes and expenditures in a social accounting matrix (SAM). The SAM can be thought of as an extended set of national accounts that disaggregates value added in each production activity into payments to various factors (e.g. land, labour, capital), and disaggregates household incomes and expenditures according to various household types. Given the objective of understanding rural growth and poverty, the Pakistan SAM presented here includes more disaggregation for agricultural activities, factors of production, and rural households. Rural household groups in the SAM are split according to three regions (Punjab, Sindh and Other Pakistan) to capture the large differences in the structure of agricultural production and incomes across Pakistan.

Chapter I of this paper describes the structure of the SAM in detail and the methodology used in constructing the SAM, including major adjustments made to reconcile conflicting data from national accounts and other sources. Chapter III presents the results, focusing on factor payments and household incomes. Details of the SAM construction are included in the annexes.

II. CONSTRUCTION OF THE 2001-02 PAKISTAN SAM

A social accounting matrix (SAM) is a comprehensive, economy-wide set of accounts that quantify economic flows (incomes and expenditures) in an economy for a given period of time (usually one year). Mathematically, a SAM is a square matrix in which each account is represented by a row and a column. Each cell shows the payment from the account of its column to the account of its row. Thus, the incomes of an account appear along its row and its expenditures along its column. The underlying principle of double-entry accounting requires that, for each account in the SAM, total revenue (row total) equals total expenditure (column total).

Four major types of accounts are distinguished in the 2001-02 Pakistan SAM: (a) activities, (b) commodities, (c) factors of production, and (d) institutions (households, government and the Rest of World), including an

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

The year 2001-02 was chosen as the base year for the Pakistan SAM since the last national household expenditure survey (2001 Pakistan Household Income and Expenditure Survey) was conducted in that year. Unfortunately, the most recent available input-output table is for 1990-91, and the published national accounts final demand aggregates and estimates of value added by sector are based on an even earlier input-output table (1985). Thus, as described below, in preparing the 2001-02 Pakistan SAM, it was necessary to construct a consistent set of accounts for production and value added by sector based on the 1991 input-output table. These accounts then formed the base upon which factor and household accounts were disaggregated.

This procedure involved two steps. First, we constructed a "proto-SAM" using the above mentioned data sources. Given that the data came from different years and different sources, the resulting "proto-SAM was, as expected, not balanced (in case of contradictory information on any item we utilised our judgment to choose the most logical value). In the second step, we balanced the SAM by adjusting the factor and household accounts, as described below.

Structure of the SAM

Box 1 lists the accounts of the 2001-02 Pakistan SAM. The SAM includes 34 activities, each producing a single commodity, except for irrigated wheat and non-irrigated wheat, both of which produce a single commodity (wheat). For the twelve agricultural activities, returns to land and own-family labour are disaggregated by region (Punjab, Sindh, and Other Pakistan) and by size of farm (small (0-12.5 acre), medium (12.5-50 acre) and large (50 acre plus) farms (defined according to area cultivated, not land ownership). Out of the 27 factors of production that are specified, 23 involve only agricultural production:

Box 1: Structure of the 2001-02 Pakistan SAM

Activities (34)

Agriculture (12): Wheat irrigated, Wheat non-irrigated, Rice-IRRI, Rice-basmati, Cotton, Sugarcane, Other major crops, Fruits and vegetables, Livestock-cattle/dairy, Poultry, Forestry, Fishing

Industry (16): Mining, Vegetable oils, Wheat milling, Rice milling-IRRI, Rice milling-basmati, Sugar, Other food, Cotton lint/yarn, Textiles, Leather, Wood products, Chemicals, Cement/bricks, Petroleum refining, Other manufacturing, Energy

Services (6): Construction, Commerce, Transport, Housing, Private Services, Public services

Commodities (33)

Same as activities with Wheat irrigated and Wheat non-irrigated aggregated as one commodity (Wheat)

Factors (27)

Labour (10): Own-farm (Large farm, Medium farm Sindh, Medium farm Punjab, Medium farm Other Pakistan, Small farm Sindh, Small farm Punjab, Small farm Other Pakistan), Agricultural wage, Non-agricultural unskilled, skilled

Land (12): Large farm (Sindh, Punjab, Other Pakistan), Irrigated medium farm (Sindh, Punjab, Other Pakistan), Irrigated small farm (Sindh, Punjab, Other Pakistan), Non-irrigated small farm (Sindh, Punjab, Other Pakistan)

Other factors (5): Water, Capital livestock, Capital other-agriculture, Capital formal, Capital informal

Households (19)

Rural (17): Large farm (Sindh, Punjab, Other Pakistan), Medium farm (Sindh, Punjab, Other Pakistan), Small farm (Sindh, Punjab, Other Pakistan), Landless farmer (Sindh, Punjab, Other Pakistan), Rural agricultural landless (Sindh, Punjab, Other Pakistan), Rural non-farm non-poor, Rural non-farm poor

Urban (2): non-poor, poor

Other Institutional Accounts (4): Enterprises, Government, Rest of world, Capital

8 types of agricultural labour, 12 types of land, water, livestock capital and other agricultural capital. This detailed treatment of rural factors and agriculture in the SAM reflects the primary objective of constructing the SAM: to better understand the relationship between agricultural performance and rural income growth in the context of imperfect rural factor markets. Fifteen of the nineteen household categories are rural agricultural households, split according to amount of land cultivated (large farm, small farm, landless) and region (Sindh, Punjab and Other Pakistan). Non-farm households, both rural and urban, are split into poor and non-poor according to their 2000-01 per capita household expenditures, with poor households defined as those with a per capita expenditure of less than 748 rupees/month per capita (22.67 percent of urban households). Non-farm rural households form the last household group, accounting for 19.8 percent of total population.[1]

The SAM uses data mainly from the following sources:

- 1990-91 Input-Output Table (97 sectors)
- 2001-02 National Accounts (value added for 15 sectors)
- 2001-02 Pakistan Integrated Household Survey (consumption disaggregation)
- 2001 Pakistan Rural Household Survey (household income disaggregation)
- 2001-02 Pakistan Economic Survey (sector/commodity data on production, prices, trade).

Macro SAM

Table 1 presents an aggregate version of the 2001-02 Pakistan SAM. Note that in the SAM all indirect taxes are shown as taxes on commodities.

Activity and Commodity Accounts

The starting points for the production accounts in the SAM were the 2001-02 national accounts (aggregates and value added by sector) and the 1990-91 input output table. The SAM further disaggregates the 15 national account sectors from Statistical Appendix Table 1.1, Pakistan Economic Survey, 2001-02 into 34 by sector using the breakdown of production activities from the 1990-91input-output table (IO91). Mapping between IO91, national accounts and SAM activities is shown in Annex Table 1.

SAM directly uses the 2001-02 national accounts' figures for value added (VA) in activities of minor crops (fruits and vegetables), fishing, forestry, construction, mining, energy (electricity and gas), trade, transport and

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[1]Non-farm rural households are defined as rural households for which the main occupation of the head of household is not crop or livestock farming.

Table 1

Macro SAM Pakistan 2001-02

	ACT	COM	FAC	HOU	ENT	GCUR	ROW	CAP	(Million Rs) Total
Activities (ACT)	0	7,200,551	0	0	0	0	0	0	7,200,551
Commodities (COM)	3,823,453	0	0	2,698,992	0	408,939	677,840	534,113	8,143,337
Factors (FAC)	3,377,098	0	0	0	0	0	0	0	3,377,098
Households (HOU)	0	0	3,377,098	0	0	0	184,769	0	3,561,867
Enterprises (ENT)	0	0	0	0	0	0	0	0	0
Government (GCUR)	0	251,633	0	146,152	0	0	0	0	397,785
Dom Ind Taxes	0	203,533							203,533
Import Duties		48,100							48,100
Direct Taxes				146,152					146,152
Rest of World (ROW)	0	691,153	0	0	0	0	0	0	691,153
Saving	0	0	0	716,723	0	−11,154	−171,456	0	534,113
Total	7,200,551	8,143,337	3,377,098	3,561,867	0	397,785	691,153	534,113	23,905,903

communications, housing services, private services, and public administration. The VA in private services includes VA in the financial sector. The other national accounts sectors, i.e. agriculture and manufacturing, are disaggregated into more activities in the SAM. Initial estimates of VA in these activities were calculated using the VA figures in the 1990-91 input-output table (IO91) multiplied by percentage changes in output and price, taken mainly the Pakistan Economic Survey (2002-03). Some variations over this rule were unavoidable for want of usable data, which are described in the following paragraphs. The total VA for each of these national accounts sectors was maintained by calculating residual VA for one or more components, viz. other major crops in agriculture, and other food manufacturing, wood products, chemicals and other manufacturing in the manufacturing sector.

Some IO91 sectors have been split to serve the purpose of this SAM. Wheat is one sector in IO91, so the IO91 VA has been split into wheat irrigated and wheat unirrigated in proportion of production of wheat in 1990-91 from these two sources. Similarly IO91 VA in rice has been split into rice irri and rice basmati in proportion of estimated value of production of the two varieties in 1990-91. Poultry is part of livestock sector in IO91, and the IO91 VA in poultry has been separated by applying the estimated share of poultry in livestock sector (see Table 2). The milling sector IO91 VA has been split into three activities, i.e. wheat milling, rice irri milling and rice basmati milling, in proportion of the value of production of wheat, rice irri and rice basmati in 1990-91. These VA estimates have been multiplied by percentage changes in respective outputs and prices to get VA in 2001-02.

Table 2

Poultry Share Estimate in Livestock, 1990 -91

Item	Production Meat (Thous. ton)	Weight (Rough Real Price)	Weighted Sum	Weighted Share
Beef	765	1.4	1071	41.97%
Mutton	665	2	1330	52.12%
Poultry	151	1	151	5.92%
Total	1581		2552	100.00%

Some proxies have been unavoidable in the estimation of VA. VA in milling of wheat, rice irri and rice basmati has been estimated by multiplying the IO91 VAs by the respective percentage changes in output and price of these three commodities. Change in poultry prices is proxied by change in GDP deflator of livestock sector. VA in petroleum products has been estimated (in line with the FBS practice) by using CMI 96 VA and the growth in quantum

index of manufacturing petroleum products and WPI of fuel, lighting and lubricants (more details are given below). Growth in VA in leather products in 1990-2002 is estimated by extrapolation of the growth VA of these products in 1991-1996, based on CMI data. Residual VA in manufacturing sector in 2001-02 has been split into other food, wood products, chemical and other manufacturing on the basis of IO91 VA proportions. Greater details of estimation of VA are given in Annex Table 2.

Initial estimates of intermediate consumption have been derived by multiplying IO91 values by respective activity ratios of 2001-02 VA and IO91 VA. The resulting commodities-activities inputs block needs splitting of some columns and rows to conform to the splits created in some IO91 sectors. Wheat sector input column was split into commodity input columns for activities of wheat irrigated and wheat unirrigated in proportion of wheat output from the two sources in 1990-91. Similar splits have been created: in rice sector column into activities of IRRI rice and basmati rice in proportion to the value of production of IRRI rice and basmati rice in 1990-91; livestock sector column into livestock and poultry activities columns by multiplying it by the estimated shares of the two activities in 1990-91; milling sector into three activities, i.e. wheat milling, IRRI rice milling and basmati rice milling in proportion of the value of production of wheat, IRRI rice and basmati rice in 1990-91. These splits, for rice, livestock and milling sectors, have been reapplied to split these sector rows into the corresponding commodity rows, with restrictions on cross activity input values, of IRRI rice into basmati rice, livestock into poultry, wheat milling into IRRI rice milling, wheat milling into basmati rice milling, IRRI rice milling into basmati rice milling, and vice versa, which have been set at zero.

The total value of production by each activity has then been derived by adding VA to intermediate consumption.

Further adjustments were required for the public administration activity. Using the 1990-91 ratio of total value added to production for the sector resulted in an output of 661.3 rupees, approximately double the figure for total government consumption in the national accounts (331.6 billion rupees). Without an adjustment to intermediate consumption, private consumption of public services would be 320.4 billion rupees (about 10 percent of total national household consumption), far in excess of the 1990-91 estimates. Two adjustments were made. First, intermediate consumption of construction services was dropped, since these are investment expenditures. Second, consumption of manufactured goods (also generally an investment expenditure) was reduced by 130 billion rupees.[2] (See the discussion of other adjustments to

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[2]This inconsistency between the 1990-91 input-output coefficients and the 2001-02 national account aggregates may also reflect a re-classification of public expenditures, perhaps the inclusion of military expenditures (specifically mentioned) in the 1990-91 input-output table and the possible omission of these expenditures in the 2001-02 accounts.

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manufactured goods accounts.) As a result of these changes, private consumption of public services fell to 3.5 percent of total consumption. Annex Table 3 summarises activity-wise value of production and intermediate consumption.

Table 3

Pakistan Value-added, 1990-91 (Million Rs)

	National Accounts	1991 Input-Output Table	Percent Difference
1. Major Crops	94,570	101,742	7.6
2. Minor Crops	43,562	41,208	–5.4
Total Crops	138,132	142,950	3.5
3. Livestock	86,219	75,553	–12.4
4. Fishing	6,072	12,774	110.4
5. Forestry	2,707	13,947	415.2
Agriculture	233,130	245,224	5.2
6. Mining	6,437	32,744	408.7
7. Manufacturing	158,840	209,005	31.6
Large Scale	112,204		
Small Scale	46,636		
8. Construction	38,172	42,942	12.5
9. Electricity and Gas	30,584	36,113	18.1
10. Transport, Communication	77,709	65,446	–15.8
11. Trade	152,017	161,661	6.3
12. Finance	26,966		
13. Dwellings	39,624	67,291	69.8
14. Public Admin	76,519	56,745	–25.8
15. Services[a]	68,376	59,404	–13.1
GDP	908,374	976,575	7.5

[a]Services includes finance sector.

Indirect taxes on commodities, both domestic and import duties, have been estimated by reshuffling of the available data, since the CBR data is not in the SAM format. Thus commodity-wise collection of domestic indirect (sales and central excise) taxes and import duties from the most recent CBR Yearbook, 1998-99 and 1999-2000, have been regrouped according to the SAM commodity classification. The proportions thus derived have then been multiplied with the 2001-02 figures of domestic indirect taxes and import duties from the national accounts to give commodity-wise shares of these taxes. Domestic indirect taxes include petroleum surcharges, Rs 39 billion, in petroleum refining as indicated by the M/o Finance and the remaining Rs 15.3 billion in gas development

surcharge in mining. The figure on subsidies from national accounts has been split on the basis of IO91 proportions. Annex Table 3 also summarises activity-wise domestic indirect taxes and import duties. The figure on total direct taxes has been left as such, as we have no basis to split it.

Exports and imports have been derived from commodity level trade data and for commodities, for which such data was not available, from the shares of these commodities in total exports or imports in the 1991 IO table. The national accounts values of exports and imports of goods have been maintained by calculating residual value of a group of commodities, where exports and imports have been split on the basis of IO91 values. Annex Table 4 gives these calculations along with explanatory notes. The resulting structure of Pakistan's economy is summarised in Annex Table 5.

Commodity shares of investment and government consumption from the 1991 input-output were used to disaggregate the 2001-02 totals taken from the national accounts. Initial estimates of total household consumption for each commodity were calculated as the residual between total supply and other demand.

Adjustments in Activity and Commodity Accounts

Value added figures in the 1990-91 input-output table do not match those from the national accounts series (see Table 3). The overall difference for total GDP is only 7.5 percent, and the figures for most sectors are within 20 percent. However, the input-output table figures are substantially larger than those of the national accounts for fishing (110 percent), forestry (415 percent) and mining (409 percent). Since the value added figures for major sectors from the national accounts are maintained in the SAM, the implicit growth rates in production (SAM relative to the I-O table) for these three sectors are smaller than in the national accounts and smaller than those for most other sectors. Moreover, because estimated intermediate and final demand for these products increased at approximately the same rate as the growth in output of most other sectors, demand from intermediate consumption, government consumption, investment and exports for these products was far in excess of total supply, necessitating adjustments to these sectors as the residual consumption was negative. Residual estimates of consumption in other sectors were also needed, as described below.

Cotton, Lint, and Yarn. Using the percentage changes computed in VA2002 for lint and yarn (based on percentage changes in yarn price (74 percent) and production (93 percent), cotton consumption, calculated as the residual between total supply less intermediate demand and other final demand, is negative. To achieve balance in these accounts, the percentage change in production of lint and yarn was reduced, and set to be approximately the same as the percentage change in cotton production (257 vs. 241 percent), so that final private consumption of cotton, and consumption of lint and yarn, is essentially zero.

     Other Manufacturing. Production in other manufacturing is calculated as a residual from industrial value added (from the official GDP accounts) less estimated valued added in other sectors (our own estimates). This estimate of production, combined with estimated imports, results in a total supply that is less than initial estimates of demand. To achieve balance in the other manufacturing commodity account, two adjustments were made to both final demand and to imports, in addition to the reduction in intermediate consumption by the public services activity described above. First, investment spending on other manufacturing was reduced by Rs 70 billion, and investment expenditures on private services were increased to keep total investment unchanged.[3] Second, imports of other manufactured goods were also raised by 190 billion from 366 billion (calculated using the 1990-91 IO Table share of other manufactured products in total imports) to 556 billion. With these adjustments, and setting final consumption as the difference between total supply and other demand, the share of other manufactured products in total final consumption share is 5.9 percent (compared to 5.8 percent in the 1990-91 IO Table).

     Petroleum and Mining. VA and value of production in the petroleum-refining sector were estimated by using CMI 96 VA and the growth in quantum index of manufacturing petroleum products and WPI of fuel, lighting and lubricants.[4] These calculations are shown in Table 4. As in the case of other manufactured products, intermediate demand for crude petroleum and mining

Table 4

Estimation of Value of Production and Value Addition in Petroleum Refining

Year	Qindex of Petroleum WB/FBS 1981=1	Qindex of Manufacturing Ec Survey 1981=1	Qindex of Manufacturing 3Yr M.Av	WPI for Fuel, Lighting and Lubricants Ec Survey 1981=1	Value of Production Million Rs	Value Added Million Rs
1993		2.28				
1994		2.37	2.35			
1995		2.41	2.42			
1996	1.35	2.48	2.44	1.7383	33,635	6,509
1997	1.39	2.43	2.51		(Item 353-354 of CMI96)	
1998	1.45	2.62	2.59			
1999	1.47	2.71				
2000						
2001	1.79					
2002	2.04			3.4147	99,620	19,278

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     [3]Investment spending on construction services was increased by Rs 20.3 billion so that supply and demand for these services balanced with private consumption of construction services equal to zero (reflecting a classification of construction services as investment). As a result, the net increase in investment demand for private services is Rs 49.7 billion.

     [4]Note that these calculations are independent of the VA/Prod ratio from 1990-91 IO table.

products was greater than total supply (even when excluding final private consumption). Thus, crude petroleum imports were increased by 49 billion to make private consumption of mining products (calculated as a residual) equal to approximately zero. Similarly, imports of refined petroleum were increased by Rs 100 billion to raise the share of refined petroleum in total private consumption to 1.0 percent (compared to 1.4 percent in 1990-91 IO Table).

Other Major Crops. Initial estimates of private consumption of other field crops, calculated as a residual, were also negative. To obtain a positive final consumption of other field crops, adjustments were made to both intermediate consumption and production. First, intermediate consumption of other field crops by the cattle sector was reduced by Rs 20 billion, from Rs 76 billion to Rs 56 billion. Production of cattle was reduced by the same amount, leaving value added in the cattle sector unchanged. The value of production of cattle was calculated as a residual. Second, production of other field crops was increased so that the residual consumption of other field crops was equal to 0.1 percent of total private consumption of all commodities. In order to maintain the total value added of major crops at the level of the 2001-02 national accounts, production and value added of other major crops for sugarcane, IRRI rice, and cotton were reduced by 5 percent and production and value added of wheat and basmati rice were reduced by 10 percent.

Construction. Using initial estimates of production, intermediate consumption and investment demand and international trade, the residual private consumption was negative. To achieve a target of zero private consumption of construction services, investment spending on construction was reduced by Rs 30 billion and intermediate consumption of construction by the public services activity was reduced by Rs 41.7 billion, increasing demand for private services in each case to maintain balance in the investment and private services accounts.

Forestry and Wood. In order to obtain positive levels of private consumption of forestry and wood products, intermediate consumption of these products was reduced. Intermediate consumption of forestry products by trade, transport and private services activities were each reduced by 60 percent. Similarly, intermediate consumption of wood products in trade, transport and private services activities were each reduced by 50 percent.

As a result of the above data manipulations, SAM figures give a bit different picture of national accounts. In SAM, private consumption figure is Rs 3,038 billion, an increased of Rs 339 (15.2 percent) over the figure given by FBS; Imports total Rs 1100 billion, an increase of Rs 409 billion, (59.2 percent) over the FBS's figure; and NFI is Rs 185 billion, Rs. 153 billion higher than given by FBS. The comparative national accounts are summarized in Table 5 and the overall structure of Pakistan's economy is given in Annex Table 5.

Table 5

Comparative Macroeconomic Aggregates (Million Rs)

	SAM Figures	FBS-National Accounts	Difference	% Difference
Consumption	3,446,932	3,107,931	339,001	10.9
Private Sector	3,037,993	2,698,992	339,001	12.6
Government	408,939	408,939	0	0.0
Investment	534,113	534,113	0	0.0
Exports	677,840	677,840	0	0.0
Imports	1,100,153	691,153	409,000	59.2
GDP MP	3,628,731	3,628,731	0	0.0
NFI	184,769	31,985	152,784	477.7
GNP MP	3,813,500	3,660,716	152,784	4.2
Net Indirect Taxes	251,633	251,633	0	0.0
GNP FC	3,561,867	3,409,083	152,784	4.5

Source: National Account figures are from *Pakistan Economic Survey 2002-03*, SA Table 1.6.

Factor and Household Incomes

Split of Value-added in Agriculture. The breakdown of value added by factor inputs for the five major crops (wheat, rice IRRI, rice basmati, cotton and sugarcane) are based on survey data on costs of production in Sindh, Punjab and Other Pakistan from the Agricultural Prices Commission.[5] Approximate shares of value added of the three regions, Sindh, Punjab and Other Pakistan, in each crop are calculated by using their shares in total cropped area based on Agricultural Census 2000 data. The regional crops VAs are then split into labour, land, water and capital costs based on distribution of these costs from the APCOM survey data.[6] The totals of regional land and labour costs (see factor shares Table 6) were then split into payments to factor sub-categories based on regional distribution of cropped area under those crops. Thus, for each activity in the SAM, it is assumed that the same technology (as represented by the input-output coefficients and factor shares) is used across regions and farm size.[7]

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[5]APCOM, Price Policy Papers for Wheat, Rice, Cotton, and Sugarcane. Note that data for other provinces is not available except for NWFP which is only for sugarcane. So that the other Pakistan was mostly proxied by Sindh based on productivity.

[6]The crop cost structure used for Other Pakistan is that of Sindh, except in case of sugarcane, which is that of NWFP.

[7]For wheat, the breakdown of value added assumes that the share of labour and capital in value added is the same for both irrigated and non-irrigated wheat. For non-irrigated wheat, all the remainder of VA goes to land, ad payments to land for medium and small farms are lumped together in small farms. For irrigated wheat, land VA is calculated as a residual of land VA for total wheat less land VA for non-irrigated wheat.

Table 6

Returns to Factors (% Value Added)—Major Crops

Factor	Wheat-irr	Wheat-unirr	Padi-irri	Padi-basmati	Cotton	Sugarcane
Labour	34.5	34.5	17.0	9.9	32.7	13.1
Land	34.8	53.7	67.0	69.6	48.6	69.1
Water	20.0	0.0	8.4	15.6	10.2	8.6
Capital	10.7	11.8	7.7	4.9	8.6	9.2

VAs in the remaining activities of the agriculture sector were split into payments for factor subcategories as follows. We first split VA into payments for labour, land, water and capital based on the authors' judgments and evidence on the five major crops (see Table 7). For Other major crops and Fruits and vegetables, the shares for labour and land were split into further factor subcategories based on weight estimated from PIHS 2001-02. The split of wages and land payment was based on regional shares of area under forests. We attributed whole of the capital share in Other major crops and fruits and vegetables to other agricultural capital. A ratio of 70:20 between for livestock capital and formal capital is assumed for livestock and poultry activities. Similarly a ratio of 50:20 is assumed for informal and formal capital in fishery.

Table 7

Distribution of Value-added in Selected Sectors (%)

Sectors/Factors	Labour	Land	Water	Capital	Total
Other Major Crops	35	50	5	10	100
Fruits and Vegetables	20	60	10	10	100
Livestock-cattle	10			90	100
Livestock-poultry	10			90	100
Forestry	20	80			100
Fishery	30			70	100

Agricultural labour was split between own-farm and hired labour in each activity using a constant ratio for all activities derived as follows. According to income data from the PRHS 2001-02 survey, agricultural wage labour accounted for 5 percent of total value added in crop agriculture. Based on the breakdown of payments to factors of production (derived from the APCOM data for major crops), returns to labour accounted for 26 percent of total value added in agriculture. These two ratios imply that wage income accounted for 19 percent (.05/.26) of total returns to labour.

The resulting distribution of payments to factors in the agricultural sector as a share of total factor payments (value added) in agricultural activities is given in the Annex Table 6. Thus, for example, wheat accounts for 2.6 percent of total value added attributed to own land for large farmers in Punjab.

VA Splits in Industry and Service Sectors. The split of VA in manufacturing is based on estimates of the share of wages in total value added. We derived the wage shares from the employment cost in total value added and shares of production workers in labour value added from data from the Census of Manufacturing Industries. The employment costs of production workers in labour value added was used as an approximation for the share of skilled workers wages in the total wage bill. We had little data was available to estimate payments of value added to factors in mining, energy, construction and other services sectors. Hence the shares of wages in VA and production workers in wages were assumed for the mining, energy, construction and the remaining service sectors based on observed values for manufacturing activities and the authors' judgment.

We have used standard capital ratios to split capital VA into two formal and informal categories from other countries as initial estimates, and then adjusted these numbers in the SAM balancing process. For housing, all VA is allocated to informal capital; for public administration, all VA is paid to skilled labour. Authors' estimates of VA splits in industry and service activities VAs into wage payments to skilled and unskilled workers and interest payments to formal and informal capital is shown in Table 8.

Household Income

No complete data on household income by factor of production was available. Estimates of factor payments to households were made largely on the basis of data from the PRHS 2001-02.

Agricultural Incomes

Factors of production are defined according to operated area (size of farm), while household groups are defined according to ownership of land. Thus, there is no direct one-to-one mapping of most factor payments to household groups.

For land, all returns to land of large farms (defined in terms of cultivated area) are paid to large land-owners in proportion of farm area of respective regions. For medium and small farms in each region, returns to land are allocated to the four types of farmers (large, medium, small, and landless) according to the shares of each group in total land revenues of small and medium farms, derived from data from the PRHS 2001-02. Specifically, returns

Table 8

Estimation of VA Splits in Industry and Service Sectors (Shares)

		Shares of Wages in VA	Shares of Prod Workers in Total Wages	Shares of Formal K in Total K	Shares in VA		Shares in VA	
					Unskilled Workers	Skilled Workers	Formal K	Informal K
		1	2	3	4	5	6	7
	Sectors				=#1-#5	=#1*#2	=(1-#1)*#3	=(1-#1)*(1-#3)
13	Mining	0.300	0.850	1.000	0.045	0.255	0.700	0.000
14	Vegetable Oils	0.129	0.603	0.700	0.051	0.078	0.609	0.261
15	Wheat Milling	0.184	0.649	0.900	0.065	0.120	0.734	0.082
16	Rice Milling Irri	0.213	0.568	0.900	0.092	0.121	0.708	0.079
17	Rice Milling Basmati	0.213	0.568	0.900	0.092	0.121	0.708	0.079
18	Sugar	0.232	0.700	0.900	0.070	0.162	0.691	0.077
19	Other Food	0.175	0.616	0.700	0.067	0.108	0.578	0.248
20	Lint, Yarn	0.231	0.855	0.900	0.033	0.198	0.692	0.077
21	Textiles	0.274	0.789	0.800	0.058	0.216	0.581	0.145
22	Leather	0.259	0.604	0.700	0.102	0.156	0.519	0.222
23	Wood	0.352	0.680	0.500	0.113	0.239	0.324	0.324
24	Chemicals	0.207	0.552	0.900	0.093	0.114	0.714	0.079
25	Cement, Bricks	0.119	0.690	0.900	0.037	0.082	0.793	0.088
26	Petroleum Refining	0.256	0.720	1.000	0.072	0.184	0.744	0.000
27	Other Manufacturing	0.276	0.680	0.700	0.088	0.187	0.507	0.217
28	Energy	0.200	0.800	1.000	0.040	0.160	0.800	0.000
29	Construction	0.700	0.500	0.500	0.350	0.350	0.150	0.150
30	Commerce	0.700	0.200	0.300	0.560	0.140	0.090	0.210
31	Transport	0.400	0.200	0.300	0.320	0.080	0.180	0.420
32	Housing	0.000		0.000	0.000	0.000	0.000	1.000
33	Private Services	0.400	0.200	0.300	0.320	0.080	0.180	0.420
34	Public Services	1.000	1.000	0.000	0.000	1.000	0.000	0.000

Notes: VA-value added, K-capital.

of small and medium-sized farms for each region (Punjab, Sindh, Other Pakistan) were allocated to households according to the following formula:

$$\text{LandShare}_h = (\text{CultArea}_h - rr * \text{Land\_In}_h + rr * \text{Land\_Out}_h) / \text{Total Cultivated Area},$$

where LandShare_h is the share of household h in total land revenues, CultArea_h is cultivated area of household h, rr is the rental cost of land (assumed to be 50 percent), Land_In_h is net land rented in of household h,[8] and Land_Out_h is net land rented out of household h.

All own-farm labour earnings on large (medium) farms (defined in terms of cultivated area) are paid to large (medium) land-owners in the respective regions. For small farms in each region, returns to own labour are allocated between small and landless farmers according to the shares of each group in total number of farm households operating small farms in each region, using data from the PRHS 2001-02.

Payments of agricultural wage labour are allocated to households according to shares of each household in the respective total factor incomes, calculated using per capita earnings from the PRHS 2001-02 and household population totals from HIES. Similarly, returns to unskilled labour in non-agricultural activities are allocated to rural households using the per capita earnings from the PRHS 2001-02 multiplied by the household population totals from HIES. Using this formula, rural households account for 43 percent of total non-agricultural unskilled wage incomes. The remaining 57 percent of non-agricultural wage incomes are allocated between urban non-poor and poor households using population weights in the HIES. All skilled labour incomes are allocated to urban non-poor households.

Returns to agricultural capital are split according to the same shares as total returns to agricultural land in the SAM. Returns to livestock are split across provinces using quantity of production data for livestock of various types (Agricultural Statistics of Pakistan) multiplied by their estimated prices. The derived estimated shares of total value of production are: Sindh 25 percent; Punjab 50 percent; and Other Pakistan 25 percent. Livestock incomes across households of various types within the regions are allocated using each household type's share of livestock income in the province calculated from PRHS 2001-02. Payments for water are split 80 percent to government (as water charges) and 20 percent to large farmers (for water rents).[9]

Returns to informal non-agricultural capital (which includes returns to self-employed labour in informal sector activities) are split between rural and urban households using the approximate the share of rural population in total

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[8]Only positive values of net land rented in are used.

[9]Future refinements of the SAM could include estimates of returns to return from PRHS 2001-02 or other survey data.

population (70 percent). The split across rural households is made using shares of each household in reported incomes from non-farm enterprises, calculated using per capita earnings from the PRHS 2001-02 and household population totals from HIES. The remaining 30 percent of non-agricultural wage incomes are allocated between urban non-poor and poor households using a 85:15 ratio.[10]

Public transfers are estimated using HIES data on per capita transfer receipts by household. Foreign transfers are allocated across households such that these transfers are a constant share of total incomes for each household group. The resulting income shares by household group are given in Table 9.

Table 9

Pakistan: Household Income Shares (2001-02)

	Land	Labour	Agric Capital	Inf Cap	Transfers	Other	Total
Large Farm Sindh	0.37	0.14	0.41	0.03	0.05	0.00	1.00
Large Farm Punjab	0.33	0.09	0.33	0.19	0.05	0.00	1.00
Large Farm Other	0.32	0.10	0.46	0.07	0.05	0.00	1.00
Med Farm Sindh	0.37	0.18	0.33	0.06	0.05	0.00	1.00
Med Farm Punjab	0.27	0.15	0.16	0.36	0.05	0.00	1.00
Med Farm Other Pak.	0.38	0.18	0.23	0.15	0.06	0.00	1.00
Small Farm Sindh	0.20	0.16	0.48	0.10	0.06	0.00	1.00
Small Farm Punjab	0.20	0.22	0.29	0.23	0.06	0.00	1.00
Small Farm Other Pak.	0.12	0.18	0.35	0.29	0.06	0.00	1.00
Landless Farmer Sindh	0.16	0.30	0.43	0.05	0.06	0.00	1.00
Landless Farmer Punjab	0.16	0.29	0.23	0.26	0.06	0.00	1.00
Landless Farmer Other Pak.	0.15	0.25	0.46	0.09	0.06	0.00	1.00
Rural Ag Labourer Sindh	0.00	0.51	0.23	0.20	0.06	0.00	1.00
Rural Ag Labourer Punjab	0.00	0.49	0.14	0.32	0.05	0.00	1.00
Rural Ag Labourer Other Pak.	0.00	0.19	0.67	0.09	0.05	0.00	1.00
Rural Non-farm Non-poor	0.00	0.43	0.00	0.50	0.07	0.00	1.00
Rural Non-farm Poor	0.00	0.30	0.05	0.59	0.07	0.00	1.00
Urban Non-poor	0.00	0.45	0.00	0.11	0.06	0.38	1.00
Urban Poor	0.00	0.76	0.00	0.18	0.06	0.00	1.00
Rural Sub-total	0.13	0.28	0.20	0.33	0.06	0.00	1.00
Urban Sub-total	0.00	0.48	0.00	0.11	0.06	0.34	1.00
All Pakistan	0.06	0.39	0.09	0.21	0.06	0.19	1.00

Source: Pakistan SAM 2001-02.

[10]Estimates of earnings from non-formal enterprises are perhaps the most uncertain figures in the SAM. Income data from the PRHS 2001-02 appear to seriously under-report these earnings for rural households. If per capita informal sector earnings from the PRHS 2001-02 are used as the basis for calculating total earnings in rural areas, the share of rural households in total informal sector earnings is only 7.2 percent.

Household Consumption and Savings

According to the 2001-2002 Household Income and Expenditure Survey (HIES), aggregate annual national household consumption was Rs 1,664 billion (Rs 950/person/month x 12 x 145.96 million people), 59.6 percent of the household consumption figure from the national account estimates (Rs 2,793 billion) and 54.8 percent of the SAM total consumption figure (3,038 billion). (Note that the SAM figure for consumption is slightly higher than the national accounts figure because of the adjustment to manufactured product imports, as described above.) (see Table 10).

Table 10

Alternative Consumption Estimates, 2001-02

	Monthly Per Capita Expends (Rs/Month)	Annual Per Capita Expends (Rs/Year)	Annual Expends (Bn Rs)	Expends as Share of Natl Accts (Percent)
HIES	950	11,402	1,664	59.6%
National Accts	1,595	19,138	2,793	100.0%
SAM	1,734	20,814	3,038	108.8%

Note: 2001-02 population is 145.96 million.

Initial estimates of consumption across households are derived from the estimated total national consumption of each commodity (the residual of supply less non- private consumption demand) as follows. For major food commodities and items that are clearly specified in the HIES (e.g. textiles and leather), this total consumption is allocated across household using the share of each household group in total consumption of each commodity from the national household expenditure survey. For some commodities, (e.g. IRRI and basmati rice), consumption data in the HIES is aggregated into a single commodity (in this case, rice), and the same shares across household group are used for multiple commodities. In the absence of explicit accurate data on expenditures on other food commodities, consumption of these items is calculated using shares of total consumption of all other goods. (See Appendix Table x).

Savings across households are estimated as 10 percent of income for rural agricultural non-poor households and large land-owner farmers. For all other households except the urban non-poor, a rate of 5 percent is used. The savings rate of urban non-poor households, calculated as the residual of national household savings less savings of the other households, is 10.9 percent.

The above procedure results in a household consumption matrix that achieves balance in all the commodity accounts, but leaves an imbalance between total household revenues and expenditures. To achieve balance in both the commodity and household accounts, the matrix of household consumption by commodity was adjusted in an iterative procedure (RAS) in which the columns and rows of the matrix are alternatively multiplied by a factor which

brings the column (or row) total in balance. Balancing the SAM in this way maintains all the estimates of production, income and non-consumption uses of commodities as described above, but forces all the adjustments in the SAM to be made to the household consumption matrix. One alternative is to use an algorithm that permits adjustment of cells throughout the SAM, such as the maximum entropy method [Robinson, Cattaneo, and El-Said (2000)].[11]

III. THE STRUCTURE OF HOUSEHOLD INCOMES AND EXPENDITURES IN PAKISTAN: 2001-02 SAM ESTIMATES

Household incomes and expenditures relative to those of other household groups follow similar patterns as in the PRHS and HIES surveys, though absolute levels of household incomes and expenditures are substantially higher given the apparent substantial under-reporting of expenditures (particularly on services) and informal sector incomes in the surveys.

On average, household incomes in the SAM are 2.1 times greater than household expenditures in the HIES Survey, and rural household incomes in the SAM are 1.5 times greater than rural household incomes in the PRHS survey (Table 11). These ratios vary by household group, however (Table 12). The SAM calculations suggest that incomes and expenditures of large and medium farmers are seriously understated in the HIES—by a factor of 3.8, on average. Compared to total incomes in the PRHS survey results, however, factor incomes of medium and large farmers in the SAM are only 2.8 times higher. Note that much of the difference in incomes is due to estimated returns to cultivated land. For only two household groups, rural non-farm poor and rural agricultural labour Sindh, are the SAM household incomes less than household expenditures in the HIES.[12]

Table 11

Pakistan: Per Capita Income (Expenditures) 2001-02,
(Thousand Rs/Person/Year)

	National Accounts Income	SAM Income	HIES Expend.	PRHS Income
Rural	n.a.	15.0	9.8	8.7
Urban	n.a.	46.2	15.4	n.a.
Total	24.9	23.9	11.4	n.a.

Source: Pakistan 2001-02 SAM; Pakistan Rural Household Survey (PRHS) 2001-02; Pakistan Household Income and Expenditure Survey (HIES) 2001-02.

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[11]A revised version of the SAM using this technique is planned. This future work may also entail adjustments to milling costs and other revisions to the input-output table.

[12]Note that, because of a lack of reliable data, the SAM does not contain household transfers received from other households. Including transfer income would likely bring the SAM household per capita income estimates for these groups to approximately the same level as the HIES household per capita expenditure estimates.

Table 12

Pakistan: Household Incomes and Expenditures, 2001-02

	SAM Income (Mn Rs)	Population (Thousands)	SAM Income/ Capita (Thous Rs)	Share of Total Income (Percent)	Share of Total Population (Percent)	PRHS Income/ Capita (Thous Rs)	SAM Inc/ PRHS Income Ratio	HIES Tot Exps/ Capita (Thous Rs)	SAM Inc/ HIES Exp Ratio
Large Farm Sindh	19,079	169	112.9	0.5%	0.1%	11.1	10.16	10.3	11.0
Large Farm Punjab	64,116	369	173.7	1.8%	0.3%	70.4	2.47	20.5	8.5
Large Farm Other	10,755	70	152.9	0.3%	0.0%	10.4	14.68	14.1	10.8
Med Farm Sindh	44,625	1,466	30.4	1.3%	1.0%	11.4	2.66	10.5	2.9
Med Farm Punjab	145,995	3,014	48.4	4.2%	2.1%	38.3	1.27	15.1	3.2
Med Farm Other Pak.	35,572	1,040	34.2	1.0%	0.7%	6.7	5.09	12.0	2.8
Small Farm Sindh	57,648	3,873	14.9	1.7%	2.7%	6.1	2.5	8.9	1.7
Small Farm Punjab	318,888	17,605	18.1	9.1%	12.1%	14.4	1.3	10.7	1.7
Small Farm Other Pak.	124,985	10,493	11.9	3.6%	7.2%	5.0	2.4	10.5	1.1
Landless Farmer Sindh	43,672	5,682	7.7	1.3%	3.9%	8.3	0.9	7.5	1.0
Landless Farmer Punjab	45,963	4,307	10.7	1.3%	3.0%	15.3	0.7	9.0	1.2
Landless Farmer Other Pak.	14,970	1,818	8.2	0.4%	1.2%	3.1	2.7	8.3	1.0
Rural Ag Laborer Sindh	20,782	3,241	6.4	0.6%	2.2%	3.5	1.9	7.7	0.8
Rural Ag Laborer Punjab	68,172	5,693	12.0	2.0%	3.9%	5.4	2.2	7.2	1.7
Rural Ag Laborer Other Pak.	9,513	653	14.6	0.3%	0.4%	2.7	5.5	8.1	1.8
Rural Non-farm Non-poor	400,771	20,233	19.8	11.5%	13.9%	13.5	1.5	13.7	1.4
Rural Non-farm Poor	134,398	24,525	5.5	3.9%	16.8%	2.8	2.0	6.6	0.8
Urban Non-poor	1,744,119	29,829	58.5	50.0%	20.4%	–	–	18.7	3.1
Urban Poor	181,413	11,880	15.3	5.2%	8.1%	–	–	6.9	2.2
Rural Sub-total	1,559,907	104,252	15.0	44.8%	71.4%	8.7	1.7	9.8	1.5
Urban Sub-total	1,925,533	41,709	46.2	55.2%	28.6%	–	–	15.4	3.0
All Pakistan	3,485,439	145,960	23.9	100.0%	100.0%	–	–	11.4	2.1

Source: Pakistan 2001-02 SAM; Pakistan Rural Household Survey (PRHS) 2001-02; Pakistan Household Income and Expenditure Survey (HIES) 2001-02.

Agricultural factor incomes account for only 23 percent of total factor incomes in Pakistan, but 60 percent of total factor incomes for agricultural households (77 percent for agricultural households in Sindh), (Table 13). 91 percent of agricultural incomes derive from land, water, own-farm labour, or livestock, so that without access to land or livestock; earnings from hired labour and (non-livestock) agricultural capital account for only 9 percent of agricultural incomes.

Table 13

Pakistan: Factor Income Shares by Household Type, 2001-02

	All HHs	Rural HHs	Rur AgHHs Sindh	Rur AgHHs Punjab	Rur AgHHs Other Pak	Rur AgHHs All Pakistan
Labour	0.522	0.298	0.248	0.24	0.19	0.232
Land	0.081	0.144	0.242	0.22	0.19	0.218
Water	0.003	0.005	0.014	0.009	–	0.008
Capital	0.394	0.553	0.497	0.531	0.62	0.542
Of which Livestk and Ag Capital	0.115	0.205	0.408	0.249	0.379	0.302
Total	1.000	1.000	1.000	1.000	1.000	1.000
Own-Farm and Agric/Total Inc	0.231	0.411	0.766	0.56	0.652	0.615
Own Farm/ Agric Income	0.906	0.906	0.890b	0.896	0.949	0.905

Source: Pakistan SAM 2001-02.

Land accounts for more than 30 percent of household incomes, only for medium and large farm owners (Table 14). Agricultural labour accounts for 32 percent of incomes for agricultural wage labourer households, but only 9 percent of incomes of tenants and 4 percent of incomes of small farmers. Overall, agricultural incomes account for an average of 56 percent of estimated incomes of agricultural households in the SAM, compared with 75 percent in the PRHS (Table 15). As described above, the higher figures in the SAM arises mainly because of allocation of income from non-agricultural labour and informal capital to rural households.

Table 14

Disaggregated Factor Income Shares by Household Group, Pakistan 2001-02

	Land	Agric Capital	Agric Labour	Total Agric	Non-agr Capital	Non-agr Labour	Other	Total Income
Large Farm Owners (50+ acres)	0.34	0.36	0.00	0.70	0.15	0.10	0.05	1.00
Medium Farm Owners (12.5-50)	0.31	0.21	0.00	0.52	0.27	0.16	0.05	1.00
Small Farm Owners (<12.5 Acres)	0.18	0.32	0.04	0.55	0.23	0.16	0.06	1.00
Pure Tenants	0.16	0.35	0.09	0.60	0.15	0.20	0.06	1.00
Agricultural Labourers	0.00	0.21	0.32	0.53	0.27	0.14	0.06	1.00
Rural Non-farm Non-poor	0.00	0.00	0.00	0.00	0.50	0.43	0.07	1.00
Rural Non-farm Poor	0.00	0.05	0.00	0.05	0.59	0.30	0.07	1.00
Urban Non-poor	0.00	0.00	0.00	0.00	0.11	0.45	0.44	1.00
Urban Poor	0.00	0.00	0.00	0.00	0.18	0.76	0.06	1.00
Rural Sub-total	0.13	0.20	0.04	0.37	0.33	0.24	0.06	1.00
Rural Non-agric Households	0.21	0.29	0.06	0.56	0.23	0.16	0.06	1.00
Urban Subtotal	0.00	0.00	0.00	0.00	0.11	0.48	0.41	1.00
All Pakistan	0.06	0.09	0.02	0.17	0.21	0.37	0.25	1.00

Source: Pakistan SAM 2001-02.

Table 15

Pakistan Rural Agricultural Incomes

	PRHS Agric Inc Per Capita ('000 Rs)	PRHS Agric Inc Share (Percent)	SAM Agric Inc Per Capita ('000 Rs)	SAM Agric Inc Share (Percent)
Medium and Large Farms	15.7	83.5	29.9	57.2
Small Farms	6.1	67.9	8.6	54.8
Landless Farmers	7.2	87.7	5.3	59.7
Rural Agric Workers	2.2	53.1	5.5	53.1
Rural Non-Farm Non-Poor	0.3	1.9	0.1	0.4
Rural Non-Farm Poor	0.2	6.3	0.2	4.5
Total Rural	6.1	69.7	5.6	37.2
Rural Agric Households	7.1	74.8	9.6	55.9

Source: Pakistan SAM 2001-02; Pakistan Rural Household Survey 2001-02.

IV. CONCLUSIONS

Construction of this Pakistan 2001-02 SAM has highlighted several major inconsistencies between the national accounts, the latest input-output table (1990-91) and trade data, particularly involving imports and availability of manufactured goods and other products. The relatively crude adjustments made to the commodity supply and demand accounts in the SAM are consistent with reports of substantial volumes of unrecorded imports in Pakistan, but further efforts are needed to improve the quality of the trade data. More generally, a new set of full national accounts with an updated input-output are needed to

reflect the changed structure of Pakistan's economy, particularly in the industrial and services sectors.

Further disaggregation of this Pakistan SAM could focus on two additional areas. First, because the focus of this current SAM has been on rural issues, there is relatively little aggregation of the urban sectors. Possible next steps would include further disaggregation of urban household groups, use of PIHS or other surveys to construct a detailed mapping of factor incomes to households. Second, further disaggregation of both urban and rural industrial sectors would be useful, if possible by province and rural/urban areas.

Even without further disaggregation, further work could involve alternative adjustments to household income and consumption to rectify the fundamental imbalance between household survey data and consumption figures implicit in the national accounts. This SAM preserves the structure of production derived from national accounts and Agricultural Census data, along with the structure of income derived from the PRHS data, thus forcing most adjustments on household consumption estimates. Alternative approaches that would make greater adjustments to production and factor accounts, (including matrix-balancing algorithms such as maximum entropy), are also possible.

Nonetheless, in spite of the data uncertainties, the SAM does capture the major features of Pakistan's rural economy and income distribution. By using land area cultivated data from the Agricultural Census, the SAM approach indicates significantly higher incomes of large and medium farm rural households than are indicated in household surveys. The SAM also likely better reflects the importance of non-agricultural incomes in total rural incomes. Thus, it is hoped that this SAM will serve as a useful tool for further quantitative analysis of agricultural policy and rural poverty reduction strategies.

REFERENCE

Robinson, S., A. Cattaneo, and M. El-Said (2000) Updating and Estimating a Social Accounting Matrix Using Cross Entropy Methods. International Food Policy Research Institute, Washington, D. C. (TMD Discussion Paper Series No. 58.)

Annex Table 1

Mapping between SAM and National Accounts Production Sectors

	SAM Activities	SAM Activity Code	IO91 Sector No.	National Account Sector
1a	Wheat Irrigated	A-WHTI	A1a 2	Major Crops
1b	Wheat Non-irrigated	A-WHTN	A1b 2	Major Crops
2	Rice IRRI	A-PADI	A2 1	Major Crops
3	Rice Basmati	A-PADB	A3 1	Major Crops
4	Cotton	A-COTT	A4 3	Major Crops
5	Sugarcane	A-CANE	A5 4	Major Crops
6	Other Major Crops	A-OCRP	A6 5-8,12,13	Major Crops
7	Fruits/Vegetables	A-HORT	A7 9,10,11	Minor Crops
8	Livestock (Cattle, Milk)	A-CATT	A8 14	Livestock
9	Livestock (Poultry)	A-POUL	A9 14	Livestock
10	Forestry	A-FOR	A10 15	Forestry
11	Fishing	A-FISH	A11 16	Fishing
12	Mining	A-MINE	A12 17,18,19	Mining
13	Vegetable Oils	A-VEGO	A13 21	Manufacturing
14	Wheat Milling	A-WHTF	A14 22,23	Manufacturing
15	Rice Milling Irri	A-RICEI	A15 22	Manufacturing
16	Rice Milling Basmati	A-RICEB	A16 22	Manufacturing
17	Sugar	A-SUG	A17 24	Manufacturing
18	Other Food	A-OTHF	A18 25-27	Manufacturing
19	Lint, Yarn	A-YARN	A19 28,29	Manufacturing
20	Textiles	A-TEXT	A20 30-36	Manufacturing
21	Leather	A-LEAT	A21 37,38	Manufacturing
22	Wood	A-WOOD	A22 39-40	Manufacturing
23	Chemicals	A-CHEM	A23 41-43	Manufacturing
24	Cement, Bricks	A-CEM	A24 48-49	Manufacturing
25	Petroleum Refining	A-PETR	A25	Manufacturing
26	Other Manufacturing	A-MANF	A26 44-47,50-60	Manufacturing
27	Energy	A-ENRG	A27 61,63 (62)	Electricity and Gas
28	Construction	A-CONS	A28 64	Construction
29	Commerce	A-TRAD	A29 73-74	Wholesale and Retail Trade
30	Transport	A-TRNS	A30 76-81	Transport and Communication
31	Housing	A-HSNG	A31 87,88	Ownership of Dwell
32	Private Services	A-PRISV	A32 82-86,89, 92,94,96,97	Services, Finance, Insurance and Banks
33	Public Services	A-PUBS	A33 90	Pub Administration and Defense

Estimation of Value Additions (Million Rs)

No.	Activity	VA in 1990-91	Real Gr in VA	Price Increase	VA in 2001-02	Increase in VA (%)	Data Source/Remarks
1	Wheat Irrigated	21,820	1.35	2.35	62,200	185.1	Production increase based on AS Table 5, price increase on ES SAT 7.5
1b	Wheat Non-irrigated	2,658	0.47	2.35	2,626	−1.2	Production increase based on AS Table 5, price increase on ES SAT7.5
2	Rice IRRI	3,958	0.92	2.32	8,024	102.7	Production increase based on AS Table 7, June price increase in Lahore AS Table 150
3	Rice Basmati	4,348	1.64	2.48	15,913	266.0	Production increase based on AS Table 7, June price increase in Lahore AS Table 149
4	Cotton	20,312	1.10	2.18	46,447	128.7	Production increase-ES SAT 2.4, price increase ES SAT 7.5
5	Sugarcane	9,575	1.33	2.75	33,442	249.3	Production increase-ES SAT 2.4, price increase ES SAT 2.12
6	Other Major Crops	39,071			94,476	141.8	Residual VA of major crops-ES2003
7	Fruits/Vegetables	41,208			121,067	193.8	Minor crops VA-ES2003
8	Livestock (Cattle, Milk)	71,083	1.87	2.29	348,421	390.2	VA in livestock minus estated VA in poultry
9	Livestock (Poultry)	4,470	2.35	2.29	24,062	438.2	Production from ES SAT 2.15, price increase on GDP deflator of livestock
10	Forestry	13,947	1.27		8,458	−39.4	VA in forestry-ES
11	Fishing	12,774	1.29		18,587	45.5	VA in fishing-ES
12	Mining	32,744	1.22		21,203	−35.2	VA in mining-ES
13	Vegetable Oils	2,401	1.21	2.62	7,631	217.8	Production ES SAT 3.4, wholesale price index ES SAT 7.5
14	Wheat Milling	12,669	1.25	2.61	41,420	227.0	Real and price increases on wheat production and price respectively
15	Rice Milling Irri	3,598	0.92	2.32	7,679	113.4	Real and price increases on rice irri production and price respectively
16	Rice Milling Basmati	3,953	1.64	2.48	16,075	306.7	Real and price increases on rice basmati production and price respectively

Annex Table 2—(*Continued*)

No	Name						Description
17	Sugar	13,877	1.68	2.05	47,810	244.5	Production increase ES SAT 3.4, wholesale price increase ES SAT7.5
18	Other Food	32,189	4.01	1.00	58,674	82.3	Resid VA split among other food, wood, chemical and other mfg in IO91 proportions
19	Lint, Yarn	18,902	1.74	1.93	48,578	157.0	C. yarn production ES SAT 3.3, wholesale price of yarn ES SAT 7.5
20	Textiles	31,035	1.94	1.93	121,037	290.0	Cloth prod ES SAT 3.3, price increase o wholesale price of yarn
21	Leather	1,475	2.04	1.00	3,003	103.6	VA extrapolated based on VA of leather and leather products-CMI91-96
22	Wood	12,176	1.62	1.00	22,194	82.3	Resid VA split among other food, wood, chemical and other mfg in IO91 proportions
23	Chemicals	9,105	5.81	1.00	16,597	82.3	Resid VA split among other food, wood, chemical and other mfg in IO91 proportions
24	Cement, Bricks	17,462	1.28	2.14	47,908	174.4	Production-ES SAT 3.4, price ES SAT7.5
25	Petroleum Refining	2,820			19,278	583.6	CMI 96 VA extrapolated-quantum index and WPI (fuel, lighting and lubricants) fr FBS
26	Other Manufacturing	47,343	5.59	2.28	86,297	82.3	Resid VA split among other food, wood, chemical and other mfg in IO91 proportions
27	Energy	36,113	1.66		115,073	218.6	VA in Electricity and Gas-ES
28	Construction	42,942	1.26		106,560	148.1	VA from ES
29	Commerce	161,661	1.42		516,121	219.3	VA from ES
30	Transport	65,446	1.61		399,515	510.4	VA from ES
31	Housing	67,291	1.76		164,389	144.3	VA from ES
32	Private Services	59,404	1.96		435,465	633.1	VA from ES, includes VA in Finance and Banking
33	Public Services	56,745	1.43		290,867	412.6	VA from ES

Total 3,377,098 GDP

Note: ES-Pakistan Economic Survey 2002-03, AS-Agricultural Statistics of Pakistan, 2002.

Annex Table 3

Value of Production at Market Prices (Million Rs)

No.	Activity	VA in 2001-02	Value of Inputs	Value of Production	Net Indirect Taxes-Dom	Import Duties
1	Wheat Irrigated	62,200	60,263	122,463	117	0
1b	Wheat Non-irrigated	2,626	2,544	5,169		
2	Rice IRRI	8,024	5,308	13,332	40	0
3	Rice Basmati	15,913	10,526	26,439	0	0
4	Cotton	46,447	29,416	75,863	32	0
5	Sugarcane	33,442	22,266	55,708	40	0
6	Other Major Crops	94,476	38,604	133,081	73	0
7	Fruits/Vegetables	121,067	67,482	188,549	669	3,650
8	Livestock (Cattle, Milk)	348,421	306,239	654,661	0	153
9	Livestock (Poultry)	24,062	22,530	46,591	0	0
10	Forestry	8,458	1,845	10,303	0	0
11	Fishing	18,587	13,988	32,575	0	0
12	Mining	21,203	7,220	28,423	17,239	122
13	Vegetable Oils	7,631	88,569	96,200	22	10,631
14	Wheat Milling	41,420	148,425	189,845	47	0
15	Rice Milling Irri	7,679	16,979	24,658	0	0
16	Rice Milling Basmati	16,075	35,544	51,619	0	0
17	Sugar	47,810	100,123	147,933	10,183	0
18	Other Food	58,674	100,291	158,965	39,842	1,034
19	Lint, Yarn	48,578	175,836	224,414	20,587	0
20	Textiles	121,037	424,363	545,399	−11,496	2,284
21	Leather	3,003	32,934	35,937	−1,751	48
22	Wood	22,194	38,869	61,064	120	0
23	Chemicals	16,597	42,284	58,880	4,455	8,135
24	Cement, Bricks	47,908	39,189	87,098	20,987	0
25	Petroleum Refining	19,278	80,288	99,567	58,469	2,350
26	Other Manufacturing	86,297	253,209	339,506	35,234	19,694
27	Energy	115,073	74,175	189,248	9,495	0
28	Construction	106,560	149,385	255,945	417	0
29	Commerce	516,121	98,290	614,411	−2,540	0
30	Transport	399,515	342,341	741,856	1,693	0
31	Housing	164,389	36,539	200,928	60	0
32	Private Services	435,465	379,111	814,576	−501	0
33	Public Services	290,867	370,395	661,262	0	0

Annex Table 4

Estimation of Commodity-wise Exports and Imports in 2001-02 (Million Rs)

No.	Commodity	Exports 1990-91	2001-02	Imports 1990-91	2001-02	
1	Wheat	0	4,362	8,721	3,056	FTS Table 6 Code 041
2	Rice IRRI	0	0	1	0	
3	Rice Basmati	0	0	0	0	
4	Cotton	0	0	0	0	
5	Sugarcane	0	0	0	0	
6	Other Major Crops	809	3,530	1,974	6,153	Estimates in proportion of the IO91 share
7	Minor Crops	1,145	7,125	1,737	13,519	FTS, Table 6 Code 05
8	Livestock (Cattle, Milk)	713	369	2,296	7,156	FTS, Table 6 Code 001 minus 0014
9	Livestock (Poultry)	0	52	0	0	Exports-FTS, Table 6 Code 0014, no imports assumed
10	Forestry	1,034	3,231	765	2,384	Exports-using % change in VA, Imports using IO91 proportion
11	Fishing	1,017	7,746	5	16	Exports-FTS Table 6 Code 03, imports using IO91 proportion
12	Mining	1,213	5,292	14,969	46,657	in proportion of the IO91 share
13	Vegetable Oils	6,543	23	684	24,034	Exports-FTS Table 6 Code 4312201, Imports ES tab 8.1
14	Wheat Milling	0	3,454	0	8,406	FTS Table 6 Code 046
15	Rice Milling Irri	0	11,653	0	0	Exports-FTS Table 6 Code 0423102, no imports
16	Rice Milling Basmati		15,856		0	Exports-FTS Table 6 Code 0423101, no imports
17	Sugar	1,340	170	481	2,846	Exports and Imports-FTS Table 6 Code 0611+0612
18	Other Food	2,934	81,819	11,193	10,972	FTS-total food code 0 FBS minus a/m items except sugar and veg oil plus beverages/tobacco, code 1

Annex Table 4—(*Continued*)

19	Lint, Yarn	33,252	60,824	1,019	7,297	Exports (raw cotton, cot waste and yarn) ES SAT8.7, Imports of cotton, yarn and textiles from SBP AR split by proportion of 90-91
20	Textiles	62,347	216,278	2,368	16,634	Exports-FTS Table 6 Code 65-651, Imports of cotton, yarn and textiles from SBP AR split by proportion of 90-91
21	Leather	6,896	15,385	539	1,130	Exports-FTS Table 6 Code 61, Imports from SBP AR SAT 9.7 converted into Rs
22	Wood	201	209	1,839	5,732	Exports-FTS Table 6 Code 63, Imports by IO91 proportion
23	Chemicals	637	9,361	9,950	114,928	SBP AR 2002 SAT 9.7 converted in Rs
24	Cement, Bricks	46	182	106	0	Exports-Es Table SA8.7
25	Other Manufacturing	8,117	112,598	145,786	366,279	Exports/imports residual
26	Energy	0	0	0		
27	Construction	0	0	0		
28	Commerce	102	445	697	2,172	Exports/imports residual
29	Transport	27,001	117,803	0		Exports by share
30	Housing	0	0	0		
31	Private Services	17	74	16,613	51,781	Exports/imports residual
32	Public Services	0	0	0	0	
		155,364	677,840	221,743	691,153	

Source: 1. FBS, Foreign Trade Statistics (FTS) of Pakistan, Dec 2002, Table 6 Code 041.
2. State Bank of Pakistan (SBP), Annual Report (AR) 2001-2002.

Annex Table 5

Structure of the Economy, Pakistan 2001-02

Sector	Output (X)	Value Added (VA)	Exports (E)	Imports (M)	Export/ Output (E/X)	Import/ Final Demand (M/Q)
			%		Ratio	
Agriculture						
Wheat	1.83	1.92	0.64	0.28	0.0342	0.0234
Rice Irri	0.19	0.24	0.00	0.00	0.0000	0.0000
Rice Basmati	0.38	0.47	0.00	0.00	0.0000	0.0000
Cotton	1.08	1.38	0.00	0.00	0.0000	0.0000
Sugarcane	0.80	0.99	0.00	0.00	0.0000	0.0000
Other Major Crops	1.90	2.80	0.52	0.56	0.0265	0.0442
Horticulture	2.70	3.58	1.05	1.23	0.0378	0.0655
Livestock	9.36	10.32	0.05	0.65	0.0006	0.0108
Poultry	0.67	0.71	0.01	0.00	0.0011	0.0000
Forestry	0.15	0.25	0.48	0.22	0.3136	0.1879
Fisheries	0.47	0.55	1.14	0.00	0.2378	0.0005
Total	19.52	23.21	3.90	2.93	0.0194	0.0230
Industry						
Mining	0.41	0.63	0.78	8.69	0.1862	0.6763
Vegetable Oil	1.38	0.23	0.00	2.18	0.0002	0.1836
Wheat Milling	2.71	1.23	0.51	0.76	0.0182	0.0424
Rice Milling Irri	0.35	0.23	1.72	0.00	0.4726	0.0000
Rice Milling Basmati	0.74	0.48	2.34	0.00	0.3072	0.0000
Sugar	2.12	1.42	0.03	0.26	0.0011	0.0177
Other Food	2.27	1.74	12.07	1.00	0.5147	0.0520
Lint, Yarn	3.21	1.44	8.97	0.66	0.2710	0.0289
Textiles	7.80	3.58	31.91	1.51	0.3965	0.0301
Leather	0.51	0.09	2.27	0.10	0.4281	0.0320
Wood	0.87	0.66	0.03	0.52	0.0034	0.0857
Chemicals	0.84	0.49	1.38	10.45	0.1590	0.6166
Cement	1.25	1.42	0.03	0.00	0.0021	0.0000
Petroleum	1.42	0.57	0.00	9.09	0.0000	0.3840
Other Manufacturing	4.86	2.56	16.61	56.93	0.3317	0.6136
Energy	2.71	3.41	0.00	0.00	0.0000	0.0000
Sub-total	33.45	20.15	78.65	92.16	0.2279	0.2816
Services						
Construction	3.66	3.16	0.00	0.00	0.0000	0.0000
Trade	8.79	15.28	0.07	0.20	0.0007	0.0035
Transport, Communication	10.61	11.83	17.38	0.00	0.1588	0.0000
Housing	2.87	4.87	0.00	0.00	0.0000	0.0000
Private Services	11.65	12.89	0.01	4.71	0.0001	0.0598
Public Services	9.46	8.61	0.00	0.00	0.0000	0.0000
Sub-total	47.04	56.64	17.46	4.90	0.0360	0.0161
Total	100.00	100.00	100.00	100.00	0.0969	0.1318
Agriculture	19.52	23.21	3.90	2.93	0.0194	0.0230
Non-agriculture	80.48	76.79	96.10	97.07	0.1158	0.1538

Sources: Pakistan 2001-02 SAM.

Distribution of Value-added in Agricultural Activities

(Share)

	Wheat-I	Wheat-UI	Padi-irri	Padi-bas	Cotton	S.cane	OthMcrops	Horticulture	Cattle	Poultry	Forestry	Fishery
Labour - agric (own)-large	0.041914	0.032629	0.025494	0.007113	0.044361	0.022488	0.046946	0.004289			0.050000	
Labour - agric (own)-med Sindh	0.017368	0.001030	0.027621	0.002166	0.020978	0.010251	0.045238	0.008381			0.002964	
Labour - agric (own)-med Punjab	0.041397	0.059084	0.023098	0.028442	0.096450	0.029921	0.063938	0.036144			0.020751	
Labour - agric (own)-med OPak	0.060143	0.034732	0.007754	0.001081	0.000752	0.003001	0.016514	0.004144			0.051285	
Labour - agric (own)-sm Sindh	0.031359	0.002374	0.047404	0.005014	0.042464	0.014623	0.037418	0.021987			0.002964	
Labour - agric (own)-sm Punjab	0.133295	0.108587	0.031645	0.054062	0.121212	0.039193	0.075259	0.099445			0.020751	
Labour - agric (own)-sm OPak	0.019859	0.106899	0.007013	0.001387	0.000467	0.011147	0.063093	0.022605			0.051285	
Labour - agric (wage)									0.100	0.100		0.300
Land - large- Sindh	0.010025	0.000851	0.047966	0.006468	0.018305	0.055353	0.007774	0.002591			0.007905	
Land - large- Punjab	0.025596	0.030514	0.030858	0.042527	0.047118	0.055339	0.059291	0.010275			0.055336	
Land - large - OthPak	0.006609	0.019351	0.021567	0.000901	0.000526	0.008332	0.000000	0.000000			0.136759	
Land - irrigated - med Sindh	0.017500		0.108767	0.015197	0.031187	0.054257	0.064626	0.025142				
Land - irrigated - med Punjab	0.041710		0.090955	0.199511	0.143389	0.158364	0.091340	0.108433				
Land - irrigated - med OthPak	0.060597		0.030535	0.007584	0.001118	0.015885	0.023591	0.012433				
Land - irrigated - sm Sindh	0.031596		0.186668	0.035169	0.063129	0.077395	0.053455	0.065961				
Land - irrigated - sm Punjab	0.134302		0.124612	0.379234	0.180202	0.207438	0.107513	0.298335				
Land - irrigated - sm OthPak	0.020009		0.027615	0.009726	0.000695	0.058999	0.090133	0.067816				
Land non-irrig - sm Sindh		0.005292									0.023715	
Land non-irrig - sm Punjab		0.260615									0.166008	
Land non-irrig - sm OthPak		0.220143									0.410277	
Water	0.199732	0.000000	0.083816	0.155599	0.101771	0.086160	0.050000	0.100000				
Capital Livestock	0.000000	0.010909							0.700	0.700		
Capital Other Agric	0.106988	0.106988	0.076611	0.048819	0.085876	0.091855	0.103869	0.112020				
Capital Formal									0.200	0.200		0.200
Capital Informal												0.500
Total Value Added	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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