Income and Substitution Effects

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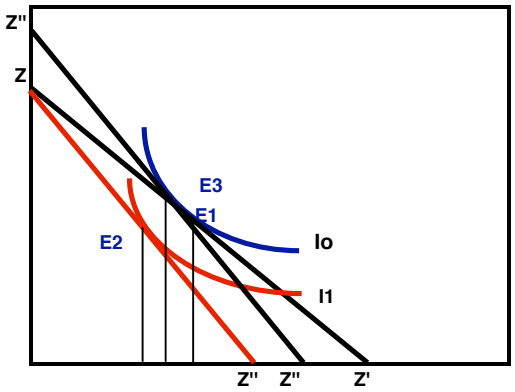
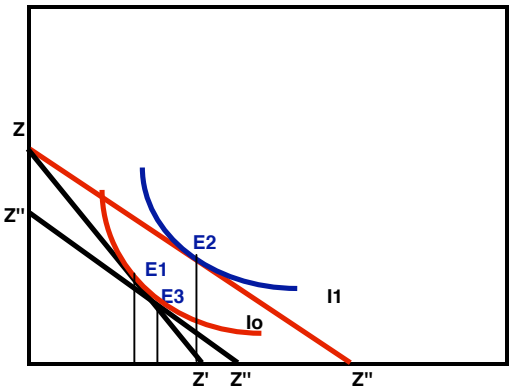
As economists have long noted, changes in the relative price of a good have both income and substitution effects. Whether the income effect or the substitution effect is dominant depends on the magnitude of the price change and on the nature of the good. Shown below are the various alternative effects arising from price increases and price decreases for normal, inferior, and Giffen goods. Given the income distorting effects of a relative change in price, economists have suggested the use of compensated rather than ordinary Marshallian demand curves.

Normal Good Case

Price Increase in X



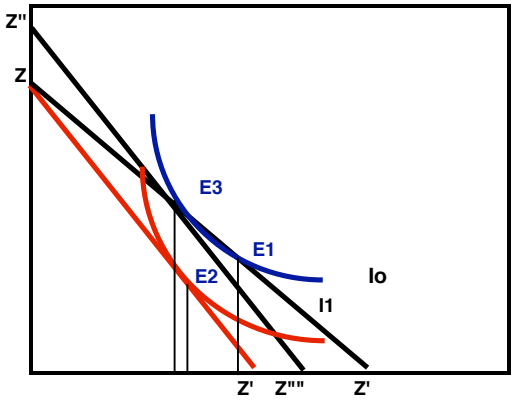
Price Decrease in X



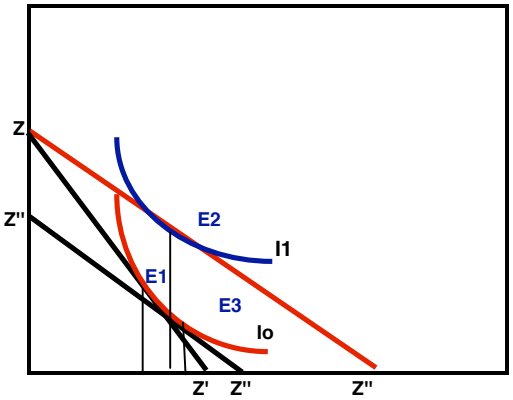
The income effect is positive and greater than the substitution effect for normal or superior goods.

Inferior Good Case

Price Increase in X



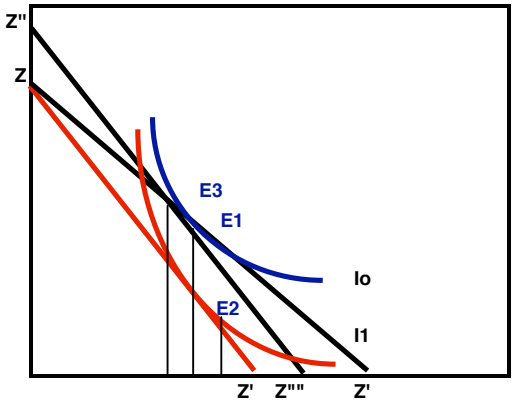
Price Decrease in X



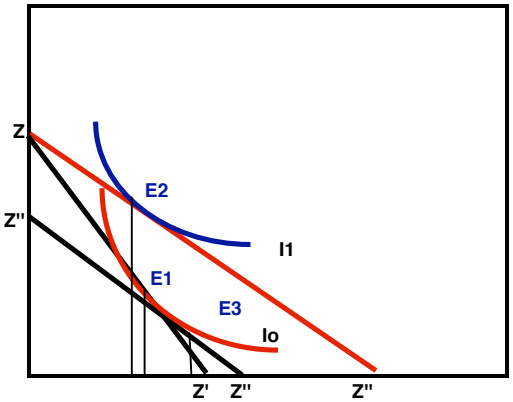
The substitution effect is positive and greater than the income effect for inferior goods.

Giffen Good Case

Price Increase in X



Price Decrease in X



For Giffen goods, the substitution effect is negatively dominated by the income effect.

Quantitative Tests for Income and Substitution Effects

A short-hand way of distinguishing between a normal, inferior, and Giffen good is in terms of the underlying income elasticity of demand. The income elasticity of demand is defined as the percentage change in demand for a one percent change in income, holding relative prices constant. Algebraically,

$$IED = \phi = \frac{\partial D}{\partial Y}$$

Given a functional demand equation of the form, $Qd_x = AP_x^{\alpha} Y_x^{\beta}$ by taking the natural logarithm we obtain the following expression: $\ln Qd_x = \ln A + \alpha \ln P_x + \beta \ln Y_x$

Using either time-series or cross-data on Q, Px and Yx, transforming them into natural logarithms and undertaking a linear regression of Qdx as a function of Px and Yx, the resulting coefficients for a and B provide direct estimates of the respective values of the own-price and income elasticities of demand.

Once one has estimates of the own-price and income elasticities of demand, we can now use information on the income elasticity of demand to categorize goods as either ordinary, inferior, or Giffen. The general rule is that ordinary or superior goods have an income elasticity of demand greater than 1. Inferior goods have an income elasticity between zero and one, while Giffen goods have a negative income elasticity of demand. We summarize this classification in the following graph:

Income Elasticity of Demand Values and the Classification of Goods

Giffen good range	Inferior good range		Superior good range
-infinity	0	1	+infinity

Another way of deriving the classification of goods is in terms of the underlying Engel curve. Superior goods will have positively sloped Engel curves, while inferior and Giffen goods will have negatively sloped ones. The problem with the Engel curve formulation is that it does not enable one to readily distinguish between the inferior and Giffen good classification, whereas numerical values of the corresponding income elasticity makes this distinction clear. In practice, most estimates of the income elasticity of demand have failed to confirm the presence of the Giffen good case. Thus, almost all goods can be classified either as inferior or superior, depending on the corresponding estimates of the income elasticity of demand.