

1 Consumer Theory

Engel Curve The relationship between the quantity demanded of a single good and income, holding prices constant.

Income Elasticity The percent change in quantity demanded of a good due to a percent change in the consumer's income.

$$\xi = \frac{\partial Q}{\partial Y} \frac{Y}{Q}$$

Normal Good Goods that we buy more of when we have more income: $\xi > 0$.

Luxury Goods Normal goods that we buy proportionally more of as our income increases: $\xi > 1$.

Necessity Goods Normal goods that we buy proportionally less of as our income increases: $0 < \xi < 1$.

Inferior Goods Goods that we buy less of as our income increases: $\xi < 0$.

Price Elasticity of Demand The percent change in quantity demanded of a good due to a percent change in the price of that good.

$$\varepsilon = \frac{\partial Q}{\partial p} \frac{p}{Q}$$

Ordinary Good Goods that we buy less of as the price increases: $\varepsilon < 0$.

Giffen Goods Goods that we buy more of as the price increases: $\varepsilon > 0$.

This is because the good is inferior and the income effect dominates the substitution effect.

Substitution Effect The change in a consumer's quantity demanded of a good when that good's price changes, given that they maintain their original utility and the prices of other goods do not change.

The substitution effect can be found by drawing a budget constraint with the new price ratio that is tangent to the original indifference curve.

Income Effect The change in a consumer's quantity demanded because their wealth effectively changes, given the prices of all goods do not change.

The wealth effect can be found by shifting the budget constraint that is used when calculating the substitution effect to the actual new budget constraint.

2 Exercises

- Matt's utility is a function of goetta, g , and e-cigs, e , and his utility function can be represented by $U(g, e) = g^{0.2}e^{0.8}$. Let P_g be the price of goetta, P_e be the price of e-cigs, and W be Matt's wealth.

- Derive Matt's demand curve for both goetta and e-cigs.

For an optimal bundle we must have $MRS = MRT$.

$$MRS = MRT \Leftrightarrow -\frac{0.2 e}{0.8 g} = -\frac{P_g}{P_e} \Leftrightarrow e = 4g \frac{P_g}{P_e}$$

We also want to use all of our wealth and choose a bundle on our budget constraint.

$$P_g g + P_e e = W \Leftrightarrow P_g g + P_e 4g \frac{P_g}{P_e} = W$$

A bit of algebra gives us our derived demand curves.

$$\tilde{g} = \frac{1}{5} \frac{W}{P_g} \quad \tilde{e} = \frac{4}{5} \frac{W}{P_e}$$

- (b) Is goetta a normal good or an inferior good? Luxury or necessity?

$$\xi = \frac{1}{5P_g} W \frac{5P_g}{W} = 1$$

ξ is greater than 0 so goetta is a normal good. However, ξ is neither greater than nor less than 1 so goetta is a borderline luxury-necessity (this is a rare and rather uninteresting case in the real world).

- (c) Is goetta an ordinary or a Giffen good?

$$\varepsilon = -\frac{1}{5} W P_g^{-2} P_g \frac{5P_g}{W} = -1$$

Since ε is less than zero, goetta is an ordinary good. We also could have known this because goetta is *not* an inferior good.

- (d) What happens to Matt's demand curve for e-cigs as the price of e-cigs increases?

Nothing! This is a change in *quantity* demanded, not demand. This is simply a movement *along* Matt's demand curve, so his demand curve does not change.

- (e) What happens to Matt's demand curve for e-cigs as the price of goetta increases? What does this tell you about the income and substitution effect?

The demand curve for e-cigs doesn't change as the price of goetta changes, but this is a unique property of Cobb-Douglas utility. The substitution effect causes Matt to buy more e-cigs as the price of goetta increases, but the income effect causes him to buy less e-cigs. For Cobb-Douglas preferences, these two effects are equivalent but of opposite sign so they cancel out.

- (f) What happens to Matt's demand curve for e-cigs as his wealth increases?

An increase in wealth will cause Matt to buy more e-cigs at every price level. This will shift his demand curve to the right.