

Lecture XXXII: Input-Output Multipliers and IMPLAN

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1 More Detail on Input-Output

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- To pick up the discussion of the input-output model introduced in Lecture XXXI consider three possible uses of each output in the final demand – $C + I + G$ (C - consumption, I - investment, and G government).
- To this we add exports (E) yielding

$$\begin{aligned}x_1 &= x_{11} + x_{12} + c_1 + i_1 + g_1 + e_1 \\x_2 &= x_{21} + x_{22} + c_2 + i_2 + g_2 + e_2\end{aligned}\tag{1}$$

- Working out a table

Table: Complete Table

	Technical Coefficients		Final Demand				Total Goods
	Sector 1	Sector 2	Cons.	Inv.	Gov.	Export	
Sector 1	x_{11}	x_{12}	c_1	i_1	g_1	e_1	x_1
Sector 2	x_{21}	x_{22}	c_2	i_2	g_2	e_2	x_2

- To modify this structure a little bit further, in total value space, the total value from sector 1 (agriculture) is x_1 , the total amount used to produce this value is $x_{11} + x_{21}$. Thus, the total value added (v_1) by the activity is

$$x_1 - (x_{11} + x_{21}) = v_1 \quad (2)$$

- this value added is then paid out in labor services (l_1) or rents (n_1) in this simple model

$$\begin{aligned} x_1 - (x_{11} + x_{21}) &= v_1 = l_1 + n_1 \\ \Rightarrow x_1 &= x_{11} + x_{21} + l_1 + n_1 + m_1 \end{aligned} \quad (3)$$

- The fully modified tableau is then depicted as

Table: Complete Table

	Technical Coefficients		Final Demand				Total Goods
	Sector 1	Sector 2	Cons.	Inv.	Gov.	Export	
Sector 1	x_{11}	x_{12}	c_1	i_1	g_1	e_1	x_1
Sector 2	x_{21}	x_{22}	c_2	i_2	g_2	e_2	x_2
Labor	l_1	l_2	l_C	l_I	l_G	l_E	L
Rents	n_1	n_2	n_C	n_I	n_G	n_E	N
Imports	m_1	m_2	m_C	m_I	m_G	m_E	M
Total Outlay	x_1	x_2	C	I	G	E	X

- I_C - Payments for domestic help.
- I_G - Payments (ages) to government workers
- Gross Output - $X = x_1 + x_2 + L + N + M$
- Gross Outlay - $X = x_1 + x_2 + C + I + G$
- In national income accounting

$$\begin{aligned}
 x_1 + x_2 + L + N + M &= x_1 + x_2 + C + I + G \\
 L + N + M &= C + I + G \\
 L + N &= C + I + G + (E - M)
 \end{aligned}
 \tag{4}$$

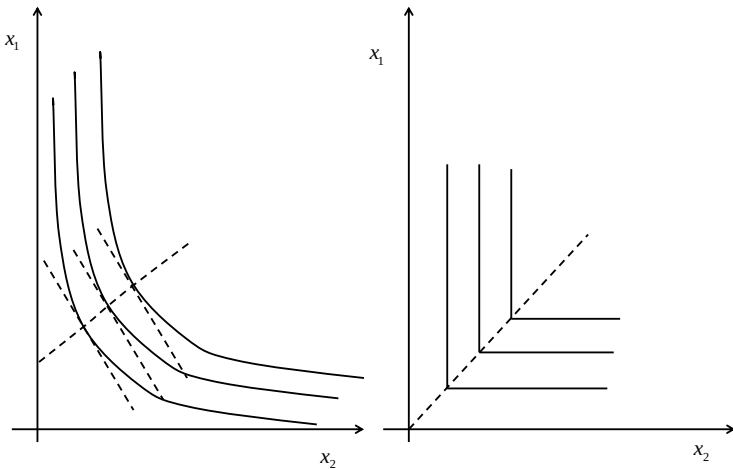


Figure: Isoquants

Table: IMPLAN Example Table

Sector	Ag.	Mining	Utilities	...	Government
11 Ag, Forestry, Fish & Hunting	4,119,056	1,045	15	...	3
21 Mining	444	3,159	0	...	1,962
22 Utilities	602,401	198,737	13,704	...	711,044
23 Construction	372,767	196	2,295,102	...	4,474,594
31-33 Manufacturing	3,884,461	134,653	1,282,921	...	3,980,885
42 Wholesale Trade	1,065,710	48,139	144,404	...	567,288
48-49 Transportation & Warehousing	524,151	244,921	860,498	...	966,749
44-45 Retail trade	51,489	2,053	7,368	...	2,417
51-56 Professional Services	4,666,978	888,930	2,790,049	...	9,612,155
61-72 Educational, Health, Recreation Service	247,930	17,756	835,103	...	1,110,645
92 Government & non NAICS	14,911	147	44,514	...	386,453

Table: IMPLAN Multipliers

Sector	Ag.	Mining		Govt	Cons	Govt	Cap.
11 Ag, Forestry, Fish & Hunting	0.19965	0.00005	...	0.00000	0.49482	0.01900	0.00067
21 Mining	0.00383	0.02726	...	0.01693	0.00548	0.00000	0.00023
22 Utilities	0.00448	0.00148	...	0.00528	0.54284	0.04460	0.00000
23 Construction	0.00046	0.00000	...	0.00547	0.00000	0.20159	0.72243
31-33 Manufacturing	0.00350	0.00012	...	0.00358	0.25761	0.03094	0.12524
42 Wholesale Trade	0.00261	0.00012	...	0.00139	0.54598	0.03005	0.04515
48-49 Transportation & Warehousing	0.00265	0.00124	...	0.00488	0.42572	0.04252	0.02518
44-45 Retail trade	0.00006	0.00000	...	0.00000	0.91736	0.00014	0.02065
51-56 Professional Services	0.00155	0.00030	...	0.00319	0.50545	0.03293	0.01440
61-72 Educational, Health, Rec Service	0.00014	0.00001	...	0.00065	0.89966	0.01500	0.00000
92 Government & non NAICs	0.00002	0.00000	...	0.00052	0.02659	0.92154	0.00024

- Employment estimation – For the current level of output for an industry (say agriculture), we have an estimated number of employees

$$\tilde{l}_1 = \frac{x_1}{\hat{l}_1} \quad (5)$$

- For a new level of production $\hat{x}_1$, we can compute the new level of employment as

$$\tilde{l}_1 = \frac{\hat{x}_1}{\hat{l}_1} \quad (6)$$