

- An economy has two industries: energy and material. To produce \$1 of energy requires 90¢ of energy and 30¢ of material. To produce \$1 of material requires 20¢ of energy and 30¢ of material.
  - Given an external demand for \$2000 of energy and \$1000 of material, how much of each industry should be produced to meet it?
  - Is the economy productive? Justify your answer.
  - Find the internal consumption when demand is met.
- An economy has two industries: iron and steel. To produce \$1 of iron requires 20¢ of iron and 10¢ of steel. To produce \$1 of steel requires 70¢ of iron and 40¢ of steel.
  - Given an external demand for \$8200 of Iron and \$4100 of Steel, how much of each industry should be produced to meet it?
  - Which industries are profitable?
- An economy has two industries: goods and services. To produce \$1 of goods requires 60¢ of goods and 50¢ of services. To produce \$1 of services requires 30¢ of goods and 10¢ of services.
  - If there is an external demand for \$6300 of goods and \$8400 of services, how much of each industry should be produced to meet it?
  - Is the economy productive? Justify your answer.
- An economy has two industries: services and manufacturing. To produce \$1 of services requires 20¢ of services and 40¢ of manufacturing. To produce \$1 of manufacturing requires 30¢ of services and 10¢ of manufacturing.
  - If there is an external demand for \$900 of services and \$1500 of manufacturing, how much of each industry should be produced to meet it?
  - Find the internal consumption when demand is met.
  - Which industries, if any, are profitable.
- For each of the consumption matrices below, determine which industries are profitable and whether the economy is productive.
  - $C = \begin{bmatrix} .8 & .3 \\ .1 & .6 \end{bmatrix}$
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- Suppose that an economy consists of three industries: a computing service, a statistical service, and an engineering service. For each \$1 of computing that is provided, 30¢ is spent on computing, 10¢ on statistical services and 30¢ on engineering. For each \$1 on statistical service, 20¢ is spent on computing, 40¢ on statistics, and 20¢ on engineering. Each \$1 in engineering takes 30¢ in computing, 10¢ in statistical services, and 30¢ in engineering. Suppose there is an external demand for \$1000 in computing, \$1500 in statistical services, and \$1800 in engineering.
  - Compute  $\det(I - C)$ .
  - Compute  $(I - C)^{-1}$ .
  - How much should each industry produce to meet the demand?

## ANSWERS:

- \$160,000 of energy and \$70,000 of material should be produced.
  - Yes, the economy is productive since  $(I - C)^{-1} \geq 0$ .
  - The economy consumes \$158,000 of energy and \$69,000 of material.
- \$19,000 of Iron and \$10,000 of Steel should be produced.
  - Only iron is profitable.
- The economy should produce \$39000 in goods and \$31000 in services.
  - Yes, the economy is productive since  $(I - C)^{-1} \geq 0$ .
- \$2100 in services and \$2600 in manufacturing should be produced.
  - \$1200 in services and \$1100 in manufacturing is consumed internally.
  - Both industries are profitable.
- Both industries are profitable, and the economy is productive.
  - Only the second industry is profitable, and the economy is productive.
  - Only the second industry is profitable, and the economy is NOT productive.
- $\det(I - C) = .2$
  - $(I - C)^{-1} = \frac{1}{.2} \begin{bmatrix} .4 & .2 & .2 \\ .1 & .4 & .1 \\ .2 & .2 & .4 \end{bmatrix} = \begin{bmatrix} 2 & 1 & 1 \\ .5 & 2 & .5 \\ 1 & 1 & 2 \end{bmatrix}$
  - \$5300 in computing, \$2900 in statistical services and \$6100 in engineering should be produced.