

Econ 301: Managerial Economics

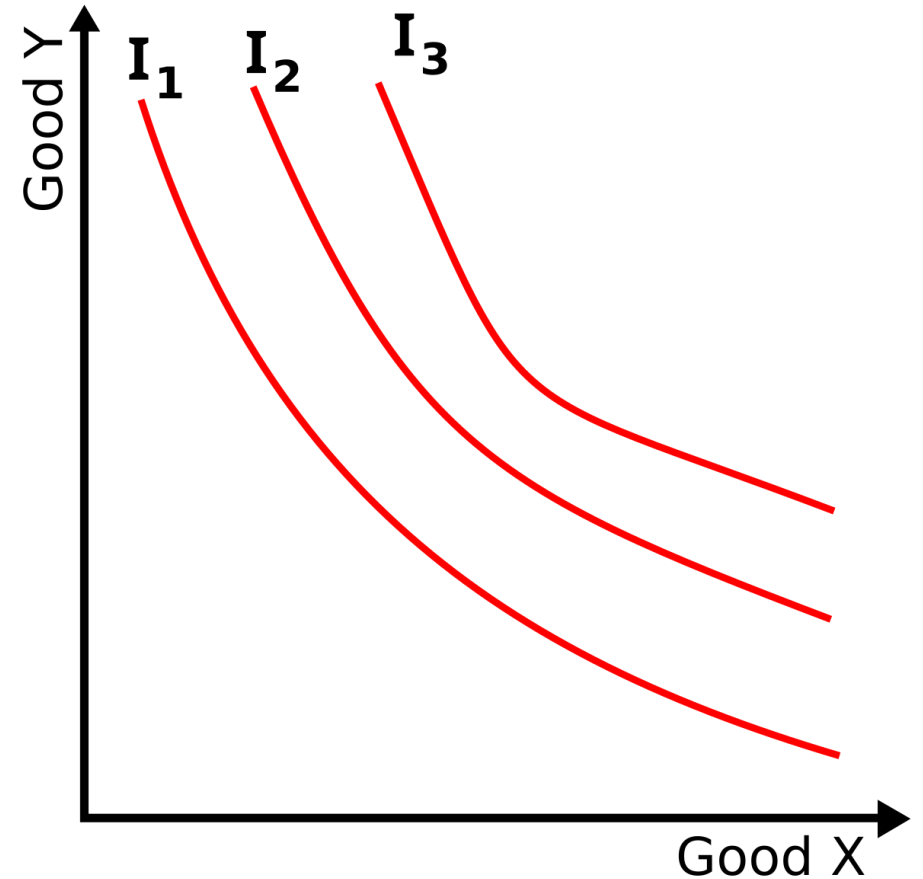
Topic 6: Consumer Optimization

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Where do people optimize Utility

- At what indifference curve do people optimize their utility?



Where do people optimize Utility

- At what indifference curve do people optimize their utility?

Answer:

- It depends!
- In this case, technically you choose the IC that is highest up and to the right (infinity utility).
- In reality, we can't choose that IC, due to scarcity



Constraints

- The existence of scarcity means we can't have everything. There are limits to our choices. This is due to limited
 - Time
 - Money
- The existence of scarcity means there are constraints
- In economics, when analyzing consumer behaviour (what do people buy), both prices and income constrain choices.

The Budget Constraint

Prices and income limit the bundles of goods affordable to consumers.

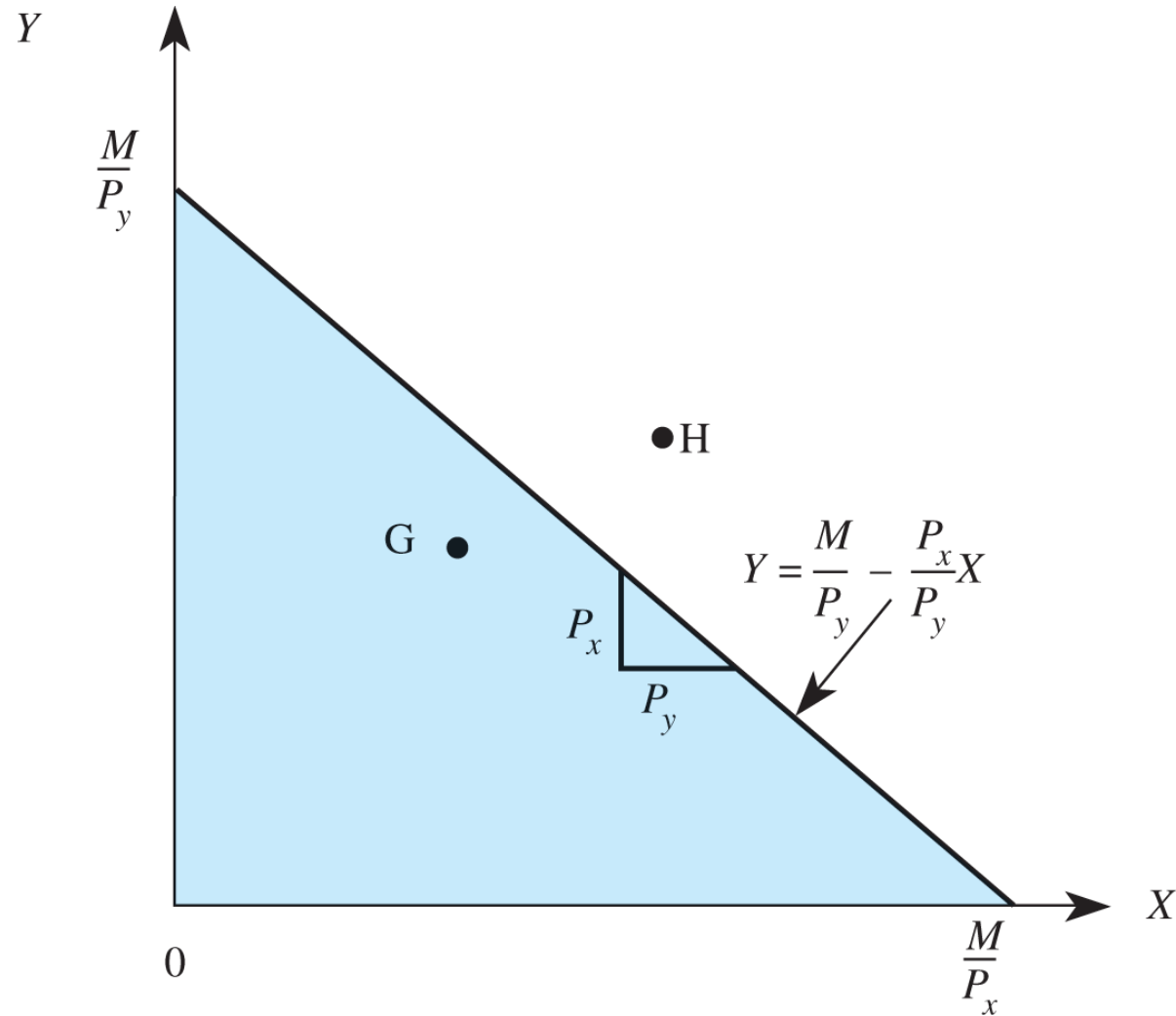
- **Budget set:** defines the combinations of goods X and Y that are affordable for the consumer

$$P_x X + P_y Y \leq M$$

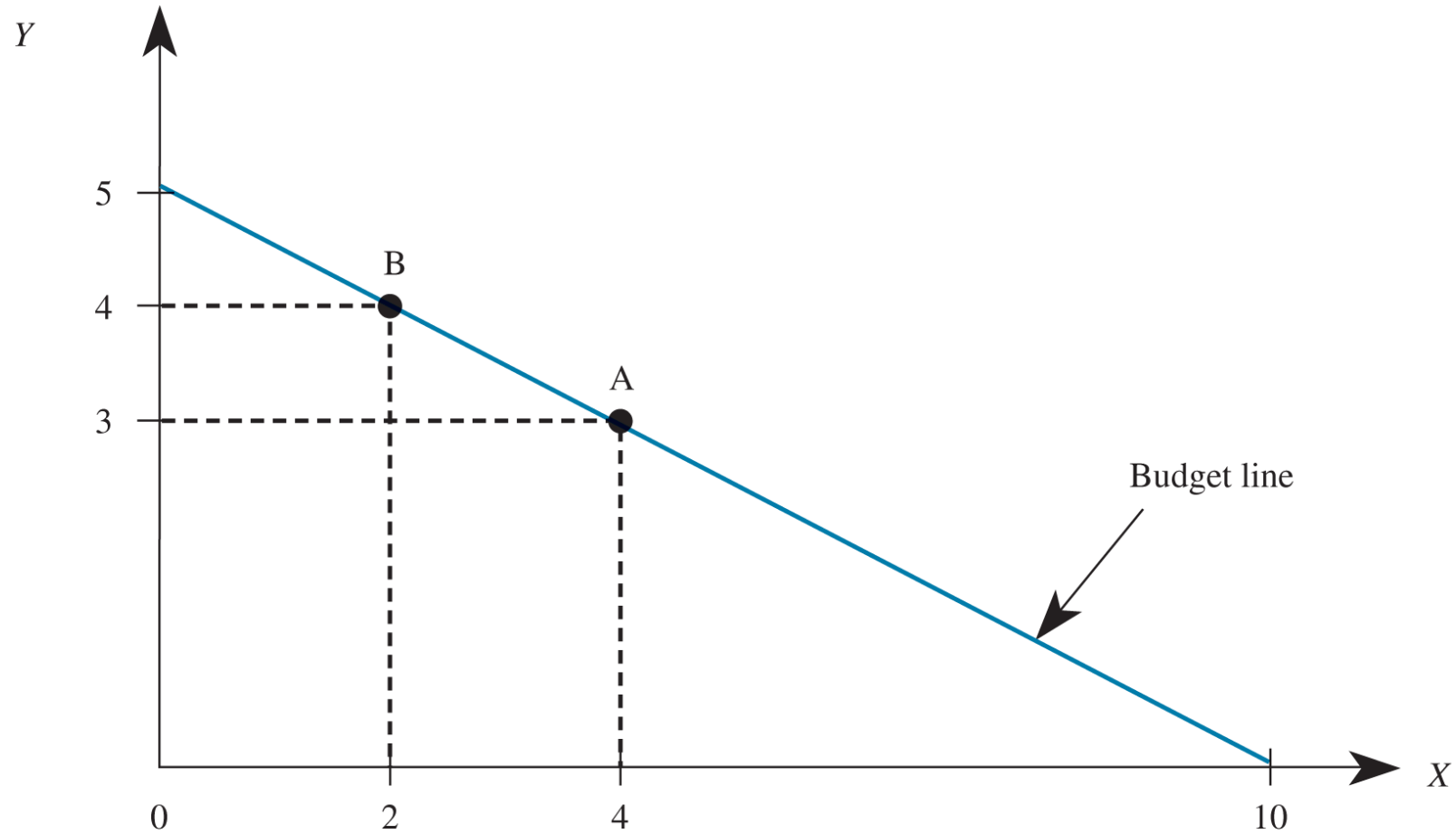
- **Budget line:** defines all combinations of goods X and Y that exactly exhaust the consumer's income

$$P_x X + P_y Y = M$$

The Budget Set



The Budget Line



The Market Rate of Substitution

- How much are you **able** to trade off one good for another?

Example: $P_x X + P_y Y = M$, Where X is bread, and Y is eggs

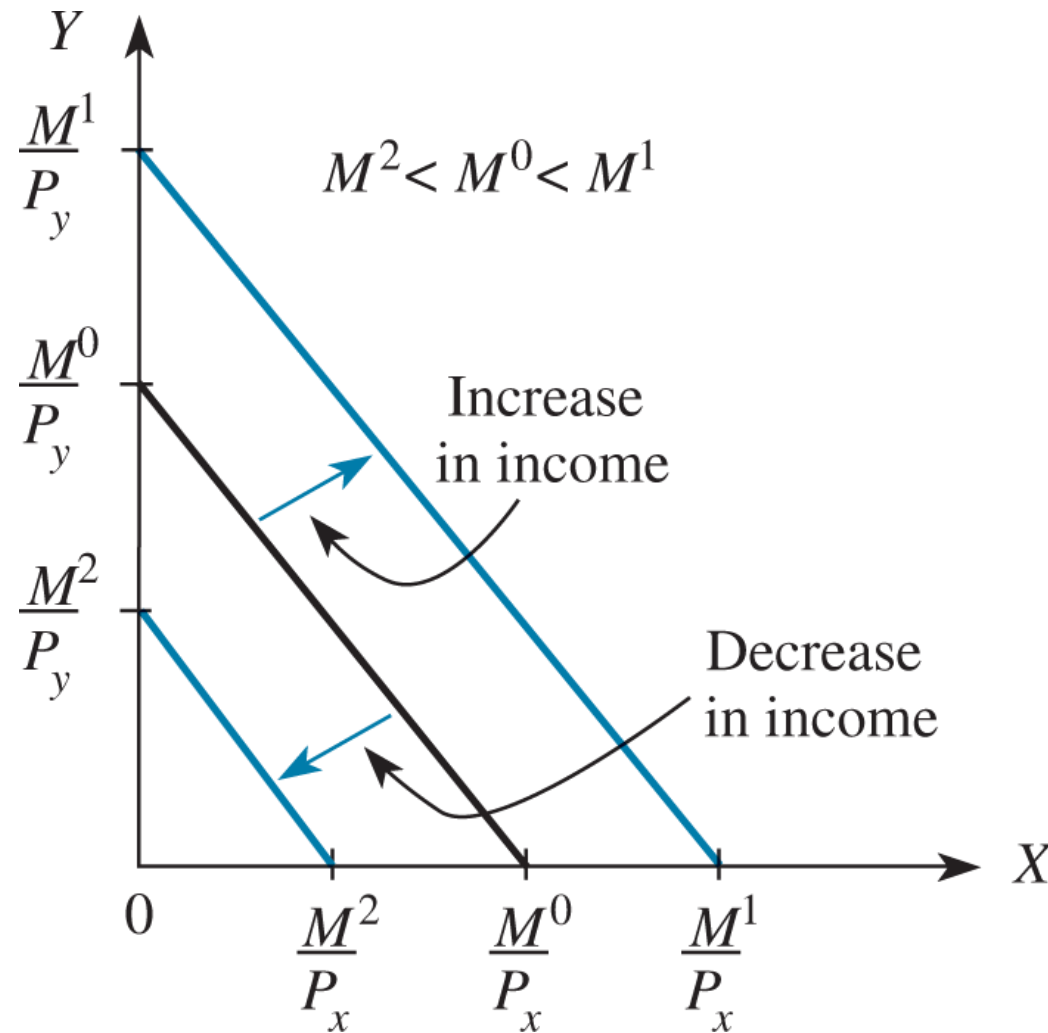
$P_x = 1$, $P_y = 2$, $M = \$10$ therefore $X + 2Y = 10$

- Any time you give up a carton of eggs, you can buy 2 more loaves of bread
- Any time you give up a loaf of bread you can buy half a carton of eggs
- It's the ratio of the prices! - $\frac{P_x}{P_y}$

What happens if income changes?

- What happens if income increases from \$10 to \$20?
- $X + 2Y = 10$ 20
- This will increase the budget set (same slope).
 - Can now buy bundles of (20 eggs, 0 bread) or (0 eggs, 10 bread).
- Opposite occurs if it decreases.

Changes in Income Shrink or Expand Opportunities

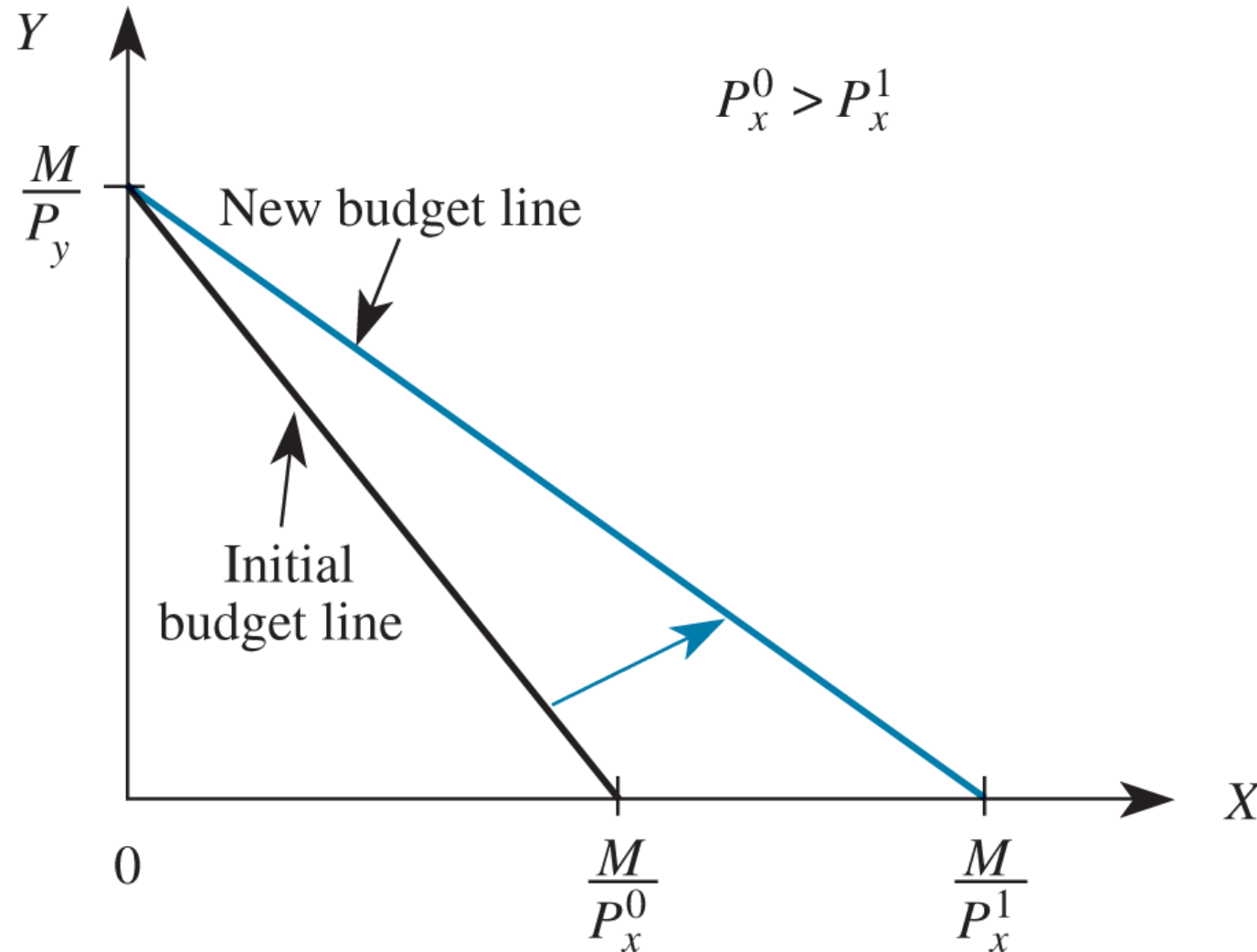


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What happens if prices change?

- What happens if the price of bread P_x goes from \$1 per egg to \$0.5?
- $0.5X + 2Y = 10$
- This will change the slope of the budget set. Now the Market rate of substitution is no longer -0.5, but $-0.25 \left(-\frac{P_x}{P_y}\right)$.
- Can get 20 eggs, 0 loaves of bread with an income of \$10
 - $\frac{M}{P_x} = \frac{10}{0.5} = 20$

A Decrease in the Price of Good X



The Budget Constraint in Action

Consider the following budget line:

$$100 = 1X + 5Y$$

- What is the maximum amount of X that can be consumed?
- What is the maximum amount of Y that can be consumed?
- What is rate at which the market trades goods X and Y ?

The Budget Constraint in Action

Answers:

- Maximum X is: $X = \frac{100}{1} = 100$ units.
- Maximum Y is: $Y = \frac{100}{5} = 20$ units.
- Market rate of substitution: $-\frac{P_x}{P_y} = -\frac{1}{5}$.

Consumer Equilibrium

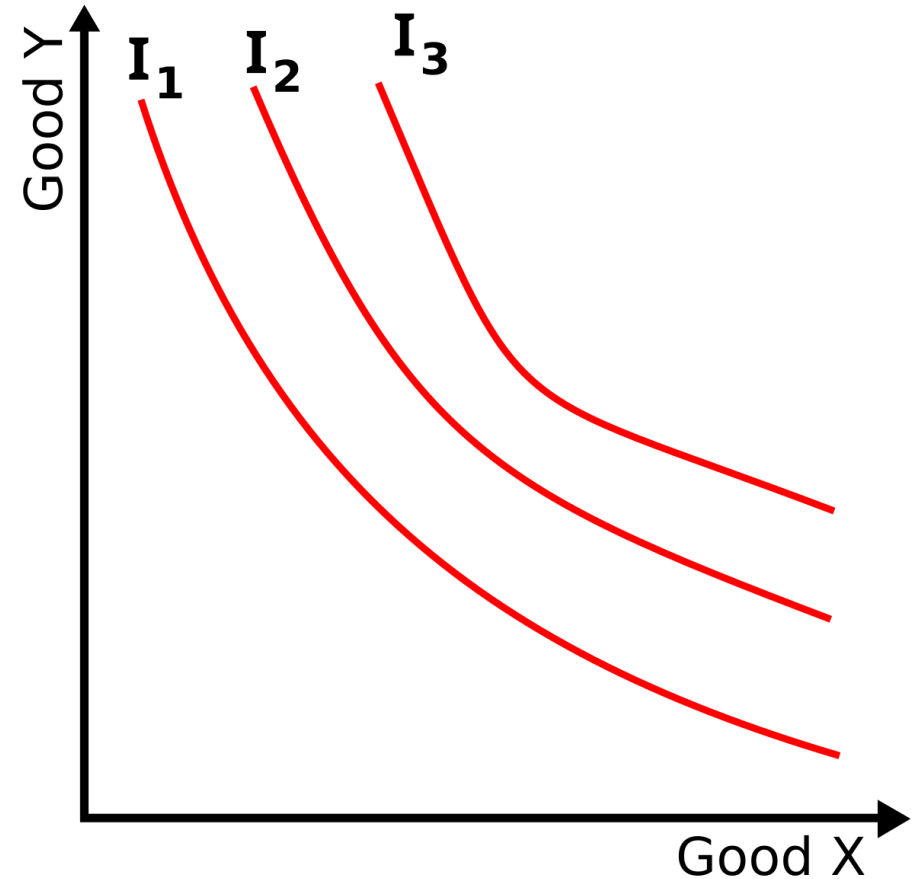
- Given a consumers indifference curves (preferences) and constraints (budget) at what bundle do they maximize their utility?

Two important things to consider.

1. They will choose a point on the highest **possible** indifference curve (up and to the right)
2. This will occur on the budget line

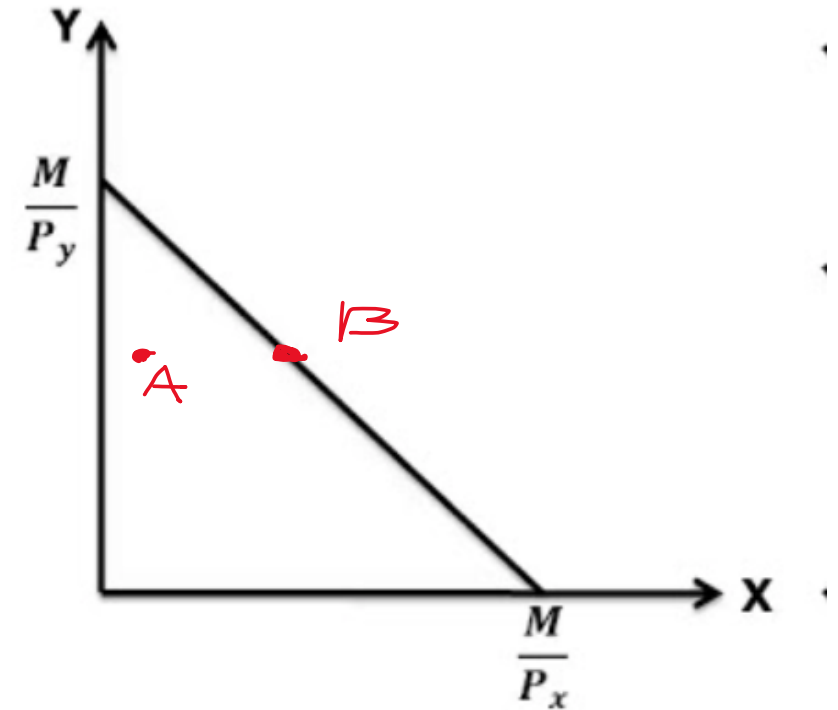
1. Highest possible IC

- A consumer gets more utility from an IC that is up and to the right



2. On The budget Line

- If a consumer is choosing a point **not on** the budget line, then there is a point **on the budget line** that will dominate the other point.
- This is due to monotonicity (more is better than less)
- Example: $B > A$



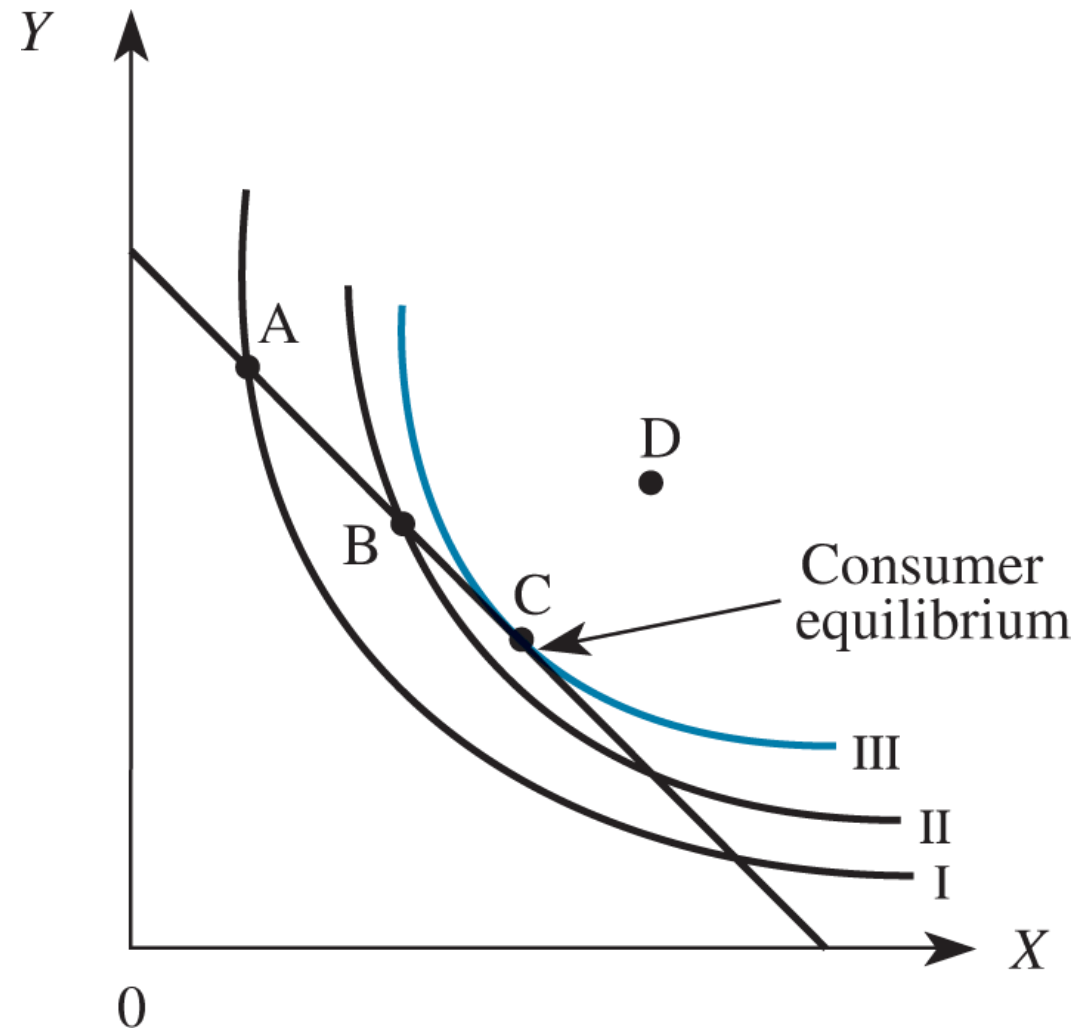
Finding the Consumer Equilibrium

Consumer equilibrium

- Consumption bundle that is affordable and yields highest utility for the consumer
- Consumption bundle in which the rate a *consumer choses* (marginal rate of substitution) to trade between goods *X* and *Y* equals the rate at which these goods are traded in the *market* (market rate of substitution)
- In other words: When the slope of the budget line is the tangent of an IC (slope of an IC at that point).

$$MRS = \frac{P_x}{P_y}$$

Consumer Equilibrium



Price Changes and Consumer Behavior

- Price and income changes impact a consumer's **budget set**. This changes the level of satisfaction that can be achieved.
- This implies that price and income changes will lead to consumer equilibrium changes.

Price Changes and Equilibrium

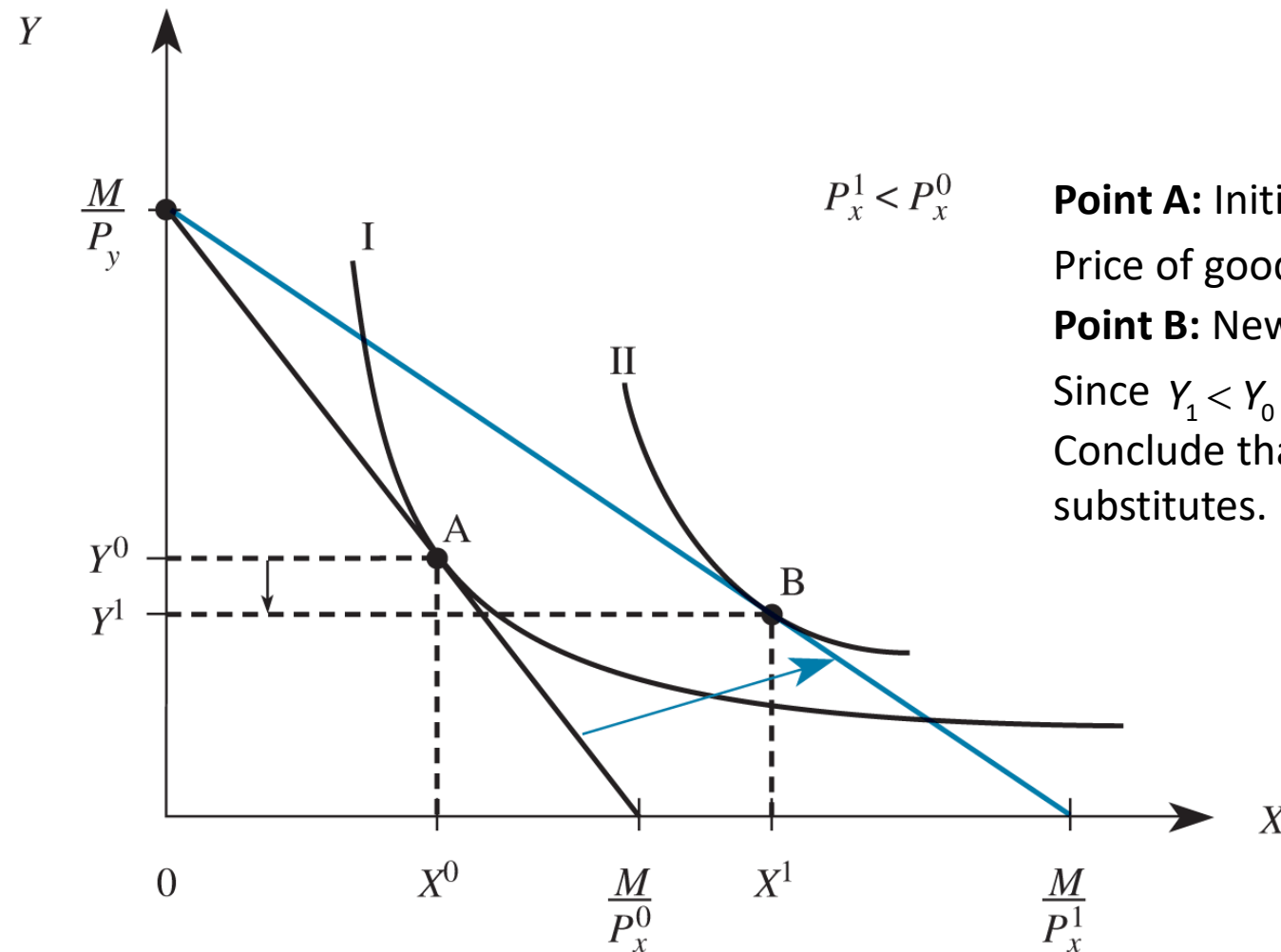
Price increases (decreases) reduce (expand) a consumer's budget set.

The new consumer equilibrium resulting from a price change depends on consumer preferences.

Goods X and Y are:

- ***substitutes*** when an increase (decrease) in the price of X leads to an increase (decrease) in the consumption of Y .
- ***complements*** when an increase (decrease) in the price of X leads to a decrease (increase) in the consumption of Y .

Change in Consumer Equilibrium Due to a Decrease in the Price of Good X (Note that good Y is a substitute for X.)



Point A: Initial consumer equilibrium.

Price of good X decreases: $P_x \downarrow$, budget set expands.

Point B: New consumer equilibrium.

Since $Y_1 < Y_0$ when $P_x \downarrow$:

Conclude that goods X and Y are substitutes.

Change in Consumer Equilibrium Due to a Decrease in the Price of Good X (Note that good Y is a Complement for X.)

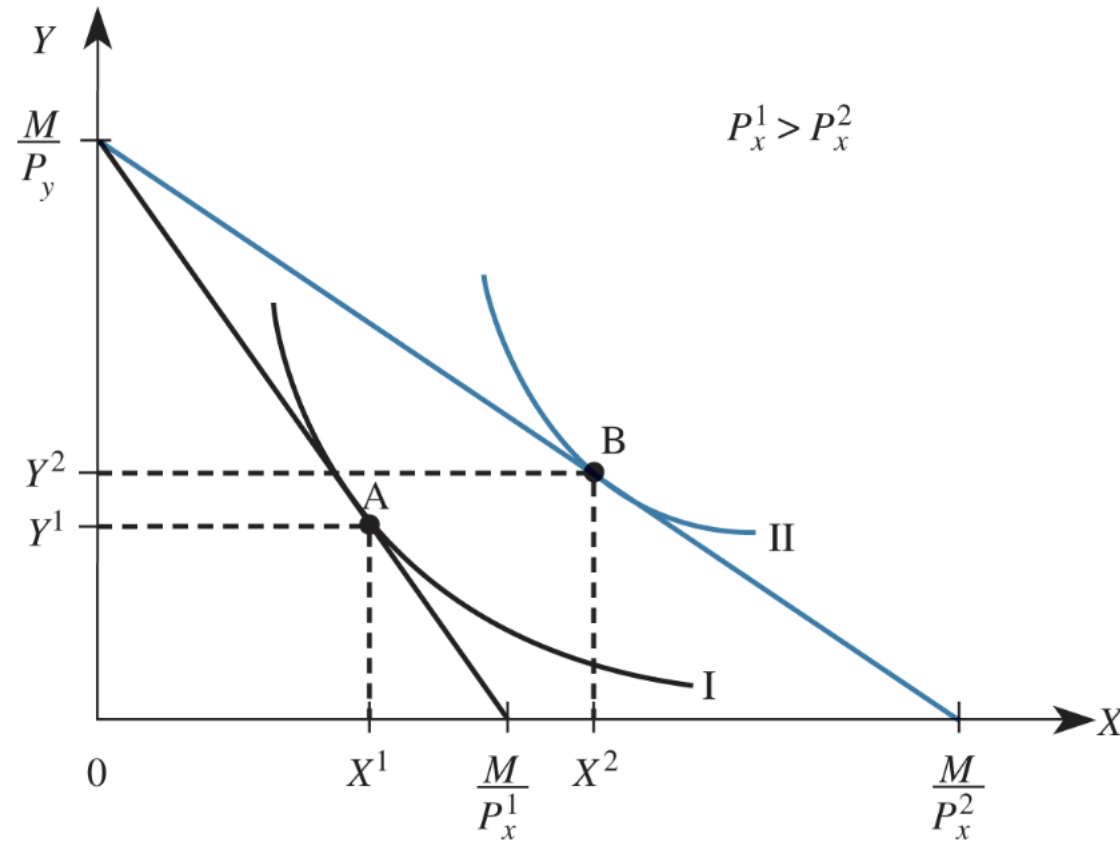


Figure 4–10

When the Price of Good X Falls, the Consumption of Complementary Good Y Rises

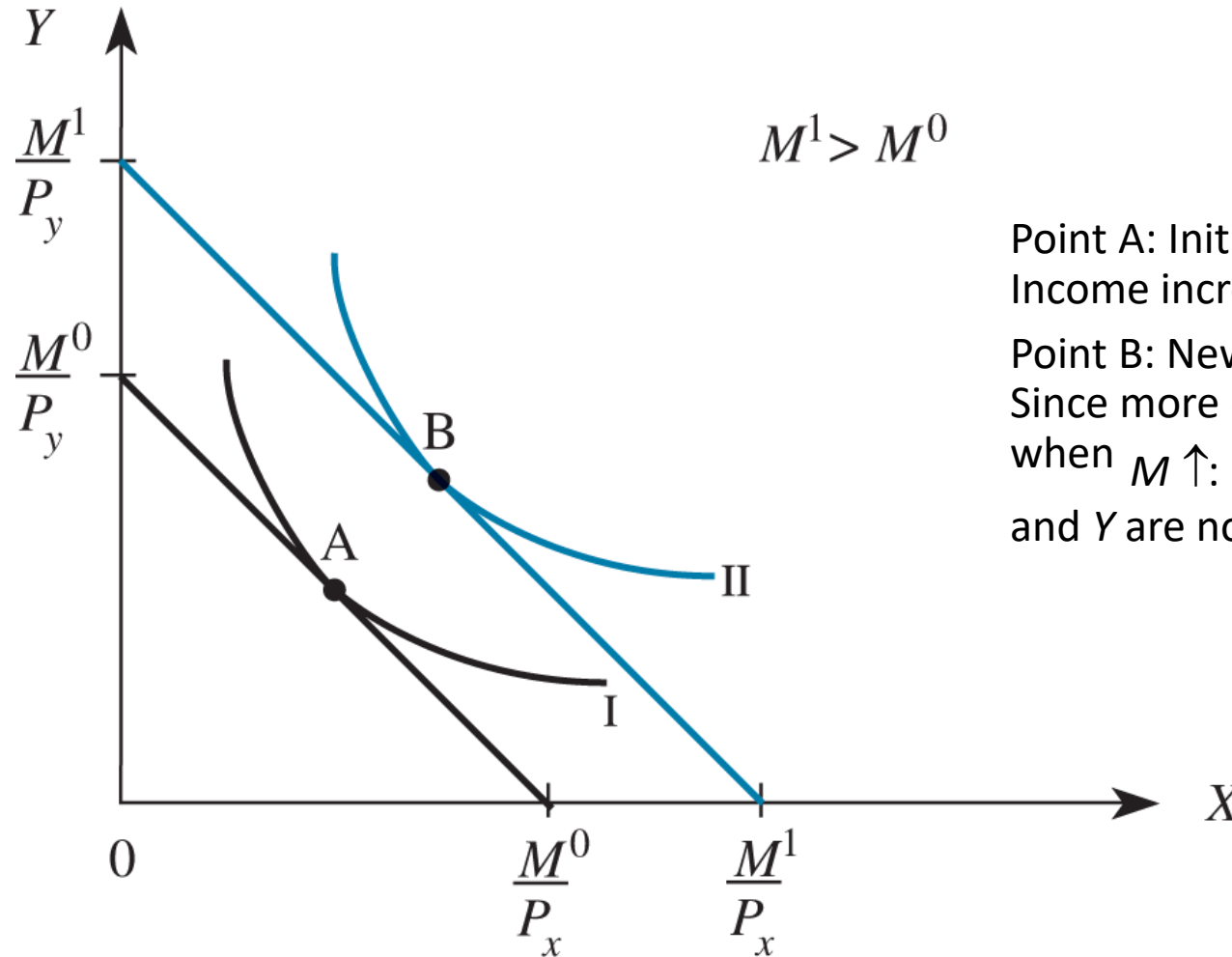
Income Changes and Consumer Behavior

Income increases (decreases) reduce (expand) a consumer's budget set. The new consumer equilibrium resulting from an income change depends on consumer preferences.

Good X is:

- a ***normal good*** when an increase (decrease) in income leads to an increase (decrease) in the consumption of X .
- an ***inferior good*** when an increase (decrease) in income leads to a decrease (increase) in the consumption of X .

An Increase in Income Increases the Consumption of Normal Goods



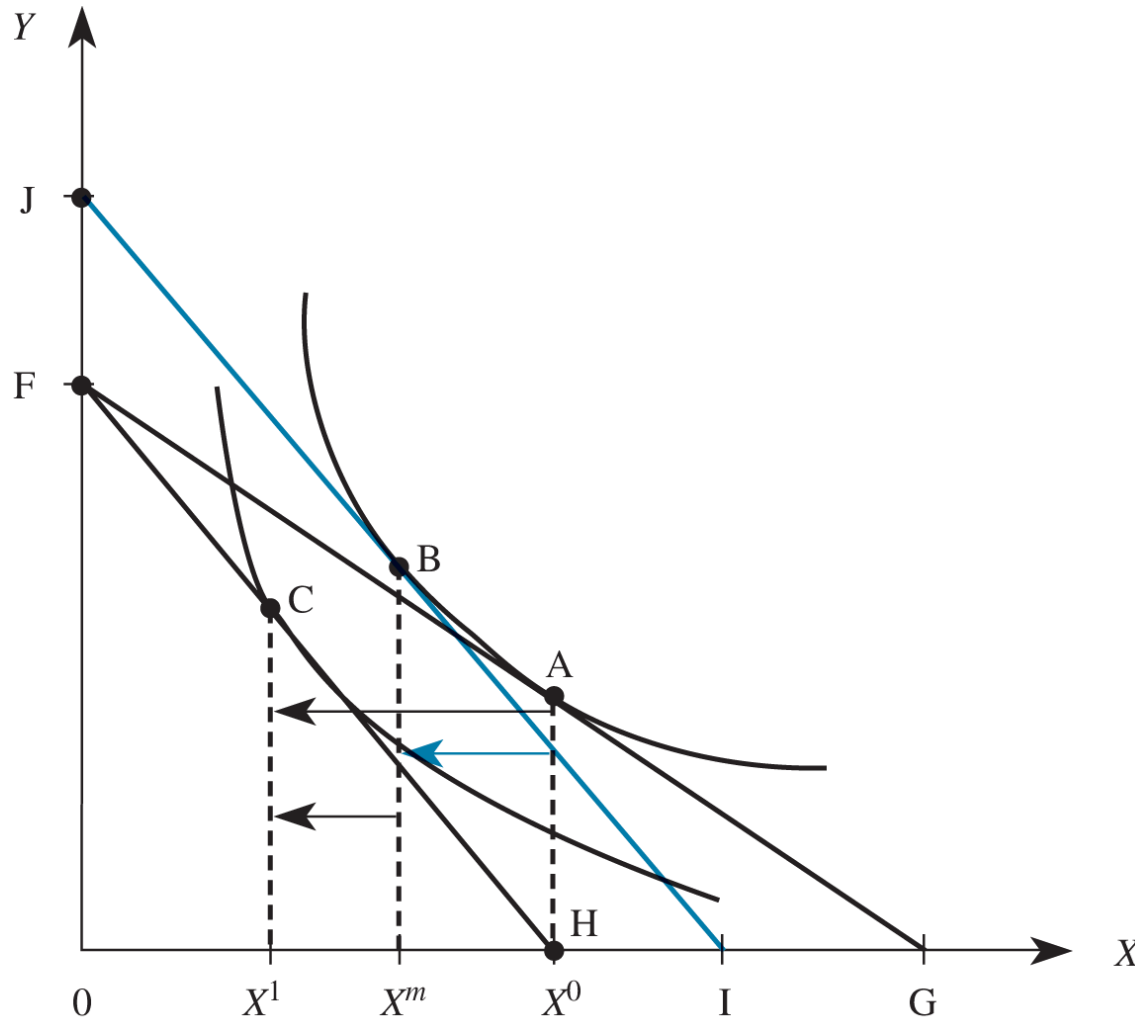
Point A: Initial consumer equilibrium.
Income increases: $M \uparrow$, budget line expands.
Point B: New consumer equilibrium.
Since more of both goods are consumed
when $M \uparrow$: Conclude that goods X
and Y are normal goods.

Substitution and Income Effects

Moving from one equilibrium to another when the price of one good changes can be broken down into two effects:

1. **Substitution effect:** The movement along a **given indifference curve** that results from a change in the relative prices of goods, holding real income constant
2. **Income effect:** The movement from one indifference curve to another that results from the change in **real income** caused by a price change
 - Where real income is how much a consumer can purchase given income and price.

An Increase in the Price of Good X Leads to a Substitution Effect (A to B) and an Income Effect (B to C)



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***Notice the two effects of a price change on consumer choice.**

Point A: Initial consumer equilibrium.

Price of good X increases: $P_x \uparrow$, new budget line FH

- **JI** has the same slope as **FH** and represents hypothetical income to isolate substitution.

Point B: substitution effect.

- Since on same IC as A, this represents the reduction in good X as a result of a higher Market Rate of Substitution, not due to the reduced real income of the consumer

Point C: income effect and new consumer equilibrium.

- Reflects that when price increases for one good. Real income falls (can get less utility overall).

Applications of Indifference Curve Analysis

Choices by consumers

- Buy one, get one free
- Cash gifts, in-kind gifts, and gift certificates

Choices by workers and managers

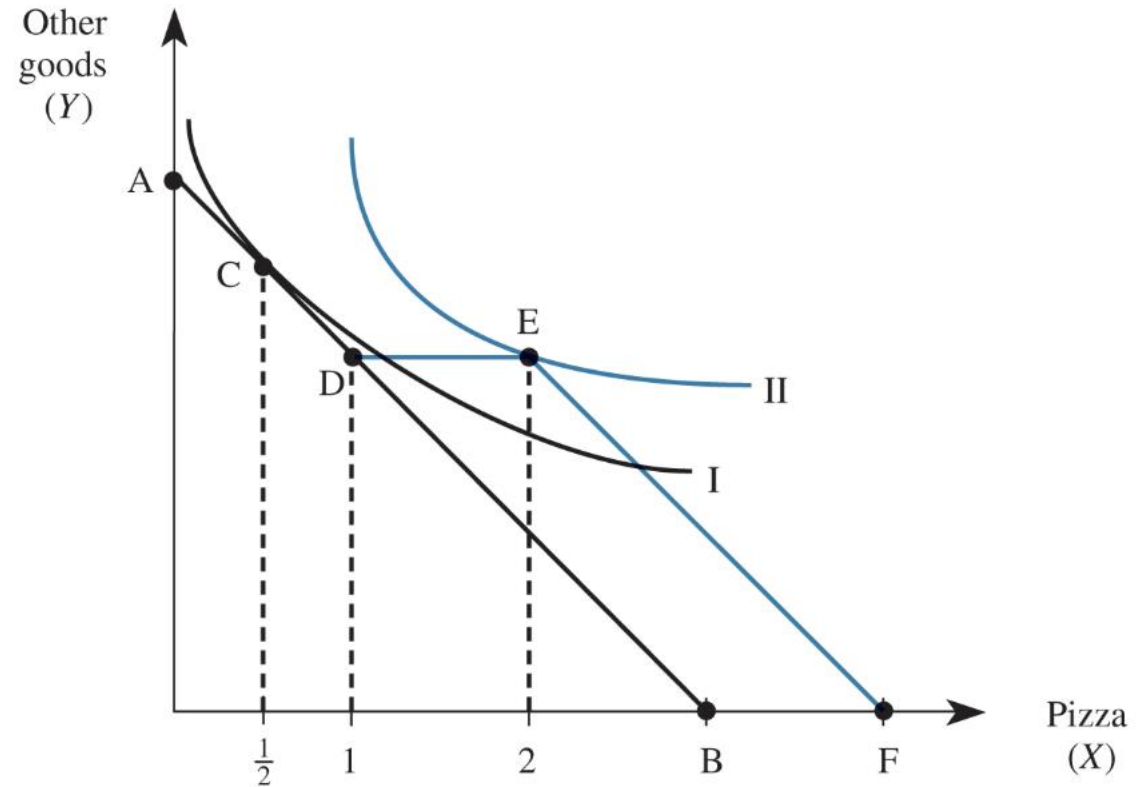
- Income-leisure choice
- Manager's preferences

Buy one Get One Free

- A common promotion by restaurants (such as pizza companies), is buy one large pizza, get a second large pizza free.
- Is this simply a 50% reduction the prize of pizza (changing the budget line)?
 - No! since this only impacts every second unit. Not every unit, which is necessary to shift the budget line.
 - This offer does not change the price of 1 pizza, or 3 pizzas.
- So how do we analyze it?

Buy one Get One Free

- Point C is current equilibrium
 - Half a large pizza is being consumed (or 1 medium)
- Point D represents the point where she would buy a large pizza.
 - C is preferred to D at this stage
- With buy one get one free, budget line now becomes kinked at **ADEF**.
 - <1 pizza it is AD
 - ≥ 1 pizza it is DEF
- Price of pizza is 0 between 1-2 units (slope is 0).
 - She can buy 1 more pizza than before (after the first).
- Bundle E is now affordable and provides higher utility than Bundle C.



Cash Gifts > Actual Gifts

- Fruitcake=Good X
- Other Good =good Y
- Fruitcake is worth \$10.
- If possible, your friend will return the fruitcake (for cash refund) to optimize their utility.
 - Note: Unless the gift is **exactly** what they wanted.

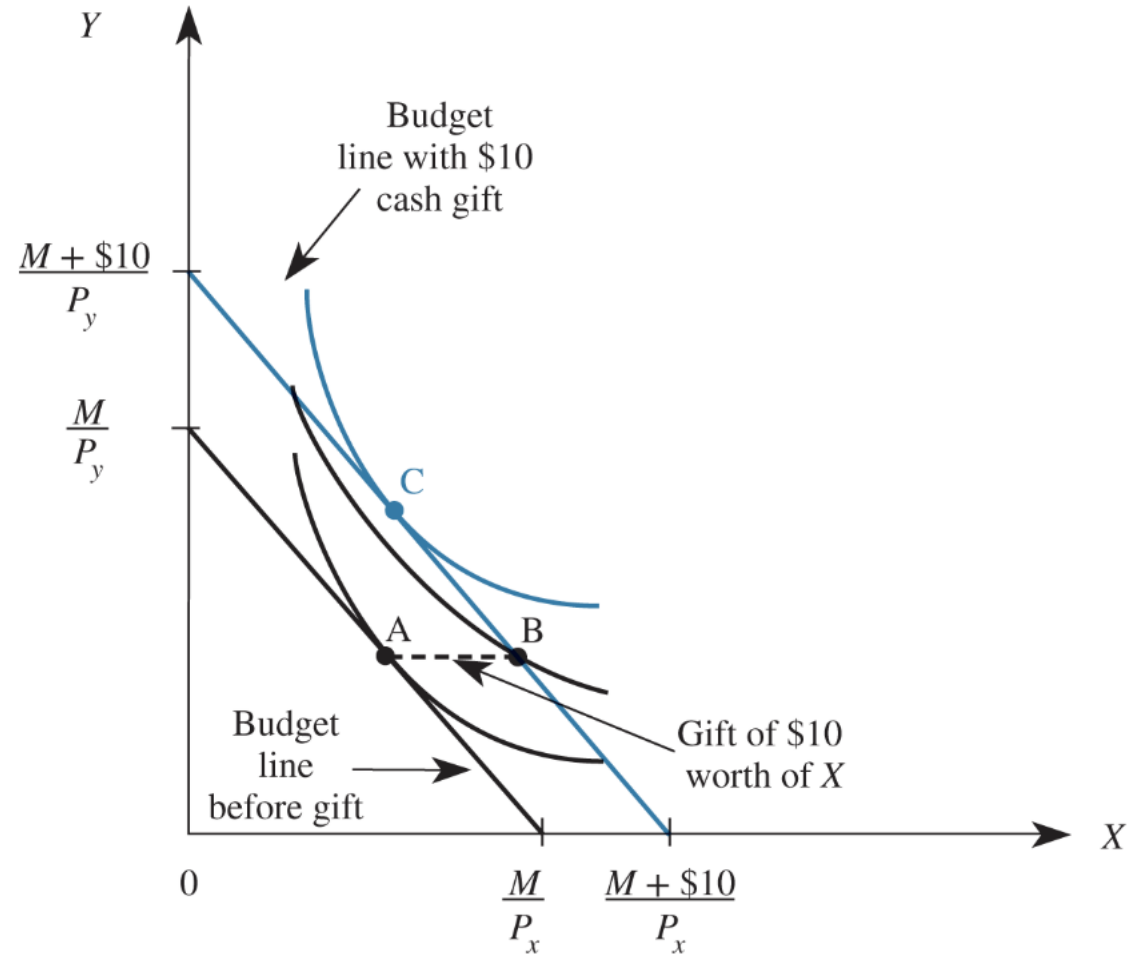


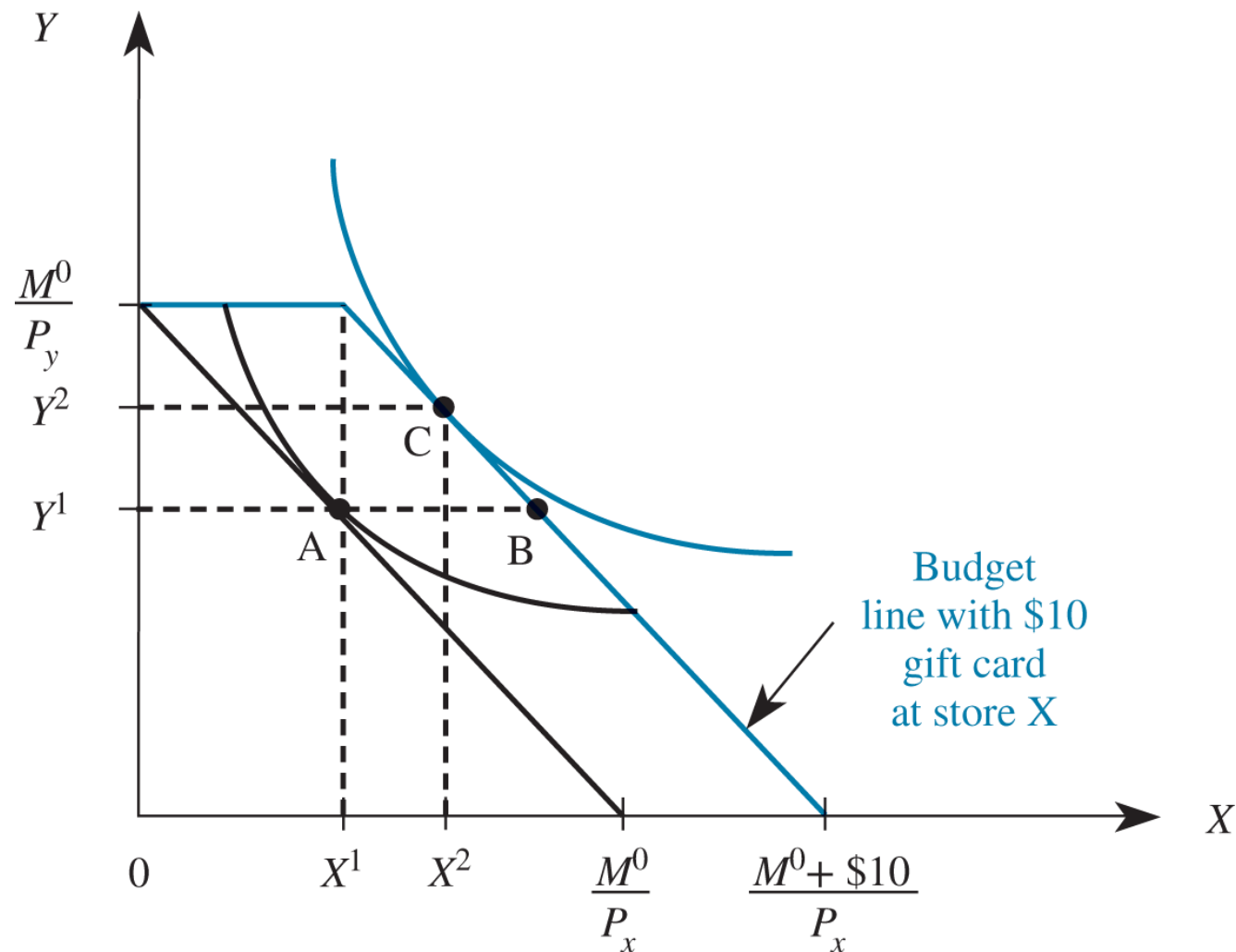
Figure 4–15

A Cash Gift Yields Higher Utility Than an In-Kind Gift

How should stores respond?

- Imagine you are a manager for a store that sells good X.
- You know from taken ECON301 that gifts can not do better than cash in terms of optimizing consumers utility.
- Thus, you know, that consumers will return gifts they receive (around Christmas), to buy less of your product (X) and more of another product (Y).
- What policies/incentives/changes could you put into place to prevent this?

A Gift Card Valid at Store X



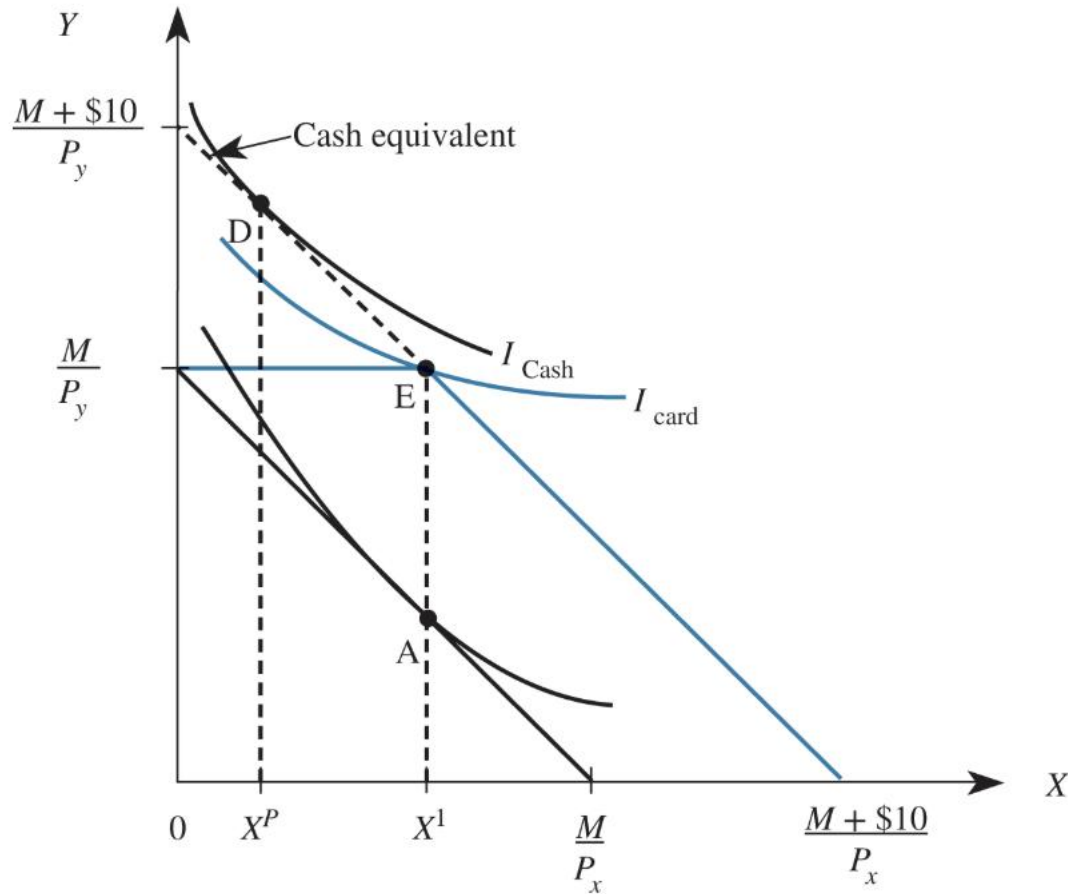
Point A: Initial consumer equilibrium
Receive a \$10 gift certificate for good X:

Point B: Higher utility holding Y
consumption at initial level

Point C: New consumer equilibrium
when X and Y are **normal goods**

In this case (X and Y are normal goods),
the gift card is as good as a cash gift.

A Gift Card Valid at Store X (if X is inferior)



In this case (X is an inferior good), the gift card is not as good as a cash gift.

Figure 4–17

Here, a Cash Gift Yields Higher Utility Than a Gift Card of Equal Dollar Value

The Intuition & Real-World Caveats

The Economic Logic

- Nobody knows your preferences better than you do.
- Cash lets you reach your highest indifference curve because you have complete freedom to optimize.
- A gift card restricts your feasible set to one store — the kink in the budget constraint may prevent tangency.
- An in-kind gift gives you ONE specific bundle — chosen by someone else's guess about your preferences.
- The more the giver's choice diverges from your optimal bundle, the greater the deadweight loss.

But Wait... Caveats!

Signaling & sentiment

A thoughtful gift signals effort, knowledge, and care — yielding utility beyond the good itself.

Self-control problems

Cash might be spent on bills or saved; gifts force "luxury" consumption the recipient wouldn't choose but enjoys.

Social norms

Giving cash can feel impersonal or even offensive in many cultures.

Information advantage

Sometimes the giver knows about products the recipient doesn't — discovery value.

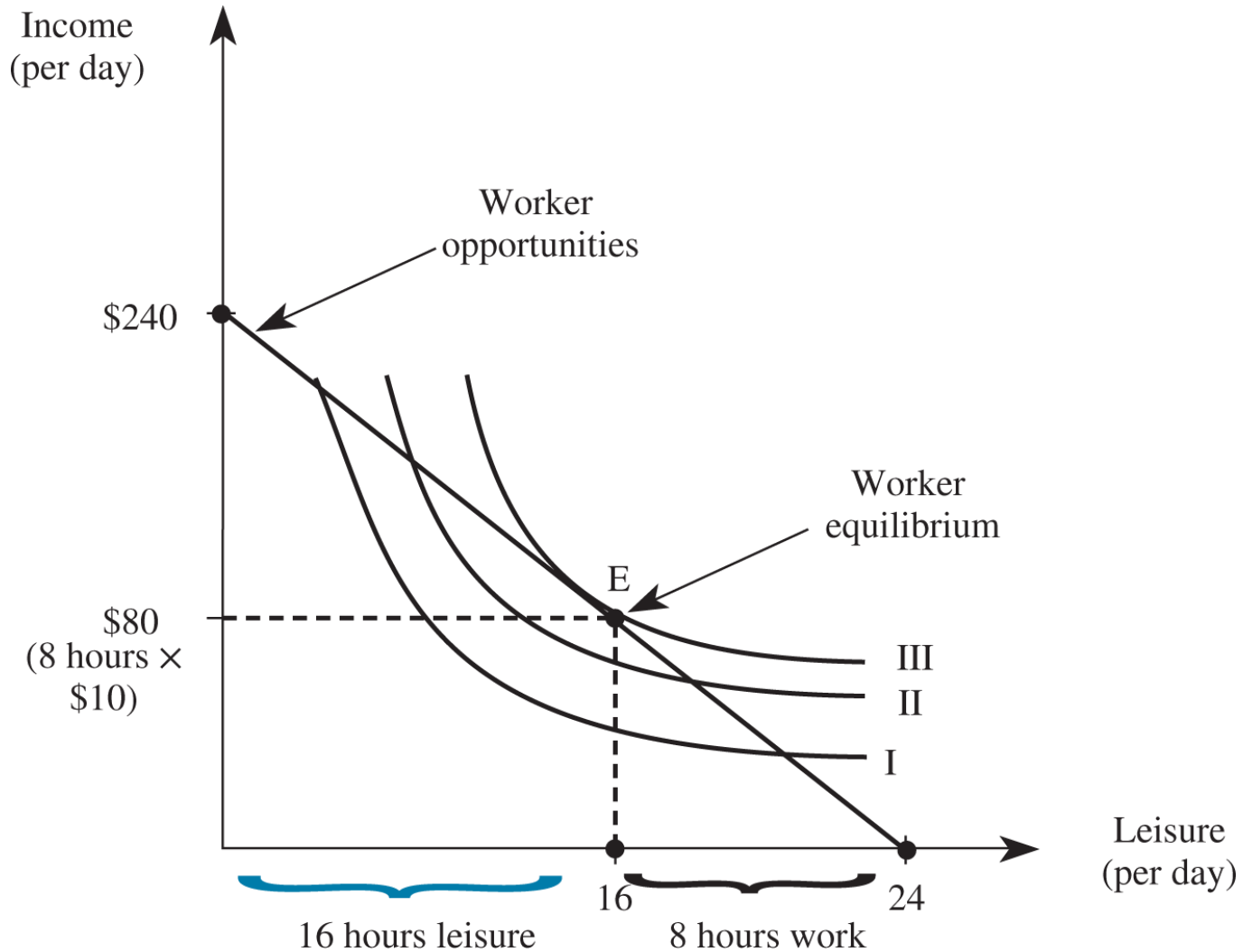
Mental accounting

Recipients may value gifts differently than equivalent cash (Thaler's mental accounting).

Labor vs Leisure

- With only 24 hours in a day, how do people decide to split their time between work and play?
- We can use the same indifference curve analysis to find the optimal point of labor/leisure split given this constraint.
- E.G- How much more (or less) should people work when income per hour increases?

Labor–Leisure Choice



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Labor–Leisure Budget Set in Action

- What is the budget set for a worker who receives **\$5 per hour of work** and a **fixed payment of \$40**? Let E denote the worker's total earnings and L the number of leisure hours in a 24-hour day.

$$E = \$40 + \$5(24 - L) = \$160 - \$5L$$

Indifference and Demand Curves

- Indifference curves along with price changes determine individuals' demand curves.
- Market demand is the horizontal summation of individuals' demands.
 - We already looked at this when eliciting People's WTP for a good.

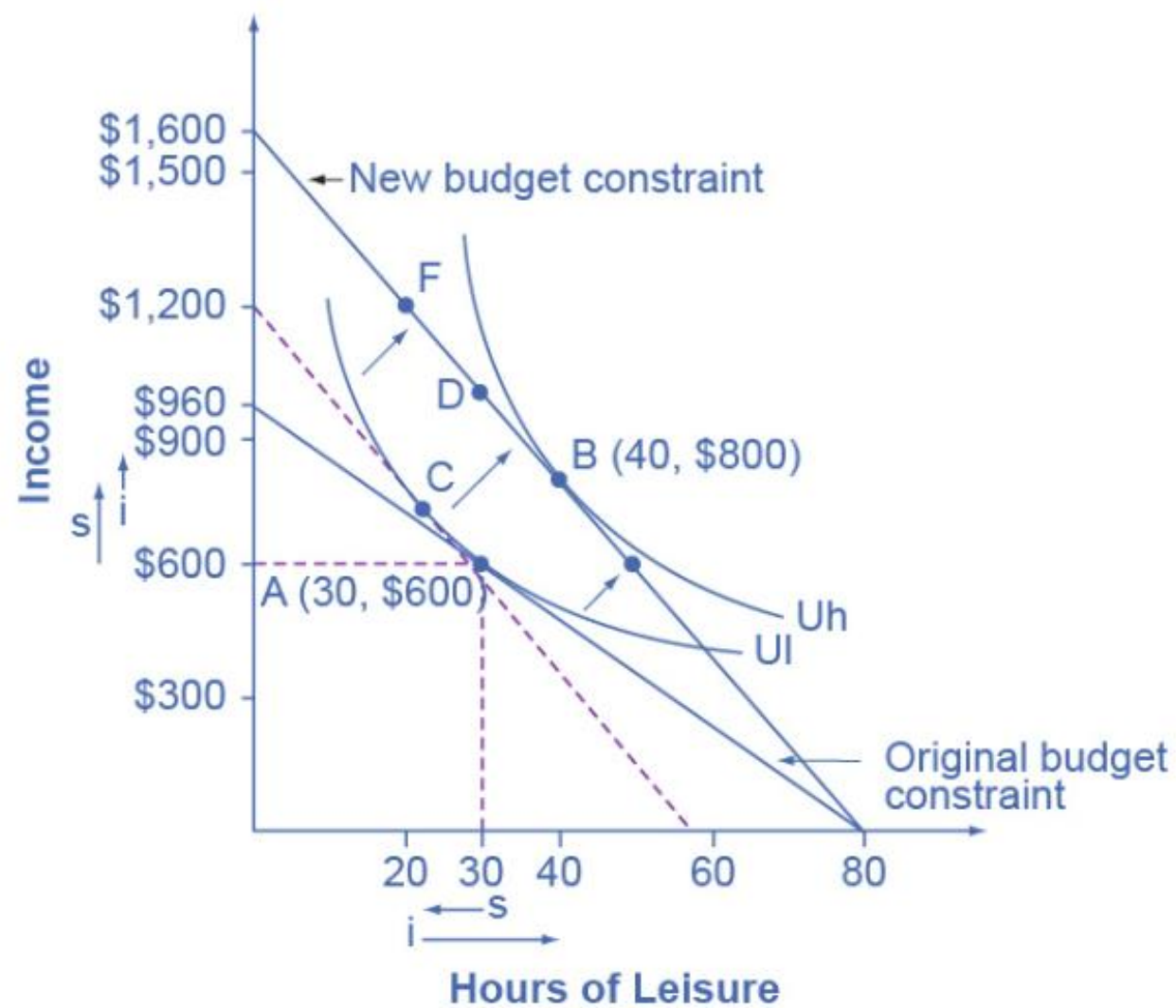
Example

- Petunia is working at a job that pays \$12 per hour but she gets a raise to \$20 per hour. After family responsibilities and sleep, she has **80 hours per week** available for work or leisure

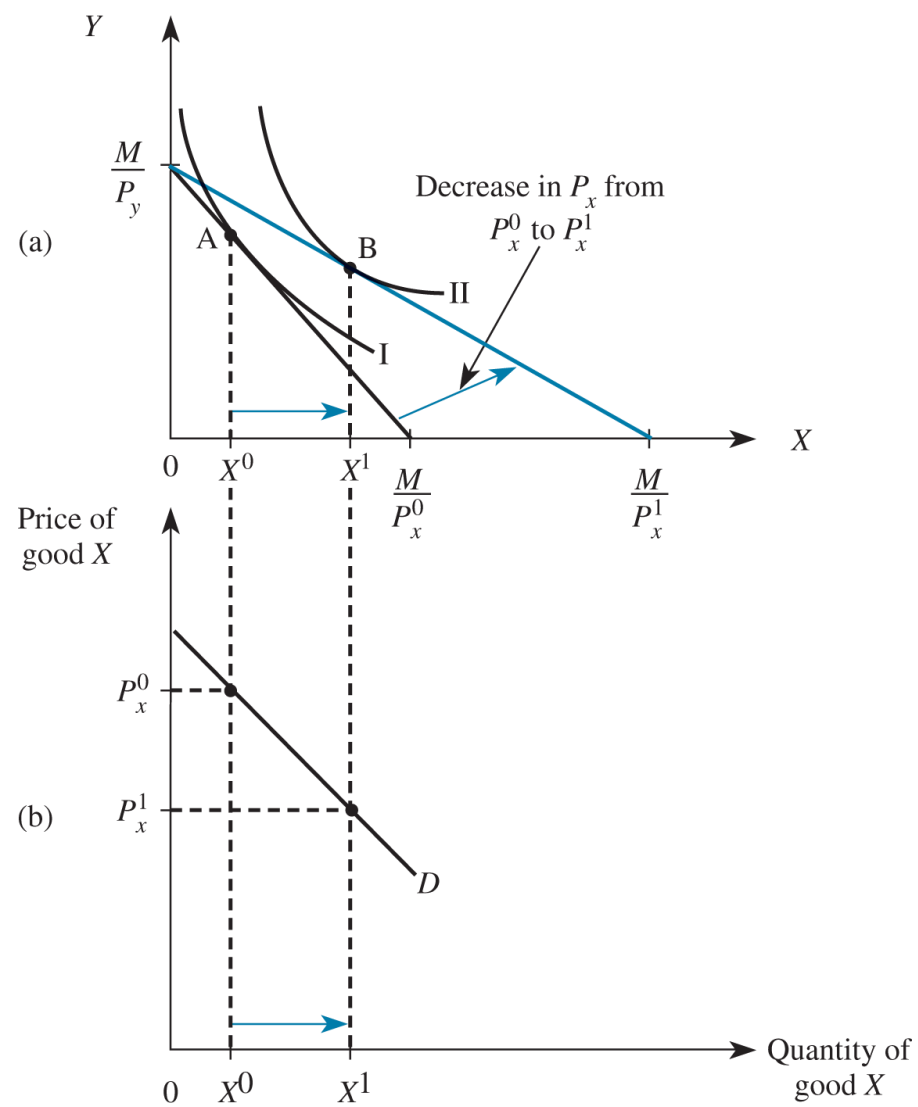
Budget Set 1: $E = \$12(80 - L) = 960 - 12L$

Budget Set 2: $E = \$20(80 - L) = 1600 - 20L$

Example

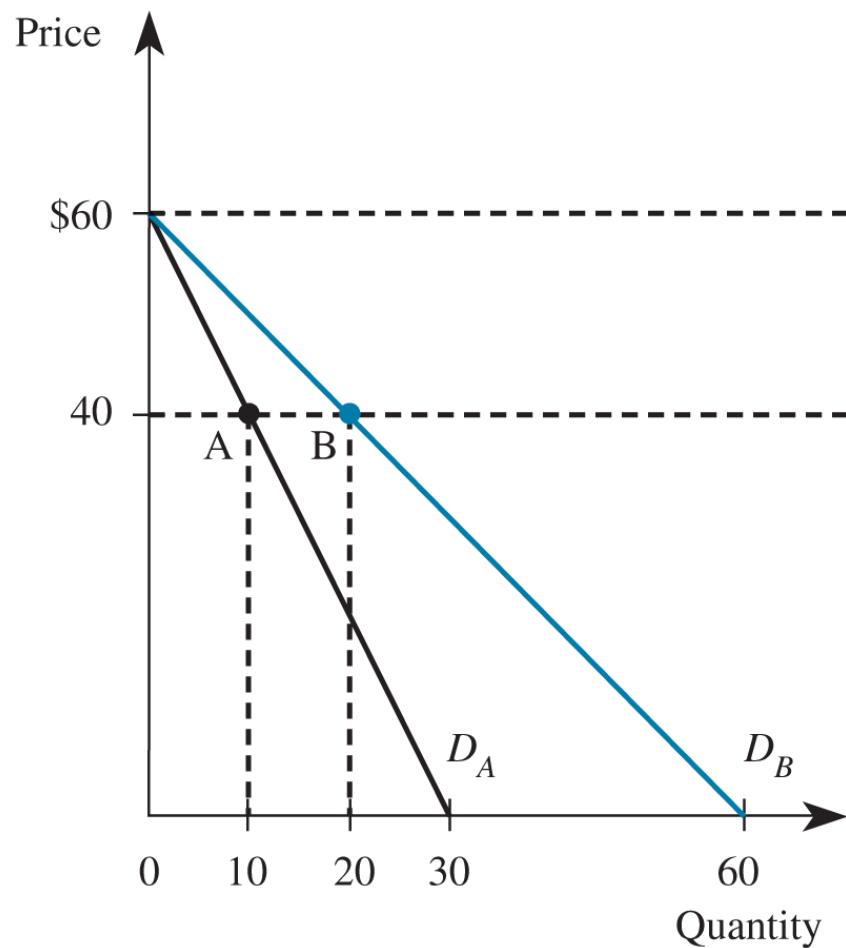


Deriving an Individual's Demand Curve (Figure 4-20)

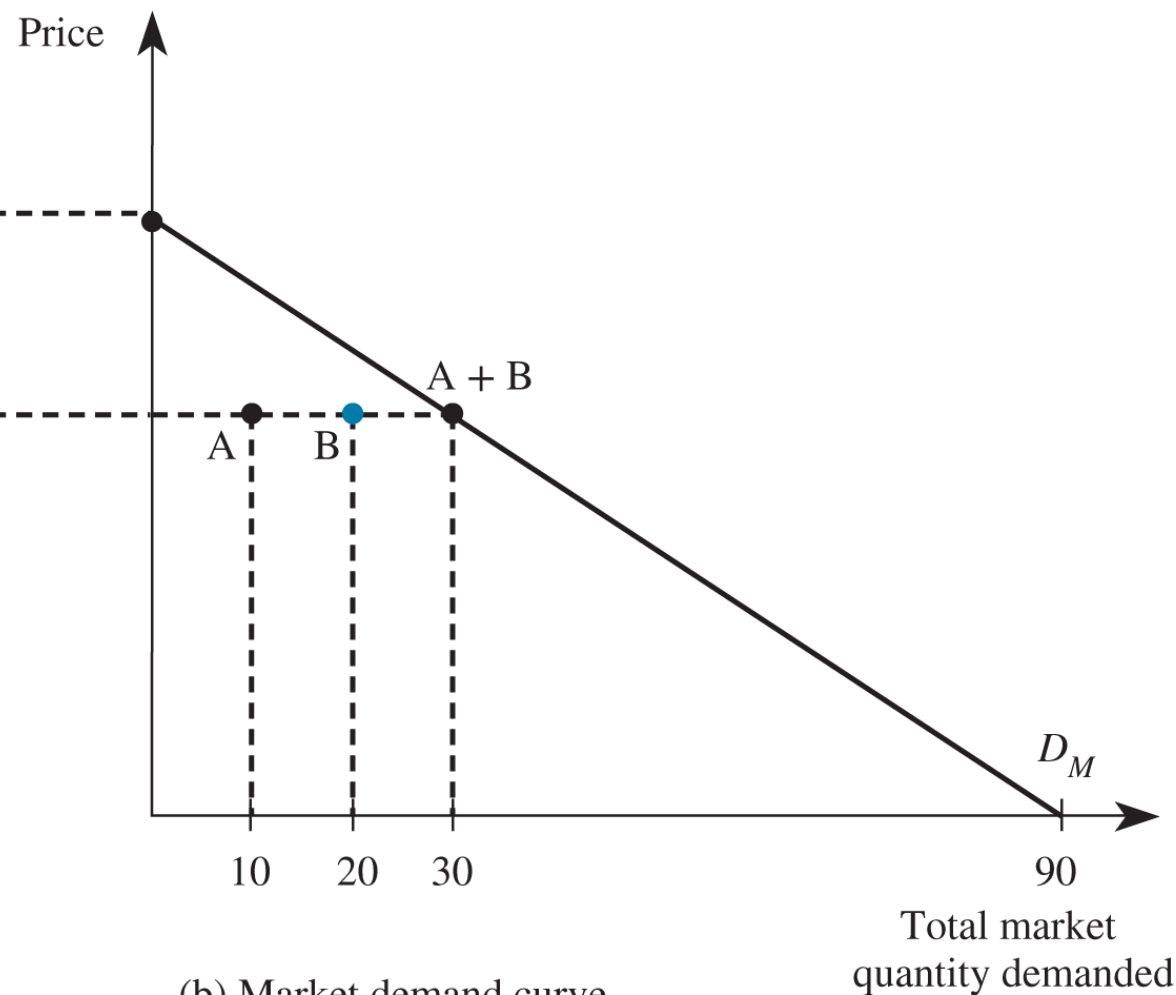


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Deriving the Market Demand Curve



(a) Individual demand curves



(b) Market demand curve