PAKISTAN
Strategy Support Program

A 2007-08 Social Accounting Matrix for Pakistan

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This paper presents the latest Social Accounting Matrix of Pakistan (SAM) for the year 2007–08. Our proposed approach to estimating SAMs is motivated by an information theoretic approach to estimation (Judge & Mittel-hammer, 2012) that takes a Bayesian perspective on the efficient use of information: "Use all the information you have, but do not assume any information you do not have." The methodology used to develop this SAM ensures that it is perfectly consistent with the National Accounts. The SAM includes 51 sectors of activity, 27 factors of production, and 18 household groups, allowing tracing direct and indirect effects of potential scenarios through production and consumption linkages and capture distributional effects. We illustrate the use of the SAM using a semi input-output multiplier model. Output multipliers in Pakistan, accounting for supply constraints, range between 1.1 and 1.4, and shocks to livestock and industry have the largest spillover effects.

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1. INTRODUCTION

A Social Accounting Matrix (SAM) is a single-entry internally consistent accounting system that documents all the economic transactions within an economy. It supports the continuing need to use recent and consistent multisectoral economic data for policy analysis and the development of economy-wide models (Robinson, Cattaneo, & El-Said, 2001). It is an extended set of national accounts that disaggregates value-added in each production activity into payments to various factors such as land, labor, and capital, and disaggregates household incomes and expenditures according to various household types. 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).

A limited number of Social Accounting Matrixes have been constructed for Pakistan in the past (Table 1.1). The first countrywide social accounting matrix (SAM) for Pakistan dates to 1979 and was built by the Pakistan Institute of Development Economics (PIDE) in 1985. This was followed by a SAM for the year 1984–85, created by the Federal Bureau of Statistics (FBS), with collaboration with the Dutch government under the Improvement of National Accounting System (INAS) project. Since this SAM had a single household group, it was not suited for analyzing distributional effects across households.

Siddiqui and Iqbal (1999) generated a new SAM for 1989–90 and disaggregated data with eight household groups. It aggregated the Input-Output (IO) table industry classifications into five production accounts, namely agriculture, industry, health, education and other sectors. In 2004, Dorosh, Niazi, and Nazli (2004) produced a SAM of Pakistan for the year 2001–02. It contained 19 household groups and 34 production accounts. Since the households were disaggregated by province and the number of commodities were larger than Siddiqui and Iqbal (1999), it was more suitable for analyzing effects of shocks in specific industries on different socioeconomic groups. Later, Waheed and Ezaki (2008) created a financial SAM for the year 1999–2000. While the previous SAMs were mainly built on the real economy, growing importance of capital flows and availability of associated data allowed the authors to disaggregate the workings of the loanable funds market into disaggregated payments related to physical and financial flows among institutions.[1] Production activities were aggregated into six accounts: i) agriculture, ii) mining and quarrying, iii) manufacturing, iv) electricity, water, and gas, v) construction, and vi) other sectors.

We build a SAM for Pakistan for financial year 2007–08 that relies on contemporaneous National Accounts and household data, as well as information present in the SAM built by Dorosh, Niazi, and Nazli (2004)[2]. This work is part of the Pakistan Strategy Support Program, which supports the Government of Pakistan with evidence-based policy reform for pro-poor economic growth and enhanced food security. The SAM has started and is expected to be used with Computable General Equilibrium (CGE) modeling to analyze the macro and distributional impact of policy changes throughout the economy.[3]

Compared to the disaggregation in Dorosh, Niazi, and Nazli (2004), the textile industry has been further disaggregated into knitwear, garments, and other textiles. The cotton lint-yarn activity has been disaggregated between ginning, spinning, and weaving. Chemicals account has also been disaggregated as fertilizers and other chemicals. As in most developing

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[1] Typically captured with a single saving-investment account.
[2] July 1, 2007 –June 30, 2008.
[3] The full SAM is available from the authors upon request.

countries, Pakistan's services sector has been growing in importance so its disaggregation is crucial for policy relevant analysis. Reflecting this, trade has been divided between wholesale, retail, and other trade, while the transport sector now has separate accounts for road, rail, air, water, and other transport. Housing has been divided between rented and owned, while private sector service is disaggregated into education, health care, business services, personal services, and other private services.

We have explicitly included four types of economic agents in our SAM, namely producers, households, government, and the rest of the world. Households are disaggregated according to province and agricultural households are further divided by farm ownership and size.[4] Non-agriculture households are divided by whether they are urban or rural and by expenditure quintiles (1, 2, and others). Out of the 18 household groups, 12 represent agricultural households. This enables an in depth analysis of the agricultural sector and its linkages with other industries.

The paper is organized in the following way. Section 2 explains how the SAM was generated. Section 3 briefly analyzes the structure of the Pakistan economy in light of the SAM. Section 4 demonstrates the use of the SAM with income multiplier analysis and Section 5 concludes.

Table 1.1—Previous SAMs for Pakistan

Nr.	Name of researchers/organization	Salient Features
1	Pakistan Institute of Development Economics (1985)	**Base year:** 1979
2	Federal Bureau of Statistics (1993)[5]	**Base year:** 1984-85
3	Siddiqui and Iqbal (1999)	**Base year:** 1989-90 **Sectors (5):** agriculture, industry, education, health, other sectors **Agents:** households (8), firms, government, rest of the world
4	Dorosh, Niazi, and Nazli (2004)	**Base year:** 2001-02 **Sectors (34):** agriculture (12), industry (16), services (6) **Agents:** households (19), enterprises, government, rest of the world
5	Waheed and Ezaki (2008)	**Base year:** 1999-00 **Sectors(6):** agriculture, mining and quarrying, manufacturing, electricity, water and gas, construction, other sectors **Agents**: households, firms, government, commercial banks, central bank, rest of the world

2. METHODOLOGY FOR GENERATING SAM

Our proposed approach to estimating SAMs is motivated by an information theoretic approach to estimation (Judge & Mittelhammer, 2012) that takes a Bayesian perspective on the efficient use of information: "Use all the information you have, but do not assume any information you do not have." Previous work on SAM estimation using this approach includes: Judge and Mittelhammer (2012), Golan, Judge et al. (1994), Robinson, Cattaneo et al. (2001), Golan, Judge et al. (1996), Debowicz (2010), and Zellner (2004).

To generate the SAM following this approach, we followed a series of major steps that are explained in Figure 2.1. The steps, which are explained in detail below, start from a schematic SAM (Table 2.1) and, using a variety of data sources, and balancing the accounts of the SAM with the use of a 'cross-entropy' technique, lead to a macro-consistent and disaggregated SAM.

Table 2.2 shows the numerical macro-SAM that we arrived at, and Table 2.3 shows the data sources that we utilized to go from the schematic macro-SAM to the numerical one.

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[4] Medium/Large farm households are defined as those owning farms with 12.5 acres or more land. Small farm households are those owning less than 12.5 acres of land.
[5] We did not find it possible to get access to these SAMs.

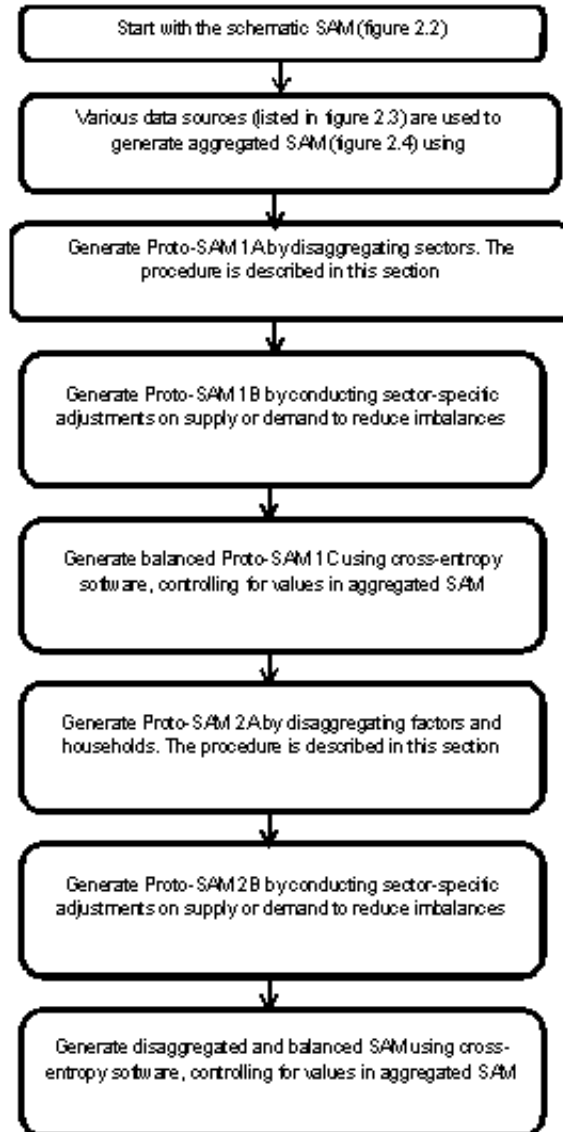**Figure 2.1—Steps to build the SAM for Pakistan 2007-08**

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┌─────────────────────────────────────────────────┐
│         Start with the schematic SAM (figure 2.2)│
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│  Various data sources (listed in figure 2.3) are used to │
│      generate aggregated SAM (figure 2.4) using  │
└─────────────────────────────────────────────────┘
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                        ▼
┌─────────────────────────────────────────────────┐
│  Generate Proto-SAM 1A by disaggregating sectors. The │
│        procedure is described in this section    │
└─────────────────────────────────────────────────┘
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┌─────────────────────────────────────────────────┐
│     Generate Proto-SAM 1B by conducting sector-specific │
│  adjustments on supply or demand to reduce imbalances │
└─────────────────────────────────────────────────┘
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┌─────────────────────────────────────────────────┐
│  Generate balanced Proto-SAM 1C using cross-entropy │
│    software, controlling for values in aggregated SAM │
└─────────────────────────────────────────────────┘
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┌─────────────────────────────────────────────────┐
│  Generate Proto-SAM 2A by disaggregating factors and │
│  households. The procedure is described in this section │
└─────────────────────────────────────────────────┘
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┌─────────────────────────────────────────────────┐
│     Generate Proto-SAM 2B by conducting sector-specific │
│  adjustments on supply or demand to reduce imbalances │
└─────────────────────────────────────────────────┘
                        │
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┌─────────────────────────────────────────────────┐
│  Generate disaggregated and balanced SAM using cross- │
│   entropy software, controlling for values in aggregated SAM │
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Table 2.1—A Schematic Social Accounting Matrix (SAM) for Pakistan

	Activities	Commodities	Land	Labor	Capital	Households	Government	Change in stocks	Saving-Investment	Rest of the World
Activities		Supply matrix								
Commodities	Intermediate consumption					Final private consumption	Final public consumption	Change in stocks	Fixed investment	Exports
Land	Value added by land									
Labor	Value added by labor									
Capital	Value added by capital									
Households			Payment from land to households	Payment from labor to households	Payment from capital to house-holds		Transfers from government to households			Remittance to house-holds
Government		Sales and imports tax			Payment from capital to public sector	Direct taxes				Transfers from non-residents to government
Change in stocks									Change in stocks	
Saving-Investment						Household saving	Government saving			Foreign saving
Rest of the World		Imports			Repatriation of dividends and utilities		Government payments to RoW			

Table 2.2—Macro-SAM for Pakistan (in Billions of Pakistani Rupees)

	Activities	Commodities	Land	Labor	Capital	Households	Government	Sales Tax	Import Tax	Direct Tax	Stocks	Saving-Investment	Rest of the World	Total
Activities		25,743												25,743
Commodities	15,822					8,046	1,278				164	2,095	1,502	28,907
Land	576													576
Labor	2,651													2,651
Capital	6,695													6,695
Households			576	2,651	5,998		617						763	10,605
Government					442			171	151	391			27	1,181
Sales Tax		171												171
Import Tax		151												151
Direct Tax						391								391
Stocks												164		164
Saving-Investment						2,168	-777						868	2,259
Rest of the World		2,842			254		63							3,160
Total	25,743	28,907	576	2,651	6,695	10,605	1,181	171	151	391	164	2,259	3,160	

Table 2.3—Sources of data for ᴹᵃᶜʳᵒ-SAM

Macro-SAM Item	Source
Value added by land	National Accounts, Gross National Product at Current Factor Cost 2007–08 of agricultural sectors (FBS) multiplied by share of land in value added of agricultural sectors from Dorosh et al. (2004)
Value added by labor	National Accounts, Gross National Product at Current Factor Cost 2007–08 for each sector (FBS) multiplied by share of labor into value added of the sector in Input-Output matrix (1991) (IO91).
Value added by capital	National Accounts, Gross National Product at Current Factor Cost 2007–08 minus two above.
Intermediate consumption	National Accounts, Gross National Product at Current Factor Cost 2007–08 for each sector multiplied by ratio between intermediate consumption and value added in those activities in Input-Output matrix (1991).[6]
Supply matrix	Sum of payments above
Direct tax	"Fiscal Development" item "Direct Taxes" 2007-08, Economic Survey (2009)
Import tax	"Pakistan: Summary of consolidated federal and provincial revenue 2007–08" Taxes on International Trade, Economic Survey (2009)
Sales tax	Handbook of Statistics (2010), Table 1.4, Indirect taxes - Subsidies - Import Tax
Final public consumption	Handbook of Statistics (2010), Table 1.4, General Government Consumption Expenditure FY08
Change in stocks	Handbook of Statistics (2010), Table 1.4, Changes in Stocks FY08
Fixed Investment	Handbook of Statistics, Table 1.4, Gross Domestic Fixed Capital Formation FY08
Exports	IMF Country Report (2010), Table 3.1, Pakistan: Balance of Payments, 2007–08. "Exports: FOB" + "Services: Credit"
Imports	IMF Country Report (2010), Table 3.1, Pakistan: Balance of Payments, 2007–08. "Imports: FOB" + "Services: Debit"
Final private consumption	Residual of commodity account
Payment from land to households	Value added by land
Payment from labor to households	Value added by labor
Repatriation of dividends and utilities	IMF Country Report (2010), Table 3.1, Pakistan: Balance of Payments 2007–08. "Income: debit" + "Current Transfers: debit" - "Income: credit"
Payment from capital to public sector	Handbook of Statistics (2010), Table 3.7, Residual of Public Incomes
Government saving	Pakistan: Summary of Consolidated Federal and Provincial Budgetary Operations, Provisional. Table 1.1, Budget Deficit 2007–08, Economic Survey (2009)
Government payments to non-residents	IMF Country Report (2010), Table 3a, Share of Foreign into Total Payment of Interest by GOP 2008–09 (not available for 2007–08) multiplied by Handbook of Statistics (2010), Table 3.7, Interest Payment FY08 Consolidated Federal and Provincial Governments
Transfer from non-resident to government	Handbook of Statistics (2010), Table 7.2, Net Current Transfers of General Government in Balance of Payments FY08
Transfer from government to household	Residual in government account

2.1. Generation of the First Proto-SAM (PSAM 1A)

The next step was to split domestic value added into 51 sectors of activity in the SAM (listed in Box 2.1, together with the rest of the SAM accounts). For this purpose, we started from value added by major sector, as in 2007–2008 Gross National Product at current factor cost in National Accounts, which sums to the value added in the Macro-SAM. To split the major sectors present in this classification into those present in the SAM, as illustrated in Figure 2.2, we conducted the following steps:

- Major and minor crops were disaggregated into wheat, rice, cotton, sugarcane, fruits and vegetables, and other field crops using the 2007-08 data from Agricultural Statistics of Pakistan (2009), "Gross value addition of Major Crops at Current Factor Cost" and "Gross value addition of Minor Crops at Current Factor Cost".

- Rice and wheat were further split using production of rice varieties and irrigated and non-irrigated wheat from Agriculture Statistics of Pakistan.

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[6] The classification of activities in IO91 is presented in Appendix 1.

- Livestock was split into poultry and other livestock using the value of their output as informed also by the Agriculture Statistics of Pakistan.
- Manufacturing was split into vegetable oil, wheat milling, rice irri-milling, rice basmati-milling, refinement of sugar, other food, lint, yarn, cloth, knitwear, garments, other textiles, leather, wood, fertilizer, other chemicals, cement, petroleum refining, and other manufacturing using the most recent available Census of Manufacturing and Industry (CMI) (2006).
- Trade was split into wholesale, retail, and other using the "Study on wholesale and retail trade, hotels and restaurants in Pakistan," Federal Bureau of Statistics (2002).
- Transport was split into road, rail, water, air, and other such as transport by tubes, using "National Accounts of Pakistan: Rebasing from 1980–81 to 1999–2000", Federal Bureau of Statistics (2004).
- Housing was split into owned and non-owned using the "Survey on Community and Personal Services," Federal Bureau of Statistics (2001).
- "Social, community, and personal" services was split into business, education, health, personal, and other services using the same source.

Once the value added of each sector in the SAM was estimated, we split the values into payments to land, capital, and labor. For the crops in the SAM, this was done using the factor shares at activity level in the cost of production of Pakistan (2003) informed by the Agriculture Policy Institute (formerly known as Agricultural Prices Commission). Wheat factor shares were updated using cost of production data for 2008-09 from the Agriculture Policy Institute (2009). For the remaining activities, the shares of labor and capital were informed by Dorosh, Niazi, and Nazli (2004), IO91, and the map from sectors in IO to those in SAM (Appendix 2).

Then, we split the intermediate use using the production cost of Pakistan 2002–03 for crops and the IO91 for rest. The supply of each activity was allocated to its corresponding commodity, generating the sector-specific supply matrix. Import taxes were generated by multiplying value imported of each commodity 2007–08, available from Ministry of Commerce (2011) by its tariff rate, available from Federal Board of Revenue (2008).[7] Sales tax is split proportional to production value of each commodity. The sector composition of imports and exports were informed mainly by 2007-08 trade data in the Pakistan Economic Survey (2009), and supplemented by 2008 import data from the Government of Pakistan Ministry of Commerce and United Nations Conference on Trade and Development (2008). The sector composition of private final consumption is informed by expenditures present in the Household Income and Expenditure Survey of Pakistan (2008), expanding with sample household weights, and translating into the commodities in the SAM, as detailed in Appendix 3. The sector composition of fixed investment, changes in stocks, and public final consumption was informed by IO91 and the respective mapping into SAM accounts.

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[7] Given data availability, we ignore secondary production.

Box 2.1—Accounts in the SAM

Activities (51)
Agriculture (12): Wheat irrigated, Wheat non-irrigated, Rice-Irri (irrigated), Rice-Basmati (irrigated), Cotton (irrigated), Sugarcane (irrigated), Other field crops, Fruits/vegetables, Livestock (cattle, milk), Livestock (poultry), Forestry, Fishing
Industry (22): Mining, Vegetable oils, Wheat milling, Rice milling (irri), Rice milling (basmati), Sugar, Other food, Cotton gin (lint), Cotton spin (yarn), Cotton weave (cloth), Knitwear, Garments, Other textiles, Leather, Wood, Chemicals, Fertilizers, Cement and bricks, Petroleum refining, Other manufacturing, Energy, Construction
Services (17): Trade-wholesale, Trade-retail, Trade-other, Transport-rail, Transport-road, Transport-water, Transport-air, Transport-other, Housing, Imputed rent, Business services, Health care, Education, Personal services, Other private services, Public services, Finance and insurance

Commodities (50)
Same as activities except Wheat irrigated and Wheat non-irrigated activities aggregated as one commodity (Wheat).

Factors (27)
Labor (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 waged, Non-agricultural unskilled, Non-agricultural 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 (18)
Rural (15): Large/medium farm (Sindh, Punjab, Other Pakistan), Small farm (Sindh, Punjab, Other Pakistan), Landless unwaged farmer (Sindh, Punjab, Other Pakistan), Landless waged farmer (Sindh, Punjab, Other Pakistan), Rural non-farm per capita expenditure quintile 1, quintile 2, and rest
Urban (3): per capita expenditure quintile 1, quintile 2, and rest

Other Institutional Accounts (4)
Government (including separate subaccounts for import taxes, direct taxes, and sales taxes), Rest of world, Saving-Investment, Change in stocks

Figure 2.2—Split of value added among sectors in the SAM

Figure 2.2—Split of value added among sectors in the SAM
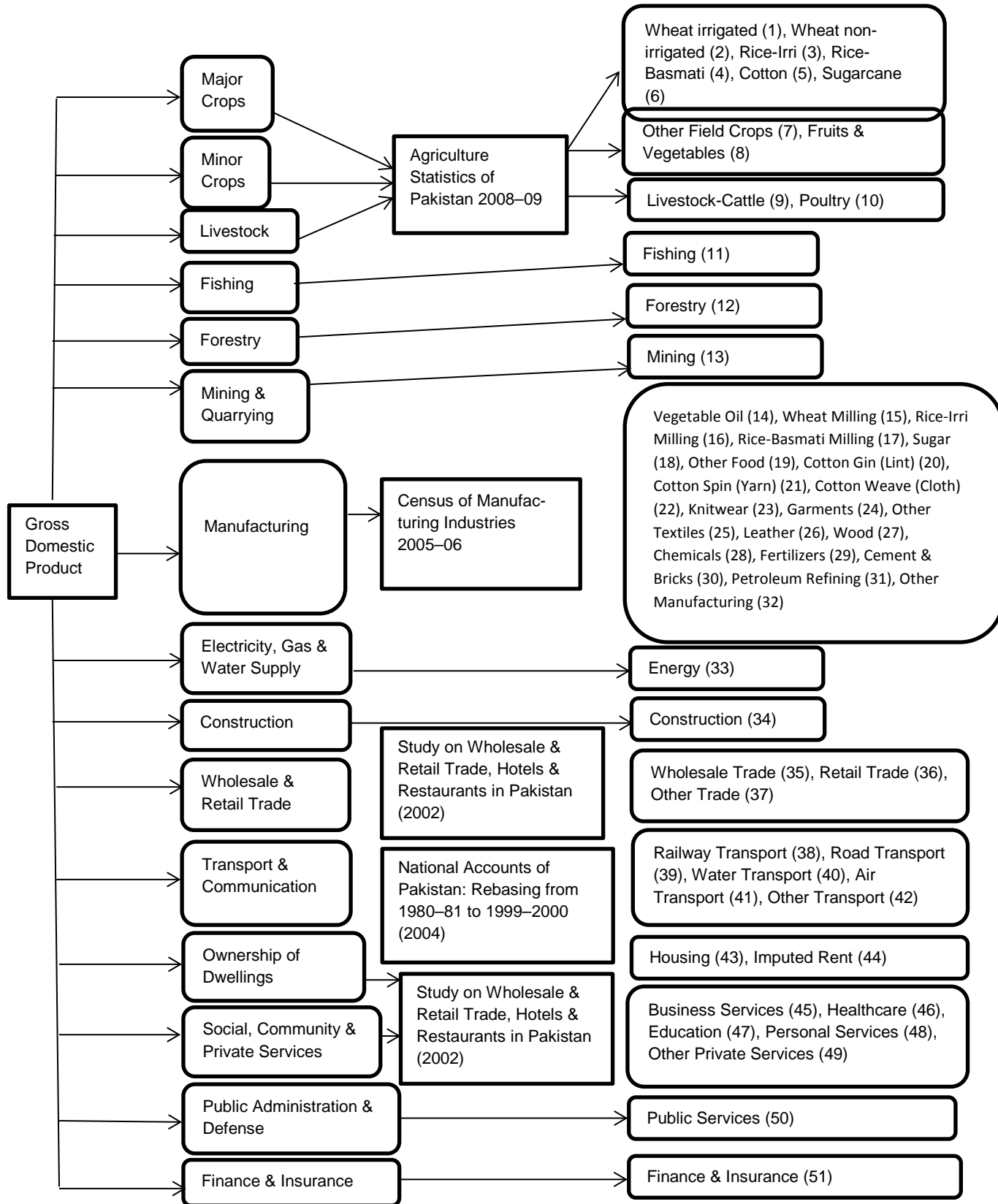
2.2. Balancing the First Proto-SAM to Get to PSAM-1C

After a series of adjustments that reduced the imbalances at the commodity level to be less than 30% of the average between supply and use, we arrived at a new proto-SAM (PSAM 1B). We then generated a consistent proto-SAM based on it, seeking to minimize the cross-entropy distance between the proto-SAM and the SAM imposing the series of controls present in the Macro-SAM (PSAM 1C). When balancing the SAM at this stage, and following the approach described in Golan, Judge, and Robinson (1994), we treated every cell in the SAM as being specified with an error support set whose weights are estimated to minimize a cross-entropy distance between the prior and the solution SAM. This treatment is strongly related to the one described in Robinson, Cattaneo, and El-Said (2001), with key differences. In the previous approach, the column coefficients in the SAM were treated analogously to probabilities and included directly in the cross-entropy minimand, generating the need for special treatment of negative cells and accounts with zero sums in the SAM. In the approach we apply, developed by Sherman Robinson and Scott McDonald - starting in turn from Robinson, Cattaneo, and El-Said (2001) -, the cross-entropy minimand only includes probability weights for a selected error support set, such that the SAM coefficients are no longer treated as analogous to probabilities and negative entries and accounts with zero sums do not require any special treatment.8 The present approach allows specification of a prior estimate of the mean and standard error of selected cell entries (expressed either as values or column coefficients), column sums, and macro aggregates. These errors can be specified as additive or multiplicative-exponential. For the aggregates present in the Pakistan Macro-SAM, we set a zero standard error. This allowed us to arrive at a SAM that is perfectly consistent with the Macro-SAM, such that the sum of the value added in the solution SAM was exactly equal to the GDP at factor cost in the Macro-SAM; the private final consumption in the solution SAM summed exactly the private final consumption in the Macro-SAM, etc.

2.3. Disaggregating the Payments Related to Factors and Households

To fully disaggregate the single household group and the three factors (labor, capital, and land) present in PSAM 1C into the complete set of 27 factors and 18 households in the SAM, we conducted the following steps. The value added of the specific activities was split among the 27 factors using the shares present in the 2000–2001 SAM for Pakistan, in turn informed by the PRHS (Pakistan Rural Household Survey 2001). Then, regarding payments from factors to institutions, after assigning the payments from factor income to government and non-residents as informed by the Macro-SAM to formal capital, the household income matrix was generated in the following way (Figure 2.3).

Labor, agricultural capital, and non-agricultural formal capital were split following the Household Income and Expenditure Survey (HIES) 2007–08 incomes. Livestock was split following the value of the livestock capital stock owned by households in HIES 2007–08. Land and water income was split following the 2000–01 SAM, which in turn is based on the PRHS. For land, all returns to land of large farms (defined in terms of cultivated area) are paid to large landowners 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 of small and medium-sized farms for each region (Punjab, Sindh, and Other Pakistan) were allocated to households according to the following formula: LandShareh = (CultAreah – rr * Land_Inh + rr * Land_Outh) / Total Cultivated Area, where LandShareh is the share of household h in total land revenues, CultAreah is cultivated area of household h, rr is the rental cost of land (assumed to be 50%), Land_Inh is net land rented in of household h, and Land_Outh is net land rented out of household h.

Returns to informal non-agricultural capital (which includes returns to self-employed labor in informal sector activities) are split between rural and urban households using as proxy the share of rural population in total population as informed by HIES (67%). 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 33 % of non-agricultural wage incomes are allocated between urban non-poor and poor households using an 85:15 ratio.9 Returns to agricultural capital are split among households in proportion to their land income.

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8 Available from the authors upon request.

9 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

In the absence of detailed information, public transfers and remittances to households informed in the Macro-SAM were allocated among households in proportion to their total expenditures.

Finally, regarding the uses of funds by households, final private consumption of each commodity was split among the 18 households using HIES 2007–08 to provide a prior. A relatively high (15%) saving rate was used as a prior for medium/large farms and non-farm (quintiles 3 to 5) and a relatively low (7%) saving rate was used as a prior for the remaining households except urban other (quintiles 3 to 5). Then, the prior saving rate of the urban other (quintiles 3 to 5, which also captures enterprise savings) was determined residually from the domestic private saving figure in the Macro-SAM, generating a rate for this household group of 37.5%.

2.4. Balancing the Final Proto-SAM

After a series of adjustments that reduced the imbalances at the household level to be less than 30% of the average between income and expenditure, we re-ran the software to generate a new SAM that minimizes the cross-entropy distance between the proto-SAM and the SAM imposing the series of controls present in the Macro-SAM, allowing the generation of a balanced SAM that is perfectly consistent with the Macro-SAM.

Figure 2.3—Generation of household income matrix
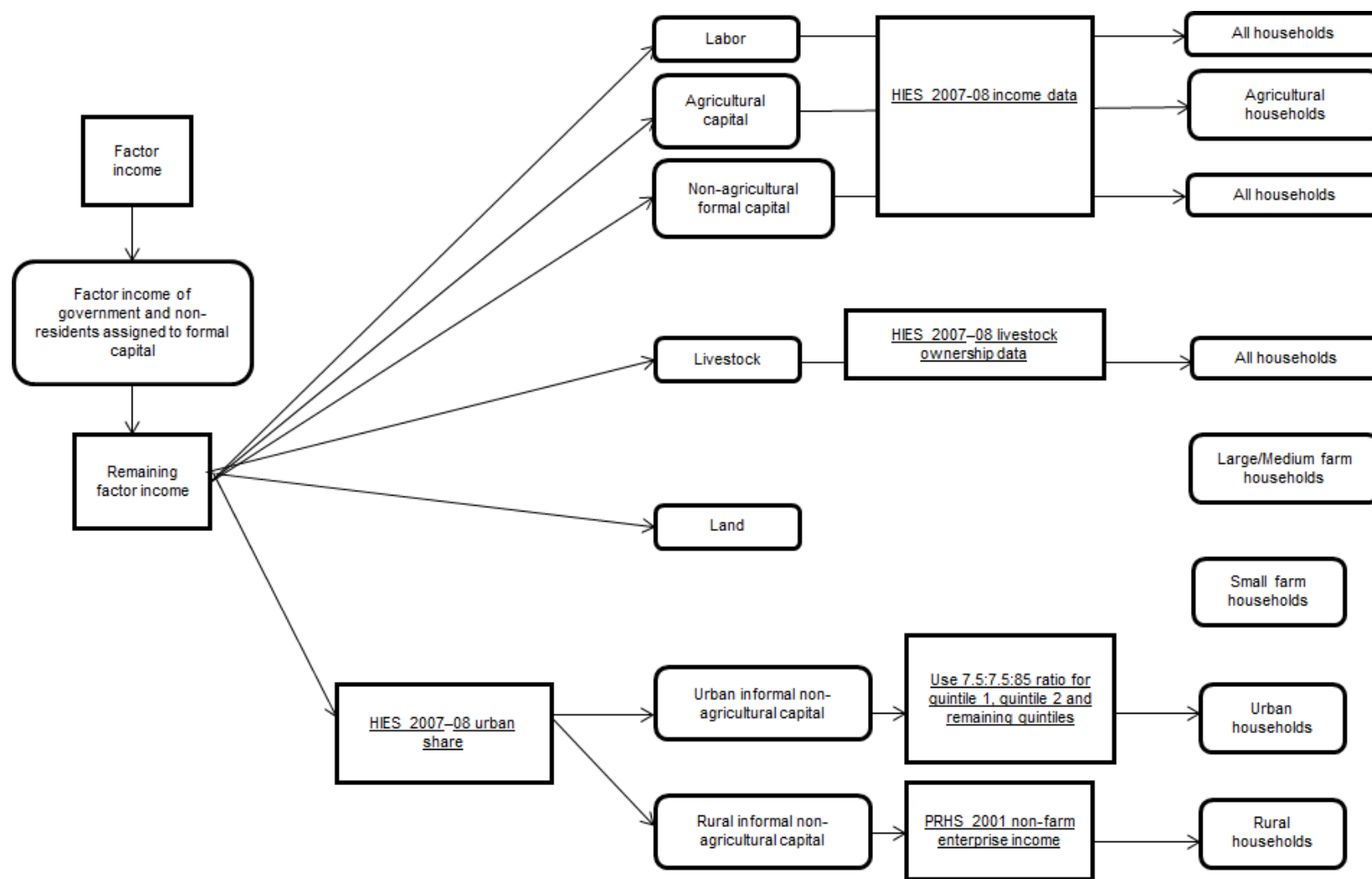
3. STRUCTURE OF THE PAKISTAN ECONOMY: OBSERVATIONS FROM THE SAM

The structure of value added (Table 3.1) is characteristic of a semi-industrialized economy, with a relatively low share of agriculture (20%), and large shares of industry and services (27% and 53%, respectively). Livestock accounts for more than half of value added of the agricultural sector. Much of the industrial production is strongly linked to agriculture, including wheat, rice and sugar milling and textile production (linked to cotton).[10] Trade (wholesale and retail) and transport generate more than half of the value added in services. Exports are a relatively low share of total output (6.5%); imports are concentrated in the industrial sector (including petroleum products, part of the mining sector) and in private services (particularly, business services).

Table 3.1—Structure of the economy (percentages)

	Output	Value added	Export	Import	Export / Output	Import / Domestic absorption
Agricultural Sector	12.1	20.3	1.6	3.0	0.9	2.9
Crops	5.7	8.9	0.8	2.8	0.9	5.7
Livestock	5.9	10.6	0.2	0.2	0.2	0.4
Fishing	0.4	0.5	0.7	-	12.5	-
Forestry	0.1	0.3	-	-	-	-
Industrial Sector	47.3	26.8	67.2	76.2	9.2	17.8
Mining and Quarrying	2.6	3.0	0.0	10.7	0.0	33.4
Manufacturing	38.9	19.7	67.2	65.5	11.2	18.8
Electricity, Gas and Water Distribution	1.2	1.5	-	-	-	-
Construction	4.6	2.6	-	-	-	-
Services Sector	40.7	52.9	31.1	20.8	4.9	6.2
Wholesale and Retail	10.3	18.4	0.1	0.6	0.1	0.7
Transport and Communication	14.0	11.7	14.9	-	6.8	-
Ownership of Dwellings	1.3	2.4	-	-	-	-
Public Administration and Defense	5.9	5.3	-	-	-	-
Social, Community and Private Services	6.7	9.4	16.1	20.2	15.6	30.5
Financial Services	2.5	5.6	-	-	-	-
Total	100.0	100.0	100.0	100.0	6.5	11.6

Source: SAM for Pakistan

Table 3.2 below shows the composition of value added across sectors. For agricultural products, land is the largest component of value added. Manufacturing activities depend heavily on formal capital, while labor and other capital are important for most services. A more disaggregated composition is shown in Appendix 4.

Table 3.2—Composition of Value Added (Total column in billions of Pakistan rupees, rest in percentage)

	Land	Labor	Live stock	Formal Capital	Other Capital	Total (%)	Total Value Added
Agricultural Sector	28.6	15.9	37.8	11.4	6.3	100.0	1986.8
Crops	63.5	27.0	0.0	0.0	9.5	100.0	882.9
Livestock	0.0	6.7	72.6	20.7	0.0	100.0	1051.4
Fishing	0.0	18.3	0.0	23.4	58.4	100.0	52.4
Forestry	50.0	5.7	0.0	0.0	44.3	100.0	30.4
Industrial Sector	0.0	25.9	0.0	60.7	13.5	100.0	2658.2
Mining and Quarrying	0.0	72.0	0.0	28.0	0.0	100.0	301.5
Manufacturing	0.0	16.9	0.0	68.4	14.7	100.0	1950.5
Electricity, Gas and Water Distribution	0.0	15.6	0.0	84.4	0.0	100.0	145.9
Construction	0.0	45.4	0.0	27.3	27.3	100.0	260.3
Services Sector	0.0	26.7	0.0	24.6	48.6	100.0	5246.2
Wholesale and Retail	0.0	8.9	0.0	27.3	63.8	100.0	1829.9
Transport and Communication	0.0	24.2	0.0	22.7	53.1	100.0	1155.9
Ownership of Dwellings	0.0	8.9	0.0	30.2	60.9	100.0	239.0
Public Administration and Defense	0.0	64.2	0.0	35.8	0.0	100.0	530.1
Social, Community and Private Services	0.0	49.9	0.0	15.0	35.1	100.0	934.6
Financial Services	0.0	23.7	0.0	22.9	53.4	100.0	556.7

Source: SAM for Pakistan

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[10] Not tabulated.

Large and medium farmers of Pakistan earn a large share of their income from land (Table 3.3). However, small and landless farmers rely on labor, livestock, and other capital for most of their income. Rural non-farm and urban households mostly rely on their labor and other capital as the sources of income.

Table 3.3—Household Income Shares (Total income column in billions of Pakistan rupees, rest in percentage)

	Land	Labor	Live stock	Formal capital	Other capital	Govern-ment	Non-residents	Total (%)	Total income
Large & Medium farm - Sindh	57.7	11.0	7.4	0.0	16.0	4.8	3.2	100.0	160.4
Large & Medium farm - Punjab	31.8	9.2	14.0	0.0	37.3	4.2	3.5	100.0	652.6
Large & Medium farm - Other	42.5	19.7	4.2	0.0	27.9	2.8	3.0	100.0	89.6
Small farm - Sindh	15.1	12.2	18.4	0.0	37.6	8.5	8.3	100.0	192.2
Small farm - Punjab	11.4	9.6	24.1	0.0	39.0	7.8	8.1	100.0	1,223.0
Small farm - Other	9.3	16.9	11.1	0.0	47.9	7.0	7.9	100.0	348.8
Landless Farmer - Sindh	11.5	10.0	21.1	0.0	41.8	7.0	8.5	100.0	144.7
Landless Farmer - Punjab	8.2	13.9	37.1	0.0	25.5	7.3	8.0	100.0	193.3
Landless Farmer - Other	5.7	16.5	18.1	0.0	43.8	7.1	8.6	100.0	79.9
Landless Agricultural Laborers - Sindh	0.0	21.7	3.5	0.0	59.7	6.6	8.6	100.0	155.5
Landless Agricultural Laborers - Punjab	0.0	21.0	11.9	0.0	53.4	6.1	7.7	100.0	148.0
Landless Agricultural Laborers - Other	0.0	33.7	1.8	0.0	49.8	6.3	8.4	100.0	19.1
Rural non-farm quintile 1	0.0	36.1	6.7	0.0	46.3	4.9	6.0	100.0	295.9
Rural non-farm quintile 2	0.0	38.9	8.5	0.0	39.3	6.1	7.3	100.0	351.6
Rural non-farm other	0.0	36.3	5.4	0.0	42.7	7.3	8.3	100.0	1,831.9
Urban quintile 1	0.0	59.8	0.0	0.0	25.3	6.9	8.0	100.0	277.8
Urban quintile 2	0.0	63.2	0.0	0.0	21.2	7.2	8.4	100.0	356.3
Urban other	0.0	16.8	0.0	59.7	12.2	4.4	6.9	100.0	4,084.9
Rural farm sub-total	16.9	12.3	18.1	0.0	39.2	6.6	6.9	100.0	3,407.0
Rural non-farm sub-total	0.0	36.7	6.0	0.0	42.7	6.8	7.9	100.0	2,479.3
Urban subtotal	0.0	22.9	0.0	51.7	13.6	4.8	7.1	100.0	4,719.0
Total households	5.4	22.7	7.2	23.0	28.6	5.8	7.2	100.0	10,605.3

Source: SAM for Pakistan

The importance of agricultural income by household group is generally lower in the recent SAM than in the Permanent Rural Household Survey (PRHS) of 2001-02, suggesting that households have more diversified income sources than as suggested by PRHS data (Table 3.4). The SAM shows that agricultural income accounts for a large share of income for all farmers, especially for the medium and large farms (66 % of their total income), consistent with the PRHS data.

Table 3.4—Rural agricultural incomes

Household group	Share of agricultural income in PRHS	Share of agricultural income in SAM
Medium and large farms	83.5	66.0
Small farms	67.9	41.2
Landless farmers	87.7	45.6
Rural agricultural workers	53.1	22.2
Rural non-farm non-poor	1.9	6.7
Rural non-farm poor	6.3	9.7
Rural agricultural	74.8	46.5
Rural	69.7	30.1

Source: PRHS 2001-02 and 2008 Pakistan SAM.

4. INCOME MULTIPLIER ANALYSES

To illustrate the use of the SAM, we use income multiplier analysis. A survey of income multiplier analysis methods and findings can be found in Haggblade, Hazell, and Reardon (2007). To capture the production and consumption linkages, taking into account the supply-rigidities present in Pakistan, we use a semi-input-output model, with constrained linear relationships among quantities in the model and fixed prices. In this approach, sectors are classified into two groups: those that are supply constrained and those that are supply-responsive. Output responses are permitted only in supply-responsive

sectors. For these models to produce a suitable approximation of reality, the supply-constrained sectors must correspond to tradable goods whose domestic supply remains fixed at the prevailing output price. Therefore, we follow this approach. In the supply-constrained sectors, imbalances between supply and demand are equilibrated via changes in net exports.

The starting point is the sector-specific equilibrium conditions, i.e. $x_c(1 + tc_c) = \sum_{c'} z_{cc'} + \sum_h c_{ch} + g_c + i_c + e_c$, where x_c is pre-commodity-tax gross output, tc_c is commodity tax rate, $z_{cc'}$ is intermediate demand of good c by sector c', c_{ch} is household consumption of good c by household h, g_c is public consumption of good c, i_c is investment (fixed and change in stock) demand for good c, and e_c is net export of good c. Intermediate and factor demand are assumed to be proportional to output production, i.e. $z_{cc'} = a_{cc'}x_{c'}$ and $v_{fc'} = a_{fc'}x_{c'}$, where $a_{cc'}$ and $a_{fc'}$ are the requirements of intermediate input c' and factor f to produce a unit of c. Household consumption is given by $c_{ch} = \theta_{ch}(1 - th_h)y_h$, where y_h is pre-tax income of household h, th_h is the corresponding tax rate, and θ_{ch} is the share of post-tax income of household h spent on commodity c. Finally, pre-tax household income is the sum of factor income and transfers received by the household from other agents, i.e. $y_h = \sum_f a_{hf}v_f + tr_h$, with $v_f = \sum_c v_{fc}$, and a_{hf} being the share of household h in the income of factor f.

Replacing the intermediate and factor demand and household demand function into the equilibrium condition, we find that $x_c(1 + tc_c) = \sum_{c'}(a_{cc'}x_{c'}) + \sum_h \left\{\theta_{ch}(1 - th_h)\left[\sum_f \left(a_{hf}(\sum_{c'} a_{fc'}x_{c'})\right) + tr_h\right]\right\} + g_c + i_c + e_c$[11], which can be solved either for x_c (demand-constrained sector) or for e_c (supply-constrained sector), fixing either e_c (demand-constrained sector) or x_c (supply-constrained sector).

We conduct a series of simulations where a constant injection is applied to the economy (100 billion rupees during the year), either to supply (supply-constrained sector) or to net export demand (remaining sectors). We run a simulation focusing the injection only in crops (SIMC), where each crop receives a proportion of total injection given by its share in the total value added of crops. We then do the same for livestock (SIML), for industry (SIMI), for services (SIMS), and for all sectors (SIMA). Finally, we divided the absolute changes in output values by the injection, getting to the following output multipliers (Table 4.1). All aggregate output multipliers are in the 1.1-1.4 range, with livestock and industry having the highest output multipliers. These multipliers are significantly below the ones found for India by Pal, Pohit, and Roy (2012), probably reflecting that the mentioned analysis assumes the absence of supply rigidities, which we seek to capture here, but aligned with the 1.5 value added-multiplier reported in Dorosh, Niazi, and Nazli (2003), Haggblade, Hammer, and Hazell (1991), and Mellor (1995). As expected, the output multipliers are largest in the sector in which the injection takes place (main diagonal of the table). We also see that the direct effects are larger than the indirect, and that most of the indirect effects are concentrated into the services sectors.[12] Finally, the injection into the services sector has the lowest output multiplier for the entire economy.

Table 4.1—Output Multipliers

	SIMC	SIML	SIMI	SIMS	SIMA
Crops	1.007	0.054	0.053	0.000	0.110
Livestock	0.004	0.991	0.003	0.005	0.109
Industry	0.139	0.020	1.049	0.024	0.308
Services	0.077	0.259	0.226	1.135	0.696
TOTAL	1.227	1.324	1.337	1.165	1.233

Source: Authors' elaboration.

5. CONCLUSIONS

This paper presented the Social Accounting Matrix (SAM) of Pakistan for the year 2007–08, which seeks to support the continuing need to use recent and consistent multi-sectoral economic data for policy analysis and the development of economy-wide models (Robinson et al., 2001). In particular, it is expected to become a vital part of the Pakistan Strategy Support Program (PSSP) run by the International Food Policy Research Institute (IFPRI), which supports the Government of Pakistan with evidence-based policy reform for pro-poor economic growth and enhanced food security. The presented approach to estimating this SAM is motivated by an information theoretic approach to estimation (Judge & Mittelhammer, 2012) that takes a Bayesian perspective on the efficient use of information: "Use all the information you have, but do not

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[11] Transaction costs are captured in the application but are ignored here to avoid cluttering the explanation.
[12] The only exception is the injection in crops, with the largest indirect effect placed in industry.

assume any information you do not have." The presented SAM will be used with Computable General Equilibrium (CGE) models to analyze the impact of policy changes throughout the economy of Pakistan. It combines both input-output and national income and product accounts, supplemented by other information from a variety of sources and uses a "cross-entropy" approach to balance the accounts. This SAM allows specification of a prior estimate of the mean and standard error of selected cell entries (expressed either as values or column coefficients), column sums, and macro aggregates, providing an updated and consistent database that is fully consistent with macroeconomic-level data and that is highly disaggregated, allowing for detailed macroeconomic and distributional analysis of relevant events.

The SAM highlights a series of relevant characteristics of the Pakistan economy. The livestock (10.5% of the economy) and trade sectors (18.4% of the economy) are shown to be significant contributors to the total domestic value added. For agricultural products, land is, unsurprisingly, the biggest component of value added. Manufacturing activities depend heavily on formal capital, while labor and other capital are important for most services. Large and medium farmers of Pakistan earn a large share of their income from land. However, small and landless farmers rely on labor, livestock, and other capital for most of their income. Rural non-farm and urban households mostly rely on their labor and other capital as income sources. To illustrate the use of the SAM, we conduct income multiplier analysis. In particular, to capture the production and consumption linkages, taking into account the supply-rigidities present in Pakistan, we use the semi-input-output model. All aggregate output multipliers turn out to be in the 1.1–1.4 range, with livestock and industry having the highest output multipliers. These multipliers are significantly below the ones found for India by Pal et al. (2012), probably reflecting that the mentioned analysis assumes the absence of supply rigidities, which we seek to capture here. The multipliers are, however, aligned with the 1.5 value added-multiplier reported in Dorosh et al. (2003) and others. Results suggest that the direct effects are larger than the indirect and that most of the indirect effects are concentrated into the services sectors.[13] Finally, the injection into the services sector has the lowest output multiplier for the entire economy.

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[13] The only exception is the injection in crops, with the largest indirect effect placed in industry.

APPENDIX

Appendix 1: Sectors in the Input-Output Matrix

1	Crops: Rice (Paddy)	42	MF: Refined petroleum
2	Crops: Wheat	43	MF: Rubber and plastic products
3	Crops: Cotton (seed cotton)	44	MF: Other chemicals
4	Crops: Sugar cane	45	MF: Bricks, tiles
5	Crops: Tobacco	46	MF: Cement
6	Crops: Other crops	47	MF: Other non-metallic mineral products
7	Crops: Pulses and grams	48	MF: Basic metal products
8	Crops: Potatoes	49	MF: Other metal products
9	Crops: Fruits	50	MF: Other non-electrical machinery
10	Crops: Vegetables and other condiments	51	MF: Electrical equipment etc.
11	Crops: Oil seeds	52	MF: Other transport equipment
12	Crops: Other	53	MF: Surgical instruments
13	Livestock	54	MF: Handicrafts
14	Forestry	55	MF: Sports goods
15	Fisheries	56	MF: Jewelry (precious metal)
16	Mining- Coal	57	MF: Other manufacturing products
17	Mining- Crude oil and natural gas	58	Electricity and water works
18	Mining- Other minerals	59	Gas supply
19	MF: Vegetable oils etc.	60	Construction: Buildings and land improvement
20	MF: Milling	61	Trade: Wholesale
21	MF: Bakery products	62	Trade: Retail
22	MF: Sugar	63	Hotel and restaurant services
23	MF: Other food products	64	Transport: Railway
24	MF: Beverages	65	Transport: Road
25	MF: Cigarettes, tobacco	66	Transport: Water
26	MF: Ginned cotton (lint)	67	Transport: Air
27	MF: Cotton yarn	68	Transport: Other and storage
28	MF: Cotton cloth	69	Communication services
29	MF: Art silk	70	Banking: Central Monetary Authority
30	MF: Made-up textile goods	71	Banking: Other Monetary institutions
31	MF: Knitwear	72	Banking: Other Credit institutions
32	MF: Carpets	73	Banking: Nominal product
33	MF: Garments	74	Insurance
34	MF: Other textile products	75	Real estate services
35	MF: Leather, leather products	76	Imputed rent (owner-occupied dwellings)
36	MF: Foot wear	77	Business services
37	MF: Wood, wooden products, furniture	78	Public administration and defense
38	MF: Paper, paper products	79	Education
39	MF: Pharmaceutics	80	Health care
40	MF: Fertilizers and pesticides	81	Other social and cultural services
41	MF: Chemicals: Consumer products	82	Personal and household services

Appendix 2: Map from sectors in IO to those in SAM

Sectors in IO91	SAM 2007–08 sectors	Sectors in IO91	SAM 2007–08 sectors
2	Wheat (Irrigated)	66	Water Transport
2	Wheat (Non-irrigated)	67	Air Transport
1	Rice (Irri)	68	Other Transport
1	Rice (Basmati)	75	Housing
3	Cotton	76	Imputed Rent
4	Sugarcane	77	Business Services
6,7,11,12	Other Field Crops	80	Health care
8,9,10	Fruits and Vegetables	79	Education
13	Livestock (cattle, milk)	82	Personal Services
13	Livestock (poultry)	81	Other Private Services
14	Forestry	70,78	Public Services
15	Fishing	71,72,74	Finance and Insurance
16,17,18	Mining		
19	Vegetable oils		
20	Wheat Milling		
20	Rice Milling (Irri)		
20	Rice Milling (Basmati)		
22	Sugar		
5,21,23,24,25	Other Food		
26	Cotton gin (lint)		
27	Cotton spin (yarn)		
28	Cotton weave (cloth)		
31	Knitwear		
32,33,34	Garments		
29,30	Other Textiles		
35,36	Leather		
37	Wood		
39,41,44	Chemicals		
40	Fertilizers		
45,46	Cement and Bricks		
42	Petroleum refining		
38,43,47-57	Other Manufacturing		
58,59	Energy		
60	Construction		
61	Wholesale Trade		
62	Retail Trade		
63	Other Trade		
64,69	Railway Transport		
65	Road Transport		

Commodities of HIES	SAM 2007–08 commodities
2103-2104, 2201-2206	Other Field Crops
1301-1308, 1501-1510	Fruits and Vegetables
1101-1103, 1201-1202	Livestock (cattle, milk)
1203-1204	Livestock (poultry)
1205	Fish
2301-2303	Vegetable oils
2101, 2502, 2503	Wheat Flour
Part of 2102	Rice (Irri)
Part of 2102	Rice (Basmati)
1701	Sugar
1803, 2105, 2501, 2504, 2601	Other Food
6103	Cotton cloth
5103	Knitwear
5101-5102, 5104-5105	Garments
6102, 6104	Other Textiles
5201-5202	Leather
2701	Wood
5601	Chemicals
4301	Petroleum
6101, 6302-6303, 6305, 6401, 6403-6404	Other Manufacturing goods
2702-2707, 2709	Energy
2406	Construction
4303	Railway Transport
4302, 4304, 6505	Road Transport
5705	Air Transport
5401-5402, 5405	Housing
5403-5404	Imputed Rent
5602	Health Care
5801-5804	Education
2901-2903	Personal Services
4401, 5903-5904	Other Private Services

Appendix 4.A: Distribution of factor payments among agricultural activities

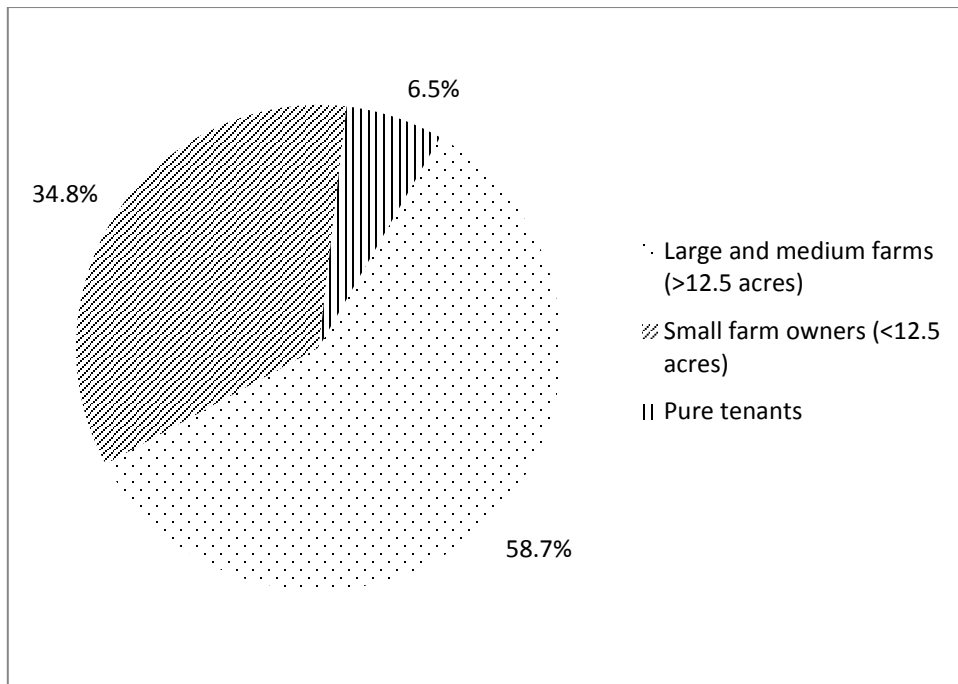|	Irrigated wheat	Non-irrigated wheat	Rice Irri (irr) 1/3	Rice Basmati (irr) 2/3	Cotton (irr)	Sugar cane (irr)	Other field crops	Fruits/vegetables	Livestock (cattle, milk)	Livestock (poultry)	Forestry	Fishing	Mining
Labor - agric (own)-large	3.4	4.6	2.1	0.6	3.6	1.8	3.8	0.3	0.0	0.0	1.2	0.0	0.0
Labor - agric (own)-med Sindh	1.4	0.1	2.2	0.2	1.7	0.8	3.7	0.7	0.0	0.0	0.1	0.0	0.0
Labor - agric (own)-med Punjab	3.4	8.3	1.9	2.3	7.8	2.4	5.2	2.9	0.0	0.0	0.5	0.0	0.0
Labor - agric (own)-med OPak	4.9	4.9	0.6	0.1	0.1	0.2	1.3	0.3	0.0	0.0	1.2	0.0	0.0
Labor - agric (own)-sm Sindh	2.5	0.3	3.8	0.4	3.4	1.2	3.0	1.8	0.0	0.0	0.1	0.0	0.0
Labor - agric (own)-sm Punjab	10.8	15.3	2.6	4.4	9.8	3.2	6.1	8.1	0.0	0.0	0.5	0.0	0.0
Labor - agric (own)-sm OPak	1.6	15.1	0.6	0.1	0.0	0.9	5.1	1.8	0.0	0.0	1.2	0.0	0.0
Labor - agric (wage)	6.5	11.3	3.2	1.9	6.2	2.5	6.6	3.7	6.7	6.7	1.1	18.3	0.0
Labor - non-ag (unsk)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8
Labor - non-ag (skilled)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.2
Land - large- Sindh	1.0	0.0	4.8	0.6	1.8	5.5	0.8	0.3	0.0	0.0	0.5	0.0	0.0
Land - large- Punjab	2.6	1.7	3.1	4.3	4.7	5.5	5.9	1.0	0.0	0.0	3.5	0.0	0.0
Land - large - OthPak	0.7	1.1	2.2	0.1	0.1	0.8	0.0	0.0	0.0	0.0	8.5	0.0	0.0
Land - irrigated - med Sindh	1.7	0.0	10.9	1.5	3.1	5.4	6.5	2.5	0.0	0.0	0.0	0.0	0.0
Land - irrigated - med Punjab	4.2	0.0	9.1	20.0	14.3	15.8	9.1	10.8	0.0	0.0	0.0	0.0	0.0
Land - irrigated - med OthPak	6.1	0.0	3.1	0.8	0.1	1.6	2.4	1.2	0.0	0.0	0.0	0.0	0.0
Land - irrigated - sm Sindh	3.2	0.0	18.7	3.5	6.3	7.7	5.3	6.6	0.0	0.0	0.0	0.0	0.0
Land - irrigated - sm Punjab	13.4	0.0	12.5	37.9	18.0	20.7	10.8	29.8	0.0	0.0	0.0	0.0	0.0
Land - irrigated - sm OthPak	2.0	0.0	2.8	1.0	0.1	5.9	9.0	6.8	0.0	0.0	0.0	0.0	0.0
Land non-irrig - sm/m Sindh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0
Land non-irrig - sm/m Punjab	0.0	14.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	0.0	0.0
Land non-irrig - sm/m OthPak	0.0	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6	0.0	0.0
Water	20.0	0.0	8.4	15.6	10.2	8.6	5.0	10.0	0.0	0.0	0.0	0.0	0.0
Capital livestock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.6	72.6	0.0	0.0	0.0
Capital other agric	10.7	10.0	7.7	4.9	8.6	9.2	10.4	11.2	0.0	0.0	44.3	0.0	0.0
Capital formal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.7	20.7	0.0	23.4	28.0
Capital informal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.4	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: SAM for Pakistan 2007–08

Appendix 4.B: Household incomes and expenditures, 2007–08

	SAM Income (Billion Rs)	Population (Millions)	SAM Income /Capita (Thousand Rs)	Share of Total Income (%)	Share of Total Population (%)	HIES Income (Billion Rs)	HIES Income /Capita (Thousand Rs)	HIES Expenditure (Billion Rs)	HIES Expenditure /Capita (Thousand Rs)	SAM Income /HIES Income Ratio
Large & Medium farm - Sindh	160.4	3.1	52.0	1.5	2.4	41.8	13.6	15.6	5.1	3.8
Large & Medium farm - Punjab	652.6	3.5	185.5	6.2	2.7	191.3	54.4	88.4	25.1	3.4
Large & Medium farm - Other	89.6	0.5	187.5	0.8	0.4	16.8	35.2	10.7	22.5	5.3
Small farm - Sindh	192.2	0.7	272.1	1.8	0.5	61.4	86.9	54.0	76.5	3.1
Small farm - Punjab	1223.0	2.2	567.7	11.5	1.6	417.4	193.8	406.6	188.7	2.9
Small farm - Other	348.8	0.5	683.2	3.3	0.4	101.7	199.2	118.0	231.1	3.4
Landless Farmer - Sindh	144.7	2.5	57.3	1.4	1.9	45.2	17.9	42.5	16.8	3.2
Landless Farmer - Punjab	193.3	3.6	54.4	1.8	2.7	81.7	23.0	71.2	20.0	2.4
Landless Farmer - Other	79.9	1.7	46.3	0.8	1.3	25.0	14.5	28.4	16.5	3.2
Landless Agricultural Laborers - Sindh	155.5	3.1	49.4	1.5	2.4	36.3	11.5	56.4	17.9	4.3
Landless Agricultural Laborers - Punjab	148.0	16.0	9.3	1.4	12.2	32.9	2.1	59.9	3.7	4.5
Landless Agricultural Laborers - Other	19.1	5.6	3.4	0.2	4.3	5.6	1.0	7.9	1.4	3.4
Rural non-farm quintile 1	295.9	9.0	33.1	2.8	6.9	105.4	11.8	62.1	6.9	2.8
Rural non-farm quintile 2	351.6	8.9	39.3	3.3	6.8	112.0	12.5	91.1	10.2	3.1
Rural non-farm other	1831.9	26.8	68.2	17.3	20.6	575.9	21.5	529.6	19.7	3.2
Urban quintile 1	277.8	8.6	32.4	2.6	6.6	289.4	33.7	82.2	9.6	1.0
Urban quintile 2	356.3	8.6	41.6	3.4	6.6	138.6	16.2	115.7	13.5	2.6
Urban other	4084.9	25.7	158.7	38.5	19.7	726.8	28.2	793.2	30.8	5.6
Rural farm sub-total	3407.0	43.0	79.2	32.1	32.9	1057.2	24.6	959.7	22.3	3.2
Rural non-farm sub-total	2479.3	44.7	55.4	23.4	34.2	793.2	17.7	682.8	15.3	3.1
Urban subtotal	4719.0	42.9	110.1	44.5	32.8	1154.8	26.9	991.1	23.1	4.1
Total households	10605.3	130.6	81.2	100.0	100.0	3005.3	23.0	2633.5	20.2	3.5
Rural poor household groups	3151.9	53.8	58.6	29.7	41.2	1024.6	19.0	998.0	18.5	3.1

Source: SAM for Pakistan 2007–08, HIES 2007–08

Appendix 4.C: Distribution of total land income in Pakistan

6.5%

34.8%

Large and medium farms (>12.5 acres)

Small farm owners (<12.5 acres)

Pure tenants

58.7%

Appendix 4.D: Poverty in Pakistan, 2007–08

1.9%

17.5%

20.1%

Large, medium farm
Small farm
Landless farmers
Rural agric laborer
Rural non-farm
Urban

9.7%

39.0%
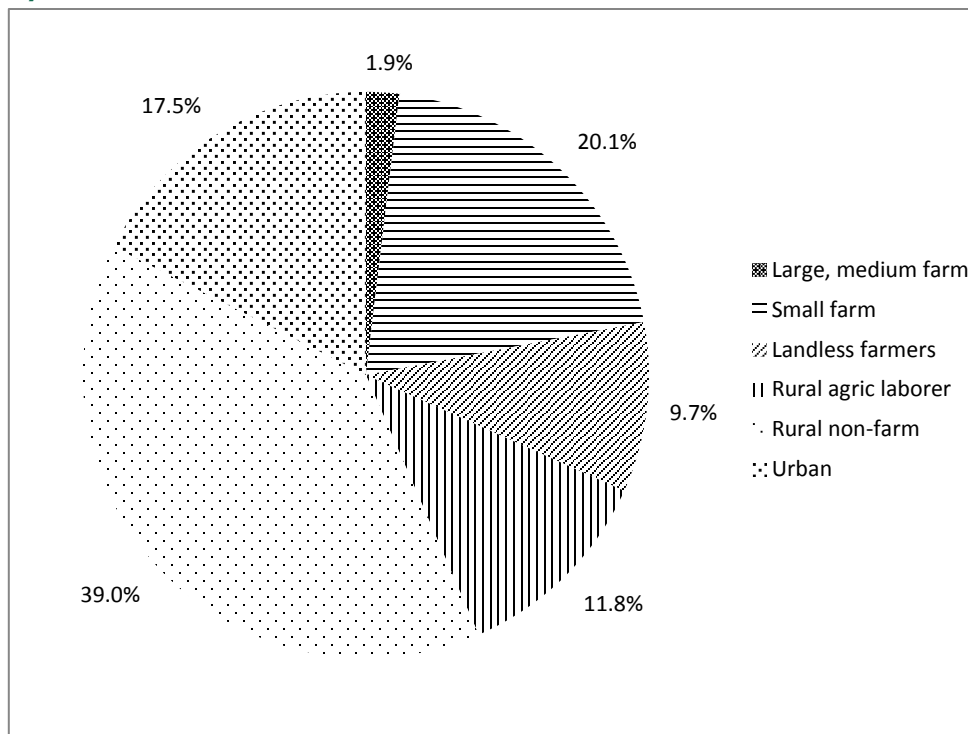
11.8%

REFERENCES

Agricultural Prices Commission. 2003. *Pakistan Price Statistics 2002–03.* Islamabad: Government of Pakistan.

Agricultural Prices Commission. 2009. *Pakistan Price Statistics 2008–09.* Islamabad: Government of Pakistan.

Debowicz, D. 2010. *Modelling trade and financial liberalisation effects for Argentina.* University of Sussex: DPhil in Economics.

Dorosh, P., M.K. Niazi, and H. Nazli. 2003. "Distributional Impacts of Agricultural Growth in Pakistan: A Multiplier Analysis." *The Pakistan Development Review* 42 (3): 249–275.

Dorosh, P., M.K. Niazi, and H. Nazli. 2004. *A Social Accounting Matrix for Pakistan, 2001–02: Methodology and Results.* Islamabad: Pakistan Institute of Development Economics.

Federal Board of Revenue. Customs Tariff. 2007–08. Accessed February 15, 2012. www.fbr.gov.pk/Docs/20101181511252278TarrifChapter1-972007-2008.pdf www.fbr.gov.pk/Docs/201011815112643390TarrifChapter98-992007-2008.pdf.

Federal Bureau of Statistics. Gross National Product at current factor cost. 2007–08. Accessed February 15, 2012. www.pbs.gov.pk/sites/default/files/national_accounts/tables/table4.pdf

Federal Bureau of Statistics. 1991. *Input-Output Matrix 1991.* Islamabad: Statistics Division, Government of Pakistan.

Federal Bureau of Statistics. 1993. *Social Accounting Matrix for 1984–85.* Islamabad: Statistics Division, Government of Pakistan.

Federal Bureau of Statistics. 2001. *Survey on Community and Personal Services.* Islamabad: Statistics Division, Government of Pakistan.

Federal Bureau of Statistics. 2002. *Study on wholesale and retail trade, hotels and restaurants in Pakistan.* Islamabad: Statistics Division, Government of Pakistan.

Federal Bureau of Statistics. 2004. *National Accounts of Pakistan: Rebasing from 1980–81 to 1999–2000.* Islamabad: Statistics Division, Government of Pakistan.

Federal Bureau of Statistics. 2006. *Census of Manufacturing Industries 2005–06.* Islamabad: Statistics Division, Government of Pakistan.

Federal Bureau of Statistics. 2008. *Household Income and Expenditure Survey (HIES) 2007–08.* Islamabad: Statistics Division, Government of Pakistan.

Golan, A., G. Judge, and D. Miller. 1996. *Maximum Entropy Econometrics: Robust Estimation with Limited Data.* New York: John Wiley & Sons.

Golan, A., G. Judge, and S. Robinson. 1994. "Recovering Information from Incomplete or Partial Multisectoral Economic Data." *The Review of Economics and Statistics* 76 (3) 541–549.

Haggblade, S., J. Hammer, and P. Hazell. 1991. "Modeling Agricultural Growth Multipliers." *American Journal of Agriculture Economics* 73 (2) 361–374.

Haggblade, S., P.B.R. Hazell, and T. Reardon. 2007. *Transforming the Rural Nonfarm Economy.* Baltimore: Johns Hopkins University Press.

International Monetary Fund. *2010. IMF Country Report No. 10/158.* Washington, DC: International Monetary Fund.

Judge, G. and R. Mittelhammer. 2012. *An Information Theoretic Approach to Econometrics.* Cambridge: Cambridge University Press.

Mellor, J. W. 1995. *Agriculture on the Road to Industrialization.* Baltimore: Johns Hopkins University Press.

Ministry of Finance. 2009. *Economic Survey 2008–09.* Islamabad: Economic Advisor Wing, Finance Division, Government of Pakistan.

Ministry of Commerce. Monthly Statements Showing Exports and Imports Of Select Commodities 2010–11 Accessed February 15, 2012. www.commerce.gov.pk/?page_id=7.

Ministry of Food and Agriculture. 2009. *Agricultural Statistics of Pakistan 2008–09*. Islamabad: Economic Wing, Government of Pakistan.

Pakistan Institute of Development Economics. 2001. *Pakistan Rural Household Survey 2001*.

Pal, B. D., S. Pohit, and J. Roy. 2012. Social Accounting Matrix for India. *Economic Systems Research* 24 (1): 77–99.

Pakistan Institute of Development Economics. 1985. *A Social Accounting Matrix of Pakistan for 1979–80*. Islamabad: Pakistan Institute of Development Economics.

Robinson, S., A. Cattaneo, and M. El-Said. 2001. Updating and Estimating a Social Accounting Matrix Using Cross Entropy Methods. *Economic Systems Research* 13 (1): 47–64.

Siddiqui, R. and Z. Iqbal. 1999. *Social Accounting Matrix of Pakistan for 1989–90*. Islamabad: Pakistan Institute of Development Economics

State Bank of Pakistan. 2010. *Handbook of Statistics on Pakistan Economy*. Government of Pakistan.

UNCTAD Statistics. Accessed March 20, 2012 http://unctad.org/en/Pages/Statistics.aspx.

Waheed, A. and M. Ezaki. 2008. "Aggregated and Compact Disaggregated Financial Social Accounting Matrices for Pakistan." *Journal of Economic Cooperation* 29 (4): 17–36.

Zellner, A. 2004. *Statistics, Econometrics, and Forecasting*. Cambridge: Cambridge University Press.

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