

The Input –Output Method

Input-output models are a device for organizing the basic accounting relations that describe the production sector of the economy. The input-output method starts with a very simple idea. All the sectors of the economy are tied together by virtue of economic relations called “linkages” and the production of a good or service can be described by a “recipe”. The ingredients of this recipe are the outputs of the other sectors of the economy as well as the primary inputs such as labor, capital, and other raw resources. A simple example will serve to demonstrate. Consider a commodity such as steel. A particular economy with a given technology will allocate the steel it produces in a unique way. Some of the steel will be used to make equipment for making more steel (e.g., rolling mill equipment), some will be exported (or some will be imported), and some will be used in the manufacture of cars, buildings, bridges, etc. Obviously, all of the steel that is allocated or used up must add up to all of the steel made. If the total amount of steel made is 1,000,000 tons an allocation might be as follows:

Steel used to make steel	100,000 tons
Steel used to make cars	500,000 tons
Steel used to make bridges	100,000 tons
Steel used to make buildings	290,000 tons
Steel sold to households	<u>10,000 tons</u>
TOTAL steel production/allocation	1,000,000 tons

The steel used to produce other commodities in the economy reflects the “linkages” mentioned above. The extent to which the economy is an integrated whole depends on the strength of these linkages. Linkages that tie steel to the output of more finished products are known as forward linkages while those (not shown in this example) that relate steel to basic raw materials and labor are known as backward linkages. A similar table could be constructed for every commodity in the economy and, taken together, these would describe the entire economy. A common unit of measurement is necessary if the sectors are to be linked into a single model of the economy. Thus, all inputs and outputs are measured in dollar units rather than physical units. To make use of all of these tables for the various commodities in the economy requires an analytical device that relates all of the backward and forward linkages in the economy in a manner which permits investigation of “what if” scenarios. This analytical device is the input-output table.

A schematic representation of an input-output model is represented in Figure A2-1. This figure shows the economy organized into several key blocks for presentation. The shaded area is the production sector of the economy. The Final Demand for the products is broken down into Consumption, Investment, Government, and Export. Total Output is the sum of the Intermediate Production (what is sold by Sector A to Sector A and to Sector B) and the Final Demand. A simple numerical example is

represented in Figure A2-2. The row sums of the matrix denote the intermediate demands for the outputs of each sector - thus, the row sum for sector 1 denotes the output of this sector that is required as inputs to sector 1 and the other sectors. The column sums denote the payments for intermediate goods used in the production of the output of sector 1. In addition to the intermediate demand there are several categories of final demand illustrated in the figure. Household consumption, investment, and government expenditures are all final demands in that they use the output of a sector directly and not as an input to another product. In addition to the payments for intermediate inputs there are several categories of primary inputs such as payments for labor and other value added components. Finally, exports (E_i) and imports (M_i) appear in the model. Total gross output is the sum of intermediate demand, final demand, and exports. Total gross outlay is the sum of payments for intermediate inputs, labor, other value added components, and imports.

Figure A2-1 A Stylized Input-Output Model of a Regional Economy

	Sector A	Sector B	Consumption	Investment	Gov=t	Exports	Total Output
Sector A							
Sector B							
Wages							
Return to Capital							
Indirect Taxes							
Imports							
Total Payments							

Figure A2 – 2 A Simple Numerical Example

	Sector A	Sector B	Consumption	Other Final Demand	Total Output
Sector A	150	500	50	300	1000
Sector B	200	100	400	1300	2000
Wages	300	500	50	150	1000
Other Value Added	350	900	500	400	2150
Total Payments	1000	2000	1000	2150	6150

Multipliers – measure the degree of interdependence in the regional economy.

Sector Level Type I and II Output Multipliers – 5 county region (Watauga, Ashe, Avery, Catawba, Wilkes)

Sector Name	Output Multiplier	
	Type I	Type II
Primary Industries	1.202	1.313
Construction and Repair	1.250	1.632
Food Processing	1.584	1.758
Manufacturing	1.210	1.378
Furniture Making	1.219	1.554
Wholesale & Retail Trade	1.224	1.678
Transportation, Communication, & Utilities	1.327	1.614
Business Services	1.255	1.708
Finance, Insurance, & Real Estate	1.169	1.468
Education (Private) and Health Services	1.234	1.724
Recreation Services	1.481	1.661
Personal Services	1.277	1.589
Government Services	1.028	1.795

Type I – Direct plus Indirect Impacts of \$1 in the sector (backward and forward linkages)

Type II – Direct plus Indirect plus Induced Income Impacts (backward, forward, and final demand linkages)

