Intermediate Microeconomics. Lecture 7

Income effect

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Response to an Increase in Income

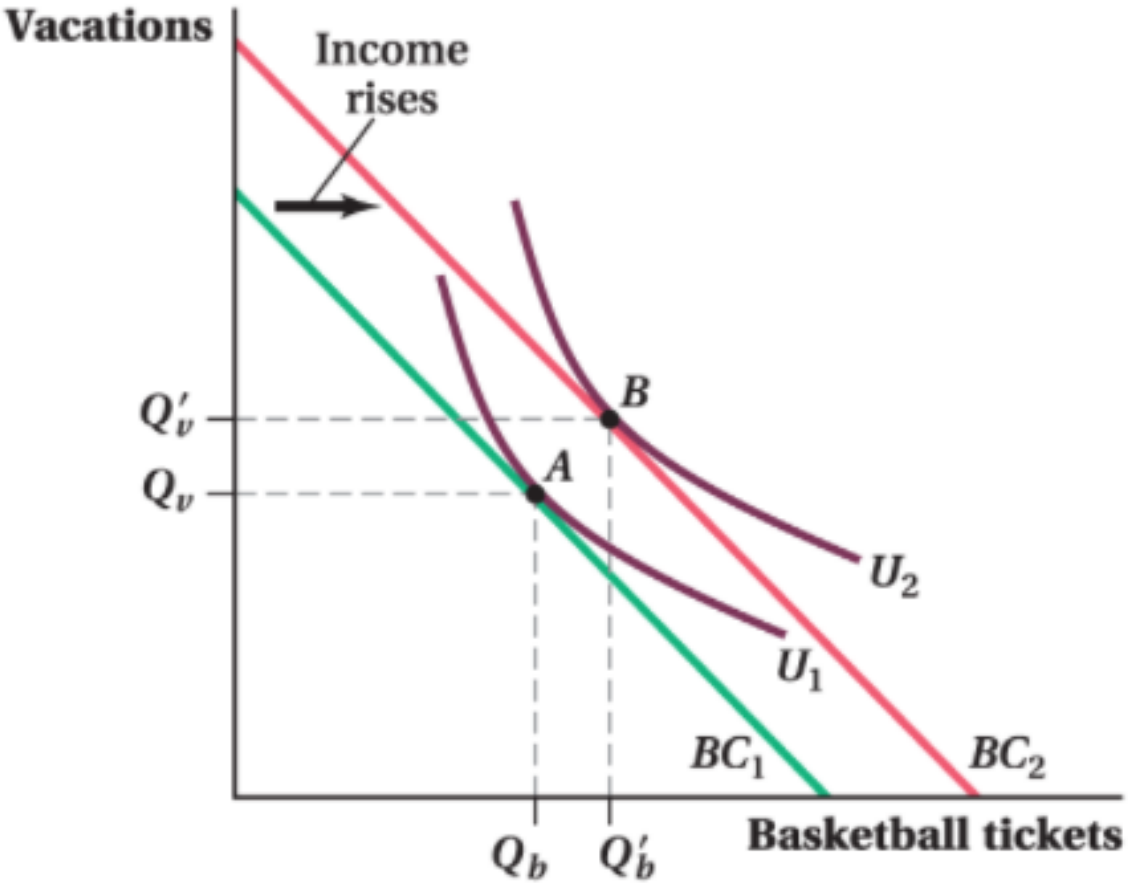

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Figure: Consumer's Response to an Increase in Income

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Normal and Inferior Goods

- Economists call a good for which consumption rises when income rises a **normal good**
- For a normal good, the income effect is positive
- A good for which consumption decreases when income rises is an **inferior good**

Normal and Inferior Goods

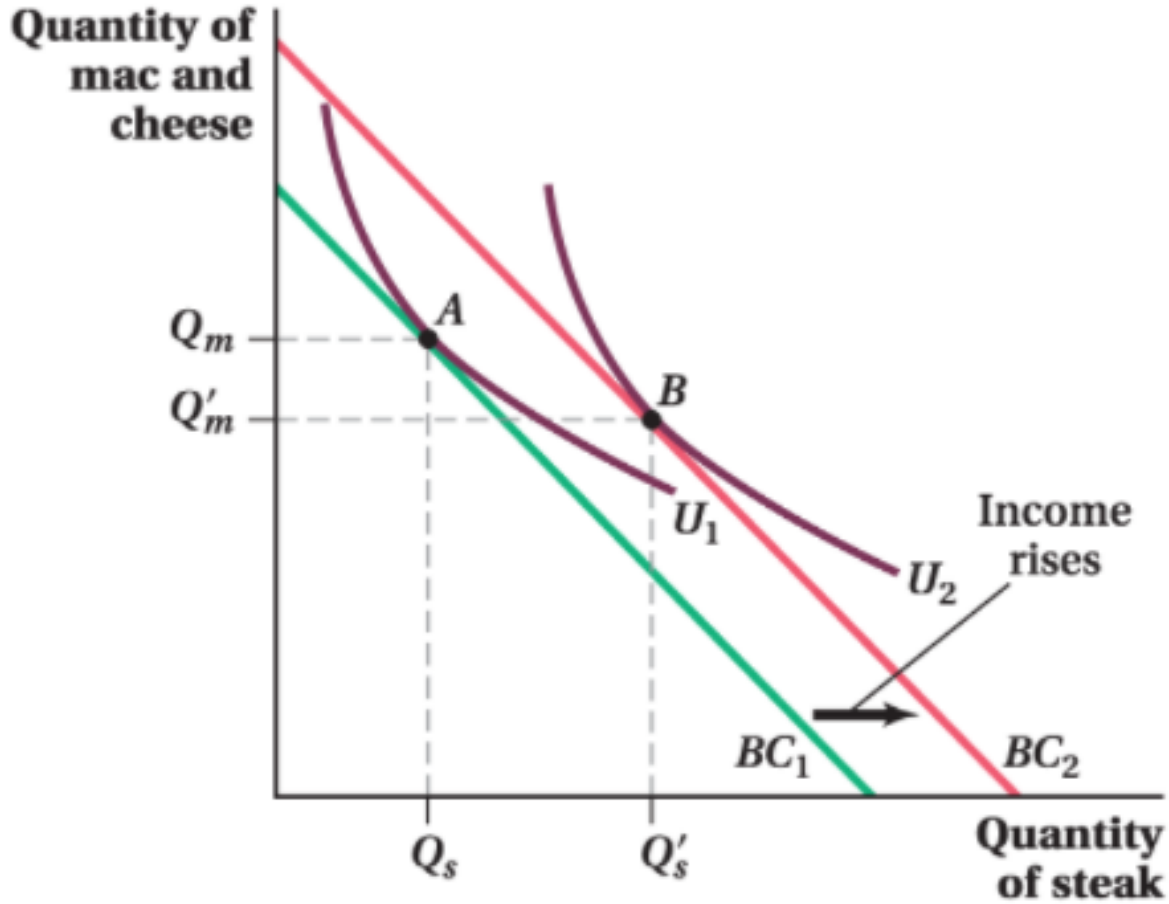

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Figure: Consumer's Response to an Increase in Income When One Good Is Inferior

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Income Elasticities and Types of Goods

- Income elasticity measures the percentage change in the quantity consumed of a good in response to a given percentage change in income

$$E_I^D = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q}$$

- The first ratio in the income elasticity definition is the income effect shown in the equation above $\frac{\Delta Q}{\Delta I}$
  - For normal goods: $\frac{\Delta Q}{\Delta I} > 0$
  - For inferior goods: $\frac{\Delta Q}{\Delta I} < 0$

- Necessity goods: $0 \leq E_I^D \leq 1$
- Luxury goods: $E_I^D \geq 1$

Example

Annika spends all of her income on golf and pancakes. Golf fee is \$10 per round. Pancake mix is \$2 per box. When Annika's income is \$100 per week, she buys 5 boxes of pancake mix and 9 rounds of golf. When Annika's income rises to \$120 per week, she buys 10 boxes of pancake mix and 10 rounds of golf. Determine whether each of the following statements is true or false

- Golf is a normal good, and pancake mix is an inferior good. **FALSE**
- Golf is a luxury good. **FALSE**

$$E_I^D = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q} = \frac{1}{20} \cdot \frac{100}{9} = \frac{5}{9} < 1$$

Example

- Pancakes are a luxury good. **TRUE**

$$E_I^D = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q} = \frac{5}{20} \cdot \frac{100}{5} = 5 > 1$$

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The Income Expansion Path

- Imagine repeating the analysis in the previous section for every possible income level, starting with 0
  - For a given set of prices and a particular set of preferences, find the utility-maximizing bundle for every possible budget constraint
  - Each constraint corresponds to a different income level
- If we draw a line connecting all the optimal bundles it would trace out the income expansion path

The Income Expansion Path

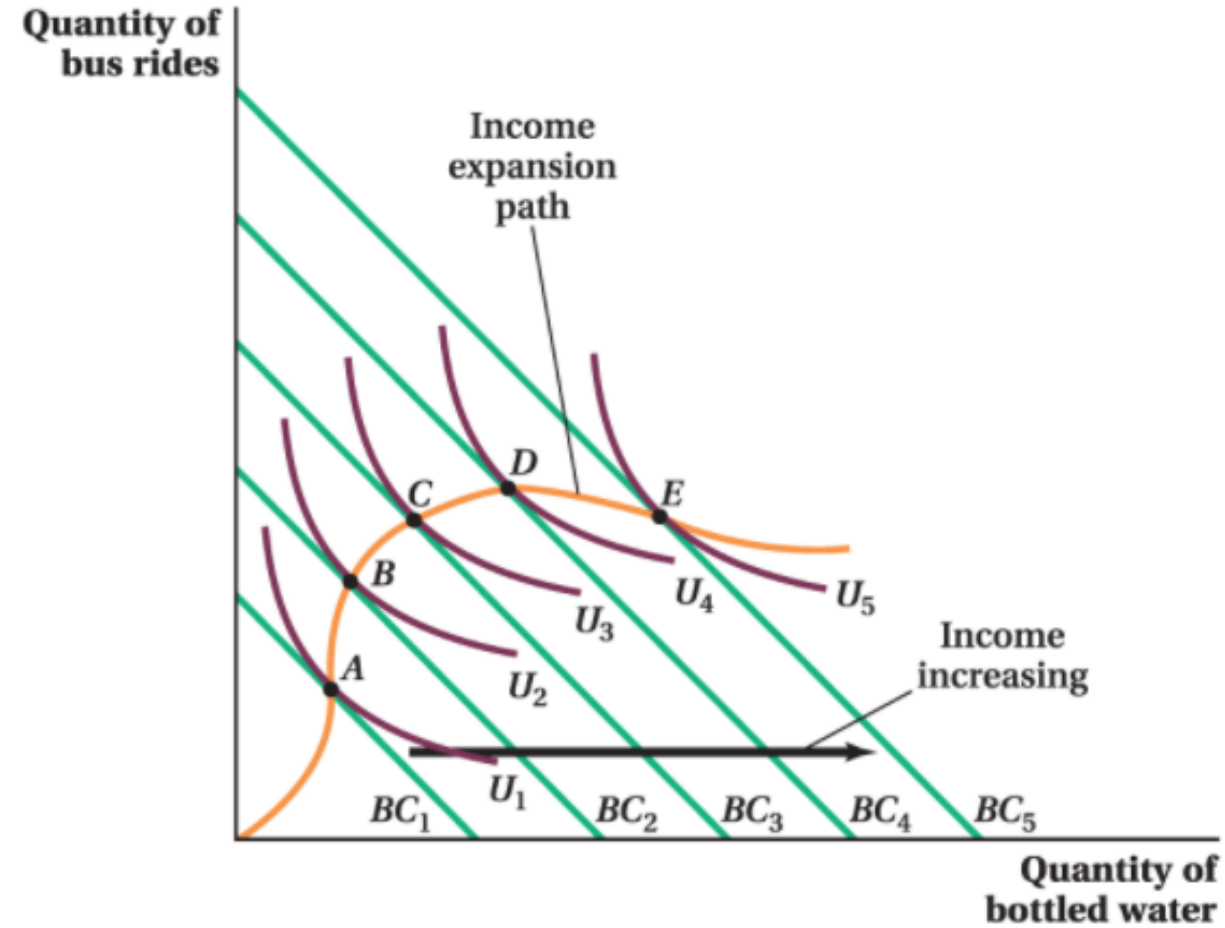

Figure: Income Expansion Path

The Income Expansion Path

- The income expansion path is a curve that connects a consumer's optimal bundles at each income level
- This curve always starts at the origin because when income is zero, the consumption of both goods must also be zero
- When both goods are normal goods, the income expansion path will be positively sloped because consumption of both goods rises when income does
- Remember that whether a given good is normal or inferior can depend on the consumer's income level

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The Engel Curve

A better way to see how the quantity consumed of one good varies with income is to take the information conveyed by the income expansion path and plot it on a graph with income on the vertical axis and the quantity of the good in question on the horizontal axis

The Engel Curve

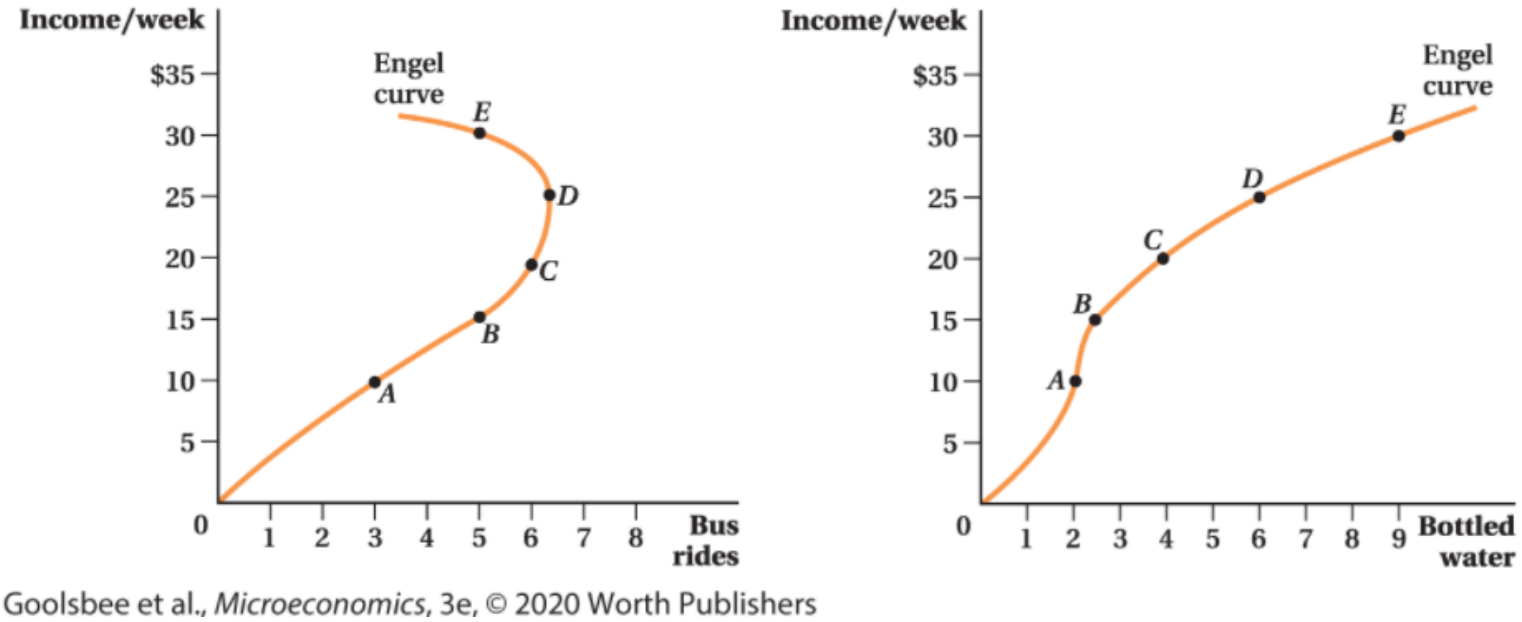

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Figure: Engel Curves Show How Consumption Varies with Income

The Engel Curve

- Engel curves show the relationship between the quantity of a good consumed and a consumer's income
- If the Engel curve has a positive slope, the good is a normal good at that income level
- If the Engel curve has a negative slope, the good is an inferior good at that income

Example: Perfect Substitutes

Consider the utility function for perfect substitutes: $u(x_1, x_2) = ax_1 + bx_2$. Previously we found that the demand function for good 1 will be

$$x_1 = \begin{cases} \frac{m}{p_1} & \frac{p_1}{p_2} < \frac{a}{b} \\ \in [0, \frac{m}{p_1}] & \frac{p_1}{p_2} = \frac{a}{b} \\ 0 & \frac{p_1}{p_2} > \frac{a}{b} \end{cases}$$

- Let us suppose we are in the case where $\frac{p_1}{p_2} < \frac{a}{b}$
- In this case the Engel curve will be a straight line with a slope of p_1: $\boxed{m = p_1 x_1}$

Example: Perfect Substitutes

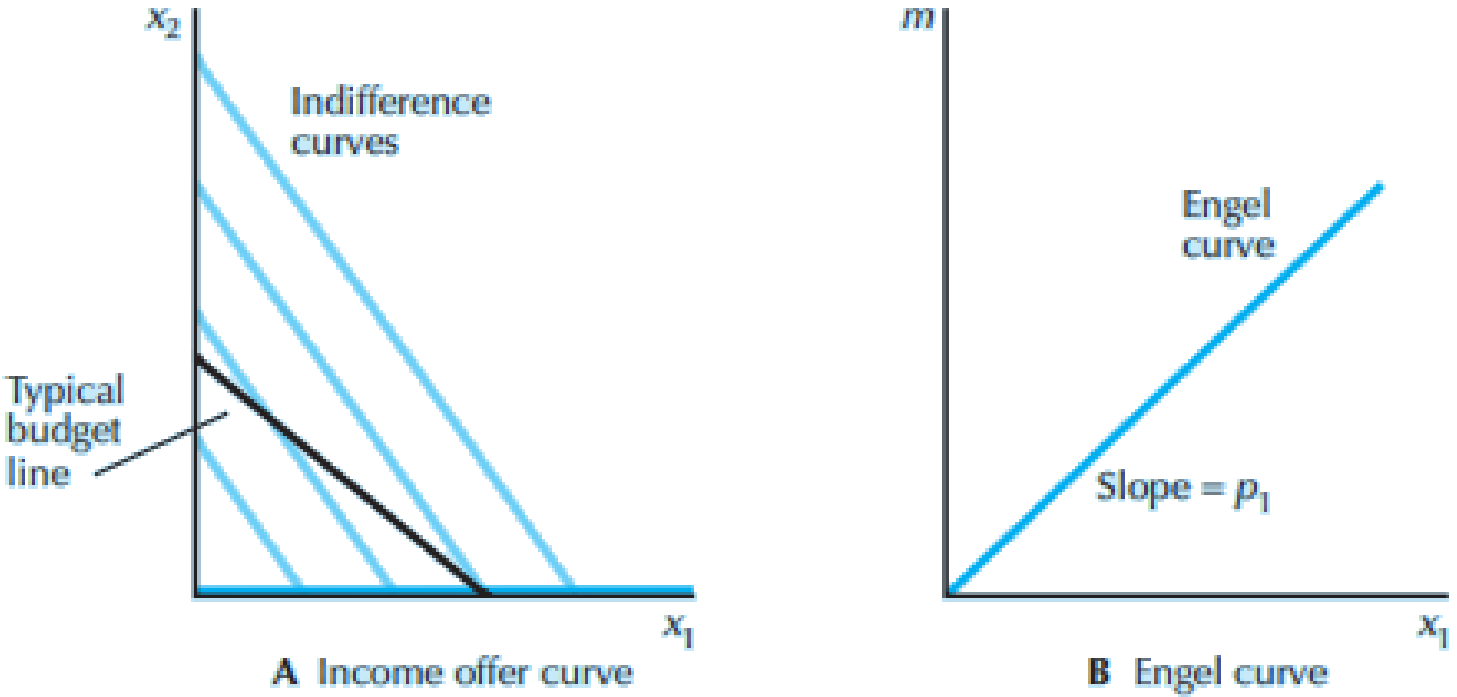

Figure: Perfect substitutes (Source: Varian, Intermediate Microeconomics 8e, 2010)

Example: Perfect Complements

Consider the utility function for perfect substitutes: $u(x_1, x_2) = min\{ax_1, bx_2\}$. Previously we found that the demand function for good 1 will be

$$x_1 = \frac{m}{p_1 + \frac{a}{b}p_2}$$

so the Engel curve is a straight line with a slope of $(p_1 + \frac{a}{b}p_2)$

$$\boxed{m = (p_1 + \frac{a}{b}p_2)x_1}$$

Example: Perfect Complements

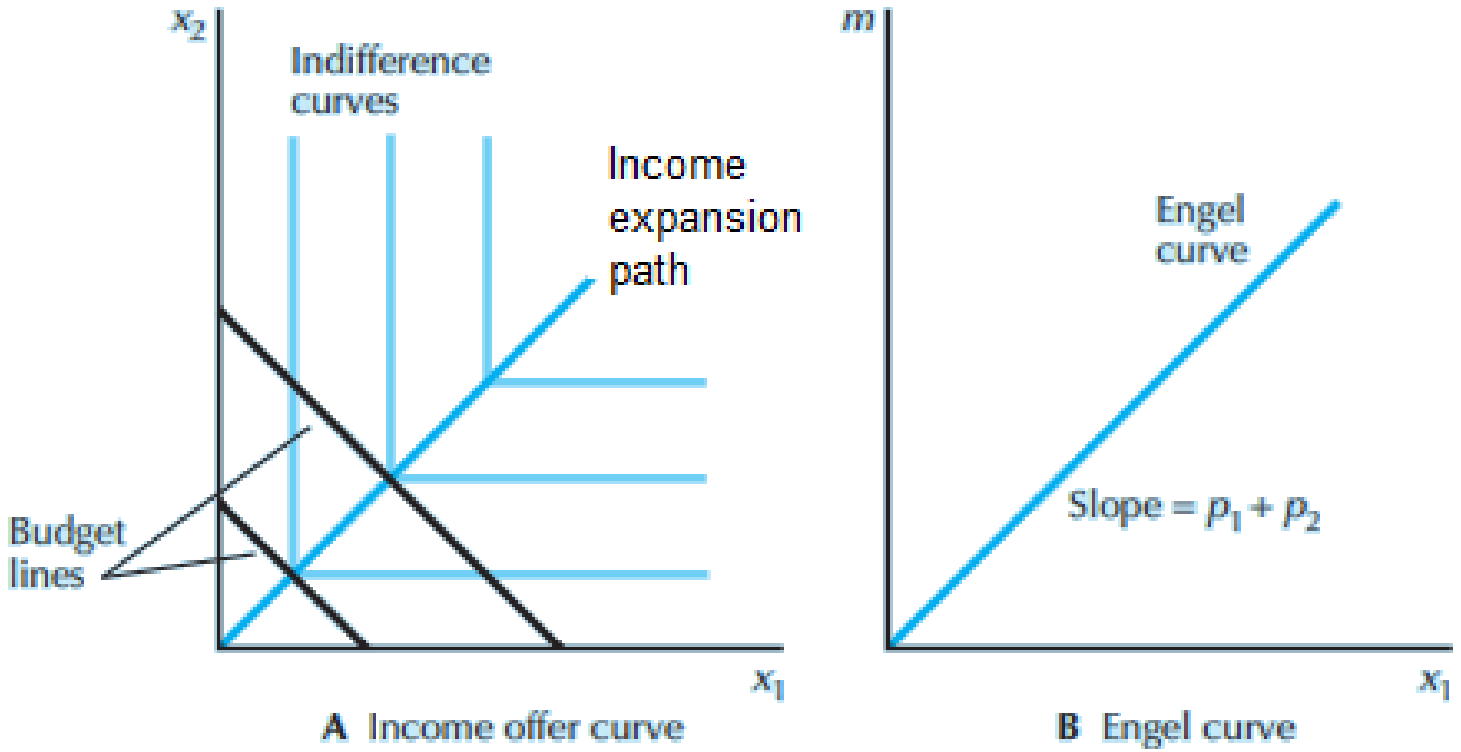

Figure: Perfect Complements (Source: Varian, Intermediate Microeconomics 8e, 2010)

Example: Cobb-Douglas Preferences

Consider now the utility function for Cobb-Douglas preferences: $u(x_1, x_2) = x_1^a x_2^{1-a}$, the Cobb-Douglas demand for good 1 has the form

$$x_1 = \frac{am}{p_1}$$

The Engel curve for good 1 will be a straight line with a slope of $\frac{p_1}{a}$

$$\boxed{m = \frac{p_1}{a} x_1}$$

Example: Cobb-Douglas Preferences

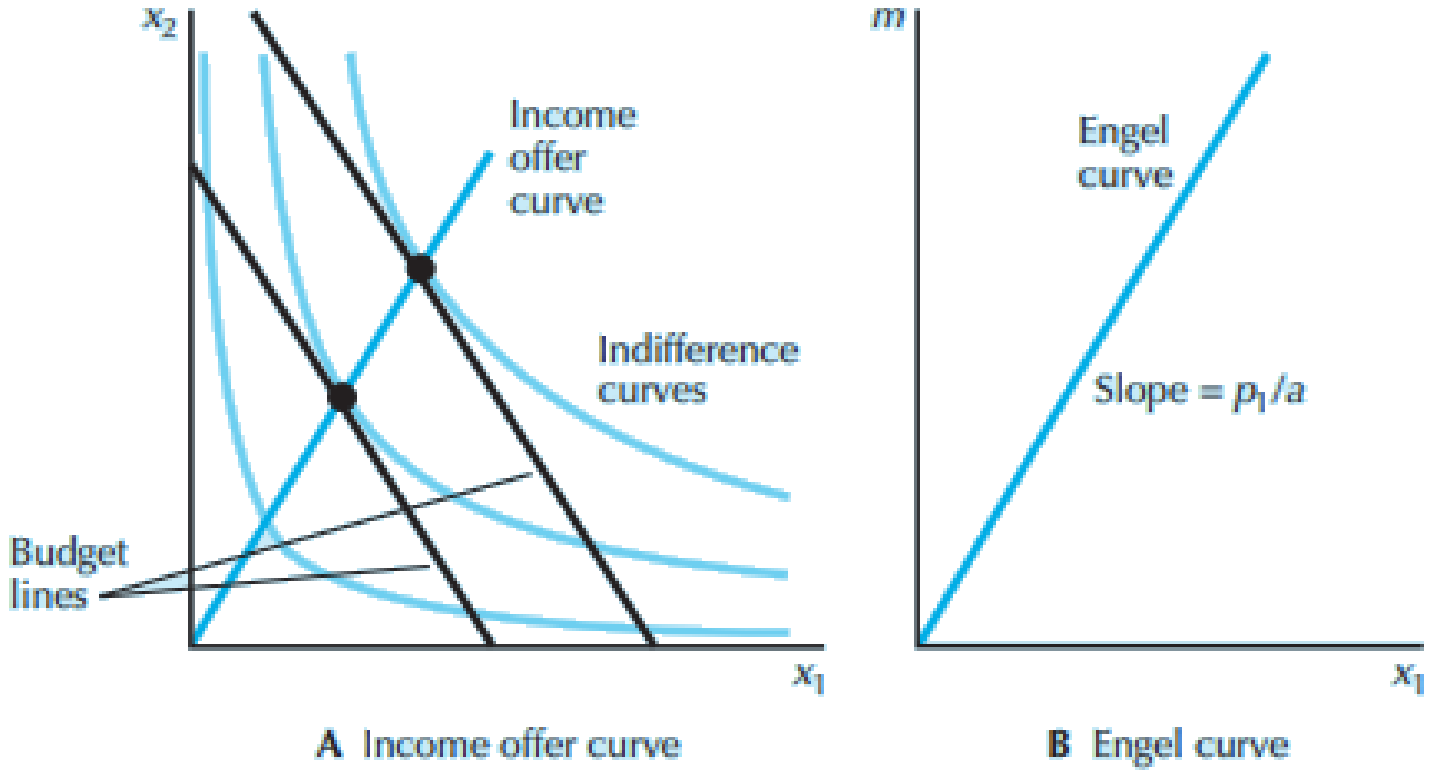

Figure: Cobb-Douglas Preferences (Source: Varian, Intermediate Microeconomics 8e, 2010)