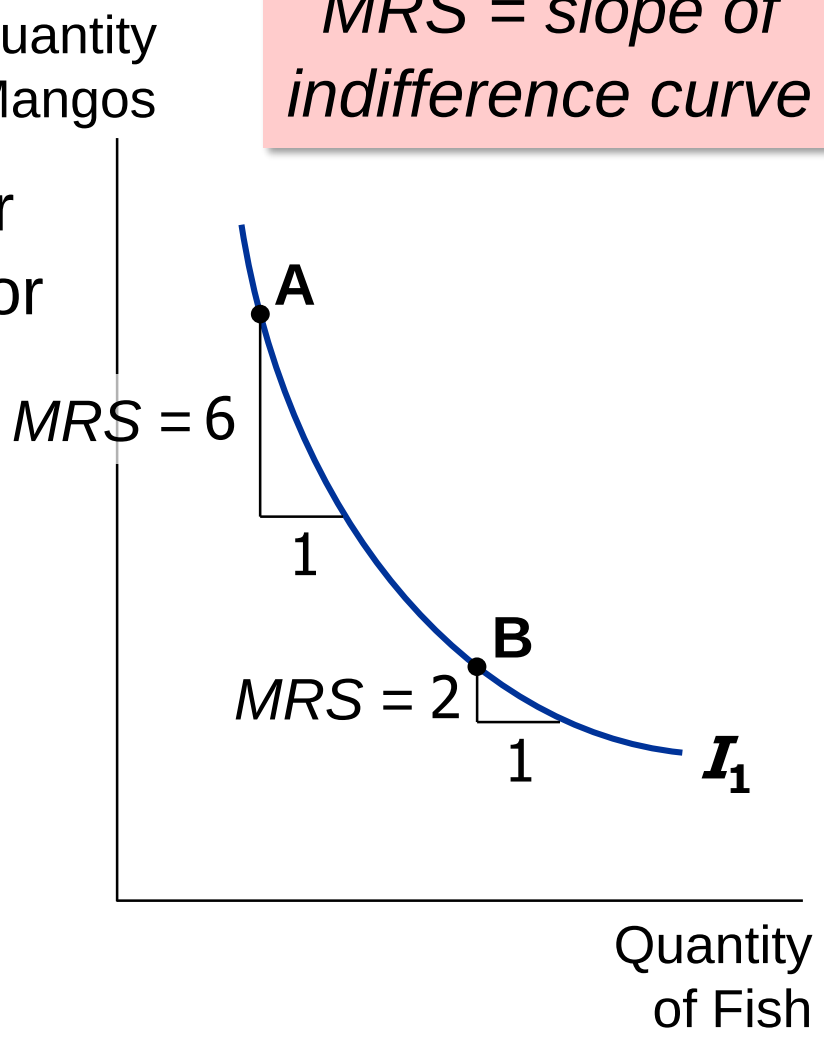
The Marginal Rate of Substitution

Marginal rate of substitution (MRS): the rate at which a consumer is willing to trade one good for another.

Hurley's MRS is the amount of mangos he would substitute for another fish.

MRS falls as you move down along an indifference curve.

MRS = slope of indifference curve



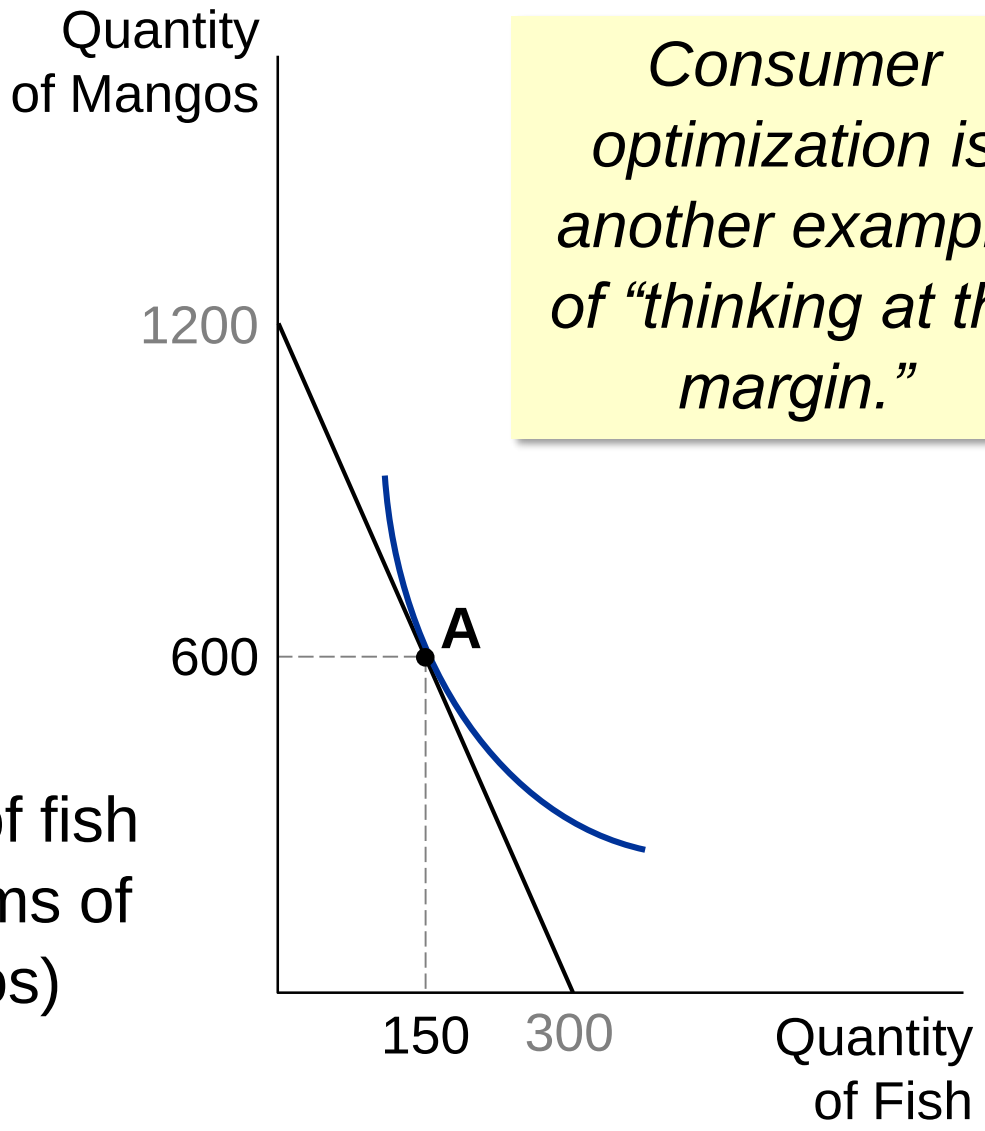
Optimization: What the Consumer Chooses

At the optimum, slope of the indifference curve equals slope of the budget constraint:

$$MRS = P_F/P_M$$

marginal value of fish (in terms of mangos)

price of fish (in terms of mangos)

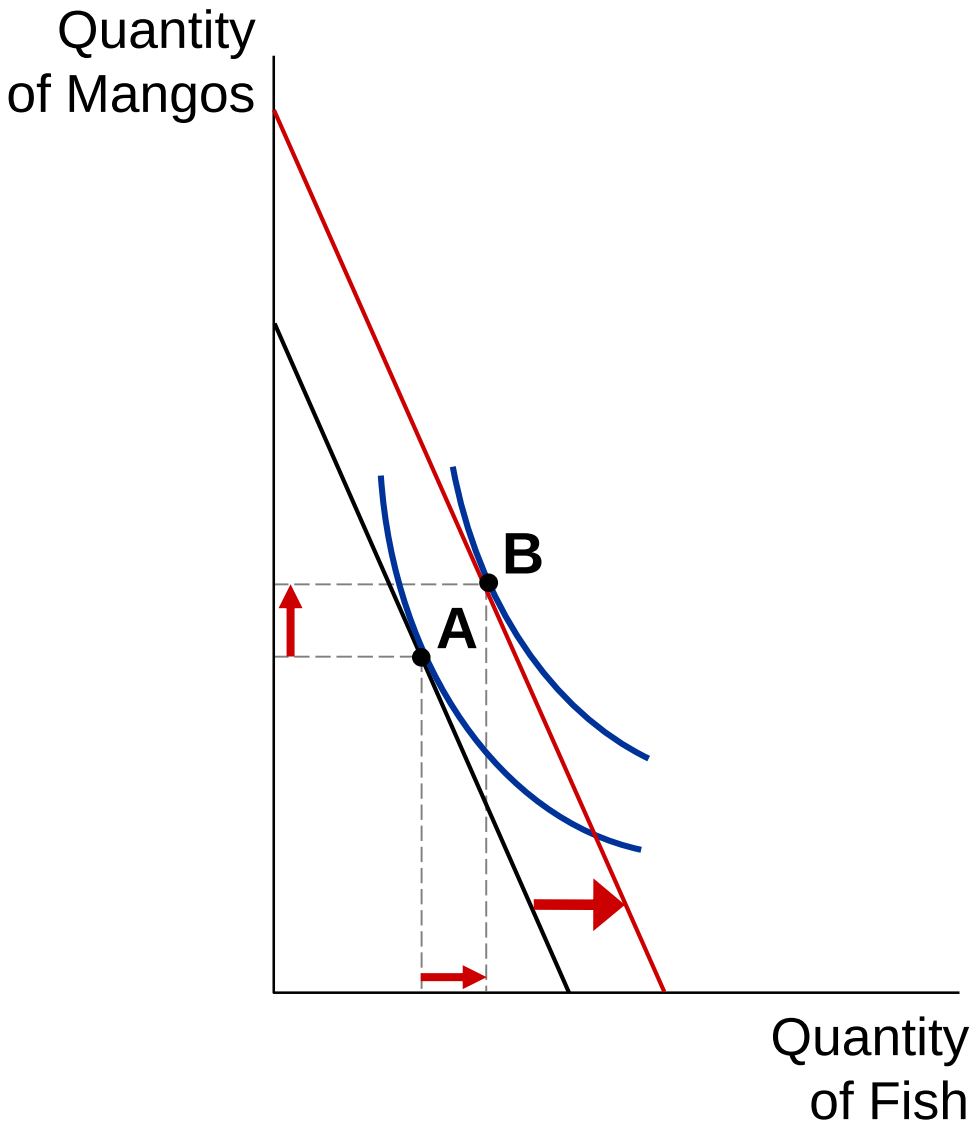


Consumer optimization is another example of "thinking at the margin."

The Effects of an Increase in Income

An increase in income shifts the budget constraint outward.

If both goods are "normal," Hurley buys more of each.



ACTIVE LEARNING 3

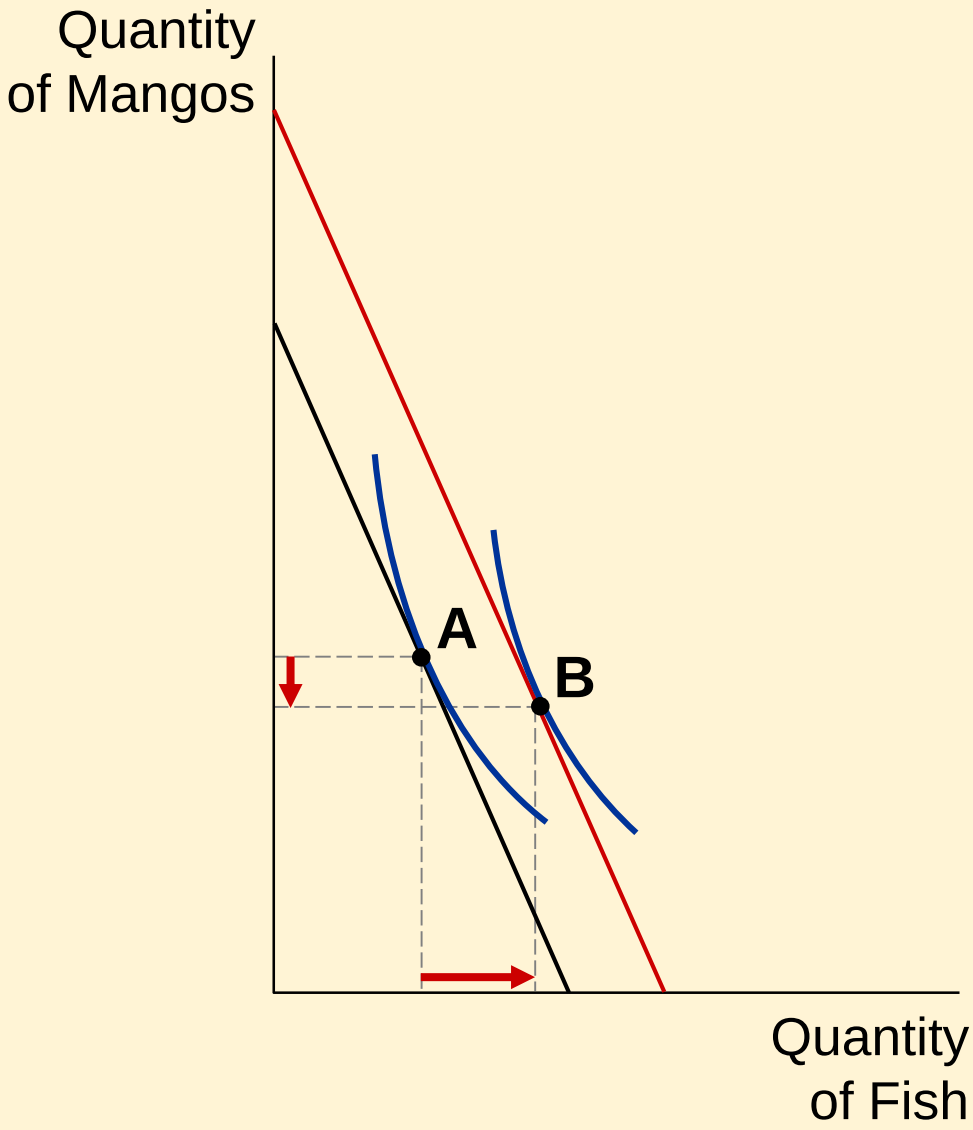
Inferior vs. normal goods

- An increase in income increases the quantity demanded of **normal goods** and reduces the quantity demanded of **inferior goods**.
- Suppose fish is a normal good but mangos are an inferior good.
- Use a diagram to show the effects of an increase in income on Hurley's optimal bundle of fish and mangos.

ACTIVE LEARNING 3

Answers

If mangos are inferior, the new optimum will contain fewer mangos.



The Effects of a Price Change

Initially,

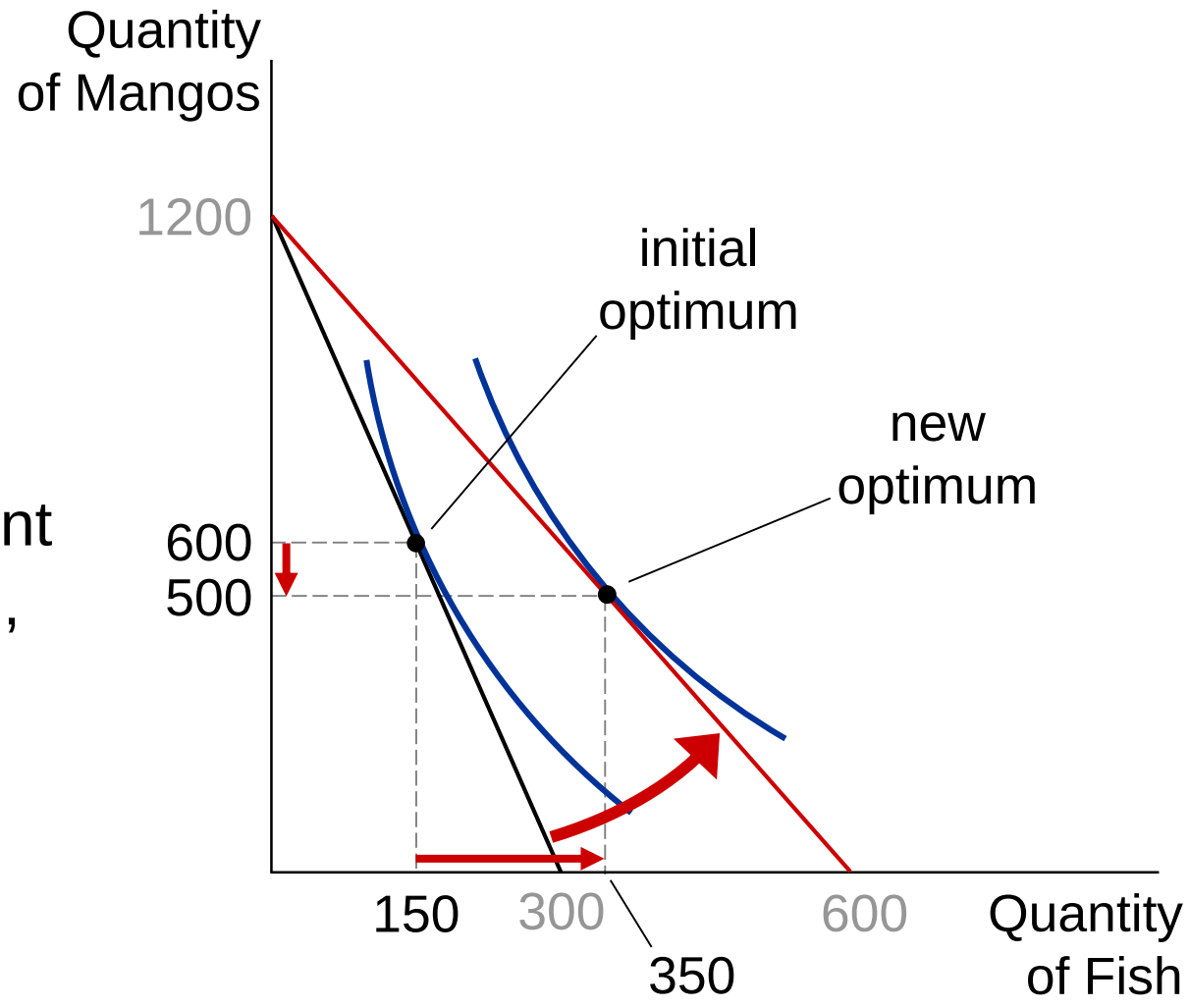
P_F = \$4

P_M = \$1

P_F falls to \$2

budget constraint rotates outward,

Hurley buys more fish and fewer mangos.



The Income and Substitution Effects

A fall in the price of fish has two effects on Hurley's optimal consumption of both goods.

- **Income effect**
  A fall in P_F boosts the purchasing power of Hurley's income, allows him to buy more mangos and more fish.
- **Substitution effect**
  A fall in P_F makes mangos more expensive relative to fish, causes Hurley to buy fewer mangos and more fish.

Notice: *The net effect on mangos is ambiguous.*

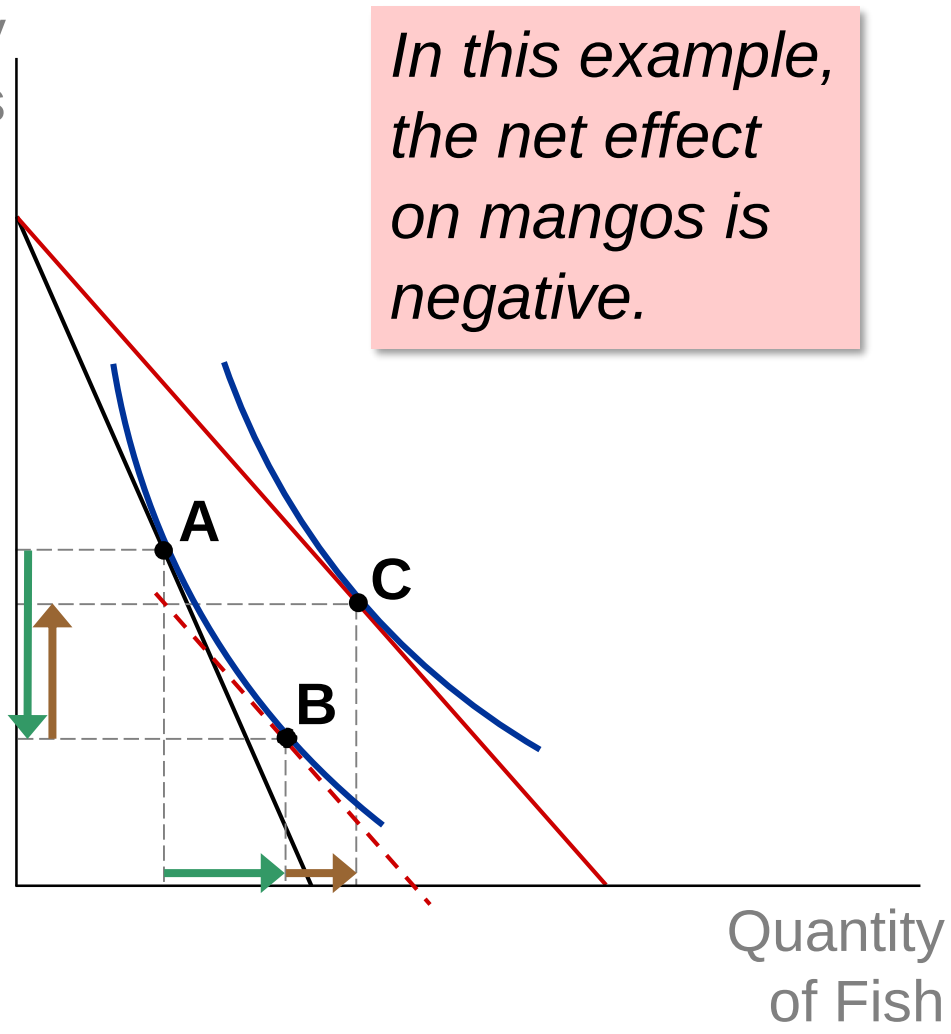
The Income and Substitution Effects

Initial optimum at **A**.

P_F falls.

Substitution effect:
from **A** to **B**,
buy more fish and
fewer mangos.

Income effect:
from **B** to **C**,
buy more of both
goods.



In this example, the net effect on mangos is negative.

ACTIVE LEARNING

The substitution effect in two cases

Do you think the substitution effect would be bigger for substitutes or complements?

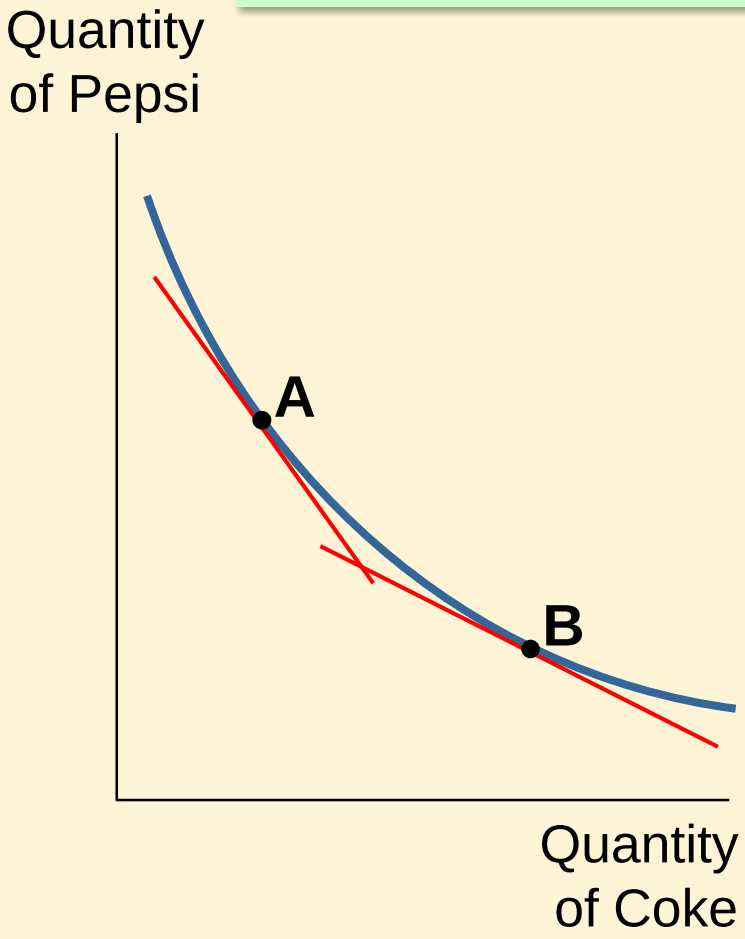
- Draw an indifference curve for Coke and Pepsi, and, on a separate graph, one for hot dogs and hot dog buns.
- On each graph, show the effects of a relative price change (keeping the consumer on the initial indifference curve).

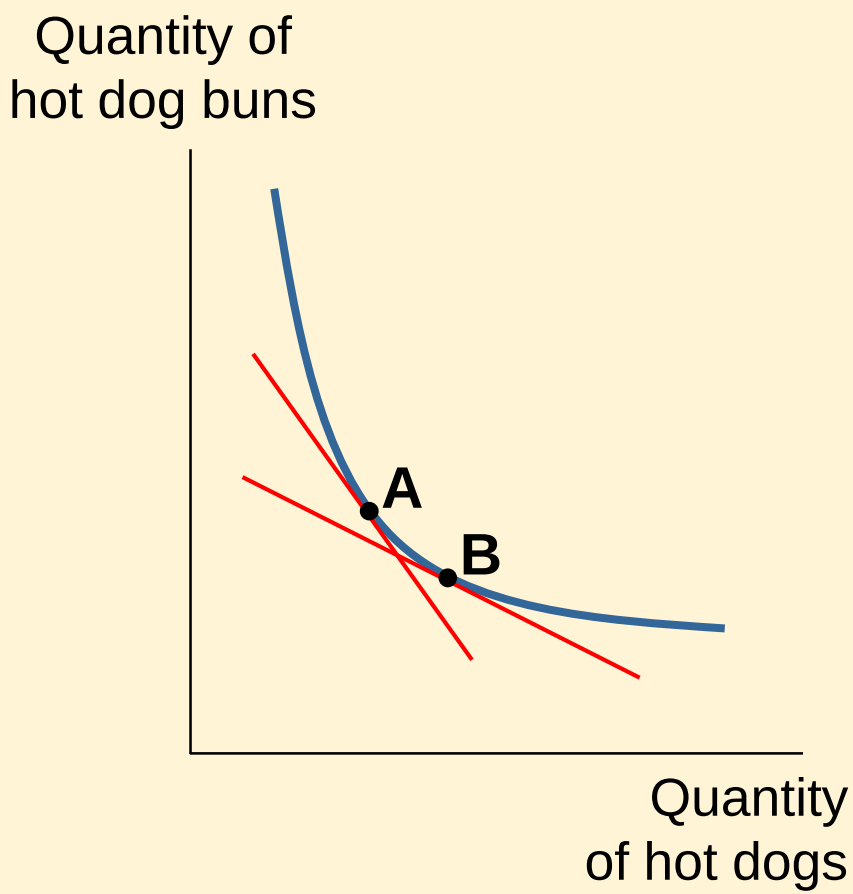
ACTIVE LEARNING

Answers

In both graphs, the relative price changes by the same amount.

But the substitution effect is bigger for substitutes than complements.

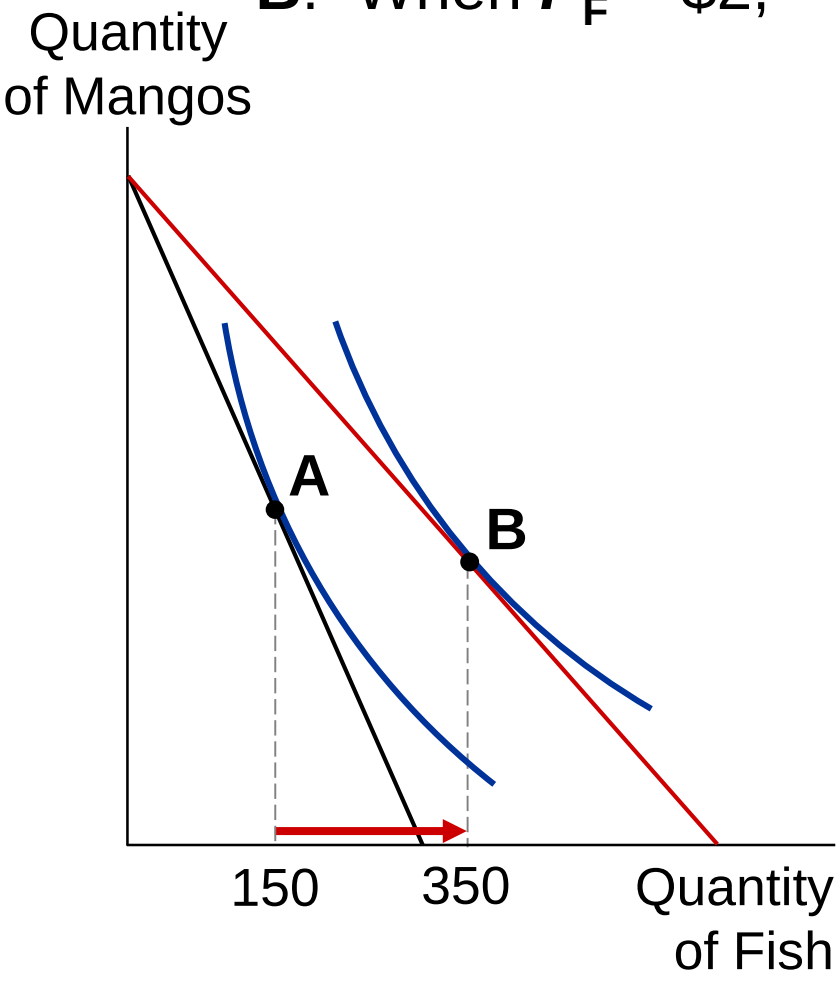


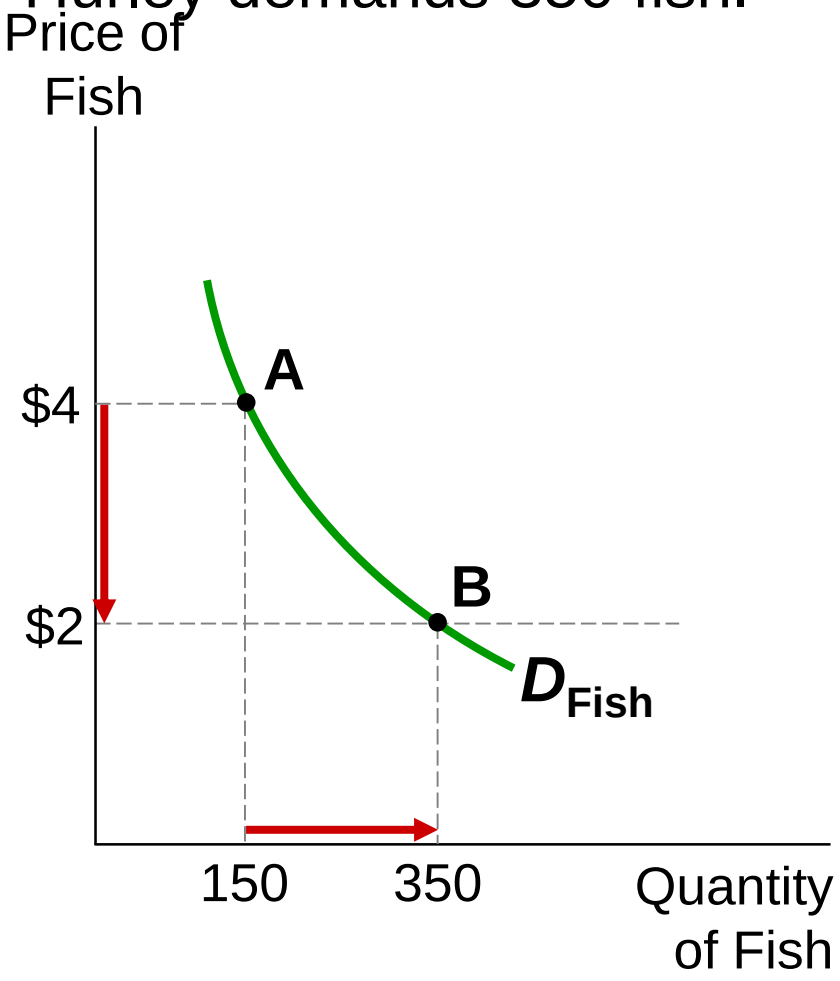


Deriving Hurley's Demand Curve for Fish

A: When P_F = \$4, Hurley demands 150 fish.

B: When P_F = \$2, Hurley demands 350 fish.

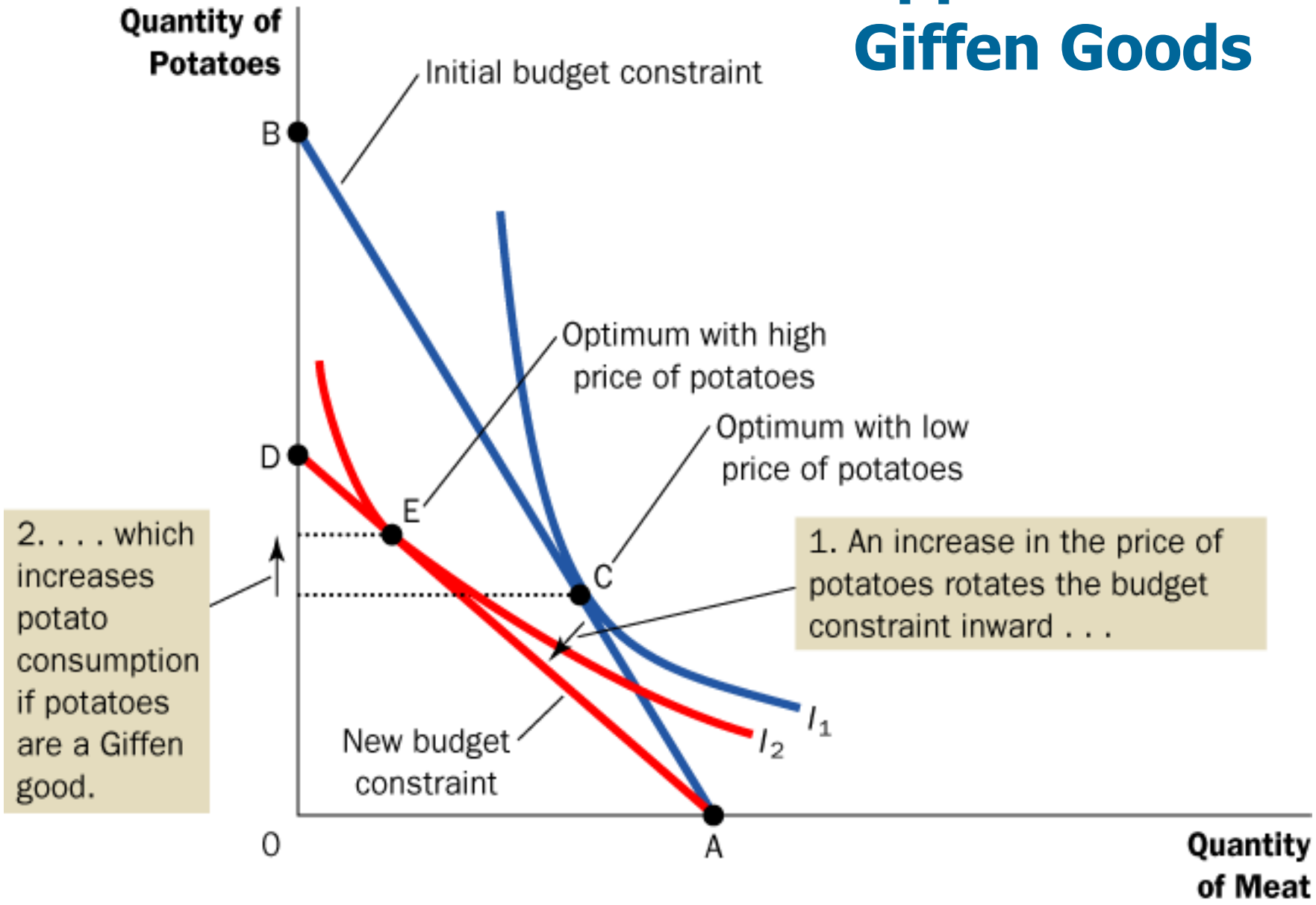




Application 1: Giffen Goods

- Do all goods obey the *Law of Demand*?
- Suppose the goods are potatoes and meat, and potatoes are an inferior good.
- If price of potatoes rises,
  - substitution effect: buy less potatoes
  - income effect: buy more potatoes
- If income effect > substitution effect, then potatoes are a **Giffen good**, a good for which an increase in price raises the quantity demanded.

Application 1: Giffen Goods



Application 2: Wages and Labor Supply

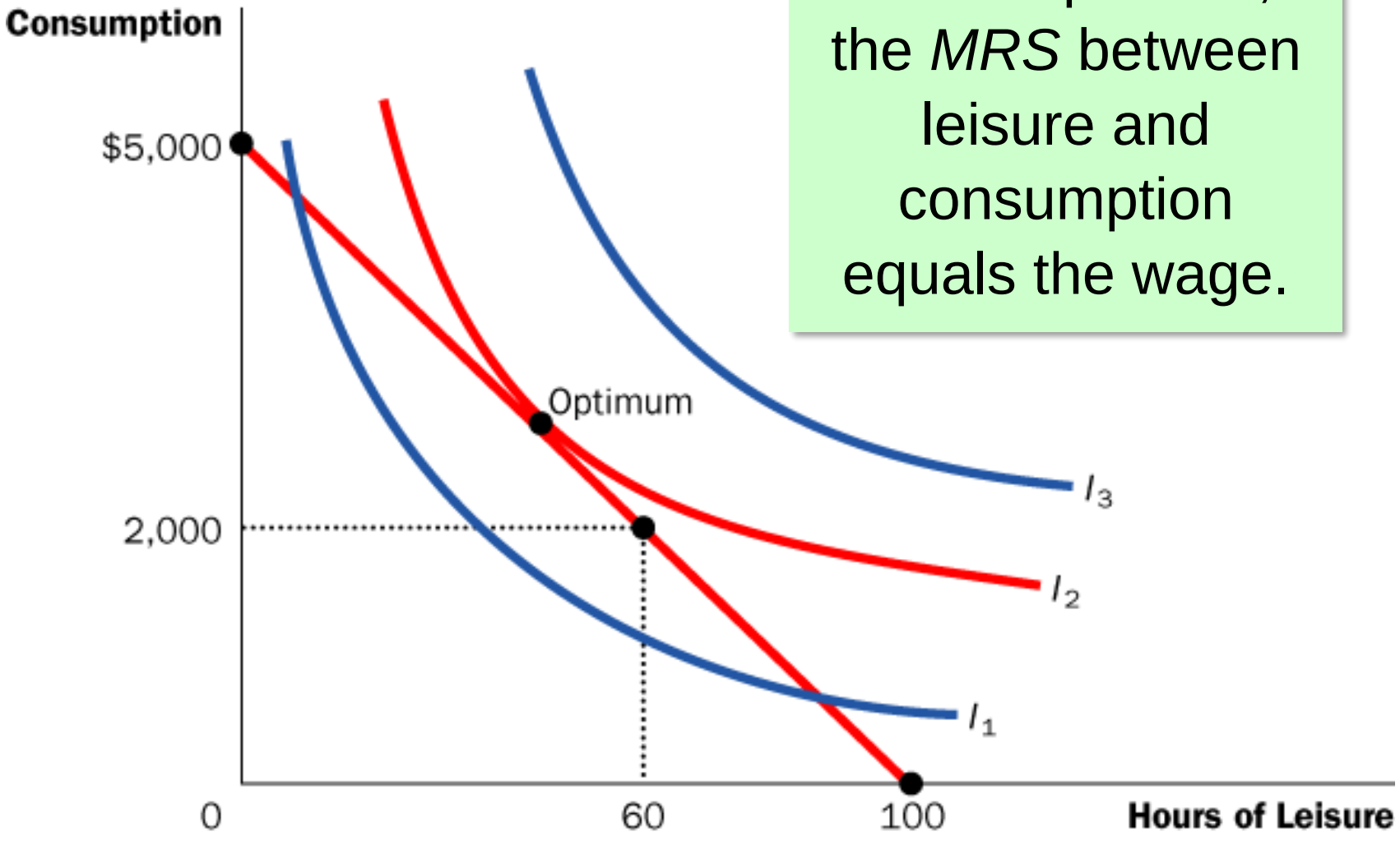
Budget constraint

- Shows a person's tradeoff between consumption and leisure.
- Depends on how much time she has to divide between leisure and working.
- The relative price of an hour of leisure is the amount of consumption she could buy with an hour's wages.

Indifference curve

- Shows "bundles" of consumption and leisure that give her the same level of satisfaction.

Application 2: Wages and Labor Supply



At the optimum, the *MRS* between leisure and consumption equals the wage.

Application 2: Wages and Labor Supply

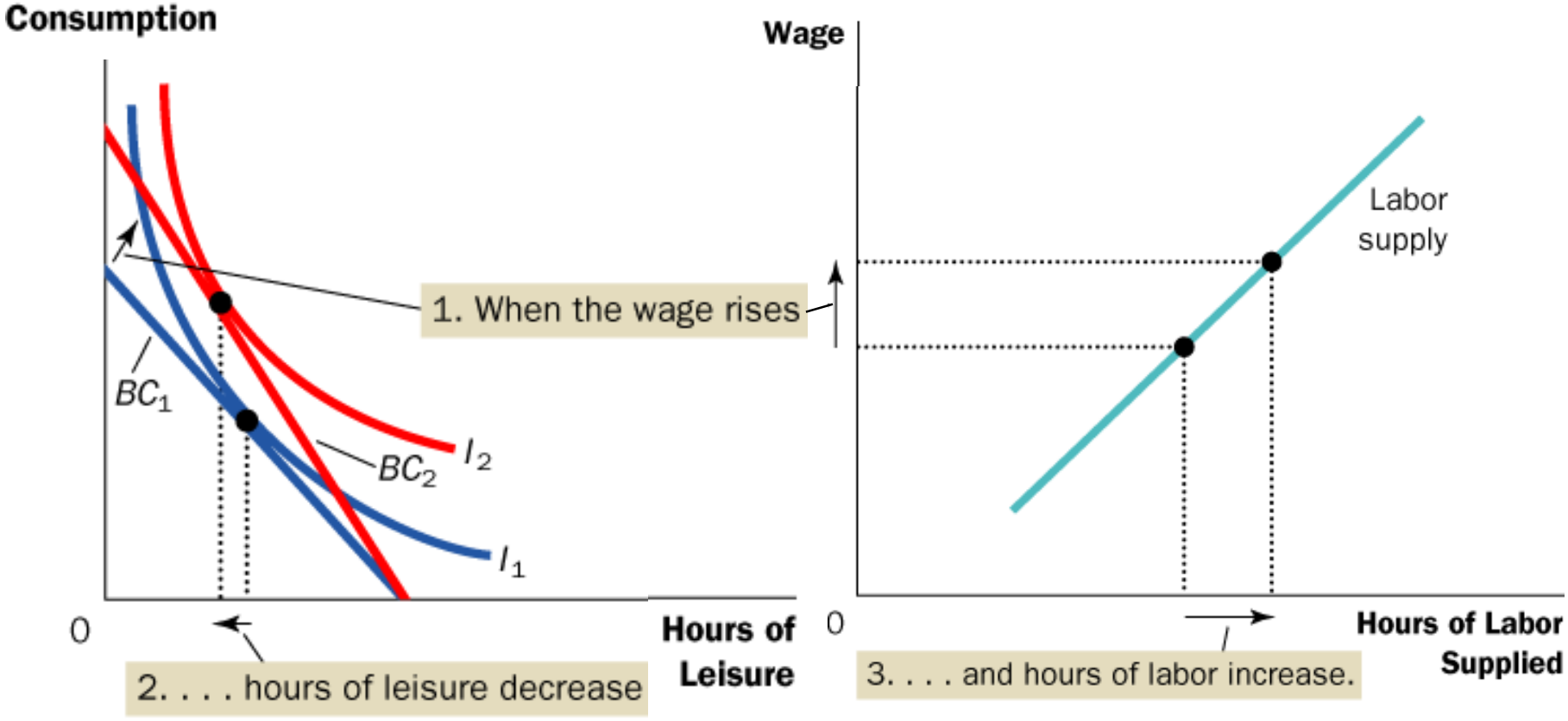
An increase in the wage has two effects on the optimal quantity of labor supplied.

- *Substitution effect (SE)*: A higher wage makes leisure more expensive relative to consumption.
  The person chooses less leisure, i.e., increases quantity of labor supplied.
- *Income effect (IE)*: With a higher wage, she can afford more of both "goods."
  She chooses more leisure, i.e., reduces quantity of labor supplied.

Application 2: Wages and Labor Supply

For this person,
SE > *IE*

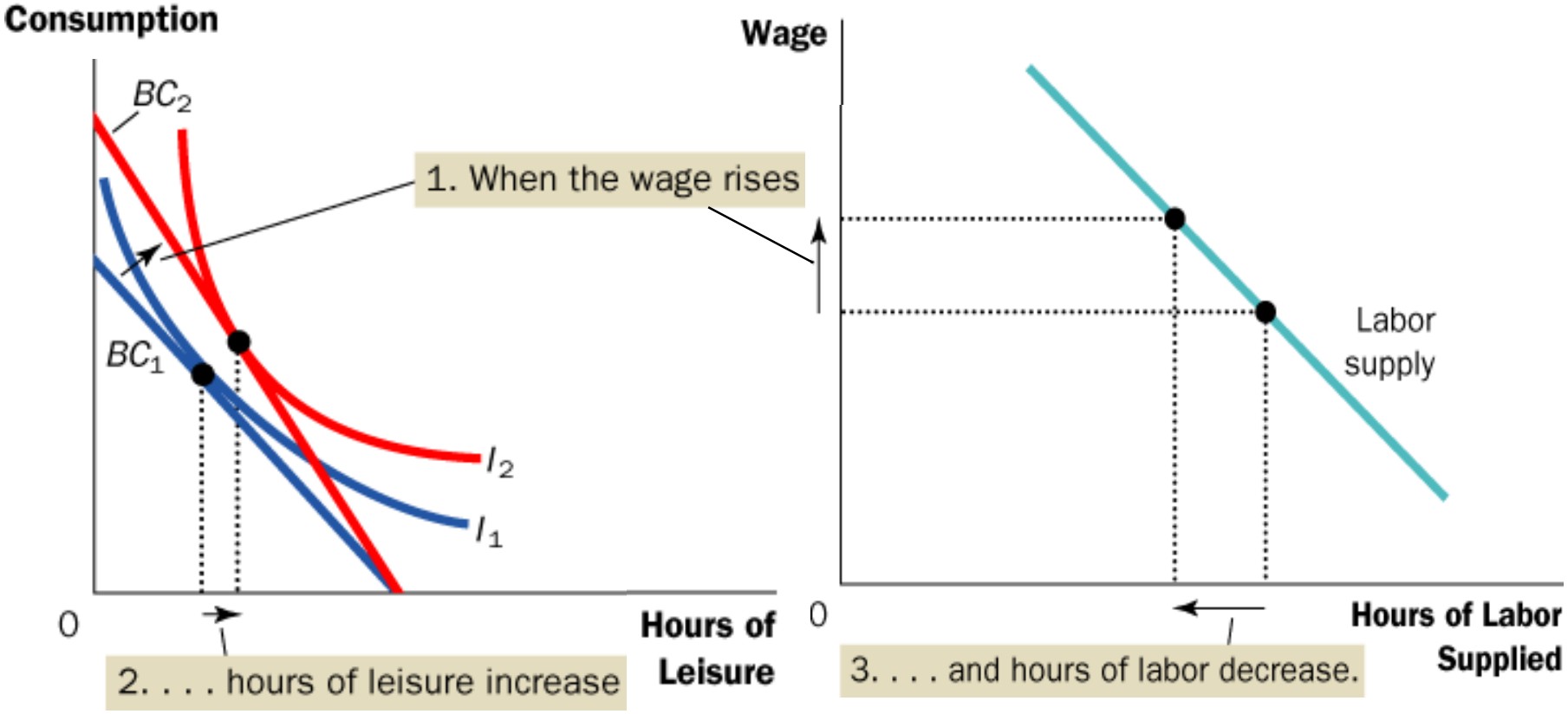
So her labor supply increases with the wage



Application 2: Wages and Labor Supply

For this person,
SE < *IE*

So his labor supply falls when the wage rises



Could This Happen in the Real World???

Cases where the income effect on labor supply is very strong:

- Over last 100 years, technological progress has increased labor demand and real wages.

  The average workweek fell from 6 to 5 days.

- When a person wins the lottery or receives an inheritance, his wage is unchanged

  But such persons are more likely to work fewer hours, indicating a strong income effect.