International Trade

L11

Find the coefficient matrix

	Banking	Insurance	Education and Research	Total Output
Banking	80000	8000	30000	**122000**
Insurance	21000	6000	3000	**30000**
Education and Research	0	0	10000	**110000**

Find the coefficient matrix

	Banking	Insurance	Education and Research
Banking	$\frac{80000}{122000} = 0.65$	$\frac{8000}{30000} = 0.26$	$\frac{30000}{110000} = 0.27$
Insurance	$\frac{21000}{122000} = 0.17$	$\frac{6000}{30000} = 0.2$	$\frac{3000}{110000} = 0.02$
Education and Research	$\frac{0}{122000} = 0$	$\frac{0}{30000} = 0$	$\frac{10000}{110000} = 0.09$

Leontief Input-Output Model

- Suppose an economy consists of two industries- steel and automobiles. In order to produce automobiles, the economy requires steel and automobiles. Similarly, in order to produce steel, the economy requires automobiles and steel. To produce one-rupee worth of steel, the steel industry requires 0.2 paisa worth of steel and 0.7 paisa worth of automobiles. To produce one-rupee worth of automobile, the automobile industry requires 0.5 paisa worth of steel and 0.1 paisa worth of automobiles. Also suppose that the economy has to export ` 15000 worth of steel and ` 5000 worth of automobiles.
- a) Express the above problem as an input-output model.
- b) How much of worth of steel and automobiles should be produced to meet the total demand?

Leontief Input-Output Model

- Let X be the total steel production and Y be the total automobile production. Let us construct an input-output table to understand the problem more clearly.

	Steel	**Automobile**	**Export (in thousands)**
Steel	0.2	0.5	15
Automobile	0.7	0.1	5

Input Output Model

Let X be the total steel production and Y be the total automobile production. Let us construct an input-output table to understand the problem more clearly

$$X = 0.2X + 0.5Y + 15 - - - - - (1)$$

$$Y = 0.7X + 0.1Y + 5 - - - - - - -(2)$$

$$\begin{bmatrix} X \\ Y \end{bmatrix} = \begin{bmatrix} 0.2 & 0.5 \\ 0.7 & 0.1 \end{bmatrix} \begin{bmatrix} X \\ Y \end{bmatrix} + \begin{bmatrix} 15 \\ 5 \end{bmatrix}$$

$$Z = AZ + E$$

$$Z = (I - A)^{-1}E - - - - - - -(3)$$

Input Output Model

$$|I - A| = \begin{vmatrix} 0.8 & -0.5 \\ -0.7 & 0.9 \end{vmatrix} = (0.8 \times 0.9) - (0.7 \times 0.5) = 0.37$$

$$Adj\ (I - A) = \begin{bmatrix} 0.9 & 0.5 \\ 0.7 & 0.8 \end{bmatrix}$$

$$Z = (I - A)^{-1}E = \frac{Adj\ (I - A)}{|I - A|}E = \frac{1}{0.37}\begin{bmatrix} 0.9 & 0.5 \\ 0.7 & 0.8 \end{bmatrix}\begin{bmatrix} 15 \\ 5 \end{bmatrix} = \begin{bmatrix} 43.235 \\ 39.189 \end{bmatrix}$$