Group of Analysis for Development

Documentation of the SAM (Social Accounting Matrix) for Peru

Final Draft

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Abstract: This paper presents the 1994 Social Accounting Matrix (SAM) for Peru which was assembled as part of a project aimed at analyzing the distributive effects of trade liberalization in a general-equilibrium context. The SAM disaggregates the production activities, labor and households accounts, and gives us the possibility to engage in a detailed analysis of the productive structure of the economy, as well as of the income distribution channels. The paper describes both, the macroeconomic and microeconomic SAMs, paying special attention to data sources, assumptions, and balancing procedures.

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Introduction

The construction of a SAM for the Peruvian economy is a methodology of economic analysis scarcely used before in the country, even less at the high level of disaggregation that the micro-SAM requires. The 1994 SAM - documented here - responds to specific requirements of a UNDP-sponsored research project, 'Export-led Growth Strategies: Effects on Poverty Inequality and Growth in Latin America and the Caribbean'. It implies the analysis of growth and welfare effects resulting from alternative policy strategies, such as trade liberalization, and regional and global integration efforts, as well as the impact of international shocks, within a general equilibrium framework. In charge of the project were Alonso Segura* and Juan Manuel García**, researchers from the Group of Analysis for Development (GRADE). The resources invested to build a SAM with the largest possible disaggregation of household categories and activity sectors that the data allows is largely compensated by the more detailed inferences that it allows and its potential use for future research.

1.   Sources of Information for the SAM

a)   Input-Output Table for the Peruvian economy in 1994

Peruvian Input Output Table contains information on 45 different economic activities, decomposed at levels of gross production value and values for supply of goods and services, intermediate demand of national and imported inputs, and items of final demand. It also gives information regarding the added value of each activity and how it is distributed into labor income, exploitation surplus, capital consumption, and other taxes on production.

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* Consultant of GRADE.

** Assistant researcher of GRADE.

The different accounts are valued according to: i) basic prices or costs of production excluding all taxes (except subsidies); ii) producer prices which exclude value added taxes (IGV and ISC) and import taxes or duties, and iii) sales prices for final users, which include trade margins, transport costs and indirect taxes (IGV and ISC).

We used the data valued using sales prices to ensure consistency with national accounts. This is more important for data from the goods and services supply matrix (which is related to the value of the national supply, imports, import duties, commercialization margins and taxes), and intermediate and final demand matrices (household consumption, gross fixed capital formation, exports, and variation of existences/change in inventories).

To ensure consistency, the supply data by production activity has been related to the goods and services demand data using the production matrix. This matrix indicates how much of the total production corresponds to primary production for each sector and how much of it is secondary production of goods and services attributable to other sectors.

b)   The 1994 Living Standards Measurement Survey (LSMS) from Instituto Cuanto[1]

This survey has national coverage and provides information on:
- The value of income sources and expenditures differentiated by household and labor types. In the case of income, LSMS contains data of each labor type and of capital revenues, as well as on government transfers, transfers from abroad, and transfers among different types of households. The proportions observed in LSMS for

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[1] Instituto Cuanto is an NGO based in Lima. They were in charge of conducting the 1994 LSMS survey.

the year 1994 are used to disaggregate the total amount of items referred to income and expenditures in the SAM.

- The characteristics of individuals such as their sex, zone of residence (urban/rural), and education level that allow us to classify workers and households.

c) Information from the Peruvian Central Bank

- General government operations. Includes data regarding the value of government expenditure items related to transfers to households and firms; revenue items that are not available in the Input-Output matrix, specifically direct taxes and non-tax revenue; transfers from the government to households and firms, and foreign debt payments.

- Balance of Payments data related to factor payments from abroad and foreign transfers received by households, firms and government.

2. Methodology used to construct the SAM

Table No. 1 makes a qualitative description of the structure of the 1994 MACROSAM for Peru, indicating the contents of each cell. The 1994 SAM is based on the typical structure of MACROSAMs as reported in Lögfren et al (2001)[2].

The SAM makes a distinction between production activities and the goods and services that those activities produce (this allow us to take into account the value of household self-consumption or production that is not actually delivered to the market). It considers three types of institutions: government, firms, and households. The tax accounts correspond to direct taxes levied to institutions, sales taxes and import

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[2] Löfgren, H., R. Lee y S. Robinson (2001). A Standard Computable General Equilibrium (CGE) model in GAMS. TMD Discussion Paper No 75. Trade and Macroeconomics Division. International Food Policy Research (IFPRI). Washington, D. C.

taxes. Finally, the SAM contains accounts related to the external sector, transaction costs (trade sector) and the savings- investment account.

In the case of total annual expenditure from households, it includes the payment of direct taxes (income and others), transfers, housing (rent), and self-consumption (valued at sales prices). The labor income of household members consists of total income from the main and secondary activities (including pensions, payment in kind, and other labor income, but not self-consumption) which form part of the gross utility according to the Input-Output matrix).

Table No 1: 1994 Social Accounting Matrix accounts explanation

			Expenditures												
			Production factors	Institutions						Combined capital account	Stock flow	Production activities	Goods and services	Trade sector	Combined account for rest of the world	Totals
				Households	Firms	General government										
						Direct taxes	Indirect taxes	Tariffs	Expenditure							
Incomes		Production factors										Value added			Factorial income from abroad	Factors income
	Institutions	Households	Factorial income	Transfers between households	Utilities distributed to households				Transfers to households						Transfers to foreign households	Household income
		Firms	Factorial income						Transfers to firms						Transfers to foreign firms	Firms income
		General government — Direct taxes		Income and net wealth taxes	Firms direct taxes							Direct production taxes				Total direct taxes
		General government — Indirect taxes	Factor taxes									Indirect production taxes, valued added tax	Export sales taxes			Total indirect taxes
		General government — Tariffs											Tariffs			Total tariffs
		General government — Incomes		Transfers to government	Transfers to government, public sector utilities	Total direct taxes	Total indirect taxes	Total tariffs							Transfers to foreign governments	Total government income

Combined capital account		Household savings	After tax non-distributed profits				Government savings (-primary deficit)						External savings (-current account balance)	Total saving
Stock flow								Total stock flow						Total stock flow
Production activities		Self-consumption of goods and services									Market value of goods and services			Activities income
Goods and services		Market consumption						Investment	Stock flow	Intermediate demand		Commercialization margins	Exports	Total demand
Trade sector										Commercialization margins				Total commercialization
Combined account for rest of the world	Factorial income paid to foreign countries		Utilities distributed to foreign countries				Transfers to foreign countries				Imports			Foreign expenditure
Totals	Factors expenditure	Households expenditure	Firms expenditure	Total direct taxes	Total indirect taxes	Total tariffs	Government expenditure	Total investment	Total stock flow	Activities expenditure	Total supply	Total commercialization margins	Income from abroad	

Table No. 2 shows the Peruvian MACROSAM for 1994. As it indicates, this SAM balances the economy at 162,215 million nuevos soles (NS.) of economic activity, with domestic absorption amounting to NS 201,505 million and a trade deficit of NS 3,332 million. The total value added produced in the economy is NS 88,908 million, of which 71.8% comes from capital and the remaining 28.2% is labor value added.

The capital account indicates NS 21,931 million of private investment, and a net capital inflow from the rest of the world of NS 5,679 million. Government expenditure amounts to NS 14,172 million while its deficit rises up to NS 3,031 million. Tax collection amounts to NS 13,049 million, of which 26.4% corresponds to direct taxation, 60.5% to indirect taxes, and 13.1% to tariffs.

In the case of the MICROSAM, we have differenced 3 household types: rural household, urban household with skilled head, and urban household with non-skilled head. We have disaggregated production factors into capital and 12 types of labor. The labor was classified according to sex (man, woman), zone (urban, rural), qualification (skilled and non-skilled), and labor segment (wage-earner, non wage-earner or self-employed). In the rural case, subdivisions between wage-earners and self-employed workers were not possible because of the low representativity of the survey (for women in particular there would have been too few observations in some cases).

The data from the 45 original activities was grouped into 22 redefined activities also due to the low frequency of data in some of them, given the fact that this data is further disaggregated using income and expenditure information from household surveys. These activities accounts have their counterparts in accounts of goods and services, which consist of extractive sectors, different types of manufacturing activities, electricity and water services, construction, commerce, transport and communications, and services (Table No. 3).

Table No 2: MACROSAM (Aggregated SAM 1994) for Perú

(nuevos soles)

Incomes \ Expenditures	Production factors	Households	Firms	Direct taxes	Indirect taxes	Tariffs	Expenditure	Capital account	Stock flow	Production activities	Goods	Trade sector	Combined account for rest of the world	Totals
Production factors										88.973.929.021			-65.725.047	88.908.203.974
Households	25.041.795.369	2.144.809.508	20.035.053.474				2.863.325.846						998.023.855	51.083.008.053
Firms	63.866.408.605						1.722.756.533						166.337.309	65.755.502.448
Direct taxes		2.594.445.648	850.720.252											3.445.165.900
Indirect taxes											7.888.682.726			7.888.682.726
Tariffs											1.714.831.935			1.714.831.935
Income			624.275.056	3.445.165.900	7.888.682.726	1.714.831.935							499.011.928	14.171.967.544
Combined capital account		-24.962.521.380	44.245.453.666				-3.030.632.884						5.678.807.754	21.931.107.156
Stock flow								1.030.146.498						1.030.146.498
Production activities		6.377.587.992									155.838.197.048			162.215.785.040
Goods		64.928.686.284					8.671.562.047	20.900.960.658	1.030.146.498	73.241.856.019		20.141.675.914	12.590.318.275	201.505.205.695
Trade sector											20.141.675.914			20.141.675.914
Combined account for rest of the world							3.944.956.002				15.921.818.072			19.866.774.074
Totals	88.908.203.974	51.083.008.053	65.755.502.448	3.445.165.900	7.888.682.726	1.714.831.935	14.171.967.544	21.931.107.156	1.030.146.498	162.215.785.040	201.505.205.695	20.141.675.914	19.866.774.074	Income=Expenditure

Table No 3: Production activities of the SAM 1994

No	Production activities	CIIU codes (rev. 3, 4 digits)
1	Agriculture, hunting, forestry	101 to 200 (except 140)
2	Fishing, fish preservation, flour and oil fish	500, 1512, 2720, 2732
3	Extraction of minerals, extraction of petroleum and gas, petroleum	1100 to 1199, 1000 to 1099, 1200 to 1499, 2301 to 2399
4	Nutritional products, milk products and other products	1521 to 1529, 1511, 1513, 1514, 1532, 1533, 1543, 1549
5	Flour elaboration and baking, sugar industry	1531, 1541, 1544, 1542
6	Drinks and tobacco	1550 to 1559, 1600 to 1699
7	Textile products	1701 to 1799,
8	Clothing, leather and articles of leather, footwear	1801 to 1899, 1911 to 1919, 1921 to 1929
9	Furniture of wood and metal, rubber and plastic, mineral and metallic products	2001 to 2099, 3611 to 36192501 to 2599, 2601 to 2699, 2710, 2731, 2801 to 2899
10	Paper products, impression and edition	2101 to 2199, 2201 to 2299
11	Chemical products, spare parts, others similar, pharmaceutical products and medicines	2411, 2412, 2413, 2421, 2430, 2423, 2401 to 2499 (except which are included in activities 19 and 20)
12	Machinery and equipment, means of transportation	2901 to 3099, 2930, 3101 to 3199, 3231 to 3239, 3401 to
13	Electricity and water services	4010, 4100
14	Construction	4501 to 4599
15	Commerce	5001 to 5299
16	Transport and communications	6001 to 6199, 6210, 6301 to 6499, 7101 to 7199
17	Financial and insurance services	6511, 6519, 6591, 6592, 6601 to 6699
18	Restaurants and hotels	5501 to 5599
19	Home services, house renting	7010, 8531, 8532, 9120, 9191, 9192, 9199, 9501 to 9599
20	Health	8511, 8512, 8519
21	Education	8010, 8021, 8022, 8030, 8090
22	Other goods and services (includes government)	3301 to 3399, 3691, 3692, 3694, 3699, 7010, 7501 to 7599, similar to activities 43 and 44 if public sector, and 7301 to 7499, 9001 to 9099, 8501 to 8599, 9201 to 9299

a)   Procedures to calculate the accounts

1.   Factors Payments

•   The total value added of each activity does not consider production taxes.

•   The estimation of the total payment to labor types has been made by using the labor income that appears in the Input-Output matrix. A third part of the amount of FONAVI, which was a contribution to housing for the poor and infrastructure projects has been added to this value for each activity (distributed by activity according to the value of the other taxes account).

•   Gross profits of firms include payments to capital (which include exploitation surplus and machinery and equipment depreciation) and other taxes (FONAVI paid by enterprises, licenses, managerial patrimony tax, SENATI). This last group of taxes does not consider direct taxes paid by the firms.

•   Remunerations or labor income by activity have been distributed by type of labor according to the survey.

2.   Government Expenditures

•   The general government does not include public sector companies.

•   Transfers from the government to households involve pensions, direct current transfers through poverty reduction social programs (including expenditures of local governments), as well as 60% of internal debt payments.

•   Government transfers to firms consist of current and capital transfers to non-financial government companies, 70% of transfers to local governments, and ONP (Retirement pensions Normalization Office) and other similar expenses. Government transfers also involve remaining internal debt payments and other government transfers items from BCR information.

•   The payment of foreign debt is included in foreign transfers.

•   General government expenses do not involve gross capital formation (because this is included in the capital account), labor payments, nor capital payments from

government enterprises (these items are paid by the government services activity)

3.   External Sector

•   Current direct external transfers to households are assumed to be 60% of total transfers. It was also assumed that 30% of the transfers went to the government.

•   To divide the net value of transfers or remittances to households according to household types, the proportions received by each household type reported in the 1994 LSMS were used.

•   The rent to foreign factors and external transfers are the net amounts taken as expenses of the external sector (Central Bank data), instead of using the corresponding income and expenses cells.

4.   Household Expenditures

•   The distribution of total consumption by group of goods and services, and by activity between market consumption and self-consumption by type of household was disaggregated using the proportions for each activity from the survey[3]. The value of household market consumption for each activity has been obtained by multiplying the market value of goods and total imports by activity times the market consumption proportions in each activity for each household type.

•   The amount of direct taxes paid by households was obtained from the revenues of the central government data and is computed as the sum of income and assets taxes, other tax revenue excluding other production taxes (FONAVI, licenses, managerial assets, SENATI) and a third part of the FONAVI (employees share). Direct taxes paid by each household type are obtained by multiplying the proportion of the total payment of these taxes (according to the 1994 LSMS) by the registered total value in the government revenues. Direct taxes paid by firms involve other production

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[3] We assumed that the commercialization margins are proportional to consumption.

taxes minus the third of the FONAVI paid by employees (this item does not include value-added taxes like the IGV and ISC).

## 5.	Households Income

•	The distribution of labor income of the input-output matrix among households was made using the sum of labor revenues according to household type in the survey. The net income labor from abroad has been added to the household income. This item was estimated as 10% of aggregated value of net factors rent (from BCR information), and it was distributed among households by using the observed proportions of domestic labor income.

•	Households receive part of the firms' profits through rents, interest and dividends after direct tax payments, transfers to the government, and depreciation have been considered (the latter is the part of firms' savings that finances the reinstatement investment). In this case it is assumed that 35% of the residual tax profit and depreciation is distributed to the families. This percentage was obtained from the data regarding dividend and distributed profits in the 1997 LSMS, adjusted to take into account the fact that household surveys are not representative for high revenues segments, and that many self-employed individuals would have a bias of under-reporting profit income.

•	Distributed profits to each household type are calculated according to the proportions of dividend revenues or distributed profits from 1994 LSMS data. Transfers to other households, and transfers of pension payments also have similar structures to the 1994 LSMS data. The government's transfers for poverty alleviation programs have been distributed among households according to the data from the social program module of the 1997 LSMS (this module for social support transfers did not exist in 1994).

•	Finally, the percentages of internal debt payment considered by household type were: 0% for the rural household, 30% for the unskilled urban household, and 70% for the skilled urban household.

b)   Adjustments used to balance the SAM

First, we fixed the amounts of the current account deficit and the fiscal deficit of the government from the Central Bank information. Since the calculation of the government deficit includes external payments, this amount was added in the account (raw) of payments to foreign countries. Since the SAM does not consider additional revenues from the general government such as non-tax revenues and other types of transfers (one of which is the Social Security payment made to support government services activities), to match such deficit, the difference between total government expenditures and the revenues reported in the SAM including tax payments (direct and indirect taxes plus import duties) and foreign transfer revenues, was assumed to be transfers from firms to the government.

As a consequence, the net capital account from abroad (or external savings) is obtained as the difference between the sum of exports, net factor income and net transfers from abroad, and the imports (therefore corresponding to the value of the current account balance).

Finally, the undistributed utilities cell or firm's savings is used to balance the SAM and is calculated as the difference between firm's revenue and their new implied total expenditure (by residual).