

United States

Kenneth Hanson and Agapi Somwaru

The United States (US) Social Accounting Matrix (SAM) for the GTAP version 4 data base is compiled from the 1987 benchmark Input-Output (I/O) accounts published in 1994 by the US Department of Commerce, Bureau of Economic Analysis. The data sources are documented in the *Survey of Current Business*, April 1994.¹ The tables are reported in millions of 1987 dollars at producer prices. GDP equals \$4,572 billion dollars, while total output equals \$8,175 billion. Commodities and industries are disaggregated into about 500 sectors, according to the 4-digit standard industry classification (SIC) codes, except for agriculture and construction. The 17 agricultural sectors are aggregated according to a commodity grouping. The 53 construction commodities and 5 construction industries are aggregated into one commodity and one industry. Three sectors in the US I/O accounts had to be further disaggregated to accommodate for the sectoral detail of the GTAP data base. There are several features of the US I/O accounts which need to be taken into consideration in preparing for the accounts of the GTAP data base.

14.14.1 Use and make tables

The US I/O accounts are in the form of a Make and Use table, where commodities are distinguished from industries. The GTAP data base has the orientation of a commodity by commodity transaction table.

The Use table provides information on the use of commodities by industries as well as 25 components of final demand (consumption, investment, inventory change, exports, plus 21 federal, state and local government agencies). There is also an array of data on imports by commodity, and

¹The 1992 input-output accounts were originally expected to be published by the end of 1997.

three components of value added by industry (employee compensation, indirect business tax, and other value added).

The Make table provides information on industry production of commodities. If there were a one-for-one correspondence of commodities and industries the Make table would be diagonal, and the Make and Use tables would simply collapse to a single transactions matrix of either commodity by commodity or industry by industry orientation. Since the table is not diagonal, we collapsed the Make and Use tables into a commodity by commodity transactions matrix for the GTAP data base.

14.14.2 The Use table is import ridden

Intermediate and final demand are for commodities which are a composite of imports and domestically produced goods sold on domestic markets. One way to think about this structure of the Use table is that imports are combined with domestic goods at the border and domestic demand is for the composite commodity. In this way, data on imports are maintained as a single dimensioned array of commodity imports.

The treatment of imports in the US I/O accounts is different from the treatment of imports in the GTAP data base, where intermediate and domestic final demand is decomposed into a demand for imported and a demand for domestically produced goods sold on domestic markets. To accommodate the GTAP data base framework, we separated imports from domestic goods in the Use table of the US I/O accounts. We accomplished this by assuming each user of a composite commodity uses the same mix of domestic goods and imports. Unpublished data underlying the US I/O accounts could have provided information for a more suitable decomposition of domestic demand for a composite commodity into imports and domestic goods. Given the time and resource limitations we did not explore the use of the unpublished data series.

14.14.3 Transactions in the use table are in producer prices

Data on trade and transportation costs exists for each transaction allowing all components of demand (intermediate, domestic final demand, and exports) for each commodity to be expressed in purchaser prices as well producer prices. Hence, a choice in the treatment of trade and transportation costs has to be made. One approach is to use commodity demand in producer prices. This way each user of a commodity also has a demand for trade and transportation services. Another approach is to treat trade and transportation services as margins on the demand for each commodity by each user of the commodity.

The reason for this clarification is to make it understood that commodity demand can be expressed either in purchaser prices or in producer prices. We have chosen to express the value of exports in the US I/O accounts to be expressed in producer prices so that these export values are made consistent with the GTAP trade data base.

14.14.4 The treatment of value added by industry

Value added data are divided into three components, employee compensation, indirect business tax, and other value added. Other value added consists of proprietors income, net interest, corporate profits, capital consumption allowance, rental income, business transfer payments, and current surplus of government enterprises. The other value added vector thus can be considered as the return to proprietors, capital, and land.

One problem with the other value added vector is that it may be negative for specific industries for the year in which the I/O accounts are compiled. When this occurs, we leave the negative value in the data, but with the expectation that an adjustment will be made.²

A second issue with the other value added component is the inclusion of all proprietors income. Other value added is the return to capital and land in the GTAP model, so all proprietors income will be treated as a return to capital plus land. Some proprietors income could be treated as a return to the proprietors' labor. To make this adjustment, the user could add an imputed return to proprietors' labor to the employee compensation component, and subtract it from the other value added component. Proprietors' labor is important in agriculture, construction, and some service sectors. For this version, we made no adjustment to labor's share of proprietors income. We recommend making this adjustment in the future. One approach is to assume that proprietors earn a wage equal to the average wage in the industry. This will require additional data on the employment of hired workers and self-employment in the industry.

A third issue relates to the treatment of tariffs in the US I/O accounts to make this compatible with the GTAP data base. In the US I/O accounts, total tariffs are treated as a positive import by the wholesale trade sector, while the negative commodity import data are tariff ridden. Total tariffs are also included as part of the wholesale trade sector's indirect business tax (part of value added). We remove the total tariff value from the wholesale trade sector of the import data and the indirect business tax data. For consistency, we also remove total tariffs from the wholesale trade sector of the make matrix prior to creating the transactions matrix. Tariffs by commodity are also provided

²This occurs for meat products (cmt). As an adjustment, we recommend the transfer of some of the returns to capital from other meat processing (omt) to the capital income of meat processing. Also we make adjustments to the sectoral output and final demand (inventory change) of these sectors to keep the sector accounts balanced. These two meat processing sectors are closely linked.

separately as part of the US data in the GTAP data base. They are from the Bureau of Census Trade Data Files. The tariff data are adjusted to equal the total tariff value in the I/O accounts. The data on imports remain tariff ridden.

14.14.5 Special industries in the US input-output accounts

To maintain a consistent definition of GDP in both the I/O accounts and the national income and product accounts, six special industries are included in the I/O accounts. These are: i) noncomparable imports; ii) scrap, used, and secondhand goods; iii) general government industry; iv) rest of the world adjustment to final uses; v) household industry; and vi) inventory valuation adjustment.

In aggregating the US I/O accounts to the GTAP data base, some of these special sectors can cause data problems, such as negative numbers or distorted sectoral cost structures. To clarify then potential problems, we discuss these special sectors in detail below:

- a. Noncomparable imports are commodity imports used by industry and domestic final demand but do not correspond with existing SIC commodities produced in the United States. The total is \$79 billion for 1987. Half are consumed by households, most as expenditures while traveling abroad. We aggregate noncomparable imports (IC472) into the public administration sector (OSG), making it appear to have a large import share.
- b. Scrap, used, and secondhand goods is a special sector that accounts for the investment component of final demand selling such goods to industry, households, government, and as exports. A potential complication with this sector is a negative investment demand (-\$25 billion in 1987). We aggregate scrap (IC473) into other machinery and equipment (OME), and used goods (IC474) into other manufactures (OMF).
- c. Government industry provides labor services for government use. It amounts to \$467 billion (10 percent of GDP). We aggregate the sector (IC475) into the public administration sector (OSG). This will bias the sector cost structure towards labor.
- d. Rest of the world sector is an adjustment, to exports, to household consumption, and to government expenditures, for expenditures by foreigners while in the United States. There is no value added or output associated with this sector. For the rest of the world industry, there is a positive export value (\$31.6 billion), a negative value for household consumption (-\$31.1 billion), and a negative value for government expenditures (-\$0.5 billion). The relatively large negative value for household consumption can be a problem when aggregating. We put the rest of world industry (IC476) into the public administration sector (OSG), and no negative final demand value problem arises.

- e. Household industry provides labor services for household consumption. The sector (IC477) is small (\$7.7 billion) and insignificant when aggregated into financial, business, and recreational services (OSP).
- f. Inventory valuation adjustment is an adjustment to other value added and to inventory change. The adjustment accounts for differences in prices used to measure the change in inventories during the year, as reported in corporate profits versus the national economic accounts. We aggregate the sector (IC478), which has a negative value added and inventory change final demand (-\$17.8 billion), into the public administration sector (OSG). The sector will distort the cost structure of the aggregate GTAP sector and can lead to negative other value added, but in our choice of sector aggregation, other value added stays positive.

14.14.6 Negative values in domestic final demand

Domestic final demand consists of consumption, government expenditures, investment, and inventory change. Except for inventory change, the GTAP data base assumes and expects positive values for all commodities for each component of final demand. There are two reasons that negative final demands may occur. One is originated from the special sectors discussed above. This may occur with the selling of scrap and used goods by the investment component of final demand, and rest of world adjustment to household consumption. Inventory valuation adjustment may lead to a negative final demand in the inventory change component of final demand, and a negative other value added. We have aggregated these special sectors such that they do not lead to negative final demands in the US GTAP data base.

Another source of negative final demands are some negative government expenditures in the US I/O accounts. These occur where the government provides a good or service, or where they receive a rental payment from an industry when using government assets. Examples are the forestry sector, various mining sectors, and a number of service sectors related to health care and education. In the aggregate GTAP data base, only the forestry sector has a negative government final demand. We left this negative value in the data base in expectation of an adjustment in the final release.³

³ Although this practice is contrary to the normal procedure for the supply of a single-region I/O table, where all values in the final demand category are supposed to be non-negative, the later processing procedure in GTAP (see chapter 14.1) does in fact eliminate all negative values in final demand.

14.14.7 Disaggregation

There are three sectors in the GTAP data base that are not distinguished in the US I/O accounts. This requires further disaggregation using additional data. This occurs for: i) Rice and wheat in the food grains sector; ii) Wool and other livestock products in the miscellaneous livestock sector; and iii) Crude petroleum and natural gas in a combined mining sector.

In all cases the data on these commodities exist in the I/O accounts, but it was necessary to use other data to create separate accounts for these commodities, given the sectoral classification in the US I/O accounts. We made the separation for the first two using data from the 1987 Agricultural Census. Our split of crude petroleum and natural gas was from the 1987 Census of Manufactures data.

Appendix: 14.14.A1 Aggregation mapping from US input-output sectors (IC) to GTAP sectors (I)

IAGG(I,IC) AGGREGATION MAPPING

PDR-WHT.	(IC)
GRO.	(IC7)
V_F.	(IC10*IC12)
OSD.	(IC15)
C_B.	(IC13)
PFB.	(IC5)
OCR.	(IC8,IC9,IC14,IC16,IC17)
RMK.	(IC1)
CTL.	(IC3)
WOL-OAP.	(IC2,IC4)
FOR.	(IC18,IC115)
FSH.	(IC19)
COL.	(IC25)
OIL-GAS.	(IC26)
OMN.	(IC22*IC24,IC27*IC31)
CMT.	(IC39)
OMT.	(IC40,IC41)
VOL.	(IC76*IC79,IC81)
MIL.	(IC42*IC46)
PCR.	(IC60)
SGR.	(IC65)
OFD.	(IC47*IC59,IC61*IC64,IC66*IC69,IC75,IC80,IC82*IC85)
B-T.	(IC70*IC74,IC86*IC89)
TEX.	(IC90*IC99,IC107*IC114)
WAP.	(IC100*IC106)
LEA.	(IC196*IC204)
LUM.	(IC116*IC142)
PPP.	(IC143*IC164)
P-C.	(IC185*IC189)
CRP.	(IC165*IC184,IC190*IC195)
NMM.	(IC205*IC228)
I-S.	(IC229*IC237)
NFM.	(IC238*IC249)
FMP.	(IC250*IC276,IC34,IC36*IC38)
MVH.	(IC349*IC352,IC360,IC361)
OTN.	(IC353*IC359,IC362,IC33,IC35)
ELE.	(IC313*IC316,IC319*IC340,IC343)
OME.	(IC277*IC312,IC317*IC318,IC341*IC342,IC344*IC348,IC363*IC376,IC473)
OMF.	(IC377*IC394,IC474)
ELY.	(IC405)
GDT.	(IC406)
WTR.	(IC407*IC408)
CNS.	(IC32)
T-T.	(IC395*IC404,IC409*IC410,IC419,IC439)
OSP.	(IC20,IC21,IC411*IC415,IC417*IC418,IC420*IC438,IC440*IC450,IC477)
OSG.	(IC451*IC465,IC466*IC472,IC475,IC476,IC478)
DEW.	(IC416)
