

# IMPLAN's Social Accounting Matrix (SAM)

MCRSA 49<sup>th</sup> Annual Meeting

June 7-8, 2018

Kansas City, MO

IMPLAN



Jimmy Squibb

Director of Global Economics

# SAM Overview

# Crash Course in SAMs

---

- Debatable lineage, but some notable moments in history:
  - Quesnay (1700s), Stone (1985), Pyatt and Round (1970s to 1980s)
- A natural extension of an IO table – adds transfer data to show flow of income to final demand.
- Historically, and with IMPLAN, SAMs reveal information about distribution of income across earnings or wealth categories.

# Excerpt of IMPLAN SAM

	Type Code	Description	Industry Total	Commodity Total	Employee Compensation	Proprietor Income	Other Property Type Income	Taxes on Production and Imports	Households LT15k	Households 15-30k	Households 30-40k	Households 40-50k
▶	1001	Industry Total		\$31,152,296,638,022								
	2001	Commodity Total	\$12,945,480,449,648						\$688,140,043,000	\$1,185,319,930,000	\$849,379,281,000	\$774,715,000
	5001	Employee Compensation	\$9,978,641,020,092									
	6001	Proprietor Income	\$1,341,932,993,771									
	7001	Other Property Type Income	\$6,077,702,996,309									
	8001	Taxes on Production and Im...	\$1,226,198,000,503									
	10001	Households LT15k		\$292,571,961	\$44,140,349,121	\$0	\$15,779,962,402		\$23,677,553	\$77,131,645	\$82,286,232	\$97,810,000
	10002	Households 15-30k		\$460,735,630	\$227,827,960,938	\$21,998,785,462	\$38,106,928,223		\$77,131,645	\$251,262,909	\$268,054,413	\$318,810,000
	10003	Households 30-40k		\$342,295,940	\$309,320,785,156	\$30,318,147,988	\$39,193,045,898		\$82,286,232	\$268,054,413	\$285,968,079	\$340,110,000
	10004	Households 40-50k		\$330,433,167	\$412,621,781,250	\$41,678,357,299	\$50,851,308,105		\$97,889,282	\$318,882,660	\$340,193,115	\$404,710,000
	10005	Households 50-70k		\$734,249,752	\$1,020,953,250,000	\$94,911,064,189	\$149,305,300,000		\$210,282,196	\$685,012,146	\$730,790,405	\$869,310,000
	10006	Households 70-100k		\$832,301,212	\$1,598,012,015,625	\$148,225,293,352	\$190,906,063,000		\$269,888,977	\$879,186,279	\$937,940,918	\$1,115,710,000
	10007	Households 100-150k		\$891,260,853	\$2,034,893,437,500	\$226,228,486,939	\$233,189,989,000		\$378,526,520	\$1,233,082,397	\$1,315,487,305	\$1,564,910,000
	10008	Households 150-200k		\$368,941,435	\$1,147,669,765,625	\$155,968,897,605	\$132,974,895,000		\$246,996,582	\$804,612,366	\$858,383,362	\$1,021,110,000
	10009	Households 200k+		\$450,676,496	\$1,986,741,593,750	\$562,926,418,530	\$484,973,500,000		\$1,180,555,786	\$3,845,760,986	\$4,102,767,090	\$4,880,710,000
	11001	Federal Government NonDe...		\$5,444,711,861	\$1,162,603,000,000	\$59,677,542,408	\$43,852,000,000	\$134,462,555,633	(\$7594,806,015)	(\$8,733,695,313)	(\$5,686,770,111)	\$24,780,000
	11002	Federal Government Defense										
	11003	Federal Government Invest...		\$23,264,803								
	12001	State/Local Govt NonEduc...		\$466,522,517,317	\$20,258,000,000	\$0	\$51,925,000,000	\$1,091,735,444,870	\$564,312,004	\$54,705,094,742	\$8,334,118,088	\$30,269,710,000
	12002	State/Local Govt Education										
	12003	State/Local Govt Investment										
	13001	Enterprises (Corporations)			\$0		\$1,862,776,000,000					
	14001	Capital		\$118,314,761,437			\$2,769,560,000,000					\$4,468,000,000
	14002	Inventory Additions/Deletions		\$32,193,243,914								
	25001	Foreign Trade	\$1,344,784,555,060		\$13,599,081,127	\$0	\$14,309,002,169		\$34,118,535,874	\$61,638,106,162	\$46,818,250,631	\$48,475,310,000
	28001	Domestic Trade	\$0						\$0	\$0	\$0	\$0
		Total	\$32,914,740,015,383	\$31,779,498,603,800	\$9,978,641,020,092	\$1,341,932,993,771	\$6,077,702,996,309	\$1,226,198,000,503	\$717,795,320,000	\$1,301,292,420,000	\$907,766,750,000	\$893,321,000,000



# Simple SAM

	1	2	3	4	5	6	7	8	9	10	11	12	
	Agriculture	Mining	Utilities	Construction	Spacecraft mfg	Services	Labor Income	Property Income	Households	Government	Capital	Trade (exports)	Total
1 Agriculture	6.00	0.02	0.08	12.43	0.00	0.80			2.00	0.08		5.00	26.41
2 Mining	0.22	0.17	1.11	28.03	8.29	29.42			10.00	10.12		128.43	215.79
3 Utilities	0.07	2.68	0.40	5.06	7.18	21.04			20.55	304.31		11.24	372.53
4 Construction	1.41	2.85	44.65	378.25	112.95	106.77			156.06	127.05		1562.63	2492.62
5 Spacecraft mfg	0.13	3.93	2.28	21.32	79.00	19.27			16.47	6.78		2048.77	2197.95
6 Services	2.15	6.62	65.88	325.70	356.21	519.31			1075.71	295.08		1264.90	3911.56
7 Labor Income	5.13	59.72	100.77	465.45	583.64	1383.58							2598.29
8 Property Income	2.54	59.13	12.31	207.38	252.68	760.45							1294.49
9 Households							2000.30	800.00		86.00	1157.39		4043.69
10 Government							150.00	367.00	2526.00		0.00		3043.00
11 Capital							0.00	127.49	0.00	996.78	0.00	32.86	1157.13
12 Trade (imports)	8.80	80.67	145.05	1049.00	797.99	1070.92	448.00	0.00	236.60	1216.80	0.00		5053.83
Total	26.45	215.79	372.53	2492.62	2197.94	3911.56	2598.30	1294.49	4043.39	3043.00	1157.39	5053.83	26407.29

# SAMs and National Income and Product Accounts (NIPA)

# Goal: Align SAM with NIPA

## NIPA example T-account

### Account 3. Personal Income and Outlay Account

Line			Line		
1	Personal current taxes (4–15).....	1,354.3	10	Compensation of employees, received.....	7,440.8
2	Personal outlays.....	9,590.3	11	Wage and salary disbursements.....	6,018.2
3	Personal consumption expenditures (1–15).....	9,224.5	12	Domestic (1–3 less 5–11).....	6,015.3
4	Personal interest payments (3–20).....	238.0	13	Rest of the world (5–3).....	2.9
5	Personal current transfer payments.....	127.8	14	Supplements to wages and salaries (1–5).....	1,422.6
6	To government (4–25).....	78.9	15	Employer contributions for employee pension and insurance funds.....	970.7
7	To the rest of the world (net) (5–17).....	48.9	16	Employer contributions for government social insurance.....	451.8
8	Personal saving (6–9).....	38.8	17	Proprietors' income with inventory valuation and capital consumption adjustments (2–9).....	1,006.7
			18	Rental income of persons with capital consumption adjustment (2–10).....	54.5
			19	Personal income receipts on assets.....	1,796.5
			20	Personal interest income (2–2 and 3–4 and 4–7 and 5–5 less 2–21 less 4–21 less 5–13).....	1,100.2
			21	Personal dividend income (2–16 less 4–22).....	696.3
			22	Personal current transfer receipts.....	1,612.5
			23	Government social benefits (4–4).....	1,585.3
			24	From business (net) (2–6).....	27.2
			25	Less: Contributions for government social insurance (4–19).....	927.6
9	<b>PERSONAL TAXES, OUTLAYS, AND SAVING</b> .....	<b>10,983.4</b>	26	<b>PERSONAL INCOME</b> .....	<b>10,983.4</b>

from U.S. BEA – “Measuring the Economy: A Primer on GDP and the National Income and Product Accounts,” 2007



# Updating IMPLAN's SAM

---

- Which NIPA accounts does IMPLAN SAM include?
- How to determine the interaction of T-accounts?
- NIPA usually does not make this clear.
- The task is to test different relationships until you have determined a set of relationships that holds for any year.
- This is inherently an ad-hoc process.

# Regional SAMs

---

- Result is a regional NIPA analogue – a set of T-accounts for every IMPLAN model.
- Adds an account that does not exist in U.S. SAM: Domestic Trade.
- Regional personal income, or regional balance of payments, for example, can be calculated from a SAM.
- Sum of all state SAMs = U.S. SAM.

# Balancing the SAM

- SAM construction cannot be fully determined before building a model:
  - Combining regions
  - Customizing model
- Identify a transaction for each account to serve as residual:
  - Test of accuracy for U.S. is whether residual matches corresponding NIPA value.
  - Choose residual as data point for which we don't have sub-national empirical estimates, e.g., personal savings by region, net flow of savings from other regions, etc.

Paying	Receiving	Transfer Type	NIPA Correspondence	Notes
14001	12001	15011	Nipa 3.3:27	This is SL savings.
12001	12002	15010	Nipa 3.17:30	SL Ed. This NIPA table never is released in time, so this value is projected and won't perfectly match NIPA.
14001	12003	15011	Nipa 3.9.5:35	Gross SL investment
14001	11001	15011	Nipa 3.2:33	This is Fed savings.
11001	11002	15010	Nipa 3.10.5:24 – 3.30.5:32	Defense consumption spending (output minus own-account investment)
14001	11003	15011	Nipa 3.9.5:19 + 3.9.5:27	Gross Fed investment
10000	14001	15011	Nipa 2.1:34	Personal savings
13001	14001	15011	Nipa 5.1:4	This is net retained earnings
25001	14001	15011	Nipa 5.1:35	Net lending/borrowing (inherently is FT b/c balances FT account, and this is net lending and borrowing across the whole country, so any remaining borrowing/lending can come only from abroad.
14001	14002	15034	Nipa 5.2.5:25	Net change in inventory

# Commuting

# Commuting: Gross Flows

---

- Current IMPLAN SAMs:
  - Net flows.
  - Sub-national SAMs consolidate all commuting in the Domestic Trade account.
- New IMPLAN SAMs:
  - Gross flows – see total in-commuting and total out-commuting for state and county models.
  - Foreign commuting stays in the Foreign Trade account.
- Consequences:
  - Greater accuracy.
  - Easier to use your own estimated commuting rate.
  - Lower induced effects, *ceteris paribus*.

# Other plans and possibilities



# Plans and Possibilities

---

- Initial launch
  - SAM customization to enable contribution analysis.
  - Other SAM customizations.
- New IMPLAN SAMs:
  - Estimated inter-regional gross flows of capital income (PI + OPI).
  - Options for managing negative values.

Any questions?

# IMPLAN's Social Accounting Matrix (SAM)

MCRSA 49<sup>th</sup> Annual Meeting

June 7-8, 2018

Kansas City, MO

IMPLAN