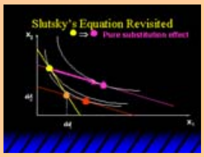
Slutsky Equation



The Slutsky Equation

These effects are often summarized in the Slutsky equation

$$\frac{\Delta Q}{\Delta P} \approx \left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} - Q\left(\frac{\Delta Q}{\Delta I}\right)$$

The Slutsky Equation

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The substitution effect is the change in demand from a movement along the indifference curve.

The Slutsky Equation

$$\frac{\Delta Q}{\Delta P} \approx \left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} - Q\left(\frac{\Delta Q}{\Delta I}\right)$$

The income effect is the change in demand from the effective increase in income

A Caution

- The version of the Slutsky equation we use is only an approximation.

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- The version of the Slutsky equation we use is only an approximation.
- We are assuming discrete changes in price and income; the correct equation assumes infinitesimal changes.

Why spend time on this topic?

- Giffin Goods

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- Giffin Goods
- The Demand for Leisure

Why spend time on this topic?

- Giffin Goods
- The Demand for Leisure
  - As wage rates increase, the cost of an hour of leisure increases
  - Demand goes up because the income effect dominates the substitution effect.

Why spend time on this topic?

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- Different Slopes

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Why spend time on this topic?

- Giffin Goods
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- Different Slopes
  - Changes in the price of one brand versus changes in the prices of all brands.

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Why spend time on this topic?

- Giffin Goods
- The Demand for Leisure
- Different Slopes
  - Changes in the price of one brand versus changes in the prices of all brands.
  - Heavily purchased goods versus lightly purchased goods.

Restating The Slutsky Equation

$$\frac{\Delta Q}{\Delta P} \approx \left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} - Q\left(\frac{\Delta Q}{\Delta I}\right)$$

The Marshallian Demand Curve

$$\frac{\Delta Q}{\Delta P} \approx \left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} - Q\left(\frac{\Delta Q}{\Delta I}\right)$$

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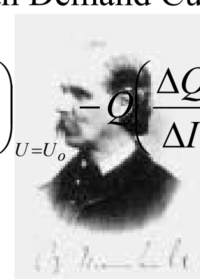

The Hicksian Demand Curve

$$\frac{\Delta Q}{\Delta P} \approx \left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} - Q\left(\frac{\Delta Q}{\Delta I}\right)$$

The Hicksian Demand Curve

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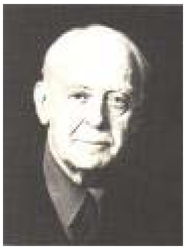
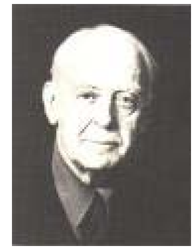
Sir John Hicks



Sir John Hicks

The Hicksian Demand Curve is the right one to use for consumer surplus calculations, but we generally use the Marshallian one



Sir John Hicks

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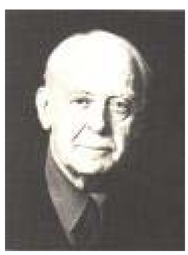
calculations, but we generally use the Marshallian one

Why? The difference is usually small



A Demonstration

$$\frac{\Delta Q}{\Delta P} \approx \left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} - Q\left(\frac{\Delta Q}{\Delta I}\right)$$

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} = \frac{\Delta Q}{\Delta P} + Q\left(\frac{\Delta Q}{\Delta I}\right)$$

Multiplying Through

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} = \frac{\Delta Q}{\Delta P} + Q\left(\frac{\Delta Q}{\Delta I}\right)$$

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o}\frac{P}{Q} = \frac{\Delta Q}{\Delta P}\frac{P}{Q} + Q\left(\frac{\Delta Q}{\Delta I}\right)\frac{P}{Q}$$

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The Two Elasticities

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o} = \frac{\Delta Q}{\Delta P} + Q\left(\frac{\Delta Q}{\Delta I}\right)$$

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o}\frac{P}{Q} = \frac{\Delta Q}{\Delta P}\frac{P}{Q} + Q\left(\frac{\Delta Q}{\Delta I}\right)\frac{P}{Q}$$

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The Elasticity Relationship

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o}\frac{P}{Q}=\frac{\Delta Q}{\Delta P}\frac{P}{Q}+Q\left(\frac{\Delta Q}{\Delta I}\right)\frac{P}{Q}$$

$$\eta_H^P=\eta_M^P+Q\left(\frac{\Delta Q}{\Delta I}\right)\frac{P}{Q}$$

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SLutsky Equation

More Manipulation

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o}\frac{P}{Q}=\frac{\Delta Q}{\Delta P}\frac{P}{Q}+Q\left(\frac{\Delta Q}{\Delta I}\right)\frac{P}{Q}$$

$$\eta_H^p=\eta_M^p+\frac{QP}{I}\left(\frac{\Delta Q}{\Delta I}\right)\frac{I}{Q}$$

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The Missing Terms

$$\left(\frac{\Delta Q}{\Delta P}\right)_{U=U_o}\frac{P}{Q}=\frac{\Delta Q}{\Delta P}\frac{P}{Q}+Q\left(\frac{\Delta Q}{\Delta I}\right)\frac{P}{Q}$$

$$\eta_H^P=\eta_M^P+\frac{QP}{I}\left(\frac{\Delta Q}{\Delta I}\right)\frac{I}{Q}$$

$$\eta_H^P=\eta_M^P+\omega\eta^I$$

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SLutsky Equation

The Final Relation

$$\eta_H^P=\eta_M^P+\omega\eta^I$$

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SLutsky Equation

The Final Relation

$$\eta_H^P=\eta_M^P+\omega\eta^I$$

Unless ω is pretty large, the difference is small

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SLutsky Equation

The Final Relation

Housing

Leisure

$$\eta_H^P=\eta_M^P+\omega\eta^I$$

Unless ω is pretty large, the difference is small

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SLutsky Equation

End