Chapter 6 - Demand

As we saw in chapter 6, one thing we'll do with utility functions is to solve for the resulting **demand functions**

→ or sometimes we'll try to estimate a utility function from observed demands to do some welfare analysis

→ Demands will be functions of prices and incomes:

$$x_1 = x_1(p_1, p_2, m)$$
$$x_2 = x_2(p_1, p_2, m)$$

→ w/ these functions, we can do useful things like **comparative statics**

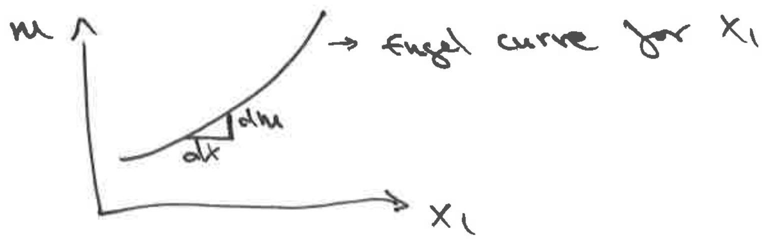
→ comparative statics show how an endogenous variable changes for a change in an exogenous variable or parameter

→ e.g. $\dfrac{\partial x_1(p_1, p_2, m)}{\partial p_1}$ is a comparative static

→ these are useful b/c a retailer might care about how a change in price affects consumer demand.

Engel Curves

→ an Engel curve shows how demand for a good changes as income changes:



→ the slope of the Engel curve is $= 1 \big/ \frac{\partial x(p_1, p_2, m)}{\partial m}$

→ we can find the Engel curve by tracing out the income-offer curve

→ this maps of all the demand for x_1 at each value of m

→ a normal good is a good for which demand increases as income increases:

$$\frac{\partial x}{\partial m} > 0$$

→ e.g. tropical vacations

→ normal goods have upward sloping Engel curves

→ inferior goods are goods whose demand falls as income rises:

$$\frac{\partial x}{\partial m} < 0$$

→ e.g. Ramen noodles

→ inferior goods have downward sloping Engel curves (at least once income is suitably high)

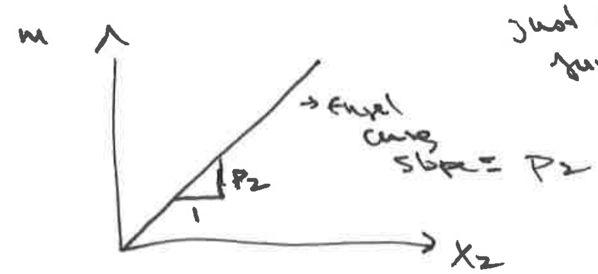
<u>Examples</u>:

Perfect subs: $u(x_1, x_2) = 2x_1 + x_2$

→ if $p_1 > 2p_2$ then $x_1^* = 0$

$$x_2^* = \frac{m}{p_2}$$

⇒ Engel curve = $\underbrace{m(x_2) = p_2 x_2}_{\text{just solve demand function for } m}$



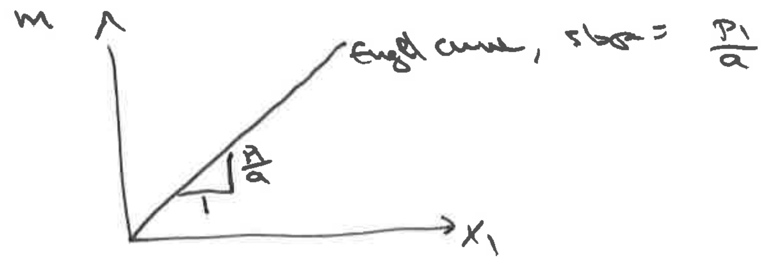
Cobb-Douglas:

$$u(x_1, x_2) = x_1^a x_2^{1-a}$$

$$\Rightarrow x_1^* = \frac{am}{p_1}$$

$$x_2^* = \frac{(1-a)m}{p_2}$$

$\Rightarrow$ Engel curve for $x_1 = \frac{p_1 x_1}{a}$



→ These 2 examples show homothetic preferences

→ these are preferences where the consumer prefers goods in some ratio → so as income increases, the amt of goods consumed goes up, but the ratio is the same

→ Homothetic preferences give rise to Engel curves that are straight lines

→ If engle curves b/c steeper, the good is a necessary good

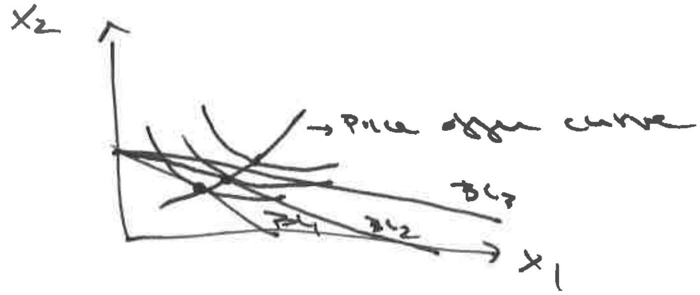
→ ~~its~~ demand rises less quickly ~~that~~ than income as income increases

→ If the Engel curve ~~b/c~~ becomes flatter, the good is a luxury good

→ its demand rises more quickly than incomes as income increases

How demand changes as prices change

→ We can plot and ~~trace~~ the optimal demands as prices change:

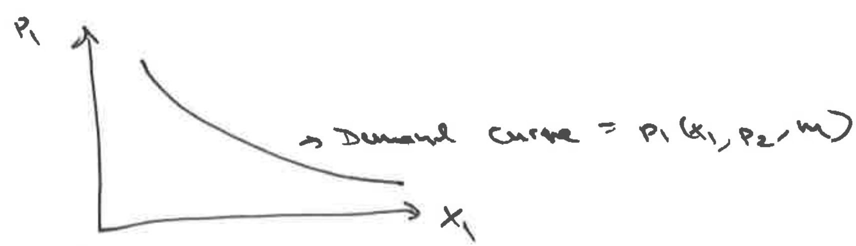


→ These gives ~~up~~ us the price-offer curve

→ or we can just take the demand function and solve for price as a function of quantity demanded

$$x_1(p_1, p_2, m) \Rightarrow p_1(x_1, p_2, m)$$

→ This gives us the demand curve



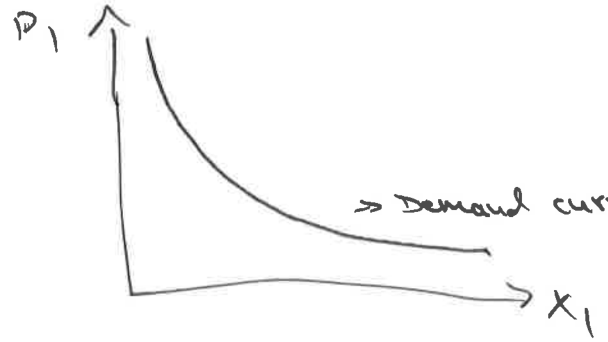
E.g. Cobb-Douglas..

$$u(x_1, x_2) = x_1^a x_2^{1-a}$$

$$\Rightarrow x_1^* = \frac{am}{p_1}$$

$$x_2^* = \frac{(1-a)m}{p_2}$$

$$\Rightarrow p_1 = \frac{am}{x_1} = \text{demand curve}$$



→ we call a good a <u>ordinary</u> good if

$$\frac{\partial x_1}{\partial p_1} < 0$$

→ i.e. it's demand falls as its price rises

→ ordinary goods have downward sloping demand curves

→ we call a good a <u>Giffen Good</u> if

$$\frac{\partial x_1}{\partial p_1} > 0$$

→ i.e. demand increases as its price rises (and demand falls as prices fall)

→ Giffen goods have upward sloping demand curves

Inverse demand functions

→ Note, when we solved demand for the demand curve, we cared about $p(x_1)$ → or how does price change for diff quantities demanded

→ we hold other prices and income constant when plotting the demand curve

→ The inverse demand function gives the price as a function of demand, prices, and incomes:

$p_1(x_1, p_2, m)$

→ really, the demand curve and the inverse demand function are the same

Substitutes and complements

→ We say that good 1 is a gross substitute for good 2 if:

$$\frac{\partial x_1}{\partial p_2} > 0$$

→ demand for good 1 increases as the price of good 2 increases

→ We say that good 1 is a gross complement to good 2 if:

$$\frac{\partial x_1}{\partial p_2} < 0$$

→ demand for good 1 increases as the price of good 2 increases