Lecture 2.1
Social and Resource Accounting: An Introduction

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Outline

1. SAM circular flow of income
2. Definitions and data sources for a macro SAM
3. SAM disaggregation and data issues
4. Regional SAM building
As we discussed in Lecture 2, SAMs remedy a major shortcoming of I/O tables by “closing” them (i.e., endogenizing income-expenditure relationships) and adding institutional detail that is absent from I/O tables. It is the institutional detail that is responsible for the “social” part of the social accounting matrix name. Indeed, a SAM without detailed factor and household accounts has little “social” information in it.
At a basic level, the SAM extends the Input/Output Analysis by adding income and transfer accounts, thereby closing the flow of income, i.e.,

\[
\begin{array}{cc}
A & F \\
V &
\end{array}
\rightarrow
\begin{array}{cc}
A & F \\
V & Y \\
& T
\end{array}
\]

where A is the matrix of I/O coefficients, V is the distribution of value added, F is the distribution of expenditure, Y is the distribution of income, and T is the distribution of institutional transfers.
• A simplified circular flow of income is clearly visible from the SAM

• V maps income to factors, Y maps factors to institutions, F maps institutional income to A, A pays V.
A more detailed mapping of income flows:
• The circular flow of income is a very important concept in SAMs. Whereas I/O tables capture indirect linkages through inter-industry structure, SAMs also capture feedback effects because they include the induced effects of circular income flows on production.

• Induced effects refer to the new demand for goods and services caused by institutions spending their new income that results from new output induced by an exogenous shock.
By bringing together all economic accounts, SAMs contain the full range of interdependencies in a socioeconomic system:

The SAM connects:
- Production of goods and services
- Generation of factor incomes
- Levels and distributions of income available to institutions
- Transfer payments and savings by institutions
- Expenditures on goods and services
Main Features of a SAM

• There are three main features of a SAM (Round, 2003)
  • **Square.** SAM accounts are represented as a square matrix (note that the I/O table is typically not), where inflows-outflows for each account are rows-columns; this structure shows interconnections between agents in an explicit way.
  • **Comprehensive.** SAMs portray all economic activities: production, consumption, accumulation, distribution.
  • **Flexible.** SAMs are flexible in aggregation and emphasis.
• SAMs are useful for:
  – **Data Reconciliation.** SAMs provide a coherent and consistent framework for bringing together data from many disparate sources, highlighting potential inconsistencies in data and thus improving data quality.
  – **Structural Insights.** SAMs show clearly the structural interdependencies underlying an economy.
  – **Modeling.** SAMs provide an accounting and analytical framework for fixed price multiplier (FPM) and CGE models.
A quick note on data reconciliation, which is one of the more unsexy but often very valuable uses of SAMs. Economic data is often collected by different government ministries, and often there is little attempt to reconcile it even though the individual data is used without question. At two ends of the spectrum, national income accounts data is usually based on production surveys, while household survey data often show results that conflict with national data.
• We will begin with a national macro SAM and work our way down to a regional micro SAM.
• Because many of you are working on building sub-national SAMs, this approach is likely the approach that many of you will use in your projects.
• These macro-micro and micro-macro directions are often complementary: We will use the macro SAM as a means to maintain consistency for the micro SAM, and the micro SAM as a means to check the accuracy of our data in the macro SAM.
• We start from basic national income accounting identities.

• Familiar open-economy identities provide an accounting framework for the macro SAM:
  – GNP: \( Y = C + G + I + (EX - IM) \)
  – Income: \( Y = C + T + S_H \)
  – Budget: \( T = S_G + G \)
  – Savings-Investment: \( I = S_H + S_G + S_F \)
  – Trade: \( EX = IM + S_F \)
Note how the above table meets the constraints posed by our national income accounting identities: as in the I/O table columns and rows are equal. Also note that we are missing a few accounts.
## A More Detailed Macro SAM

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<td><strong>2. Commodities</strong></td>
<td>Intermediate Consumption</td>
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<td>Investment</td>
<td>Exports</td>
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<td><strong>3. Factors</strong></td>
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<td>Value Added</td>
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<td><strong>4. Households</strong></td>
<td>Wages, Salaries and Other Benefits</td>
<td>Transfers to Households</td>
<td>Transfers to Households</td>
<td>Net Foreign Transfers to Households</td>
<td>Household Income</td>
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<td><strong>5. Enterprises</strong></td>
<td>Gross Profits</td>
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<td>Net Foreign Transfers to Enterprises</td>
<td>Enterprise Income</td>
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<td><strong>6. Government</strong></td>
<td>Net Indirect Taxes</td>
<td>Consumption Taxes plus Import Tariffs</td>
<td>Factor Taxes</td>
<td>Income Taxes</td>
<td>Enterprise Income Taxes</td>
<td>Net Foreign Transfers to Government</td>
<td>Government Revenue</td>
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<td><strong>7. Capital</strong></td>
<td>Household Savings</td>
<td>Retained Earnings &amp; Enterprise Savings</td>
<td>Government Savings</td>
<td>Net Capital Inflows (=Foreign Savings)</td>
<td>Total Savings</td>
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<td><strong>8. Rest of World</strong></td>
<td>Imports</td>
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<td>Total Commodity Supply</td>
<td>Total Factor Payments</td>
<td>Allocation of Household Income</td>
<td>Total Enterprise Expenditure</td>
<td>Allocation of Government Revenue</td>
<td>Total Investment</td>
<td>Total Foreign Exchange</td>
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A More Detailed Macro SAM

• Don’t panic! It looks complicated but all we have done is:
  – 1) disaggregated production and use;
  – 2) allowed factors to intermediate between activities and institutions;
  – 3) added the capital account; and
  – 4) allowed for inter-institution transfers

• Let’s start with some definitions and then come back to this table...
SAM Definitions

- SAM definitions are drawn from the UN System of National Accounts (SNA), which we discussed in lecture 1.
- This system attempts to ensure consistency and comparability among countries that may have very different accounting systems.
- For a more lengthy treatment of these definitions, see UNSD (1993).
1. Activities

Definition

Activities produce goods and non-factor services in the commodity market. Activities are best thought of as individual production activities within a business or industry. For instance, the auto industry might be composed of several activities.

Transactions

Row 1: Activities receive income from Commodities’ “purchase” of goods and services.

Column 1: Activities purchase Commodities and Factors needed for production, and pay indirect taxes to Government.
2. Commodities

- Definition
  - Commodities are goods and non-factor services used by activities (intermediate demand) and institutions (final demand). The commodity account represents total “absorption” (supply) in the economy (column 2). Robinson (2003) refers to the commodities account as a ‘department store,’ which buys goods and services and sells them to other actors in commodity markets.

- Transactions
  - Row 2: Commodities receive income from their purchase by Activities, Households, Government, Investment, and Exports.
  - Column 2: Commodities “purchase” goods and services from Activities and ROW (imports), and pay excise taxes and import duties.
3. Factors

- Definition
  - Factors typically include labor, capital, and land. In countries with state or mixed property ownership, land is difficult (but not impossible) to include even though returns to land are important.

- Transactions
  - Row 3: Factors are paid by Activities.
  - Column 3: Factors distribute factor income to Households (wages, salaries, and other benefits), Enterprises (gross profits), and Government (factor taxes).
4. Households

- Definition
  - Households are usually disaggregated into at least two types.

- Transactions
  - Row 4: Households receive income from Factors and transfers from Enterprises (e.g., distributed profits), Government (e.g., social security payments), and ROW (e.g., overseas investments).
  - Column 4: Households spend that income on Commodities, taxes to Government, and savings to Capital.
5. Enterprises

- Definition
  - Enterprises may be state-owned enterprises (SOEs), private enterprises, or foreign invested companies. Note that ‘enterprises’ is not synonymous with activities.

- Transactions
  - Row 5: Enterprises earn profits from Factors and transfers from ROW.
  - Column 5: Enterprises make transfers to Households (e.g., distributed profits), pay corporate taxes to Government, and “pay” retained earnings and savings to Capital.
6. Government

Definition
- Government levies taxes to obtain revenue and spend a budget.

Transactions
- Row 6: Government receives tax income from Activities, Commodities, Factors, Households, and Enterprises, and transfers from ROW.
- Column 6: Government spends on Commodity purchases and transfers to Households, with the remainder sent to the Capital account as savings.
SAM Definitions: 7. Capital

- 7. Capital
  - Definition
    - Somewhat like the commodity account, the capital account is a clearinghouse that collects savings from households, enterprises, government, and foreigners and allocates it into investment goods in the commodities account.
  - Transactions
    - Row 7: Capital receives “income” in the form of savings from Households, Enterprises, Government, and ROW (as capital inflows).
    - Column 7: Capital “spends” savings income on Investment.
SAM Data Sources

- Even at an aggregate level, SAM data comes from diverse sources: I/O tables, national accounting data, household surveys, firm surveys, labor market surveys, government accounts, international trade accounts ...

- Typically at the very least, to construct a macro SAM we need:
  - National Make and Use tables or an I/O table
  - Household survey with a labor force survey component
  - Government budget accounts
  - Trade statistics and BoP statistics
  - Official national accounting data
8. Rest of World

- Definition
  - ROW is self-explanatory. Purchases of domestic goods by non-residents living domestically and purchases of foreign goods by residents living abroad are typically included in ROW as imports and exports.

- Transactions
  - Row 8: ROW earns income from Commodities in the form of income.
  - Column 8: ROW buys exports from Commodities, makes transfers to Households, Enterprises, and Government, and “pays” Capital in the form of savings.
You will face one of two situations in constructing a SAM:

1) You have consistent data from a previous SAM, but it is not up to date

2) No SAM exists, and you will be estimating a new SAM.

In the first case, you could use new column/row information and balancing techniques to update the SAM.

In the second case, you will need to do intensive “data mining.”
• In either case, a good first step is to assemble a macro SAM for the year that you are building the SAM for:

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<th>ACT</th>
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Data requirements for a macro and micro SAM are different: for a macro SAM you are going to want to find the most official data possible because you will likely use it as a control.

Generally it is better to use government statistical yearbooks to ensure consistency; international agencies also have macroeconomic data:
- UN national accounts data (SNA)
- World Bank
- IMF
## Potential Data Sources

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<td>Residual (GO – VA – IT)</td>
<td>Statistical Yearbook</td>
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<td>Customs Data</td>
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<td>Statistical Yearbook</td>
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<td>National Expenditure Survey</td>
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While the macro SAM is useful as a control, it tells us little about economic structure. Detail is what makes SAMs interesting and useful.

From a policy perspective, high levels of aggregation in SAM-based models can obscure important trade-offs and make it difficult to anticipate adjustment costs.

For instance, Cockburn (2004) demonstrates that there can be a wide disparity between CGE models that use SAMs with a “representative” household, and those that use highly disaggregated household classifications.
In principle, micro SAMs can be as disaggregated as needed. For instance, we can disaggregate labor value added into skilled and unskilled; we can disaggregate households into different groups based on location or any other socioeconomic classification.

For instance, while at a minimum production, factor, and household accounts are usually disaggregated in a micro SAM, we can disaggregate the tax and government accounts, capital accounts, and trade accounts as well.
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An often-used principle proposed by Pyatt and Thorbecke (1976) is that, in choosing disaggregation schemes, analysts should seek as much within-group homogeneity relative to between-group differences as possible.

This just means choosing classifications that are relatively similar within a group (e.g., rural households), but very different from other groups in the same category (e.g., urban households).

Ultimately, both the kind and level of disaggregation will be determined by the focus of the study and what can be supported by available data.
• Disaggregating SAMs typically requires large amounts of data, but often it is possible to do quite a bit with a small amount of data, careful classifications, and a few simplifying assumptions.

• At the same time, it is important to remember that although balancing techniques allow for creating disaggregated SAMs with minimal data inputs, the quality (and usefulness) of the SAM still depends on the quality of original data inputs. See Round (2003) for an overview of this argument.
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<td>1. Activities</td>
<td>Make Matrix (I/O table)</td>
<td>Household Consumption (I/O table) (HH Surveys)</td>
<td>Government Consumption (I/O table) (Fiscal Yearbook)</td>
<td>Investmen t (I/O table)</td>
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<td>Total Sales</td>
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<td>2. Commodities</td>
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<td>4. Households</td>
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<td>HH Income (LF Surveys)</td>
<td>Transfers to Household (HH Surveys)</td>
<td>Transfers to Households (HH Surveys)</td>
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<td>Household Income</td>
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<td>5. Enterprises</td>
<td>Gross Profits (Ent. Surveys)</td>
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<td>Enterprise Income</td>
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<td>7. Capital</td>
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<td>Household Savings (HH Surveys)</td>
<td>Enterprise Savings (Residual)</td>
<td>Government Savings (Fiscal Yearbook)</td>
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<td>Total Savings</td>
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<td>Imports (I/O table)</td>
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<td>Imports</td>
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<td>9. Total</td>
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<td>Total Commodity Supply</td>
<td>Total Factor Payments</td>
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<td>Total Enterprise Expenditure</td>
<td>Allocation of Government Revenue</td>
<td>Total Investment</td>
<td>Total Foreign Exchange</td>
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Typical Classification Criteria

- Labor accounts
  - Geographic location (urban-rural or geographical region)
  - Skill or education level
  - Employment status
  - Gender

- Household accounts
  - Geographic location
  - Household socio-economic characteristics (income or assets)
  - Socio-economic characteristics of principle wage earner
  - Income source (farm/non-farm)
Typical Classification Criteria

- Enterprises
  - Geographic location (rural, urban)
  - Ownership (state-owned, corporate, foreign)
- Government
  - Administrative division (central and provincial for provincial SAMs)
- Activity-Commodity
  - Enterprise types
  - New industries
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<td>2. Commodities (124)</td>
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<td>3. Factors (13)</td>
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<td>4. Private Households (5)</td>
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<td>5. Enterprises (3)</td>
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<td>6. Recurrent State (1)</td>
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<td>7. Investment Savings (1)</td>
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<td>8. Rest of World (94+1)</td>
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<td>3. Factors</td>
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A useful lesson from this diagram is that, because of the way the SAM is structured, data cannot be entered in piecewise. Revising one transaction in the SAM will have implications for other transactions.

For instance, if we decide to disaggregate labor compensation into ‘skilled’ and ‘unskilled,’ we also have to disaggregate sources of household income into ‘skilled’ and unskilled’ factors.
• Particularly for the household accounts, note how much more complex disaggregation makes the SAM. In the above example, we now need:
  – Household factor income by source for 5 household types and 13 factor types.
  – Household transfers from enterprises and government for 5 household types and 3 enterprise types.
  – Household remittance income for 5 household types from 95 countries.

... 

• This is not to convince you to avoid detail, but rather to be realistic.
• Household survey data is indispensable in SAM creation; without it there is no good way to disaggregate household accounts.

• Household survey data often also provides a means of filling in or estimating data left out of production-based surveys; enterprise surveys typically have an employee-based threshold, which means they do not include information on smaller enterprises.

• Lastly, household surveys provide a means to estimate the value of non-market activity, which is typically crucial for measuring living standards in developing countries.
Sample National SAM: Thailand

- 79 domestic production activities/commodities
- 4 factors of production
  - Labor (agriculture and non-agriculture)
  - Capital (agriculture and non-agriculture)
- 10 household types
- 1 enterprise type
- Government (six fiscal instruments)
- Consolidated capital account
- Up to 94 trading partners
Sample National SAM: Viet Nam

- 124 domestic production activities/commodities
- 4 factors of production
  - labor
  - Capital
  - Water
  - Land
- 10-300 household types (rural, urban)
- 3 enterprise types (private, public, foreign)
- Government (disaggregated taxes, central and provincial)
- Consolidated capital accounts
- Up to 94 trading partners
Sample National SAM: Cambodia

- 23 domestic production activities/commodities/imports
- 6 factors of production
  - Skilled and Unskilled labor
  - Capital
  - Land
  - Other Natural Resources
- 1 Enterprise
- Government (disaggregated taxes, central and provincial)
- Consolidated capital accounts
- Rest of World
• While there are many interesting and policy-relevant applications for SAMs, both standard SAM multiplier and FPM models still suffer from some of the deficiencies of I/O tables: fixed coefficients, fixed prices, and spare capacity.

• If structure changes as a result of changes in relative prices, then SAMs are less useful, and we need to look to more complex models, like CGE.