Input-Output Analysis

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Session 2.2

Closed IO Models

Open model

- Previous IO structure is called OPEN MODEL
  Components of final demand are considered exogenous
  to the system

- But, there is the CIRCULAR FLOW in the economy
  Leading to the endogeneity of economic accounts

Circular flow in the economy

Factors payment

Factors (labor etc)

Firms

Households

Final goods
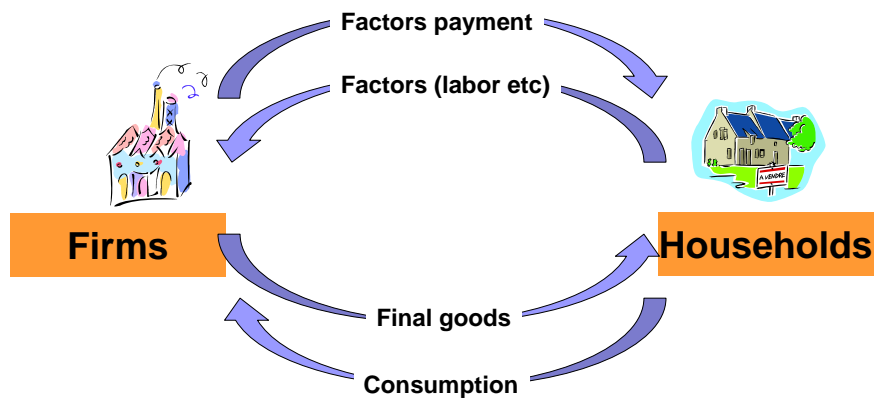
Consumption

Closing the IO table

- Household is considered to carry out production process
- Consumption is the input to the process. The output is labor services (whose factor's payment is wages/salaries)

- Closing the IO table with respect to household account
- Include the consumption column and wages/salaries row into the intermediate transaction matrix

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Hypothetical example – transaction table

		Production Sectors		Final Demand		Total Output
		1	2	C	I	X
Production Sector	1	100	400	300	200	1000
	2	300	600	500	600	2000
Primary Input	L	200	700			
	N	400	300			
Total Input		1000	2000			

Put Zero in this cell. Now the dimension of the Intermediate input is n+1

$$\mathbf{A} = \mathbf{Z}(\hat{\mathbf{X}})^{-1} = \begin{bmatrix} 100 & 400 & 300 \\ 300 & 600 & 500 \\ 200 & 700 & 0 \end{bmatrix} \begin{bmatrix} \frac{1}{1000} & 0 & 0 \\ 0 & \frac{1}{2000} & 0 \\ 0 & 0 & \frac{1}{800} \end{bmatrix} = \begin{bmatrix} 0.1 & 0.2 & 0.375 \\ 0.3 & 0.3 & 0.625 \\ 0.2 & 0.35 & 0 \end{bmatrix}$$

The Leontief inverse

Previously
(open model)

$$(\mathbf{I} - \mathbf{A})^{-1} = \begin{bmatrix} 1.228 & 0.351 \\ 0.526 & 1.579 \end{bmatrix}$$

Closed model

$$(\mathbf{I} - \mathbf{A})^{-1} = \begin{bmatrix} 1.8780 & 1.2927 & 1.5122 \\ 1.6585 & 3.2198 & 2.6341 \\ 0.9561 & 1.3854 & 2.2244 \end{bmatrix}$$

Output Multiplier

Induced effect

- In the closed model, in addition to the DIRECT and INDIRECT effects,

  there is another additional INDUCED EFFECT

- Output multiplier of Sector 1
  - Previously 1.764
  - In close model 4.4926
  - The difference is induced effect 2.7286

- High induced effect signifies the importance of consumption in the economy

Miyazawa Approach

Miyazawa Approach

- Miyazawa suggests that the consumption part of the IO can be disaggregated to reflect income groups of households
- It is possible to stratify society according (for an example) to LOW, MEDIUM, and HIGH income groups
- Therefore, we have column of consumption divided into three columns
- The wages/salaries row is also divided into three rows comprising wages/salaries received by respective household groups

Table modification

		Production Sectors		Final Demand		Total Output
		1	2	C	I	X
Production Sector	1	100	400	300	200	1000
	2	300	600	500	600	2000
Primary Input	L	200	700			
	N	400	300			
Total Input		1000	2000			

Usually put zeros here -- akward!

Data requirements

- Households in the country need to be stratified according to the groups

- In each group, we need consumption and labor data
- Ratios are used to split the total values in each cell

- Alternative group structure: low-medium-high, decile, standard-deviation, urban-rural, etc.

Example

- Aceh province IO data in Miyazawa framework

- Household is divided into Low – Medium – High categories

- The new output multiplier is analyzed and compared to those obtained from the regular IO table

Output multipliers compared

S e c t o r s	Standard IO	Miyazawa
Rice, seeds and flour milling industries	1,94	3,23
Food, beverages & tobacco industries	1,89	3,11
Sawmill and wooden materials industry	1,84	3,09
Restaurant	1,82	2,95
Fish oil industry	1,72	3,02
Government and defense service		4,2
Education service		3,58
Social service		3,43
Quarrying materials industry		3,39
Insurance and financial service		3,26

Policy simulations

- **Skenario 1**: 36% increase in final demand of oil & gas sector

- **Skenario 2**: 36% increase in final demand of oil refinery industry

- **Skenario 3**: increase in final demand of transportation sector (land 40%, sea & river 25%)

Impact analysis (% increase)

	Income groups		
	Low	Medium	High
Skenario 1	17,53	19,55	19,55
Skenario 2	16,59	14,87	14,87
Skenario 3	2,26	2,21	2,21

Endogenize other economic accounts?

		Production Sectors		Final Demand		Total Output
		1	2	C	I	X
Production Sector	1	100	400	300	200	1000
	2	300	600	500	600	2000
Primary Input	L	200	700			
	N	400	300			
Total Input		1000	2000			

?????

Mathematically speaking: yes, we can. But economically, zeros in these cells are akward. No economic meaning!