The Social Accounting Matrix Framework

A SAM is a snapshot view of the circular flow of accounts in an economy (fig. 1). Within a matrix of double-entry accounting, a SAM represents national income and product accounts and Input-Output (I-O) production accounts as debits (expenditures) and credits (receipts) in balance sheets of activities and institutions. The SAM generalizes the I-O framework by integrating the I-O tables in a disaggregated structure of institutional incomes and expenditures.

As illustrated in the simple schematic SAM (fig. 2), a SAM is comprised of a set of production activities (such as meat and poultry processors), commodity markets for goods and services (such as meat and poultry products), factors (labor and capital), households, a capital account, and other institutions (government and the rest of the world). The ij^{th} entry in the SAM represents the payment by account j to account i for services rendered or goods supplied (where "*i*" represents rows and "*j*" represents columns). For example, a firm's purchase of production inputs are registered in the second row, first column in the schematic SAM. Household purchases of goods or services are registered in the second row, fourth column in the schematic SAM. The ij^{th} entry can also represent an income transfer from account *j* to account *i*. For example, household tax payments to government are recorded in the sixth row, fourth column, while government welfare payments to households are registered in the fourth row, sixth column. The sum of the entries in the j^{th} column gives total expenditures made by account j to all accounts in the SAM. Similarly, the i^{th} row total represents all income payments to account *i* made by all other accounts. Double-entry accounting principles ensure that total gross income equals total gross expenditures across each account, meaning that all corresponding rows and column totals are equal.

The row and column entries of *production activities* and *commodities* in the SAM form the input-output table developed by the U.S. Department of Commerce, Bureau of Economic Analysis. In the first column of the schematic SAM, the total costs to firms are equal to the sum of intermediate input purchases; payments to factors in the form of wages, profits, and rents; and payments to the government in the form of indirect taxes. These total costs are equal to firms' total sales, which are composed of domestic sales plus exports (first row). Total absorption (second column) is equal to total domestic production, valued at market prices, plus imports and tariff payments. Total absorption is allocated between consumption of intermediate goods, household consumption, investment, and government purchases (second row).

The SAM framework also incorporates the reallocation of factor income from domestic and foreign sources

Figure 1
Linkages in a Social Accounting Matrix multiplier model

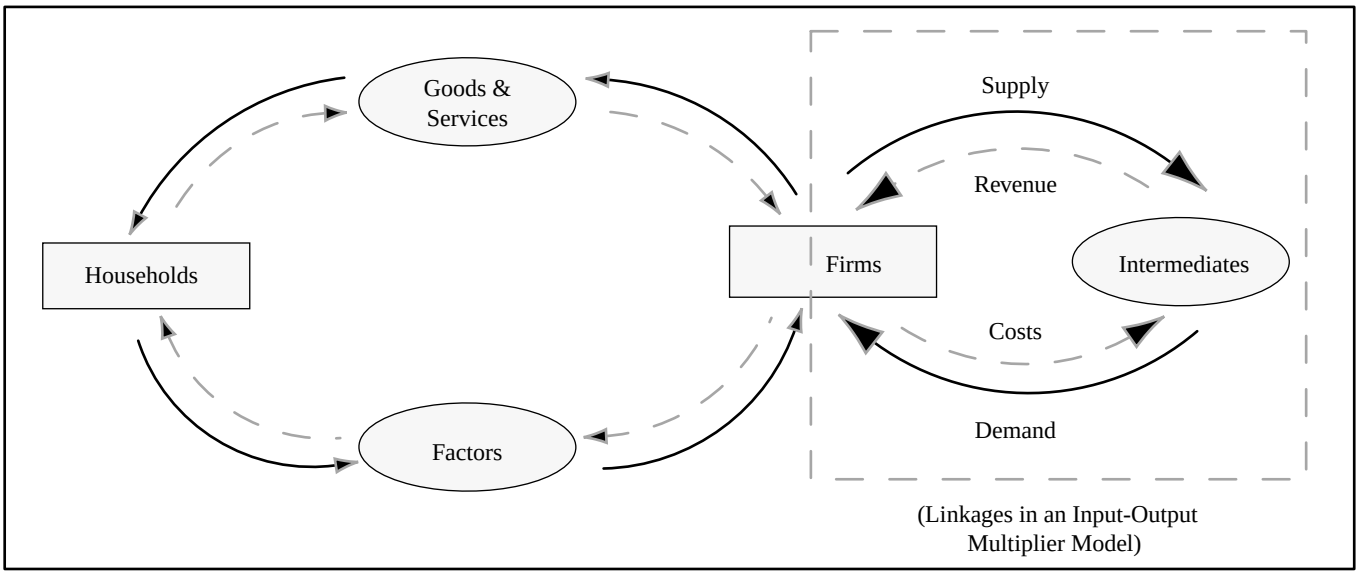

Figure 2
The double-entry accounting framework of the HACCP SAM

Accounts	Producer activities	Commodities	Factors	Households	Capital account	Other institutions	Total
Producer activities		Domestic sales				Exports	Sales
Commodities	Intermediate goods			Consumption	Investment	Govt. purchases	Components of domestic consumption
Factors (labor and capital)	Wages and capital income					Foreign factor income	Factor income
Households			Distribution of factor			Govt. transfers	Household income
Capital account			Corporate savings	Household savings		Govt. deficit, capital inflows	Savings
Other institutions (government and rest of world)	Indirect business taxes	Imports and commodity taxes	Factor taxes	Income taxes			Government income and imports
Total	Costs	Domestic consumption supply	Factor income	Household expenditures	Investment	Expenditures by government and rest of world	

(third row) to households, to the capital account in the form of corporate savings, and to the government in the form of factor taxes, such as social security taxes (third column). Households' total income, factor income plus government transfers (fourth row), equals their expenditures for consumer goods, savings, and income taxes (fourth column). The economy's macroeconomic equilibrium is found in the capital account in which savings from all sources (fifth row) equals investment (fifth column). Finally, the sixth row and column capture equilibrium for the two other institutions in the economy. For the government, tax revenue from all sources (indirect business, commodity, factor, and household taxes) equals its expenditures (government purchases, transfers to households and businesses, and government savings). For the rest of the world (ROW), imports equal exports plus remittances of foreign factor income—the definition of the trade balance.

Building the HACCP SAM

To construct a SAM, the first task is to identify the important activities and institutions in the economy with respect to the policy issues under consideration. Aggregating the industries, services, households, government agents, and ROW accounts of an economy into a smaller number of major accounts makes the model more manageable and focuses the investigation. The aggregation scheme determines the flows that the model can trace explicitly. If the aggregation is done correctly, the major flows in the economy, both positive and negative, are evident. Otherwise, the impact of policy will be blurred, with negative and positive flows occurring within a single account. In the HACCP SAM, the accounts focus the model on the primary activities and institutions affected by foodborne illness or by the HACCP program. We paid particular attention to the construction of the industrial and household accounts.

Industrial Accounts

For the industrial aggregation, all firms that make similar, but not necessarily identical products are grouped together into one account. The industrial aggregation in the HACCP SAM includes the major industrial and commercial sectors of the economy. In addition, the aggregation highlights the three major areas of the economy most directly impacted by HACCP and foodborne

Table 4—Population distribution by household type, 1993

	Households with children	Households without children	Elderly	Total
Number of households	35,823	49,424	21,189	106,436
Percent of all households	34	46	20	100
Number of persons	139,028	80,488	37,038	256,554
Percent of total population	54	32	14	100
Adults	71,573	79,054	7,186	157,813
Children	66,795	0	1,211	68,006
Percent of all children	98	0	2	100
Elderly	661	1,434	28,640	30,735
Percent of all elderly	3	4	93	100
Percent below poverty	18	13	17	16

Percents may not total to 100 due to rounding.
Note: Household and population numbers are in thousands.
Source: Hanson et al., forthcoming.

illness: the meat and poultry production and distribution sector, the health care sector, and the health insurance sector. The HACCP SAM does not explicitly isolate all of the flows generated by foodborne illness, but each set of flows is differentiated so that positive and negative flows do not occur in the same account (at least in the first round). The industrial aggregation in the HACCP SAM traces the flows generated by the production and sale of meat and poultry products (and regulatory costs) from the Livestock sector, to the Food Processing, Wholesale Trade, and Food Retail Trade sectors to consumers. Medical costs can also be traced from the account of payment (household and insurer) to the account of receipt (pharmaceuticals, medical services, etc.).

Household Accounts

The grouping of households for the HACCP SAM encompasses two primary considerations. First, the incidence of foodborne illness is most common among the very young and very old (Council for Agricultural Science and Technology, 1994). Households with young children and older adults are therefore expected to incur a disproportionately large share of the total expenses due to foodborne illness. Second, the expenditure and savings patterns of households depend on the income level and age composition of the household, particularly with regard to medical expenditures and participation in the Medicaid and Medicare programs. The three household categories for the HACCP SAM are: (1) households headed by persons age 65 or older, (2) households headed by persons under age 65 and one or more children under age 18, and (3) childless households headed by persons under age 65. Households with children account for the largest share of the population. Table 4 shows the population distribution among the household types.

Each household category is subdivided into households above and below the official poverty line to reflect the observation that income affects the ability and propensity to spend on health care as well as eligibility for Medicaid. The poverty rate is slightly higher for members of households with children than for other persons.[4]

The Data

The HACCP SAM is based on a 1993 SAM derived from a model of the U.S. economy developed at USDA's Economic Research Service (ERS) (Hanson et al., forthcoming). The underlying data are the 1987 benchmark I-O accounts prepared by the U.S. Department of Commerce, Bureau of Economic Analysis (1994). Information about the distribution of the U.S. population by household type and poverty level is based on estimates from the March 1994 Current Population Survey conducted by the U.S. Department of Commerce, Bureau of the Census.

[4] The income calculations for the poverty classification excluded all in-kind assistance, Earned Income Tax Credits (EITC), Supplemental Security Income (SSI), Aid to Families with Dependent Children (AFDC), and general assistance payments in order to focus on the household's ability to achieve an adequate income without government assistance.