11.481J / 1.284J / ESD.192J Analyzing and Accounting for Regional Economic Growth
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Regional Input-Output Models

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Assumptions

• Constant returns to scale
• Homogeneous products with no joint production
• Constant direct input (technology) coefficient
• A demand-driven model
### National input-output table

<table>
<thead>
<tr>
<th>Purchasing industries</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image_url" alt="Diagram" /></td>
</tr>
</tbody>
</table>

- **FD** = final demands, including:
  - Personal consumption expenditures
  - Gross private capital formation
  - Net inventory change
  - Net foreign exports
  - Federal, state and local gov’t purchase

- **VA** = Value added, including:
  - Wages and salaries
  - Rent
  - Depreciation
  - Taxes etc.

- **m X m**
- **Gross National Product**
- **Gross National Income**

**m** = number of industries
**Balanced Regional Input-Output Tables**

<table>
<thead>
<tr>
<th></th>
<th>Export to other regions</th>
<th>Import from other regions</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing industries</td>
<td>(+)</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Producing industries</td>
<td>m X m</td>
<td>m x 1</td>
<td>m x 1</td>
</tr>
<tr>
<td>VA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Region 1

- Sum of each row = sum of each column
- Assumption: Technology coefficients differ by region
- \( m = \) number of industries
<table>
<thead>
<tr>
<th>Purchasing industries</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producing industries</td>
<td></td>
</tr>
<tr>
<td>VA</td>
<td></td>
</tr>
</tbody>
</table>

- Sum of each row: total consumption only by purchasers within the region.
- Sum of each column: total input requirements of each industry, regardless of the location of production.
- Sum of each row ≠ sum of each column

$m = \text{number of industries}$
Regional Input-Output Tables

For a regional table, the sums of corresponding rows and columns will not necessarily be equal.

The difference is attributable to interregional trade.

\[ m \times m \]

\[ m = \text{number of industries} \]
\[ n = \text{number of regions} \]
### Interregional Input-Output table

![Interregional Input-Output Table Diagram](image)

**Figure by MIT OpenCourseWare, based on Polenske (1963).**
Multiregional input-output tables—trade matrices

Assumption: Technology coefficients are the same for all regions

- Sum of each row: For a given industry, total outflows from a region.
- Sum of each column: for a given industry, total inflows into a region.
- Sum of each row ≠ sum of each column
- The difference is net foreign export

m = number of industries
n = number of regions
## Commodity Flow Table

<table>
<thead>
<tr>
<th>Receiving region</th>
<th>Foreign export (+)</th>
<th>Foreign import (-)</th>
<th>Total output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping region</td>
<td>n X n</td>
<td>n x 1</td>
<td>n x 1</td>
</tr>
<tr>
<td>Regional Demand</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Industry 1**

n = number of regions
### Multiregional Input-Output Table

<table>
<thead>
<tr>
<th>Industry 1</th>
<th>Industry 2</th>
<th>...</th>
<th>Industry m</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>...</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>m</td>
<td>m</td>
<td></td>
<td>m</td>
<td>m</td>
</tr>
<tr>
<td>VA</td>
<td>VA</td>
<td></td>
<td>VA</td>
<td>VA</td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
<td></td>
<td>Total</td>
<td>Total</td>
</tr>
</tbody>
</table>

*Figure by MIT OpenCourseWare, based on Polenske (1963).*