

# Chapter 4

## Extensions to Demand

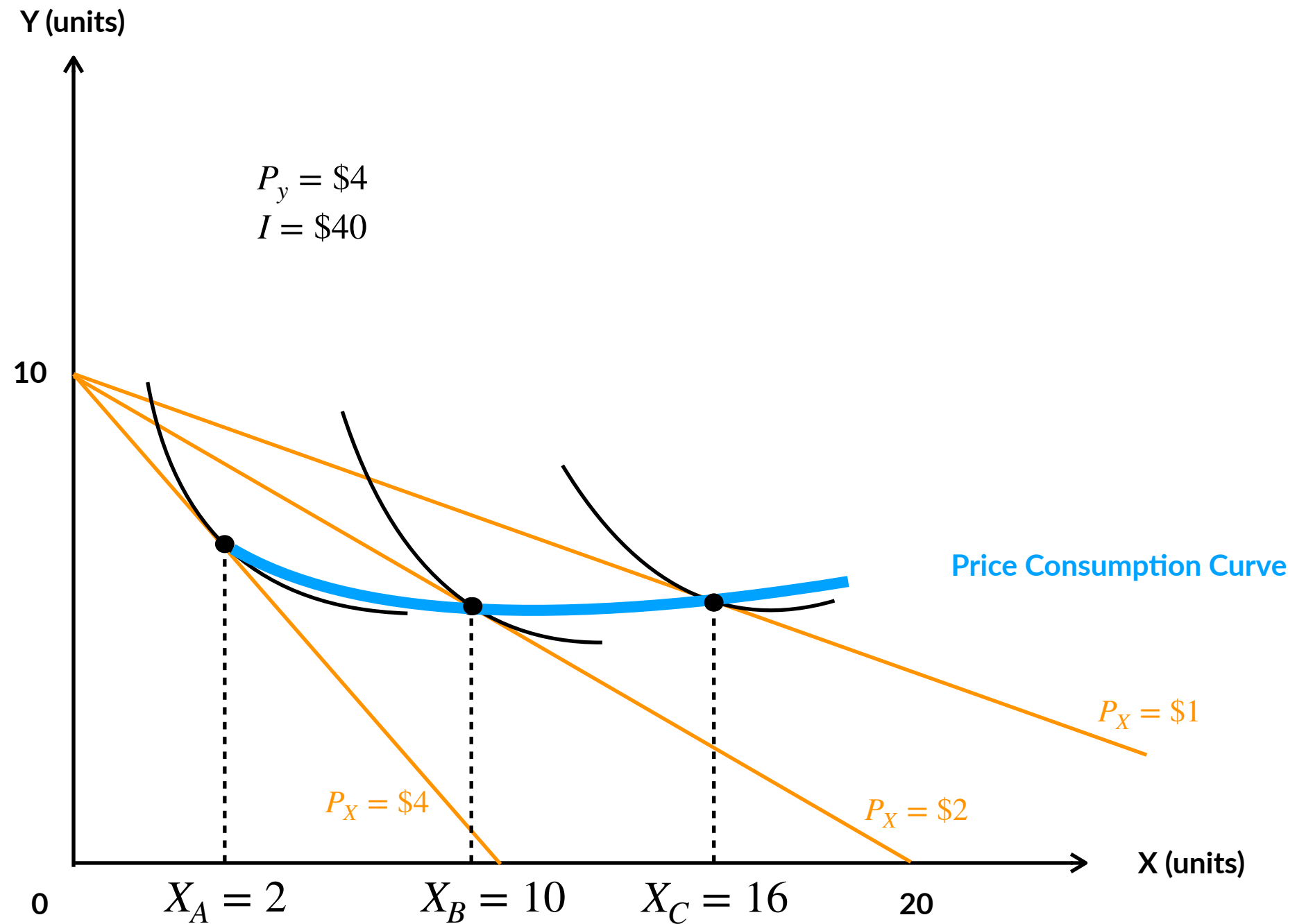
# Individual Demand Curves

- In Chapter 3, the consumer's optimal basket of goods was determined
- We can now tell how much a consumer will demand of good  $X$  for a given price of  $X$  (also given income and price of other goods)
- Can find all the points on a demand curve by changing the price of  $X$  and determining how much the consumer will demand

# Individual Demand Curves

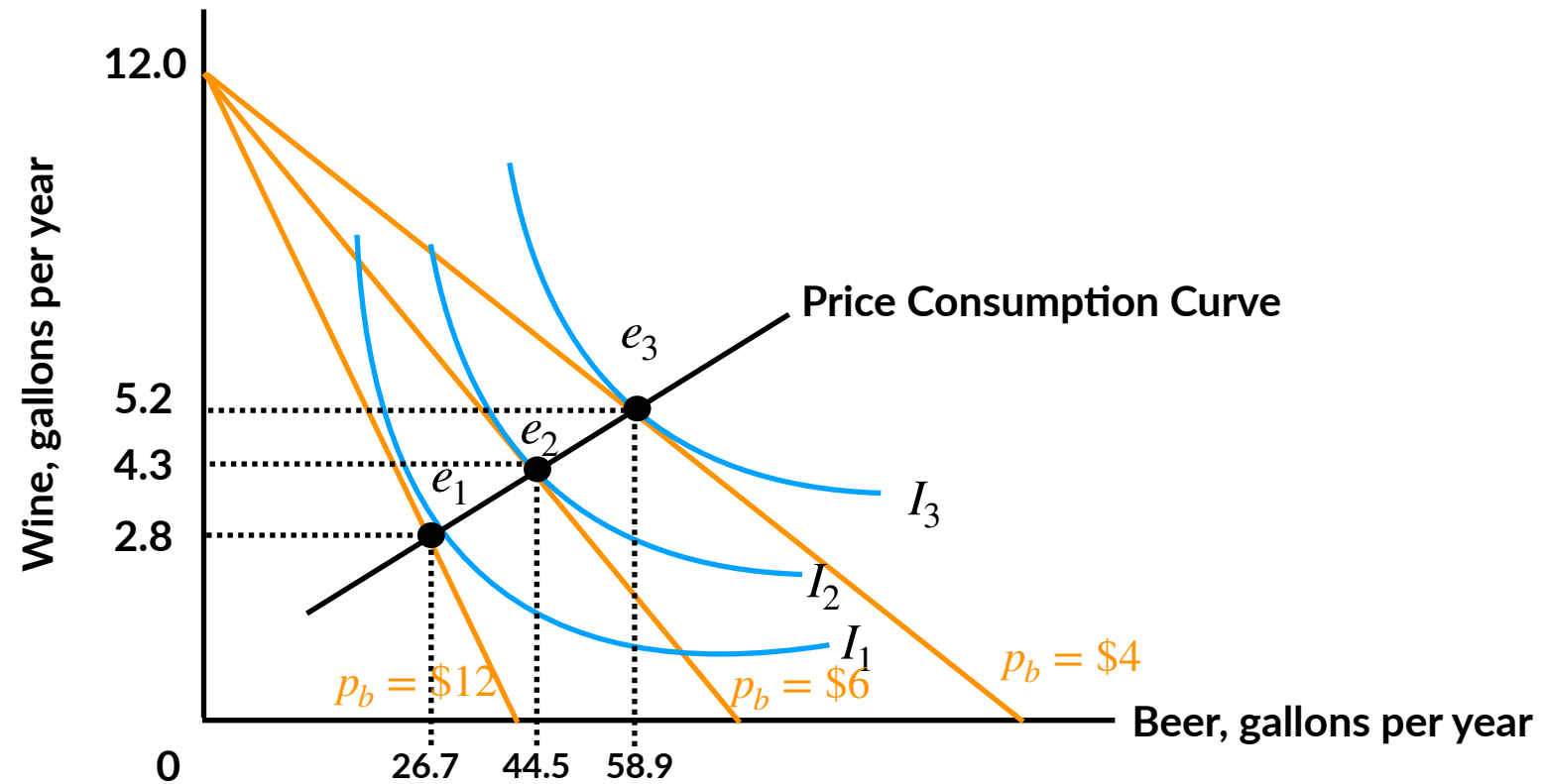
- The Price Consumption Curve of Good X: the set of optimal baskets for every possible price of good X, holding all other prices and income constant
  - Can be written as the quantity consumed of good X for any price of X — this is the individual's demand curve for good X

# Price Consumption Curves

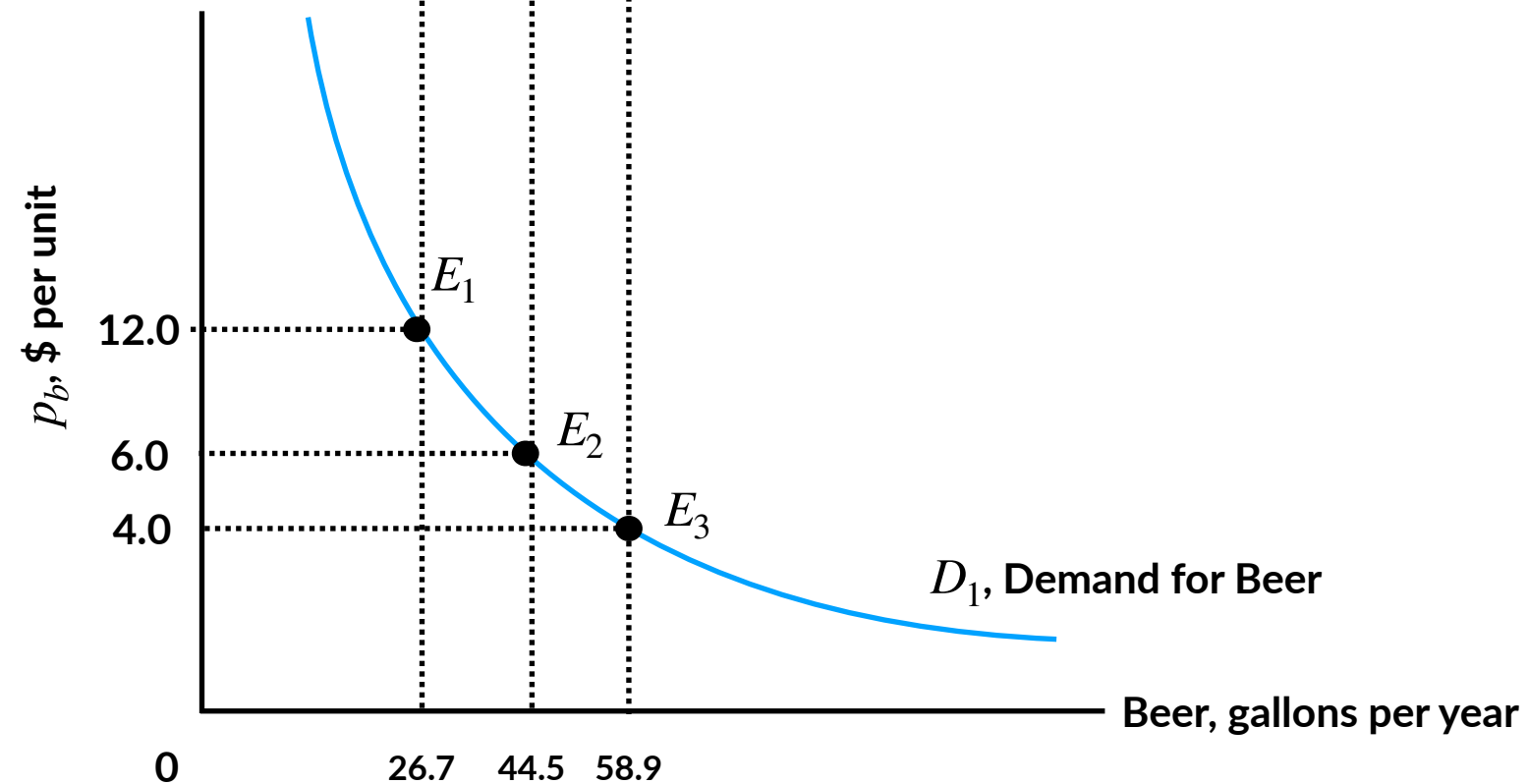


# Deriving an Individual's Demand Curve

(a) Indifference Curves and Budget Constraints



(b) Demand Curve

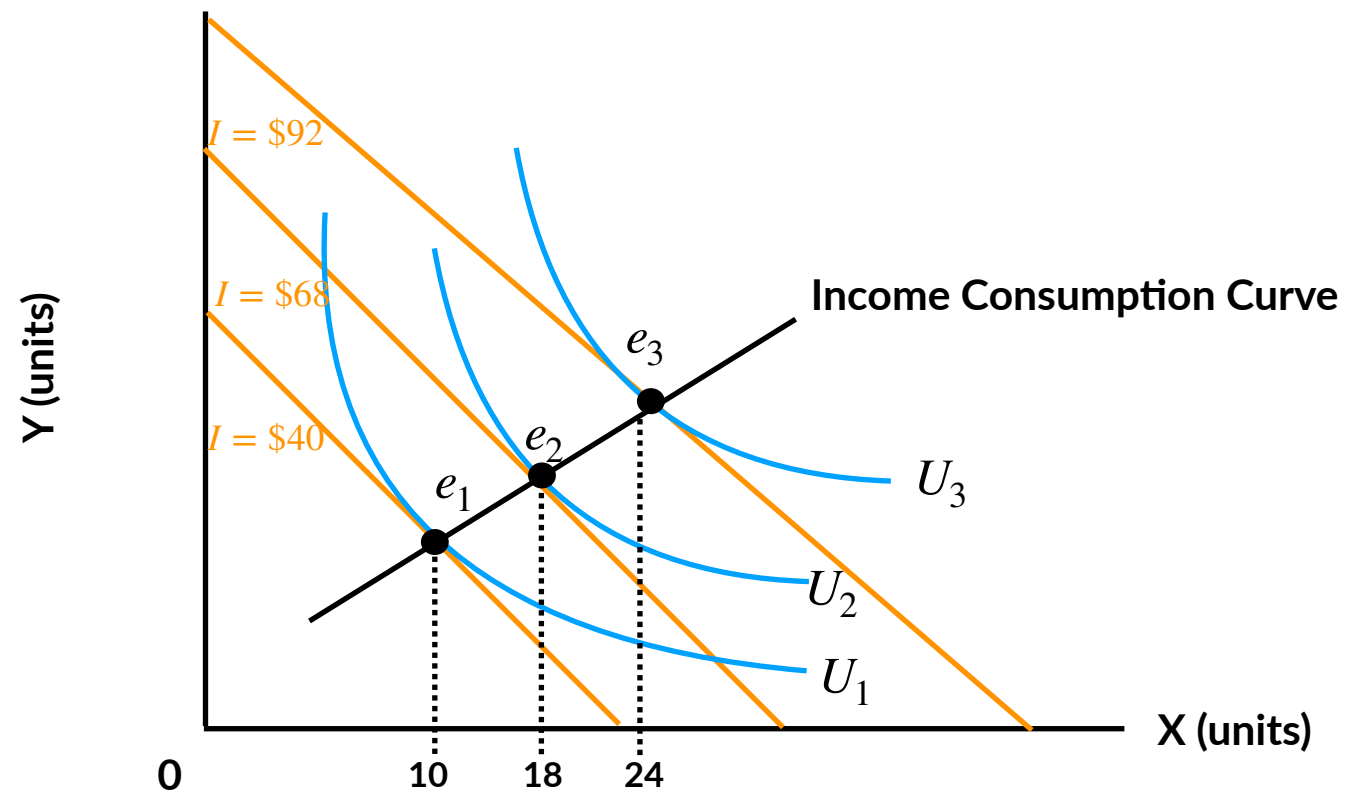


# Income Consumption Curve

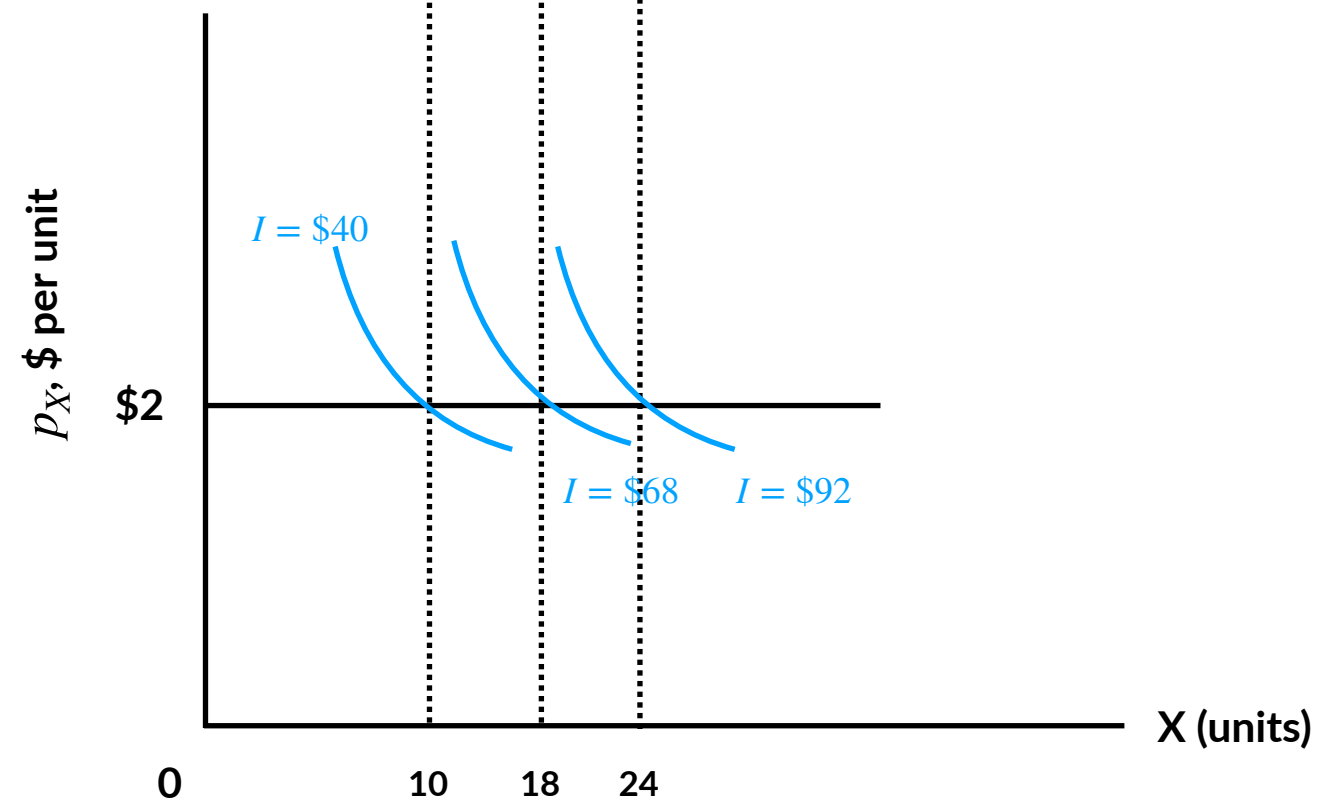
- The Income Consumption Curve of good X is the set of optimal baskets for every possible level of income
- We can graph the points on the income consumption curve as points on a shifting demand curve

# Income Consumption Curve

(a) Indifference Curves and Budget Constraints



(b) Demand Curve

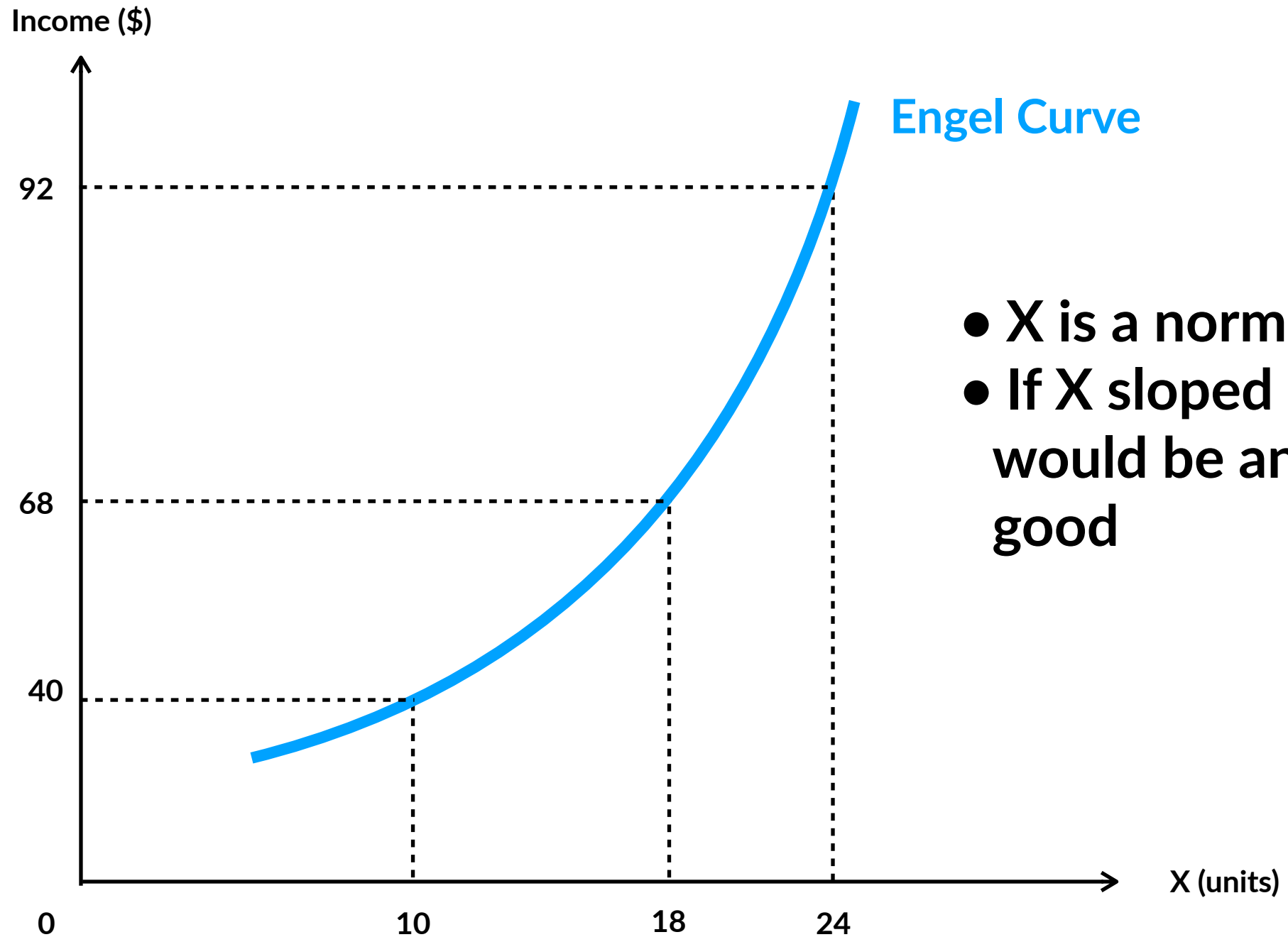


# Engel Curves

- Demand curves show the price and quantity relationship, but what about the income ( $Y$ ) and quantity relationship?
- Engel Curves show the relationship between a consumer's income level and their quantity demanded of a good
- Let's examine the demand curve to Engel curve linkage



# Engel Curve



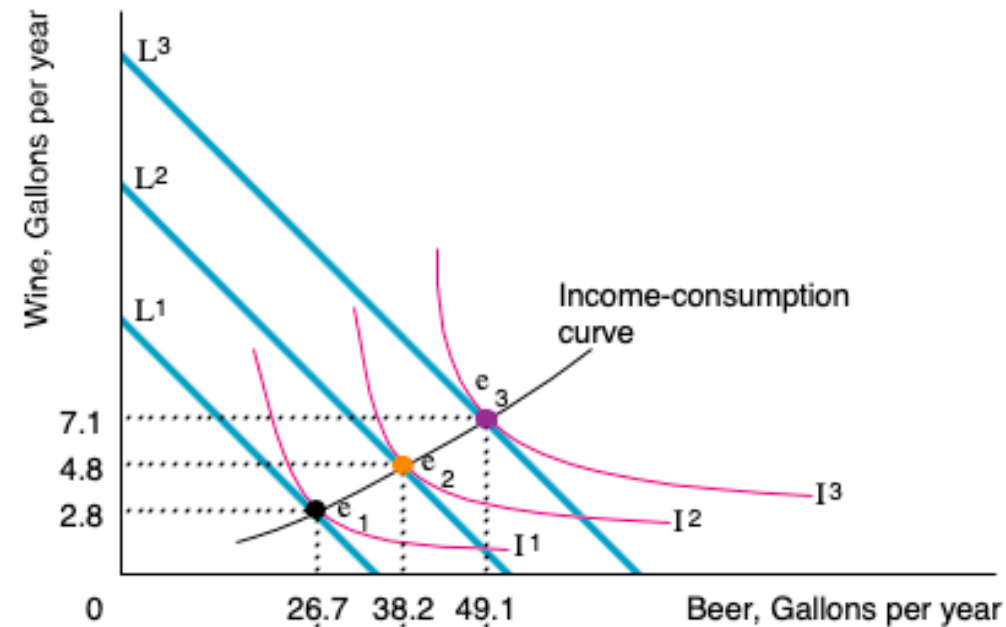
- X is a normal good
- If X sloped down, it would be an inferior good

# Definition of Goods

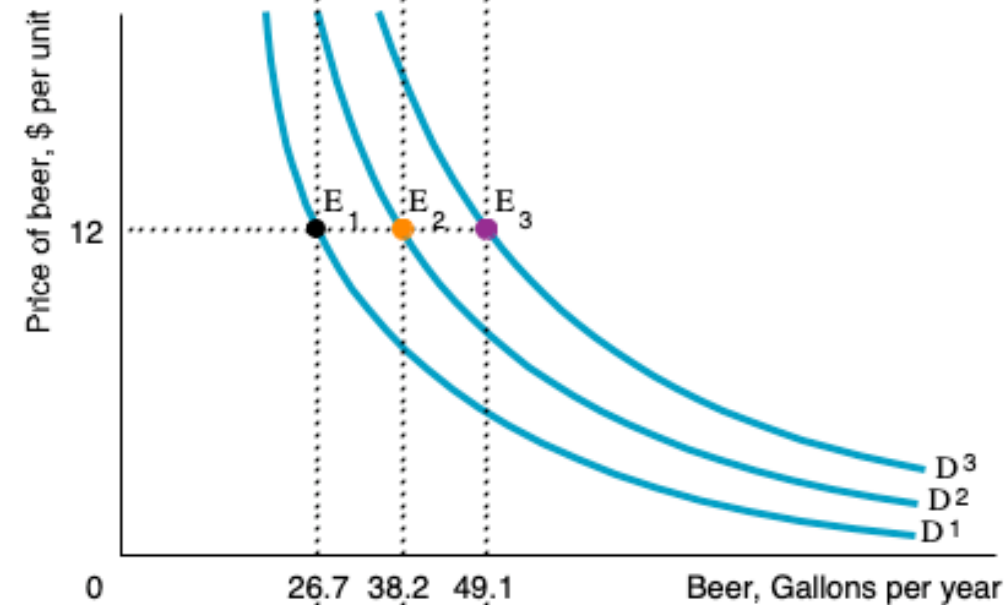
- If the income consumption curve shows that the consumer purchases more of good X as her income rises, good X is a normal good
- Equivalently, if the slope of the Engel curve is positive, then the good is a normal good
- If the income consumption curve shows that the consumer purchases less of good X as her income rises, good X is an inferior good
- If the slope of the Engel curve is negative, then the good is an inferior good

# Effect of a Budget Increase on an Individual's Demand Curve

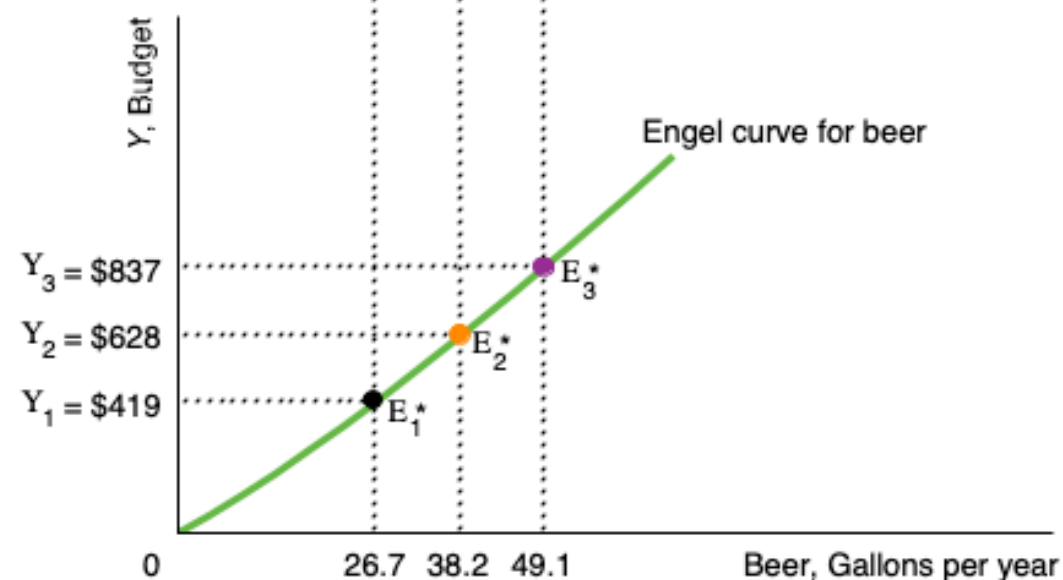
(a) Indifference Curves and Budget Constraints



(b) Demand Curves



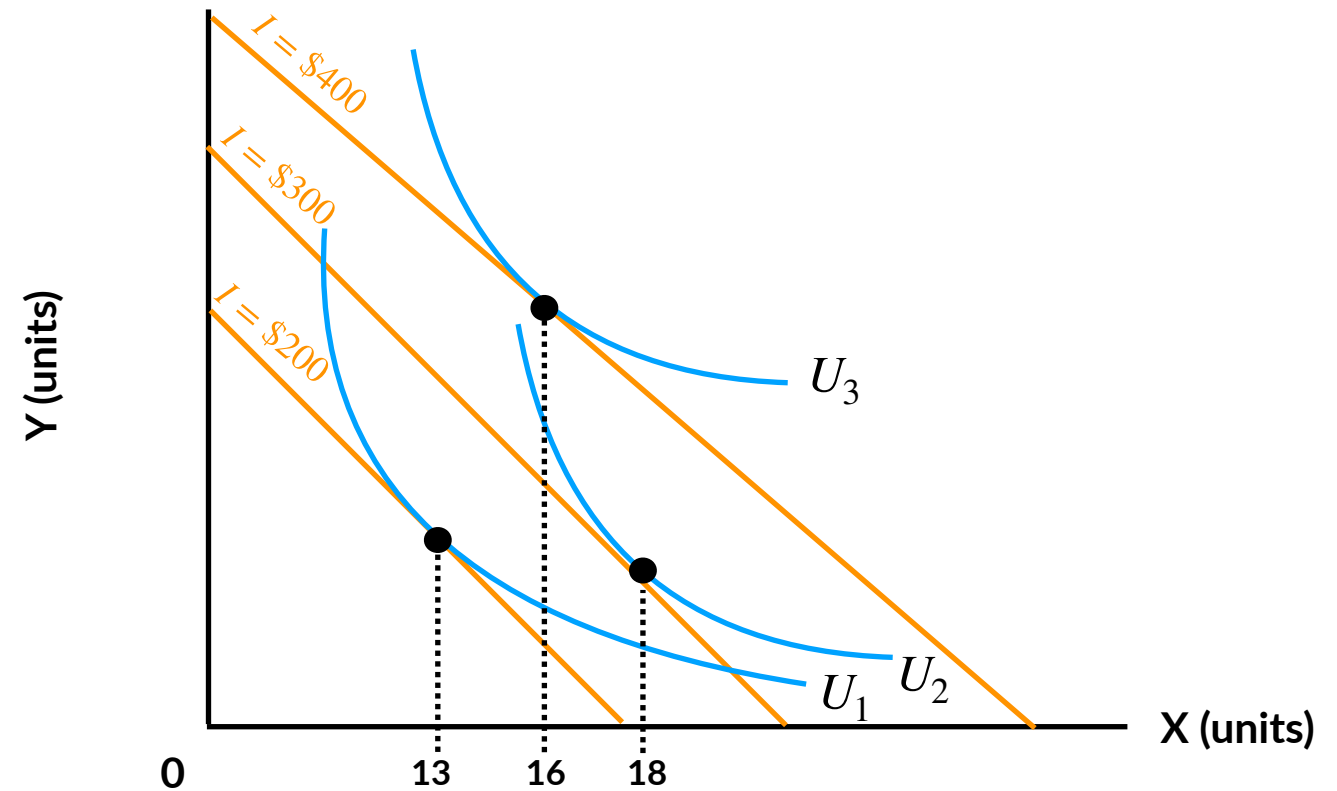
(c) Engel Curve



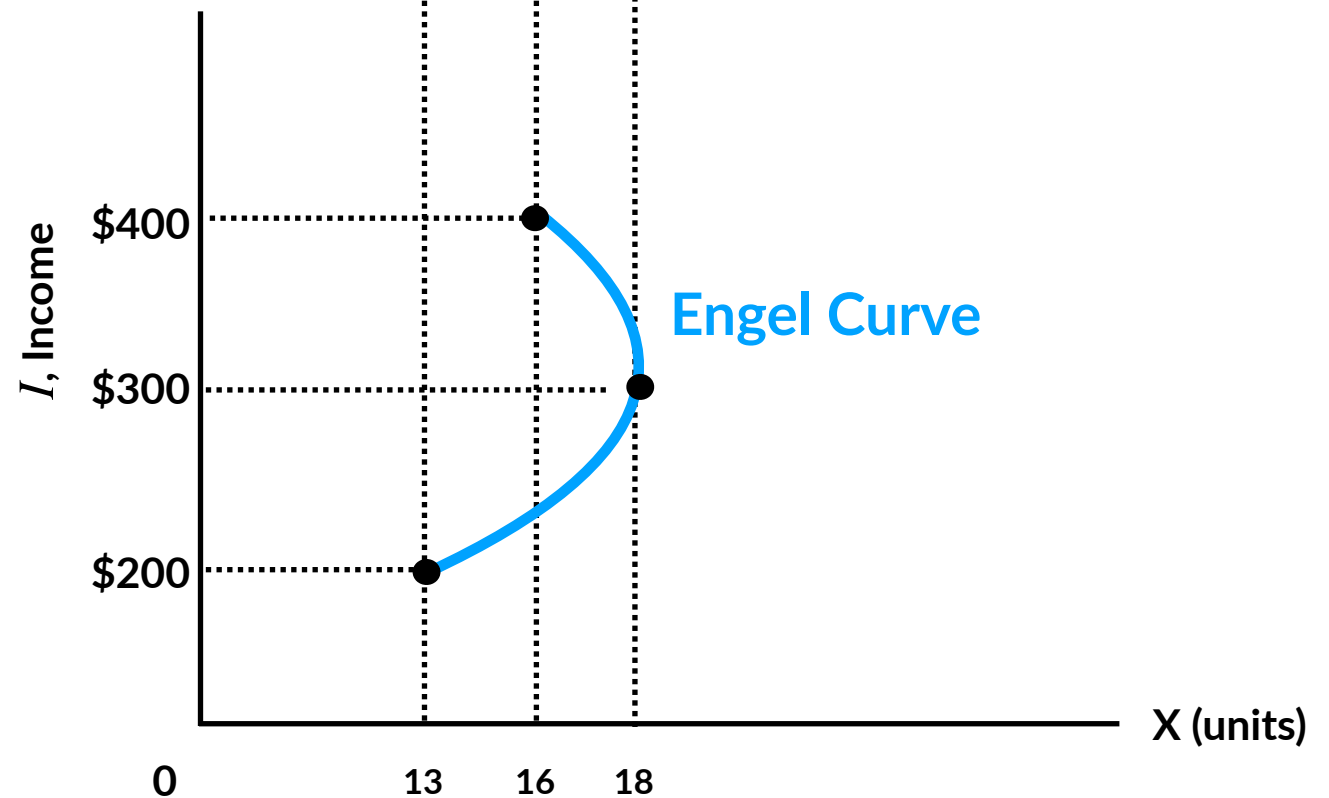
# Backwards Bending Engel Curve

- A good can be normal over some ranges and inferior over others
- As income goes up, the Engel curve bends back and the good has not become inferior
- What's an example?

(a) Indifference Curves and Budget Constraints



(b) Demand Curve



# Some Definitions

- Recall that we defined Income Elasticity as:

$$\xi = \frac{\Delta Q/Q}{\Delta Y/Y} = \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q} = \frac{\delta Q}{\delta Y} \times \frac{Y}{Q}$$

- Inferior good: a good for which income elasticity is negative
- Normal good: a good for which income elasticity is positive
- Luxury good: a good for which income elasticity is great than one
- Necessity good: a good for which the income elasticity is positive but less than one
- Note: these differ from person to person

# Income Elasticity Application

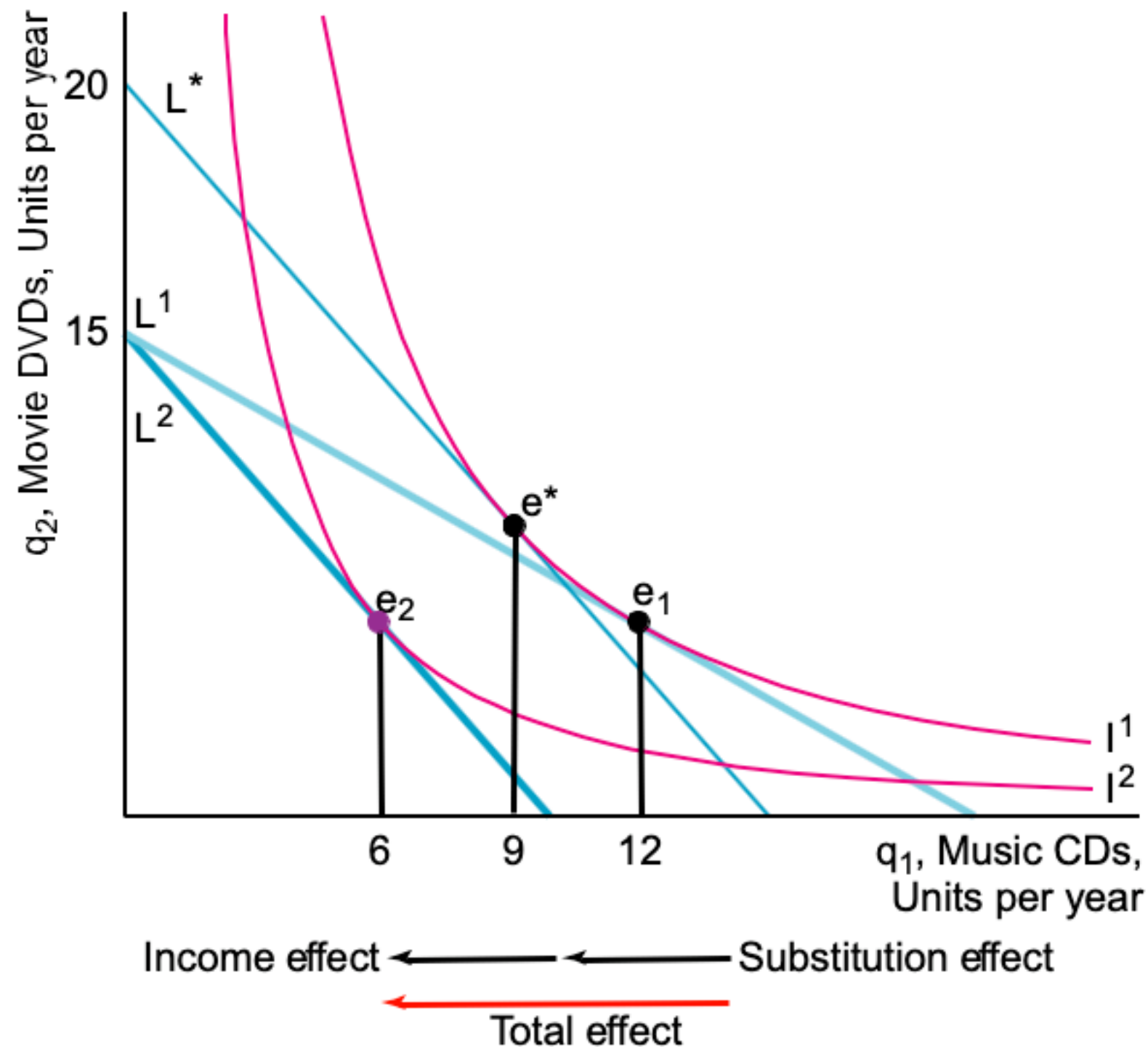
- Consumption levels at the top and bottom quintile of the U.S. income distribution:

Item	<u>High-Income Expenditures</u>
	<u>Low-Income Expenditures</u>
Tobacco	1.2
Food at home	2.1
Health care	2.5
Apparel and services	3.6
Housing	3.7
Education	3.7
Food away from home	4.3
<i>All Items</i>	4.4
Alcoholic beverages	4.6
Entertainment	6.4
Cash contributions	7.8
Life and other personal insurance	7.8
Pensions and Social Security	37.8

# Substitution and Income Effects of a Price Change

- Substitution Effect: the portion of the change in a consumer's  $Q_d$  due to a relative change in the price of a good, holding all other prices and the consumer's utility constant
- Income Effect: the portion of the change in a consumer's  $Q_d$  due to a relative change in their income level, holding all prices constant
- Important point: when the price of a good changes, you observe a combination of the two effects!

# Substitution and Income Effects with Normal Goods





# Compensated Demand Curve

- Marshallian (Uncompensated) Demand Curve: reflects both the substitution effect and the income effect
- Hicksian (Compensated) Demand Curve: measures the substitution effect only
- Hicksian Demand:  $q_1 = H(p_1, p_2, \bar{U})$

# The Slutsky Equation

- The elasticity of demand also registers both the income and substitution effects (like Marshallian Demand)

total effect = substitution effect + income effect

$$\varepsilon = \varepsilon^* + (-\theta\xi)$$

- $\theta$  = the share of the budget spent of the good in question
- Question: what sorts of markets would we expect  $\varepsilon$  and  $\varepsilon^*$  to differ the most?

# Not Covered in Chapter 4

- Cost of living adjustments, inflation adjustments, and the consumer price index (CPI)
- Revealed preferences — working the utility maximization problem in the opposite direction, back to the utility function