# Social Accounting Matrix and global databases

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# Social accounting matrix (SAM)

- A SAM is a double-entry table reporting the economic transactions of an economy for a given period (year).

- Expenses are reported-column-wise and revenues row-wise.

- A SAM is made up of six accounts: activities, commodities, factors, institutions (households, firms and government ), Capital/investment) and Rest of world

**EXPENDITURES**

**INCOMES**

| | 1 Activities | 2 Commodities | 3 Factors — Labor | 3 Factors — Capital | 4 Institutions — Households | 4 Institutions — Firms | 4 Institutions — Government | 5 Capital account | 6 Rest of world | 7 Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **1 Activities** | | Domestic sales | | | | | Export subsidies | | | Production |
| **2 Commodities** | Intermediate demand | | | | Household Consumption | | Government consumption | Investment | | Domestic demand |
| **3 Factors — Labor** | Wages | | | | | | | | Factor incomes from abroad | Gross national product at factor cost |
| **3 Factors — Capital** | Rent | | | | | | | | | |
| **4 Institutions — Households** | | | Labor income | Distributed Profits | Intrahousehold Transfers | Transfers | Transfers | | Transfers from Abroad | Households income |
| **4 Institutions — Firms** | | | | Nondistributed Profits | Transfers | | Transfers | | | Firms income |
| **4 Institutions — Government** | Value-added taxes | Tariffs Indirect taxes | Taxes Social Sec. | Taxes on profits | Direct Taxes | Taxes | | | | Government income |
| **5 Capital account** | | | | | Household savings | Savings | Government savings | | Capital transfers | |
| **6 Rest of World** | | Imports | Factor payments | | | Current transfers abroad | | | | Imports |
| **7 Total** | Production | Domestic supply | Factor outlay | | Household expenditures | Firms expenditures | Government expenditures | Total investment | Foreign exchange earnings | |

| | | ACTIVITIES | | | COMMODITIES | | | FACTORS | | INSTITUTIONS | | | | | | Investment | Rest of world | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Manuf | Services | Agriculture | Manuf. | Services | Labour | Capital | Firms | Rural Households | Urban poor households | Urban Rich households | Government | | | | |
| ACTIVITIES | Agriculture | | | | 23376 | | | | | | | | | | | | | 23376 |
| | Manuf. | | | | | 15968 | | | | | | | | | | | | 15968 |
| | Services | | | | | | 106066 | | | | | | | | | | | 106066 |
| COMMODITIES | Agriculture | 2365 | 5228 | 2655 | | | | | | | 4615 | 5152 | 1810 | | 1738 | 1912 | 25475 |
| | Manuf. | 402 | 2480 | 3595 | | | | | | | 3141 | 4703 | 2369 | | 186 | 1167 | 18043 |
| | Services | 5897 | 4528 | 45728 | | | | | | | 6430 | 12809 | 8231 | 13589 | 16009 | 10103 | 123324 |
| FACTORS | Labour | 8500 | 1592 | 24528 | | | | | | | | | | | | | 34620 |
| | Capital | 5134 | 2102 | 21923 | | | | | | | | | | | | | 29159 |
| INSTITUTIONS | Firms | | | | | | | | 14733 | | | | | | | | 14733 |
| | Rural households | | | | | | | 8549 | 5134 | 1734 | | | | 330 | | 2100 | 17847 |
| | Urban poor households | | | | | | | 19937 | | 2552 | | | 129 | 371 | | 1896 | 24885 |
| | Urban rich households | | | | | | | 6134 | 9292 | 1513 | | | | 123 | | 188 | 17250 |
| | Government | 1078 | 38 | 7637 | 191 | 89 | 1278 | | | 2358 | 357 | 249 | 1540 | | | | 14815 |
| Investment | | | | | | | | | | 6005 | 3304 | 1972 | 3171 | -2003 | | 5484 | 17933 |
| Rest of world | | | | | 1908 | 1986 | 15980 | | | 571 | | | | 2405 | | | 22850 |
| Total | | 23376 | 15968 | 106066 | 25475 | 18043 | 123324 | 34620 | 29159 | 14733 | 17847 | 24885 | 17250 | 14815 | 17933 | 22850 | |

# Input-Output Table

| | | ACTIVITIES | | | COMMODITIES | | | Households | Government | Investment | Rest of world | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Manudacturing | Services | Agriculture | Manudacturing | Services | | | | | |
| ACTIVITIES | Agriculture | | | | 23376 | | | | | | | 23376 |
| | Manufacturing | | | | | 15968 | | | | | | 15968 |
| | Servioces | | | | | | 106066 | | | | | 106066 |
| COMMODITIES | Agriculture | 2365 | 5228 | 2655 | | | | 11577 | | 1738 | 1912 | 25475 |
| | Manufacuring | 402 | 2480 | 3595 | | | | 10213 | | 186 | 1167 | 18043 |
| | Services | 5897 | 4528 | 45728 | | | | 27470 | 13589 | 16009 | 10103 | 123324 |
| FACTORS | Labour | 4500 | 1592 | 24528 | | | | | | | | |
| | Capital | 9134 | 2102 | 21923 | | | | | | | | |
| INSTITUTIONS | Firms | | | | | | | | | | | |
| | Rural households | | | | | | | | | | | |
| | Urban poor households | | | | | | | | | | | |
| | Urban rich households | | | | | | | | | | | |
| | Government | 1078 | 38 | 7637 | 191 | 89 | 1278 | | | | | |
| Investment | | | | | | | | | | | | |
| Rest of world | | | | | 1908 | 1986 | 15980 | | | | | |
| Total | | 23376 | 15968 | 106066 | 25475 | 18043 | 123324 | | | | | |

# SAM MATRICES PRODUCED BY IFPRI

| Countries | Years | | Countries | Years | | Countries | Years | |
|---|---|---|---|---|---|---|---|---|
| | > 2000 | < 2000 | | > 2000 | < 2000 | | > 2000 | < 2000 |
| **East Asia** | | | **Sub-Sahara Africa** | | | **Central and North America** | | |
| Bangladesh | | 1993-1994 | Bostwana | 2007 | | Costa Rica | | 1997 |
| China | 2007 | | Ethiopia | 2006 | | El-Salvador | 2000 | |
| Indonesia | | 1995 | Ghana | 2005 | | Honduras | | 1997 |
| Pakistan | 2007-2008 | | Kenya | 2001-2003 | | Mexico | 2008 | |
| Thailand | | | Lesotho | 2007 | | **South America** | | |
| Vietnam | 2007 | 1996-1997 | Malawi | 2007 | 1998 | Argentina | 2000 | |
| **Mena countries** | | | Mozambique | 2007 | | Bolivia | 2012 | 1996 |
| Egypt | 2010-2011 | 1997 | Namibia | 2007 | | Brazil | | 1995-1996 |
| Irak | 2011 | | Nigeria | 2006 | | Chile | | 1996 |
| Morocco | | 1994 | Rwanda | 2006-2007 | | Columbia | | 1997 |
| Tunisia | 2012 | | South Africa | | 1993, 1998-1999 | Paraguay | | 1998 |
| Yemen | 2012 | | Swaziland | 2007 | | Peru | 2002 | 1994 |
| | | | Tanzania | 2009, | 1992, 1998-2001 | Uruguay | | 1995 |
| | | | Uganda | | 1999 | | | |
| **Europe** | | | Zambia | 2007, 2001 | 1995 | | | |
| Slovak Republic | 2000 | | Zimbabwe | | 1991 | | | |

# The construction of a SAM

- The construction of a SAM needs the use of many statistical sources: The main one is the input-output table which allows the representation of the majority of information regarding the activities account. The account of the institutional transfers, the trade statistics, the households budget and consumption survey, the employment surveys, the special surveys characterizing the agricultural farms as well as firms in the rest of the economy etc..

- In general, in published form, these data are not consistent with equilibrium conditions: for example, payments to labor from firms will not equal labor income received by households.

- A number of adjustments are required to ensure that equilibrium conditions hold (RAS method or entropy approach).

# The construction of a SAM (2)

- Once the SAM constructed, the main assumption made in CGE modeling is that the observed data are not obtained by chance, they are the result of an optimization process made by all the agents.

  Hence, the accounting equilibrium corresponds to an economic equilibrium.

- This leads to the determination of this optimization process, which constitutes the specification of the model.

- The SAM includes values (price*quantity) and the usual assumption made is that in the base year, all prices are equal to unity. The model is solved in terms of relative prices according to a chosen numéraire (for example, consumer price index or producer price index)

# 2. GTAP DATABASE

- GTAP = Global trade analysis project

- The centerpiece of the GTAP is its GTAP Data Base, a fully documented, publicly available global data base which contains complete bilateral trade information, transport and protection linkages.

- The GTAP Data Base represents the world economy and is utilized by thousands worldwide as a key input into contemporary applied general equilibrium (AGE) analysis of global economic issues.

- The GTAP Data Base is most commonly used with the GTAP Model and RunGTAP software.

- Data in GTAP can be aggregated by regions, commodities and endowments) using the GTAPAgg2 (or FlexAgg2) program provided with the data base to the desired level

- Then data can be used with the GTAP or GTAPinGams model/s to analyze the impact of global policies (trade, environmental, migration policies are commonly examined).

- Another use of the GTAP database is to extracting country SAMs or I-O tables for single country models.

# GTAP DATABASE 9

- Three reference years: 2004, 2007 and 2011
- 140 regions (countries) and 57 sectors
- New macro-economic data for 2004, 2007, and 2011
- New bilateral merchandise trade data for 2011
- New protection data for 2007 and 2011
- New Time-Series Bilateral Trade data from 1995-2013
- Improved bilateral services trade data for 2004, 2007, and 2011
- Improved energy data for 2004, 2007, and 2011
- Revised OECD domestic support for 2004, 2007, and 2011
- Decomposition of tariff (into ad valorem and specific)
- $CO_2$ emissions dataset integrated into core data base
- Five labor skill categories

# Sector coverage in GTAP

- 57 sectors
- 12 agricultural sectors
- Forestry
- Fishery
- Four mining sectors
- Seven food processing
- Beverages and tobacco products
- 27 manufacturing sectors
- 14 service sectors

# What the GTAP dtabase is not

- **a repository of Input-Output tables.** The GTAP Data Base is a consistent representation of the world economy in the year base of the current version. The underlying input-output tables are heterogeneous in sources, base years, and sectoral detail, thus for achieving consistency, substantial efforts are made to make the disparate sources comparable. For these reasons, the objective of the GTAP Data Base is not to provide IO tables, but to facilitate the operation of economic simulation models ensuring users a consistent set of economic facts.

- **a repository of time series on economic data.** Except for trade data, the GTAP Data Base is a cross-section of consistent data on consumption, production, and trade.

- **a relational data base of economic variables.** Users interested in economic data only for comparative purposes are better served by sources such as the World bank Development Indicators, the IMF's financial statistics, or the FAO's agricultural statistics, to name a few. The data in the GTAP Data Base accurately depicts the magnitudes of economic variables, but they are presented in terms of the aggregates that serve CGE modeling.

# Cost of GTAP database

| GTAP 9 Data Base (USD) | | | | | | |
|---|---|---|---|---|---|---|
| | **Standard Price** | | **Lower-Middle Income Economy** | | **Low Income Economy** | |
| | **New** | **Upgrade** | **New** | **Upgrade** | **New** | **Upgrade** |
| **Government/Private Sector** | $5,940 | $3,830 | $3,560 | $2,300 | $2,380 | $1,530 |
| **Library Academic** | $4,400 | $2,340 | $2,640 | $1,400 | $1,760 | $940 |
| **Multiple Academic** | $2,200 | $1,170 | $1,320 | $700 | $880 | $470 |
| **Single Academic** | $1,160 | $580 | $700 | $350 | $460 | $230 |

# Other global databases

- WIOD: World I-O data base

- UN COMTRADE database

- ITC  database

- FAO database

- World Bank

- WITS  (World Bank)

- MacMAPS  (ITC)

- CEPII  (Several databases on international trade but also on distances,

# THANK YOU