

SAM Development and Economy-wide Analysis at IFPRI

IFPRI has a well-established reputation in the application of economy-wide simulation approaches for policy analysis, namely the development of static and dynamic computable general equilibrium (CGE) models. The most crucial data requirement in developing a CGE model for a particular country is a recent social accounting matrix (SAM). The SAM represents a snapshot of the economy in a particular (base) year, to which the CGE is calibrated. Consequently, the base run of the model replicates the initial economic equilibrium captured in the SAM. Insofar, SAM database and CGE modeling framework share the same economic features and conditions and can be interpreted as different ways of representing the national economy.

While SAMs exist for many countries, the database requirements for our research are often very specific with respect to the underlying analytical interest. In the context of most IFPRI research, for example, agriculture is considered an important economic driver towards growth, development, food security, and poverty reduction. However, many SAMs developed in the 1980s and early 1990s merely considered an aggregated agricultural sector without any further disaggregation into the various crops and other agricultural sub-sectors. Given the lack of disaggregation on one hand, and the sector-specific agricultural interests, on the other, the need for constructing a more disaggregated SAM has arisen.

Other reasons for constructing SAMs are:

- Outdated base year of an existing SAM;
- Lack in disaggregation of production activities, commodity and factor markets, or representative household categories;
- Availability of more recent “structural” data from a new input-output table and/or household and labor force surveys;
- Incorporating a flexible and highly diverse disaggregation of representative household categories drawing directly on household survey data;
- Incorporating spatial (e.g. regional) aspects in sector and household disaggregation; and
- Incorporating environmental features such as land or water markets; etc.

IFPRI’s extended research agenda in Africa, Asia, and Latin America called for substantial efforts in SAM construction and estimation for many countries in these regions. Despite the gathering of structural and base year data such as national accounts, government accounts, balance of payments, foreign trade data, IO table, as well as household and labor force surveys, the construction of a SAM requires an appropriate balancing procedure. IFPRI has been engaged in the development of a [cross-entropy estimation approach](#) that is most effective in accomplishing these balancing requirements. Data use, construction process, estimation procedure, and main structure of the SAMs developed are described in the documentations that accompany each individual country SAM.

The Social Accounting Matrix (based on “[A Standard Computable General Equilibrium \(CGE\) Model in GAMS](#)”)

A Social Accounting Matrix (SAM) is a comprehensive, economy-wide data framework, typically representing the economy of a nation. More technically, 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). Table 1 shows an aggregated SAM with verbal explanations in the cells instead of numbers.

The preferred disaggregation of a SAM depends on data availability and purpose of the research.

With regard to the structure of the standard SAM, a number of features are noteworthy. First, the standard SAM distinguishes between accounts for “activities” (the entities that carry out production) and “commodities” (markets for goods and services). The receipts are valued at producer prices in the activity accounts and at market prices in the commodity accounts (i.e. including indirect commodity taxes and transaction costs). Activity outputs are either exported or sold domestically, while commodities comprise of domestic supply and imports. This separation of activities from commodities is preferred because it permits activities to produce multiple commodities (for example, a dairy activity may produce cheese and milk that are delivered into different commodity markets) while any commodity may be produced by multiple activities (for example, different activities for small scale and large-scale maize production may both produce the same maize commodity).

Second, the matrix explicitly associates trade flows with transactions (trade and transportation) costs, also referred to as marketing margins. For each commodity, the SAM accounts for the transaction costs associated with domestic, import, and export marketing. For domestic marketing of domestic output, the marketing margin represents the cost of moving the commodity from the producer to the domestic market. For imports, it represents the cost of moving the commodity from the border (adding to the c.i.f. price) to the domestic market, while for exports; it shows the cost of moving the commodity from the producer to the border (reducing the price received by producers relative to the f.o.b. price).

Third, the government is disaggregated into a core government account and different tax collection accounts, one for each tax type. This disaggregation is often necessary because the economic interpretation of some payments may otherwise be ambiguous. In any given application, the SAM may exclude any (or all) of these specific tax collection accounts. In the SAM, payments between the government and the other domestic institutions represent government transfers.

Fourth, the domestic non-government institutions in the SAM consist of households and enterprises. The enterprises earn factor incomes (reflecting their ownership of capital and/or land) and may also receive transfers from other institutions. Enterprises pay corporate (direct) taxes, save, and transfer profits to other institutions. Assuming that the relevant data are available, it is preferable to have one or more accounts for enterprises when these have tax obligations and savings behavior that are independent of and different from the household sector. Enterprises should be disaggregated in a manner that captures differences across various enterprise types in terms of tax rates, savings rates, and the shares of retained earnings that are received by different household types.

Finally, the SAM distinguishes between own home consumption, which is activity-based, and marketed consumption, which is commodity-based. Home consumption, which in the SAM appears as household payments to activities, is valued at producer prices. Household consumption of marketed commodities appears as payments from household accounts to commodity accounts, the values of which include marketing margins and commodity taxes.

The data needed for the construction of a SAM can be divided in six groups:

1. National accounts
2. Balance of payments
3. Monetary accounts
4. Public sector budget
5. Input-output matrix
6. Secondary data on household consumption, factor employment and capital stock.

Table 1: Basic SAM Structure

| | Activities | Commodities | Factors | Households | Enterprises | Government | Investment | Rest of the World | Total |
|-------------------------|---------------------------------|------------------------------------|---|---|--|-----------------------------|------------|-----------------------------------|--------------------------------|
| Activities | | marketed outputs | | home-consumed outputs | | | | | Activity income (Gross Output) |
| Commodities | intermediate inputs | transactions costs | | private consumption | | government consumption | investment | exports | Demand |
| Factors | value-added | | | | | | | factor income from RoW | factor income |
| Households | | | factor income to households | inter-household transfers | surplus to households | transfers to households | | transfers to households from RoW | household income |
| Enterprises | | | factor income to enterprises | | | transfers to enterprises | | transfers to enterprises from RoW | enterprise income |
| Government | producer taxes, value-added tax | sales taxes, tariffs, export taxes | factor income to government, factor taxes | transfers to government, direct household taxes | surplus to government, direct enterprise taxes | | | transfers to government from RoW | government income |
| Savings | | | | household savings | Enterprise savings | government savings | | foreign savings | savings |
| Rest of the World (RoW) | | imports | factor income to RoW | | surplus to RoW | government transfers to RoW | | | foreign exchange outflow |
| Total | activity expenditures | supply | factor expenditures | household expenditures | Enterprise expenditures | government expenditures | investment | foreign exchange inflow | |