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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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Reference: Karen R. Polenske. 1995. Leontief's Spatial Economic Analyses, *Structural Change and Economic Dynamics* 6: 309-318

# Assumptions

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

# National input-output table

	Purchasing industries	FD
Producing industries	m X m	Gross National Product
VA	Gross National Income	

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 = number of industries

# Balanced Regional Input-Output Tables

		Purchasing industries	Export to other regions (+)	Import from other regions (-)	FD
Producing industries		$m \times m$	$m \times 1$	$m \times 1$	
	VA				

**Region 1**

$m = \text{number of industries}$

Sum of each row =  
sum of each column

Assumption:  
Technology coefficients  
differ by region

# Unbalanced Regional input-output Table

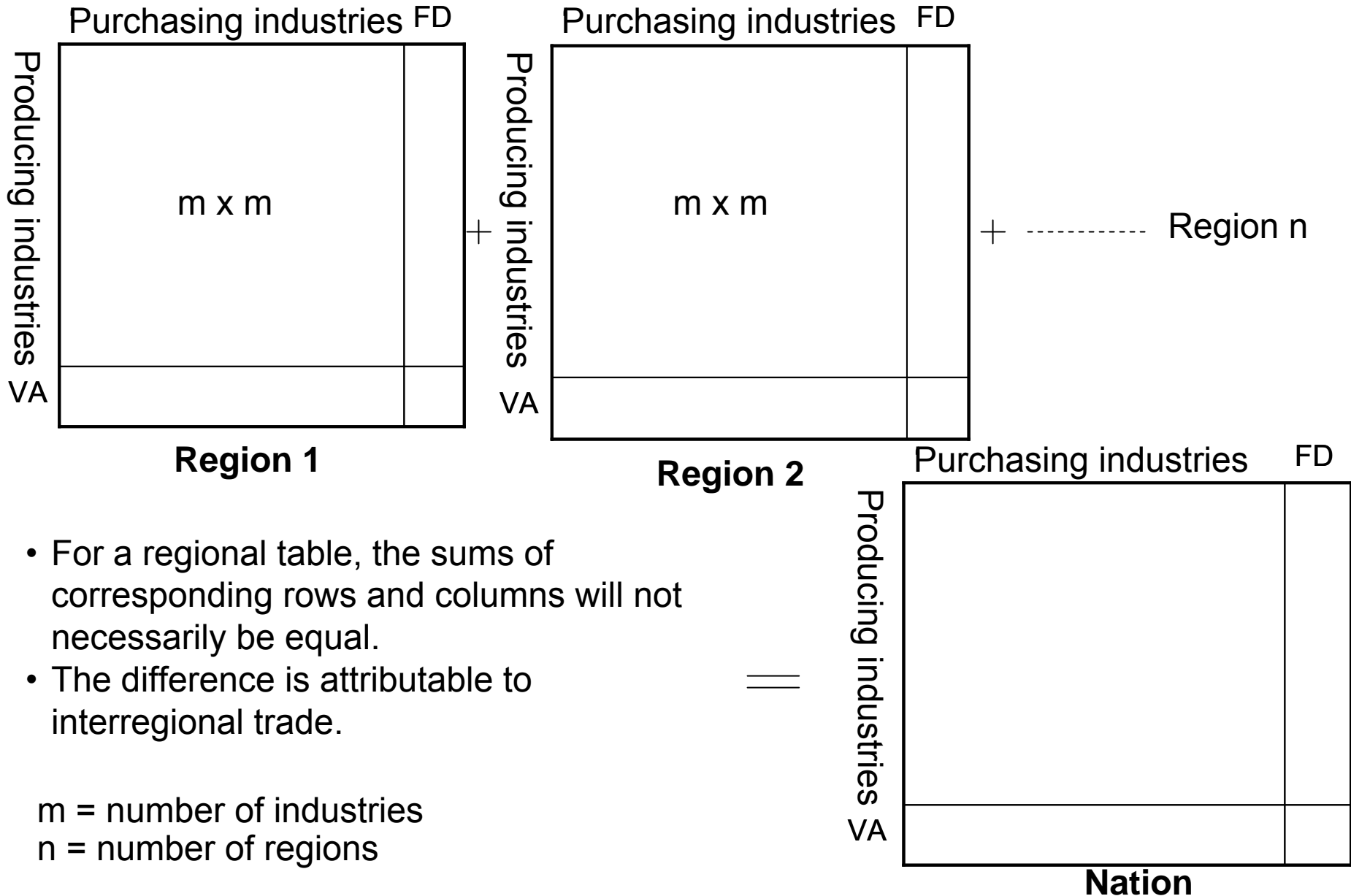
	Purchasing industries	FD
Producing industries	$m \times m$	
VA		

**Region 1**

- 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  $\neq$  sum of each column

$m$  = 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.

$m$  = number of industries  
 $n$  = number of regions

# Interregional Input-Output table

	<i>Region 1</i>			<i>Region 2</i>			...	<i>Region n</i>			<i>Total</i>			Total output		
	1	...	m	FD	1	...	m	FD	1	...	m	FD	1		...	m
<i>Region 1</i>	1															
	...															
	m															
VA																
<i>Region 2</i>	1															
	...															
	m															
VA																
...																
<i>Region n</i>	1															
	...															
	m															
VA																
<i>Total</i>	1															
	...															
	m															
VA																
Total																
input																

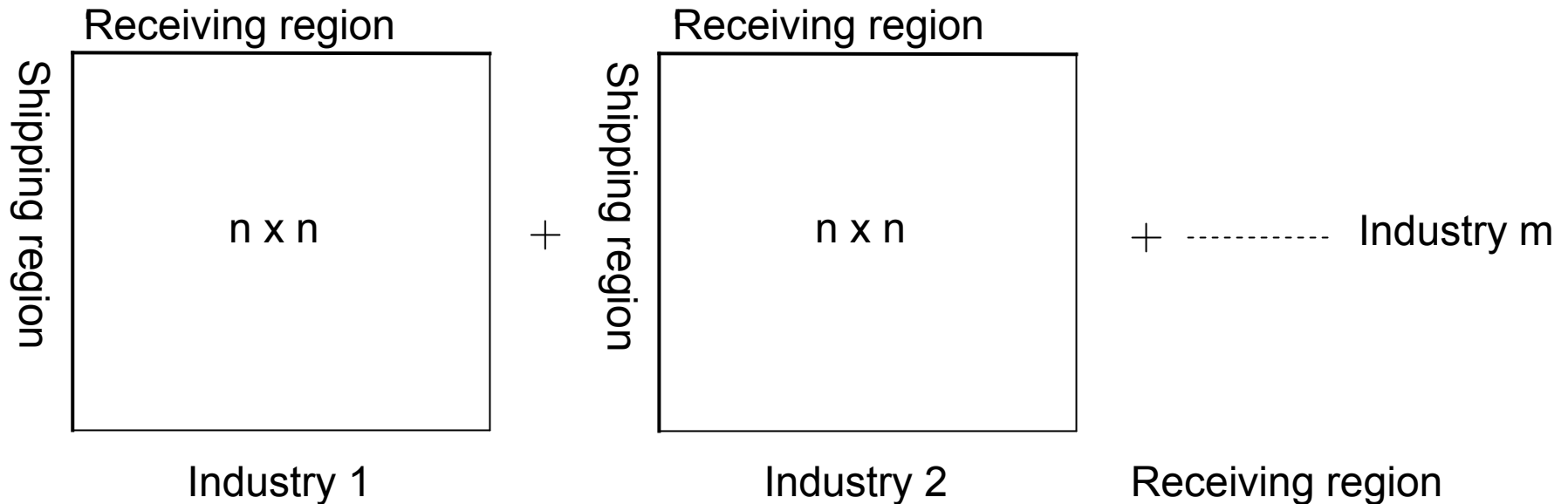
The table is divided into several key sections:
 

- Regional IO tables:** Indicated by a red dashed box and arrow, this section encompasses the  $m \times m$  blocks for each region (Region 1, Region 2, ..., Region n).
- National flow table:** A red dashed box highlights the  $m \times m$  blocks in the 'Total' row and column, which represent the aggregate national flows.
- GNP and GNI:** The 'Total' row and column are associated with Gross National Product (GNP) and Gross National Income (GNI) respectively.

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



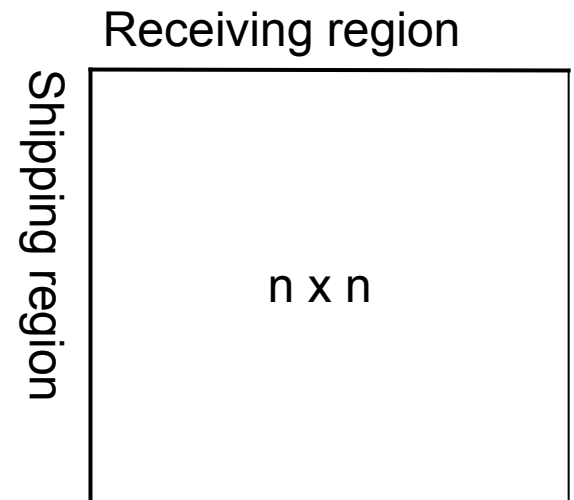
# Multiregional input-output tables— trade matrices



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  $\neq$  sum of each column
- The difference is net foreign export

=



Total

$m$  = number of industries  
 $n$  = number of regions

# Commodity Flow Table

		Receiving region	Foreign export (+)	Foreign import (-)	Total output
Shipping region		$n \times n$	$n \times 1$	$n \times 1$	
	Regional Demand				

**Industry 1**       $n = \text{number of regions}$

# Multiregional Input-Output table

