Lecture 3: Consumer Choice

September 15, 2015

Overview

Course Administration

1. Return problem sets
2. Problem set answers may be updated until problem sets are returned
3. Problem set and RFH grades are posted on Blackboard
   - presentation is graded, mostly on success in relating to the themes of the previous lecture
   - article finding is pass/fail
4. Any questions or outstanding issues?

How What You're Learning is Policy-Relevant

Ripped from Headlines presentation(s)

As a reminder, next week

Afternoon

Finder	Presenter
Erica Harvey	Yihan Cheng
Ben Goebel	Caroline DeCelles

Evening

Finder	Presenter
Alex Severn	Katie Deeter
McKenna Saady	Anna Chukhno

Two Types of Quantity Regulations

We just looked at regulations on price. Now we consider regulations on quantity.

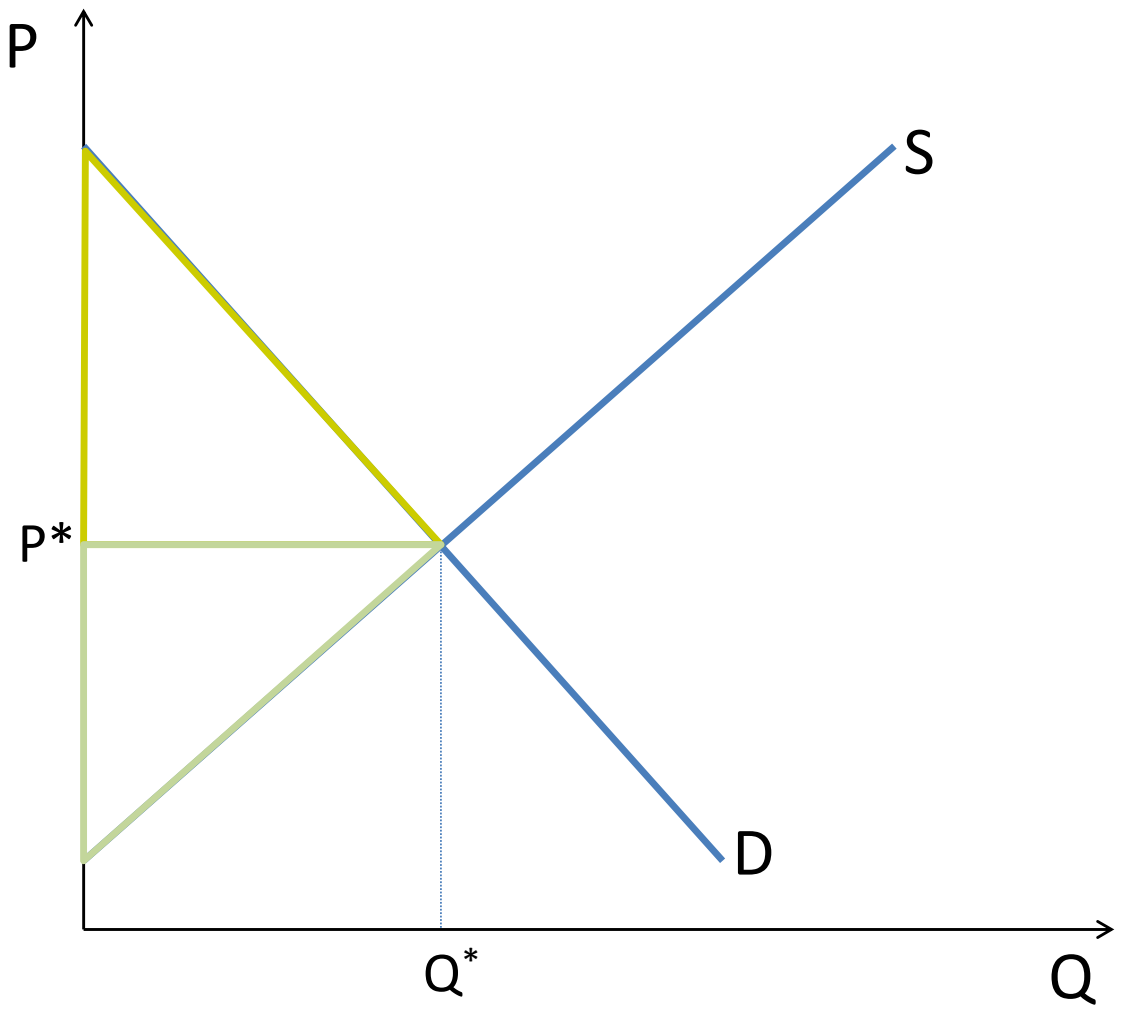
1. Quota $\equiv$ a regulated (almost always limited) "quantity of a good or service provided"
2. Government provision of a good or service (skip for time reasons)

Analyzing Quotas

- What's the impact of a quota on price?
- Give an example of a market with quotas

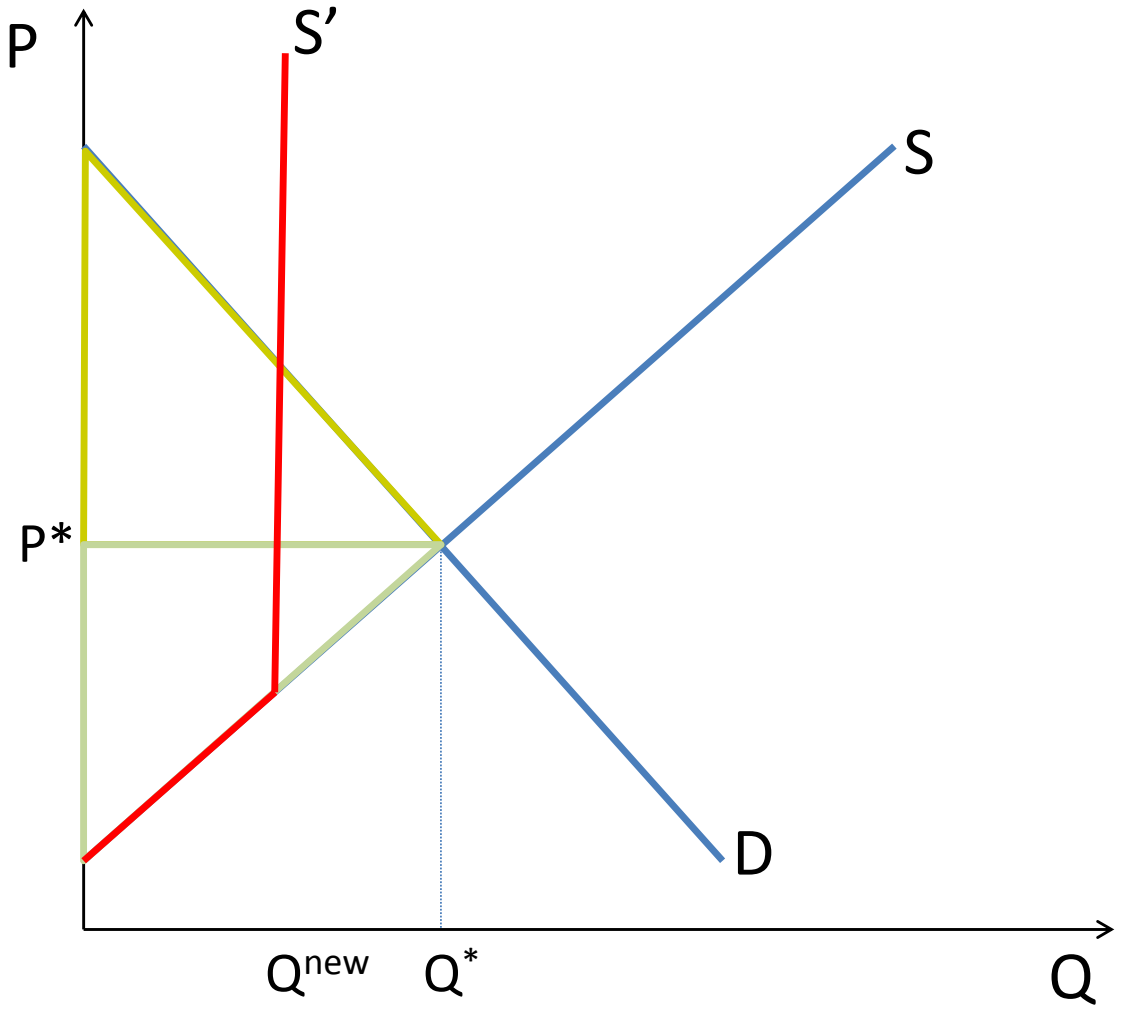
Quotas in Pictures

Market Equilibrium: How Does Supply Change with a Quota?



Quotas in Pictures

Supply with a Quota: What Happens to Price?



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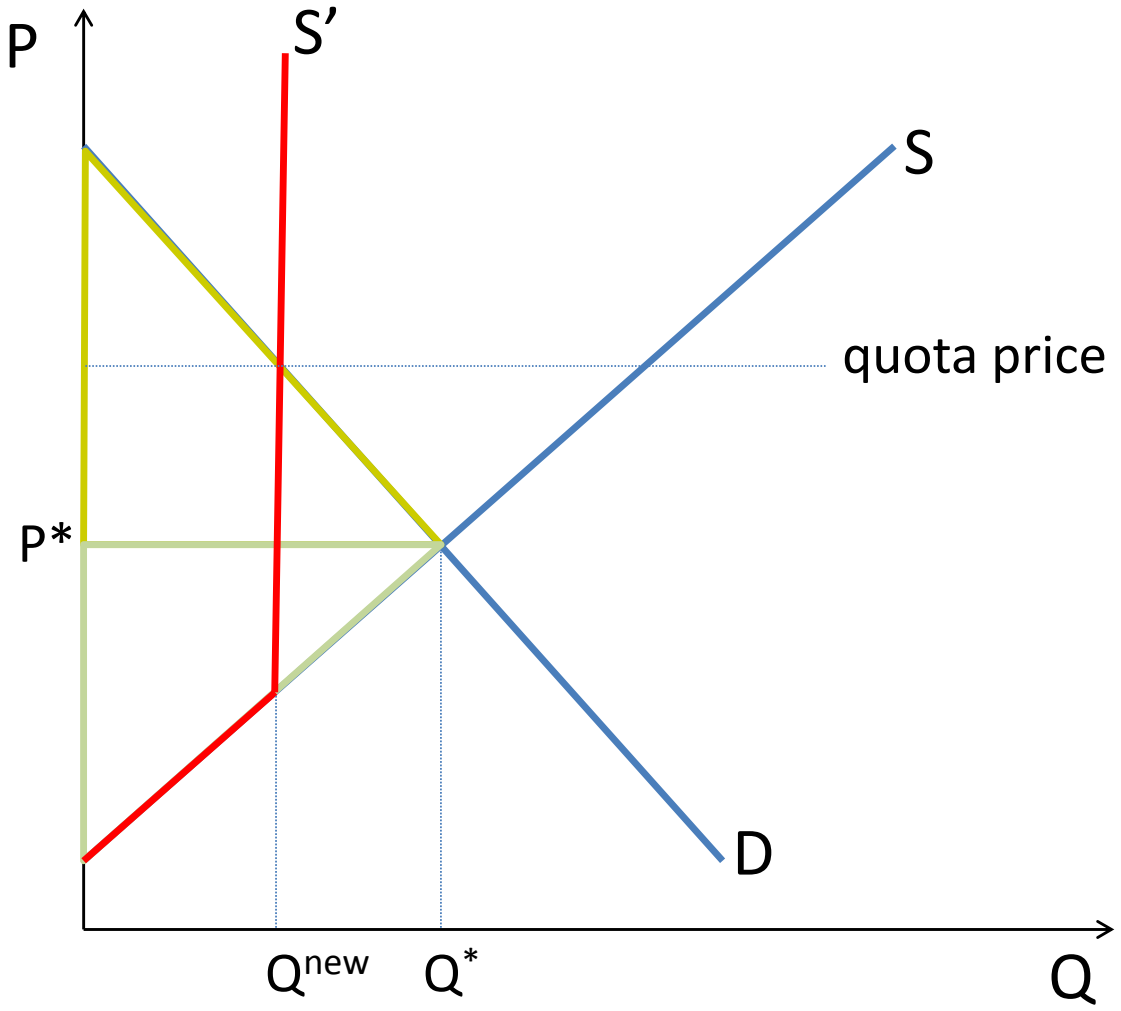
Supply with a Quota: What Happens to CS and PS?



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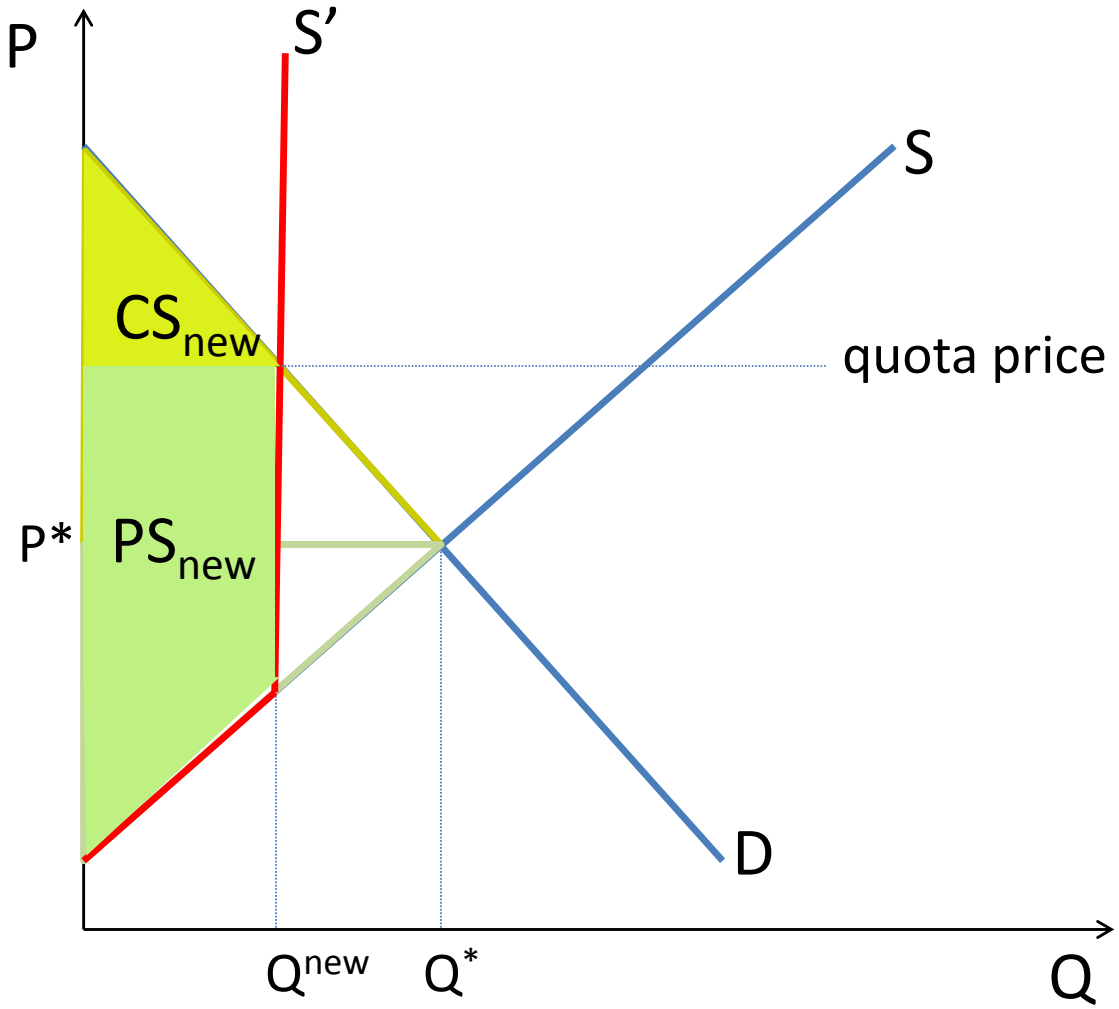
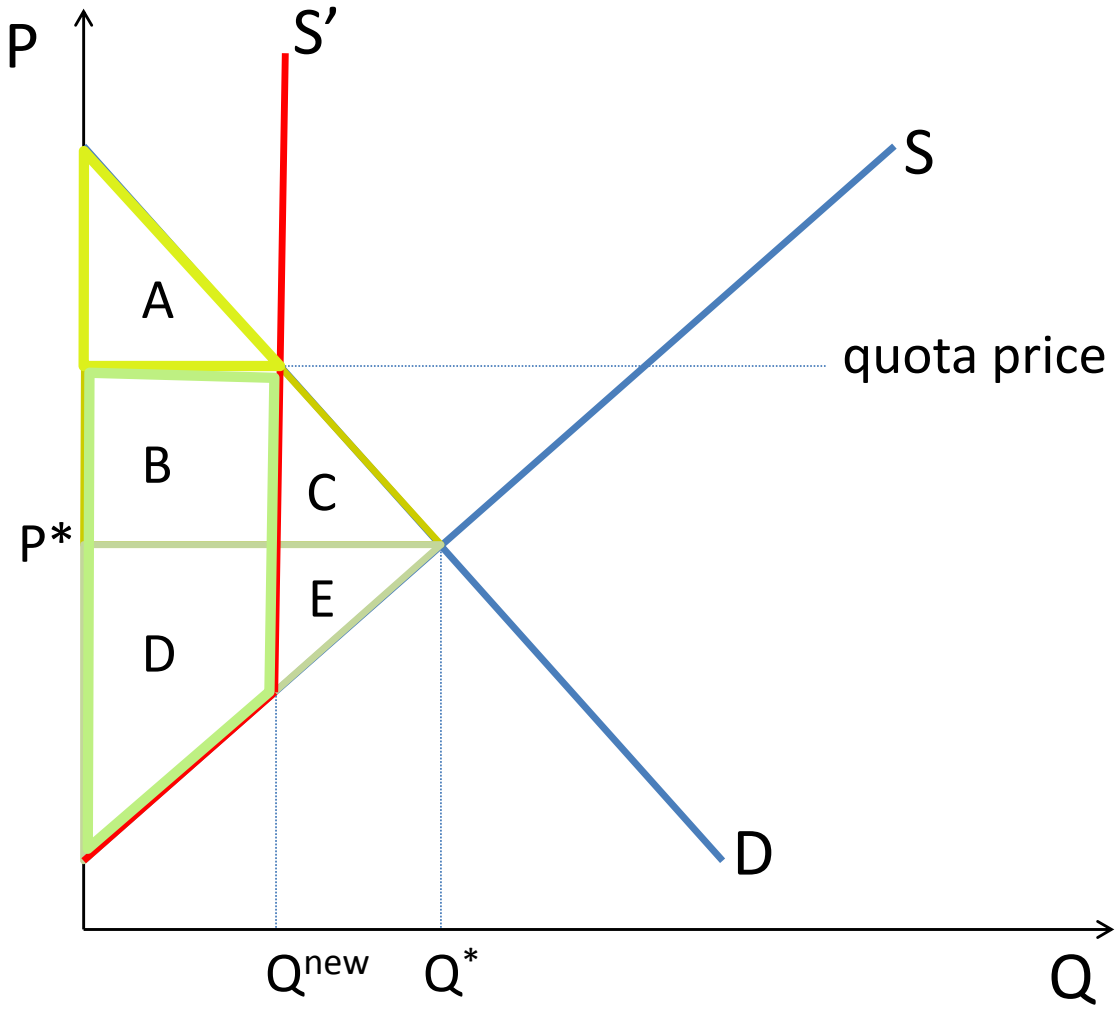


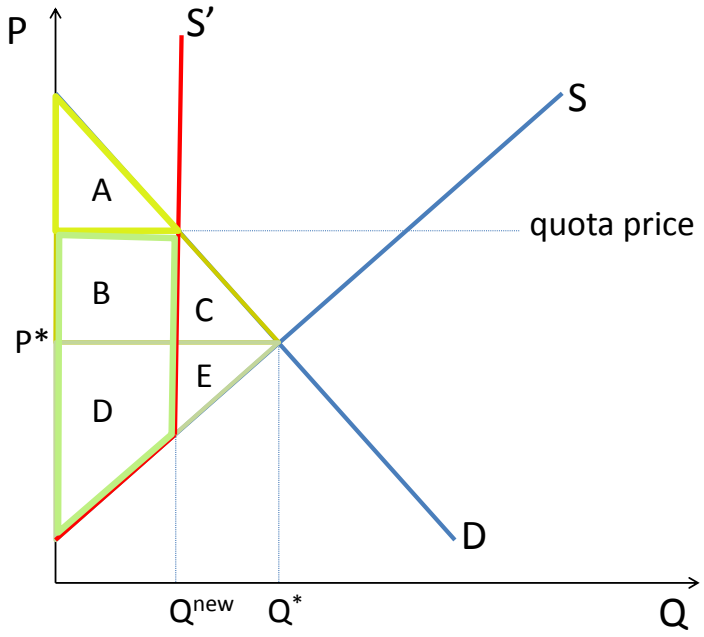
Quotas in Pictures

Figuring Out the Differences



Figuring Out the Difference, Details

- Before
  - $CS =$



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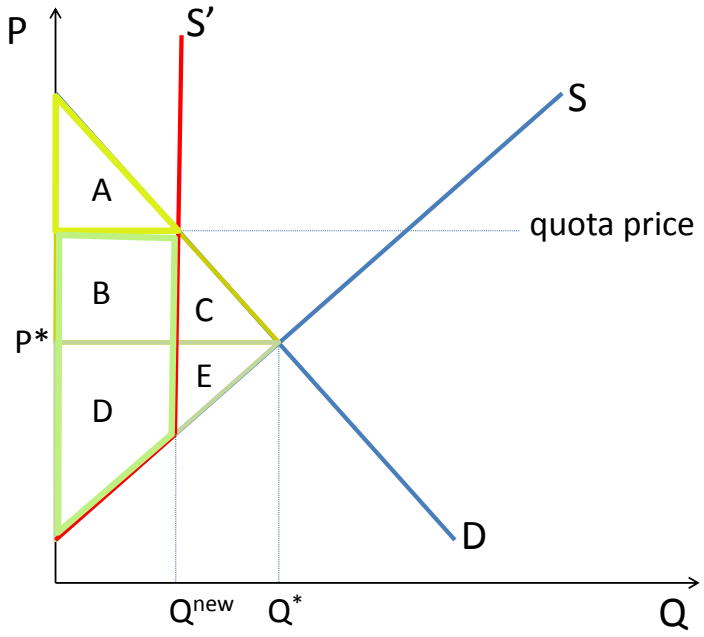
- Before
  - $CS = A + B + C$
  - $PS =$



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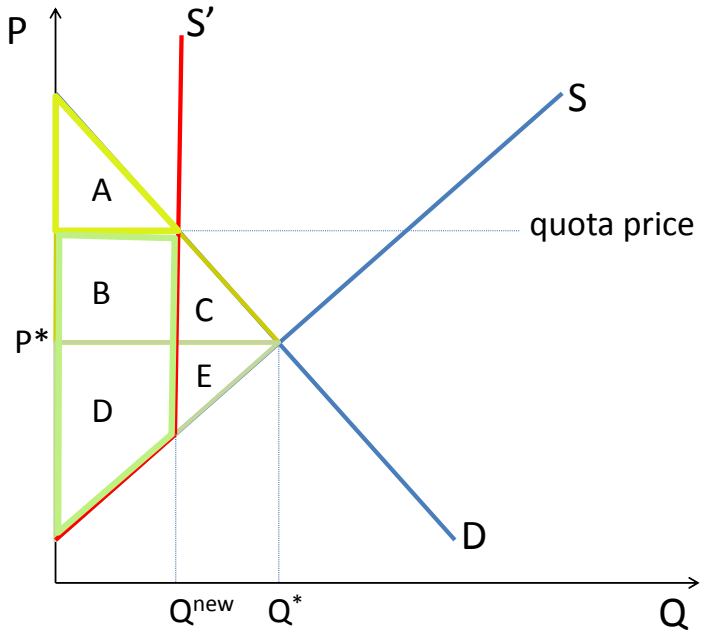
  - $PS = D + E$



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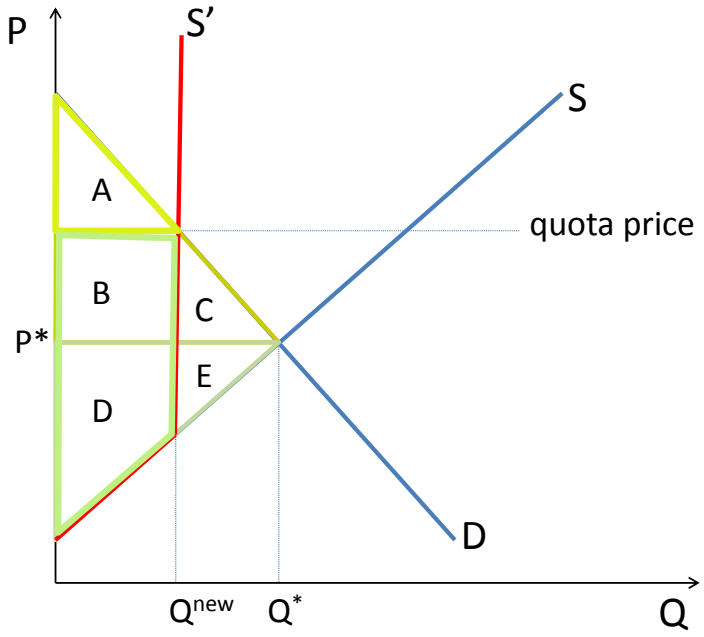

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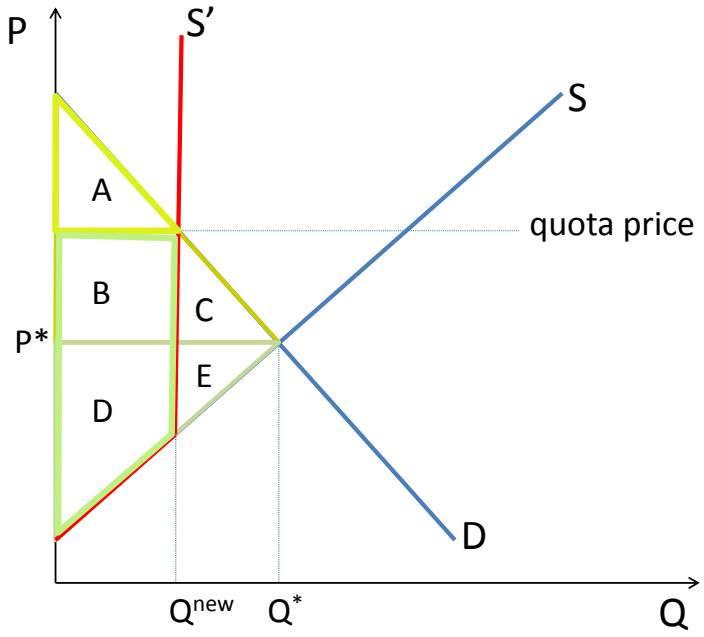

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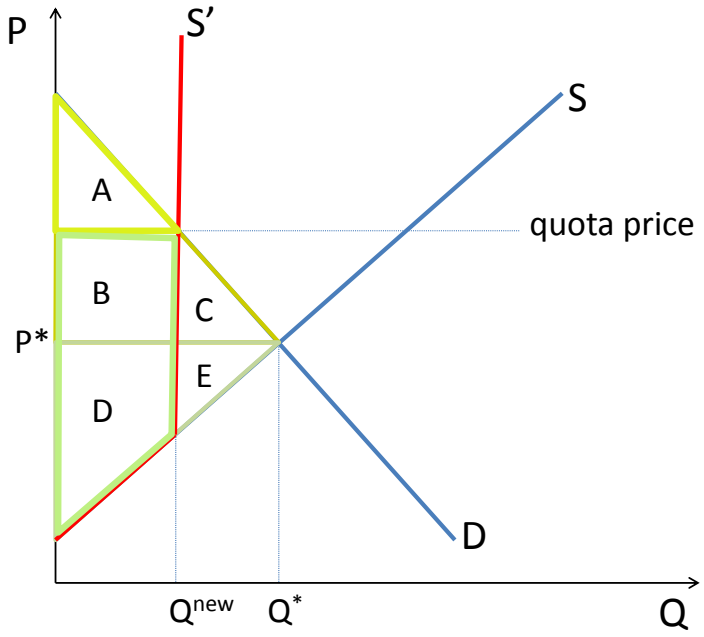

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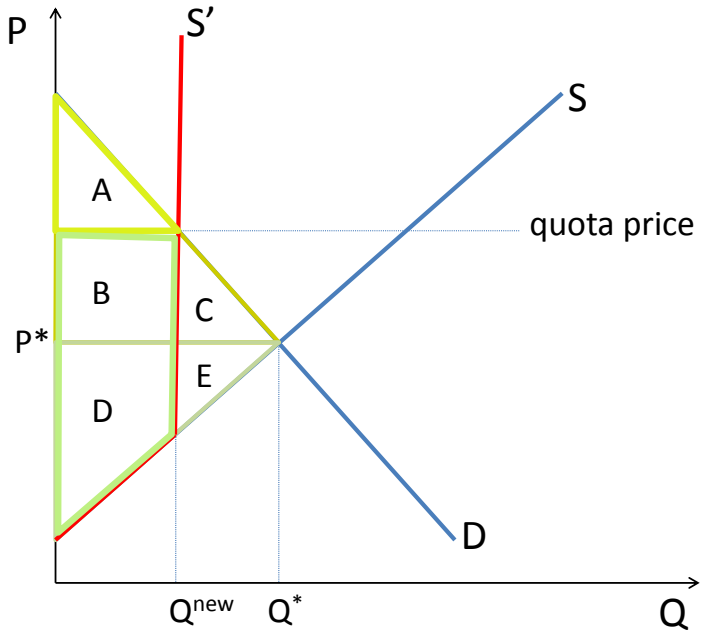

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  - $PS = B + D$
- Difference
  - $\Delta CS = A - (A + B + C) = -(B + C) < 0$
  - $\Delta PS = (B + D) - (D + E) = B - E$, sign ambiguous
  - transfer from

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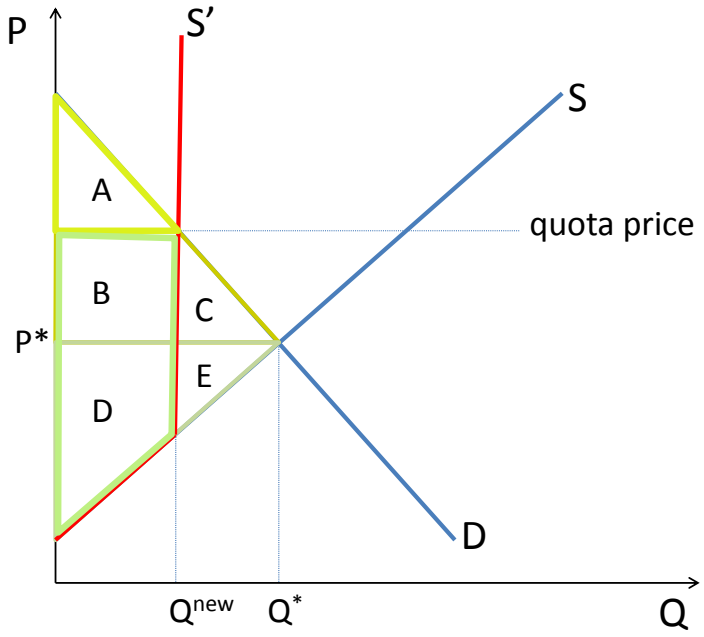

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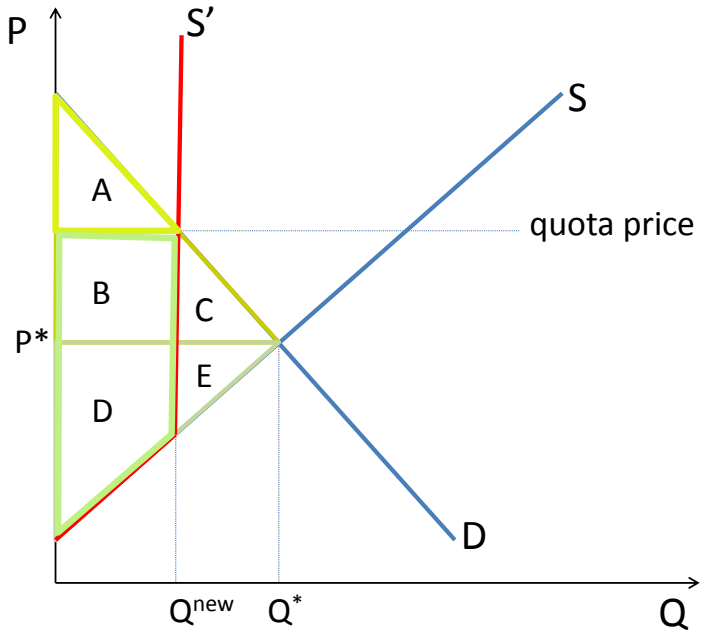

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  - transfer from consumers to producers is B
  - Note that nobody gets C or E after $\rightarrow$ trades that don't take place $\rightarrow$ DWL $= C + E$

Why Do We Study the Consumer's Problem?

- Build up to the demand curve from first principles
- Understand consumer choices
- Clearly illuminate areas where policy can act
- Illustrate welfare consequences of policy choices

Assumptions about Consumer Preferences

1. Completeness and Rankability
   - You can compare all your consumption choices
   - For two bundles A and B, you always either
     - prefer A to B
     - prefer B to A
     - are indifferent between A and B
2. More is better – at least no worse – than less
3. Transitivity
   - If A is preferred to B, and B to C, then $A > C$
4. The more you have of a particular good, the less of something else you are willing to give up to get more of that good

What is Utility?

Overall satisfaction or happiness

What is Utility?

Overall satisfaction or happiness

- Measured in utils!
- This framework allows us to describe what consumption or habits make you happier than other consumptions or habits
- It's not a tool for comparing across people

Some Example Utility Functions

Most general $U = U(X, Y)$.

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Most general $U = U(X, Y)$.
They can take many forms

- $U = U(X, Y) = XY$
- $U = U(X, Y) = X + Y$
- $U = U(X, Y) = X^{0.7}Y^{0.3}$

Marginal Utility

Marginal utility $\equiv$ "additional utility consumer receives from an additional unit of a good or service"

$$
\begin{aligned}
MU_X &= \frac{\Delta U(X,Y)}{\Delta X}\left(= \frac{\partial U}{\partial X}\right) \\
MU_Y &= \frac{\Delta U(X,Y)}{\Delta Y}\left(= \frac{\partial U}{\partial Y}\right)
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What is true about marginal utility of X as consumption of X increases?

Utility and Comparisons

- Ordinal: we can rank bundles from best to worst
- Not cardinal: we cannot say how much one bundle is preferred to another in fixed units
- We cannot make interpersonal comparisons

No other assumptions on utility apart from the four preference assumptions.

Describing Your Utility

- A consumer is indifferent between two bundles (X_1, Y_1) and (X_2, Y_2) when $U(X_1, Y_1) = U(X_2, Y_2)$
- An indifference curve is a line where utility is constant: a combination of all consumption bundles that give the same utility

Working Up to an Indifference Curve

- Give me two items

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- Give me two items
- Each axis is a **quantity** of those items
- Give me some points where you are equally happy

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Why Can We Draw Indifference Curves?

- Because of the assumptions we made at the beginning about preferences: completeness and rankability
- All bundles have a utility level and we can rank them

Indifference Curves Level and Slope

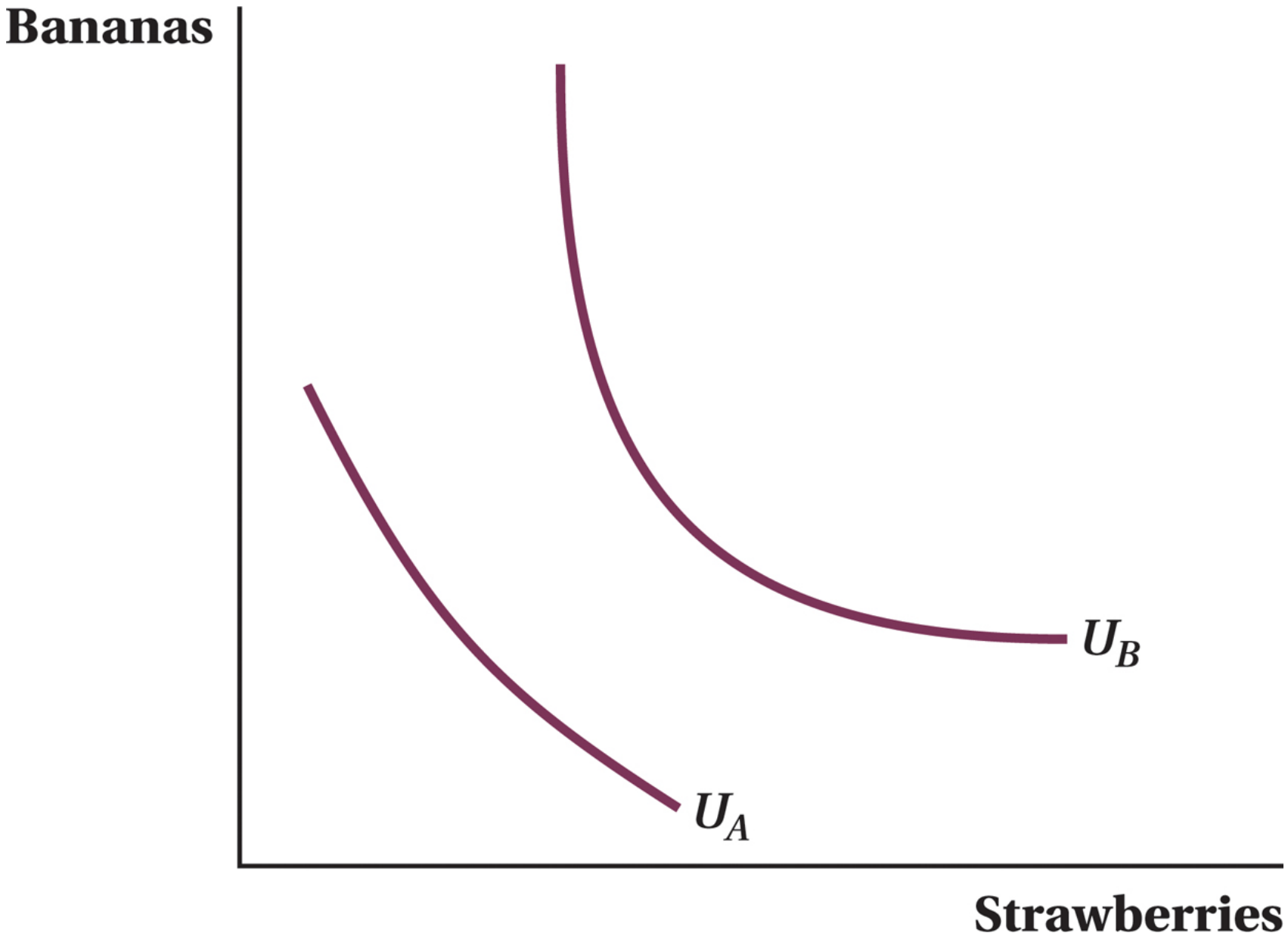
What does "more is better" tell us?

Indifference Curves Level and Slope

What does "more is better" tell us?

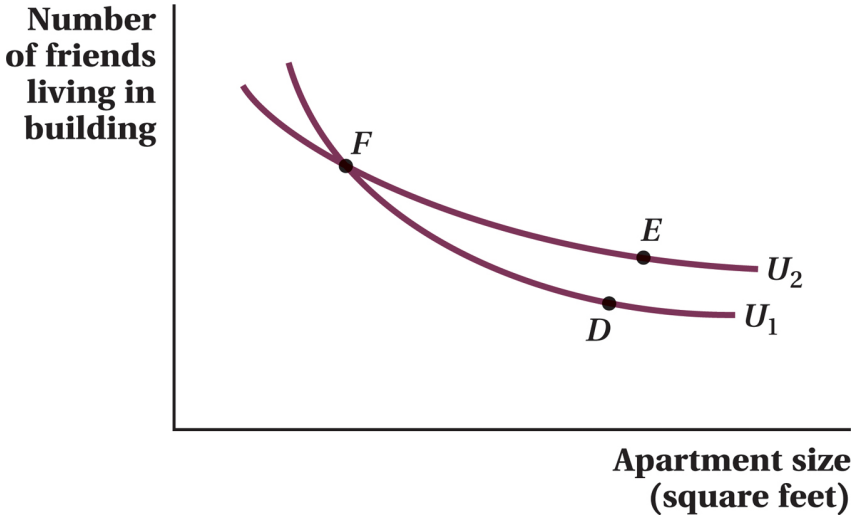
- That higher indifference curves give more utility
- Curve must have a negative slope
  - Suppose that you increase your consumption of X
  - "More is better" $\rightarrow$ you are happier
  - To be equally happy as before, you should give up some Y

More Utility on Curves Farther From Origin



Indifference Curve Shape

- Curves never cross
  - it would violate transitivity
- Curves are U-like (convex) with respect to the origin
  - Comes from assumption about diminishing marginal utility
  - Your willingness to trade off differs along the curve



Steepness of the Indifference Curve

- We know that you are equally happy anywhere along the indifference curve
- So what changes as you move along the curve?

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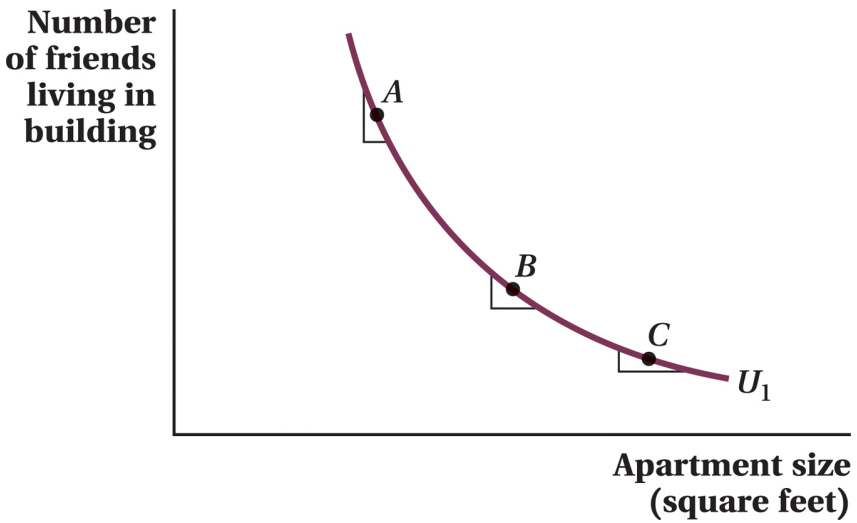
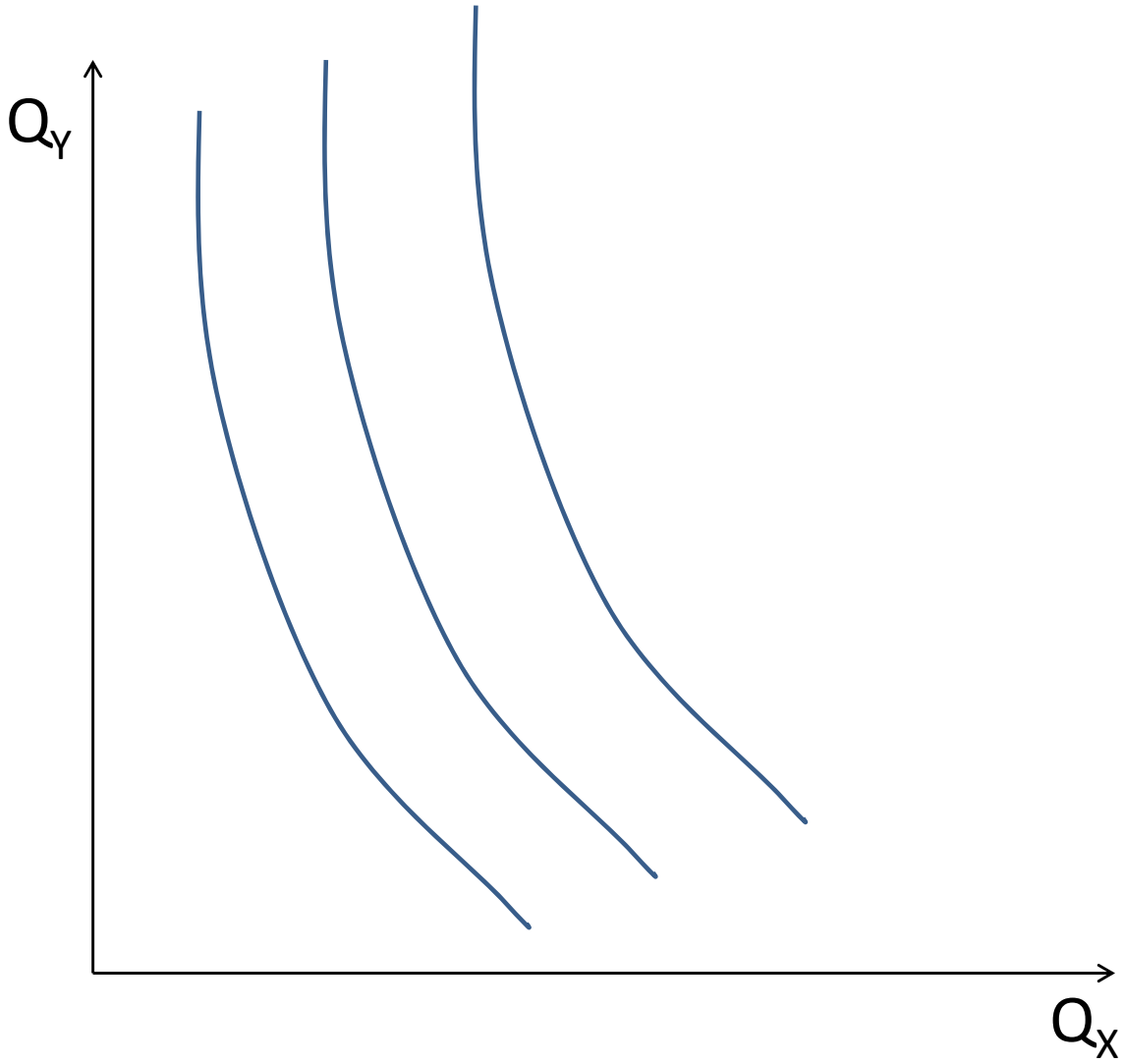
- We know that you are equally happy anywhere along the indifference curve
- So what changes as you move along the curve?
  - you are trading off X and Y
  - the rate at which you trade them off tells us how much you value them



When the curve is steep, what are you willing to give up more of?



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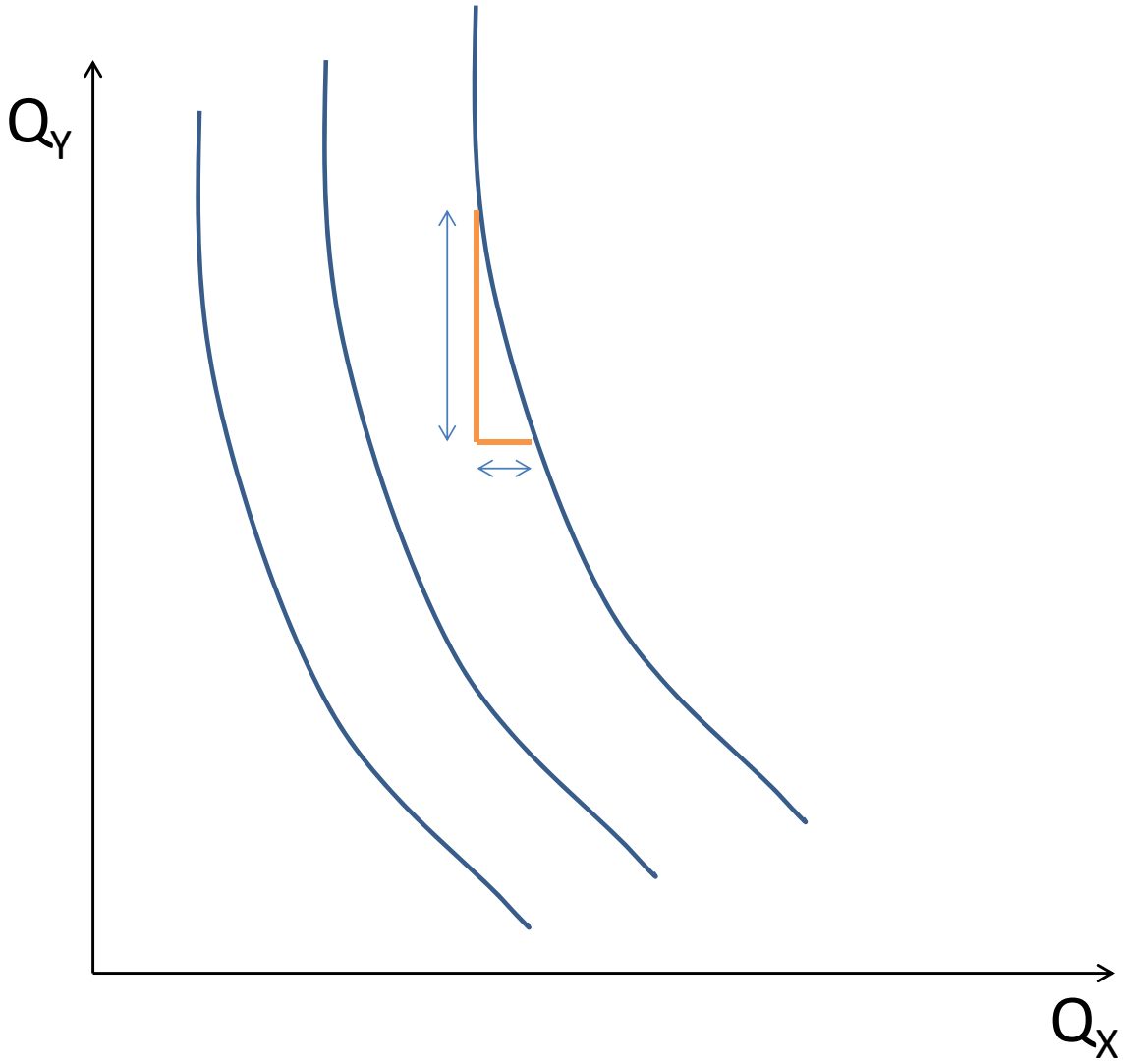

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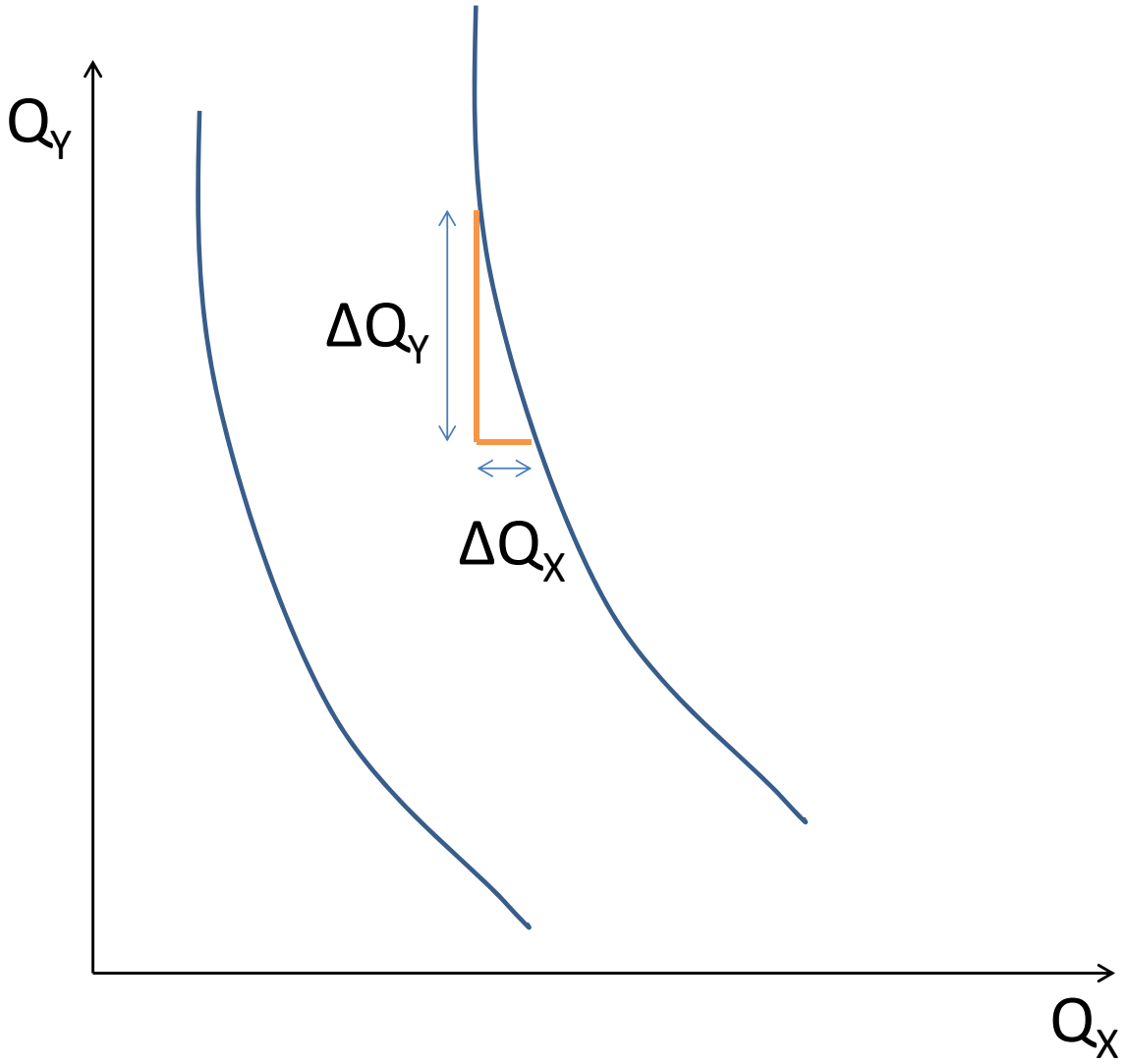

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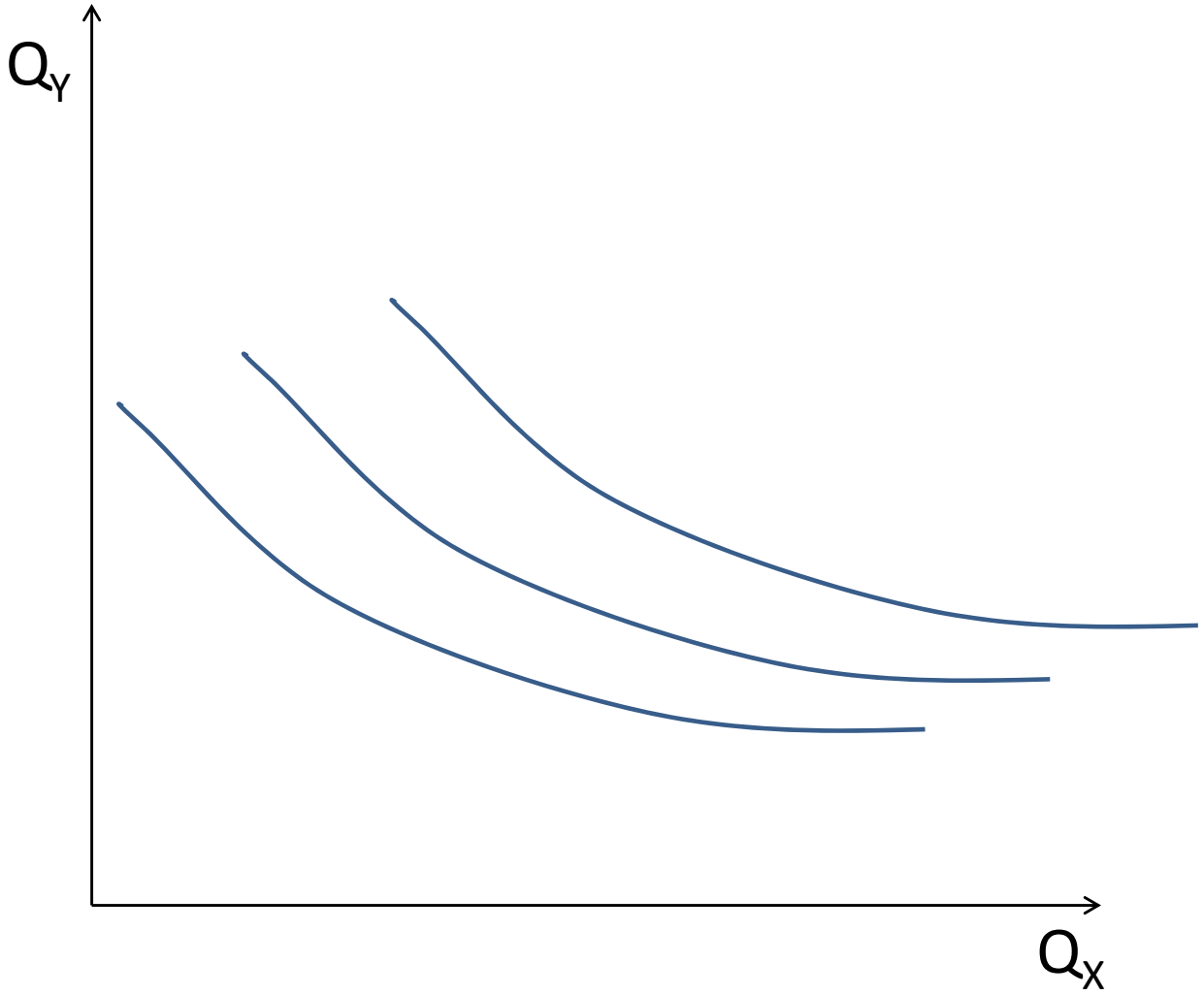

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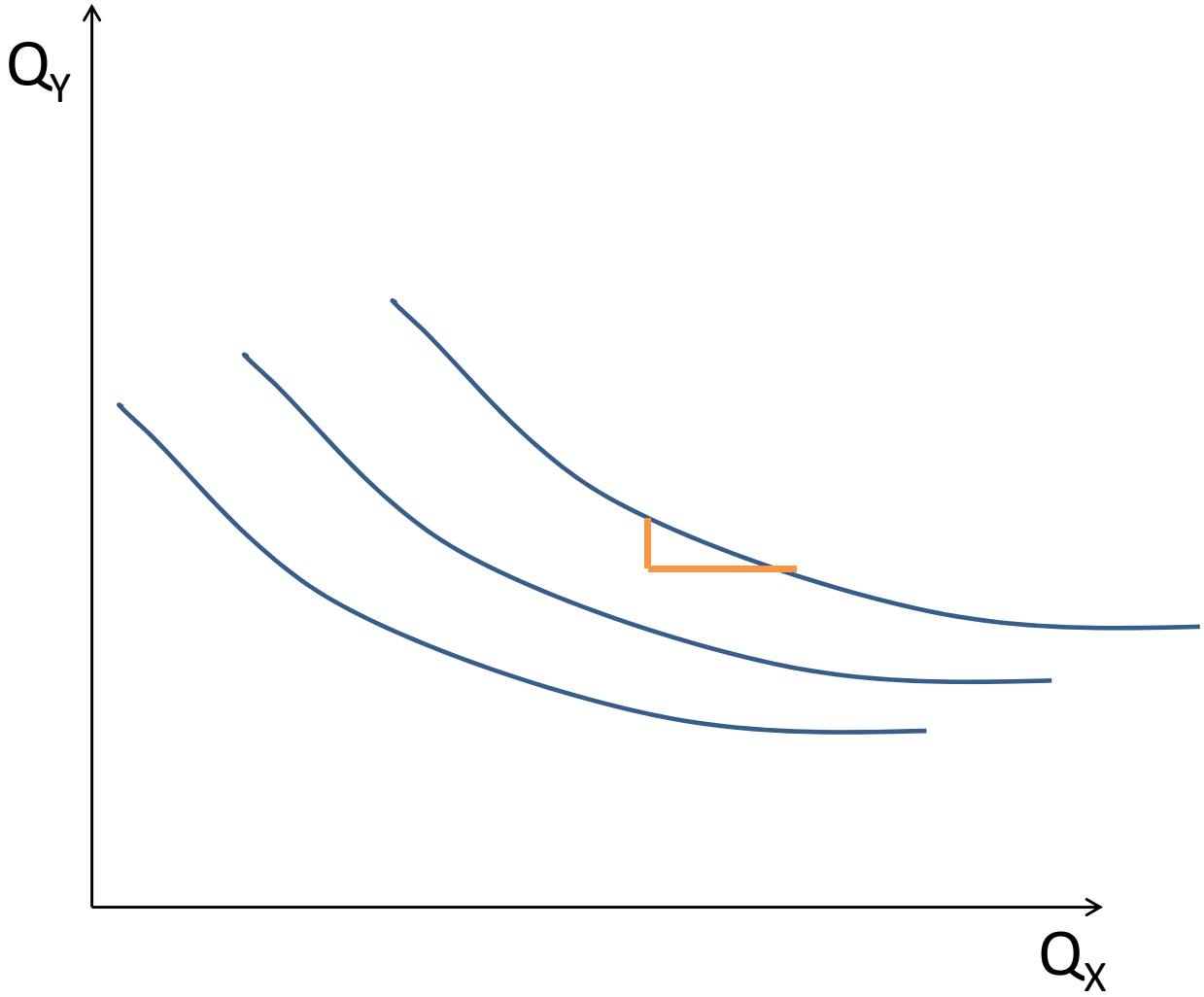

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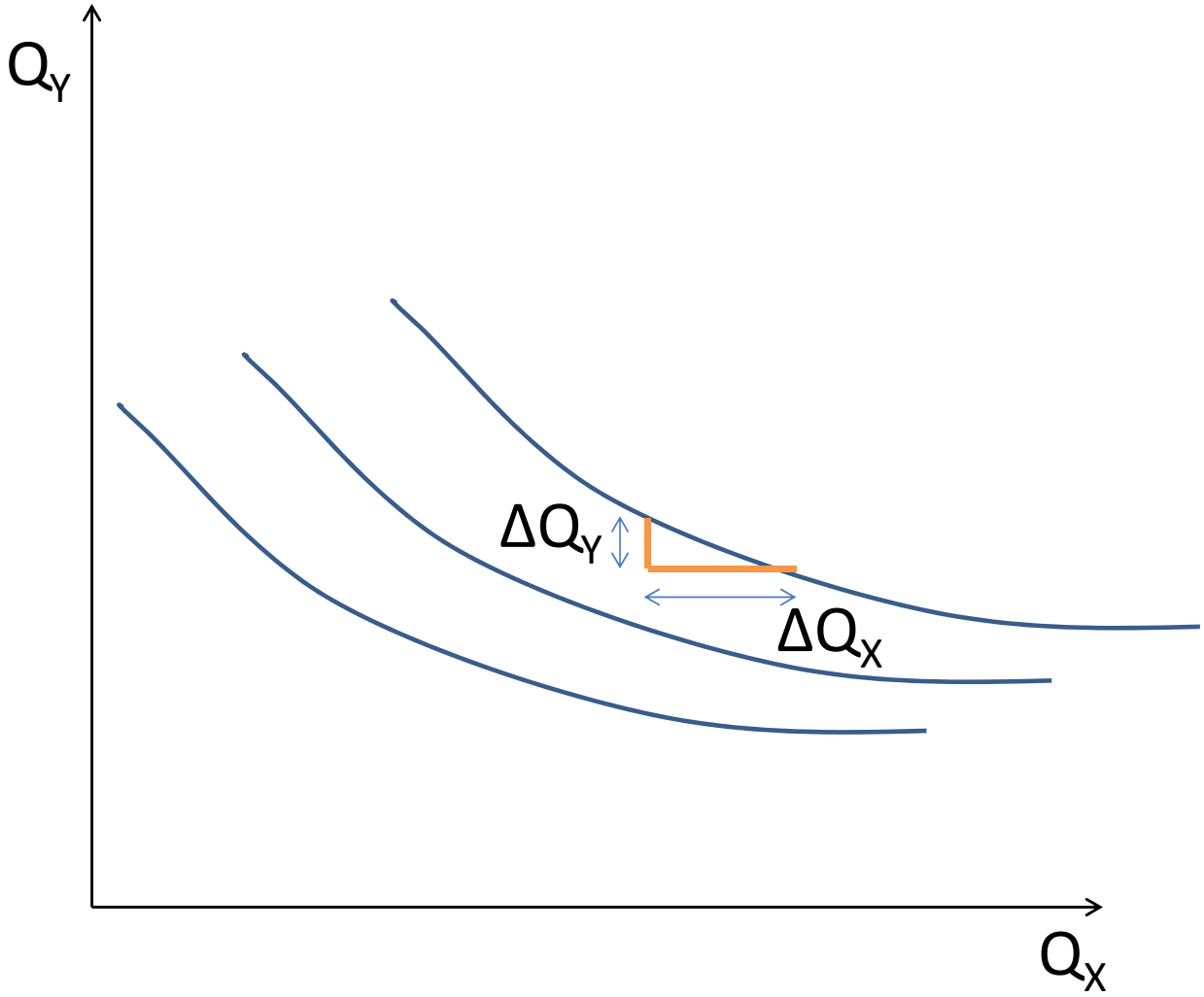

Quantifying the Trade-off in the Indifference Curve

- How much of X are you willing to give up for Y?
- We call the **Marginal Rate of Substitution** the trade-off between these two
- Define

$$MRS_{XY} = \frac{MU_X}{MU_Y} = -\text{slope of indifference curve}$$

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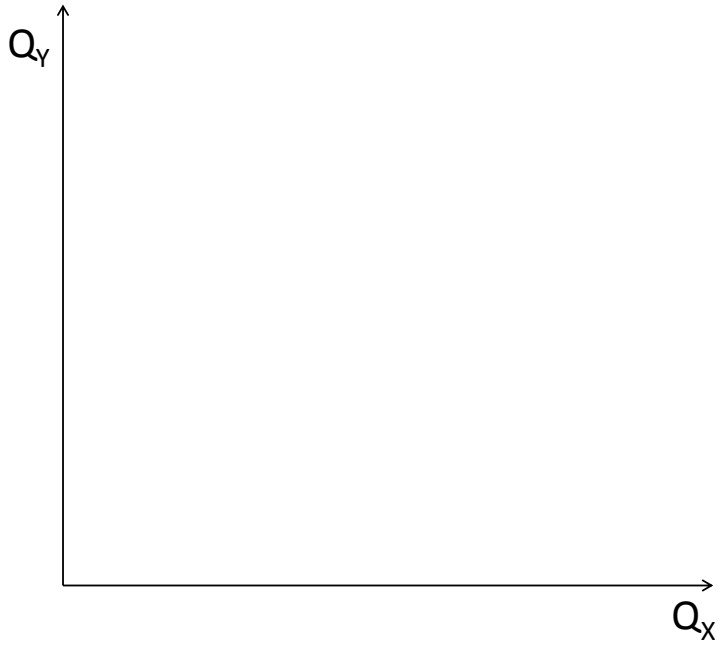
- Is it the same everywhere on the curve? Not necessarily.
- If you want a derivation, see the textbook!

Curves for Perfect Complements

Work with your neighbor!

- Suppose we have two goods that are perfect complements
- X and Y being perfect complements means each is useless without the other
- What do the indifference curves look like?
- We write this utility as $U = \min\{aX, bY\}$



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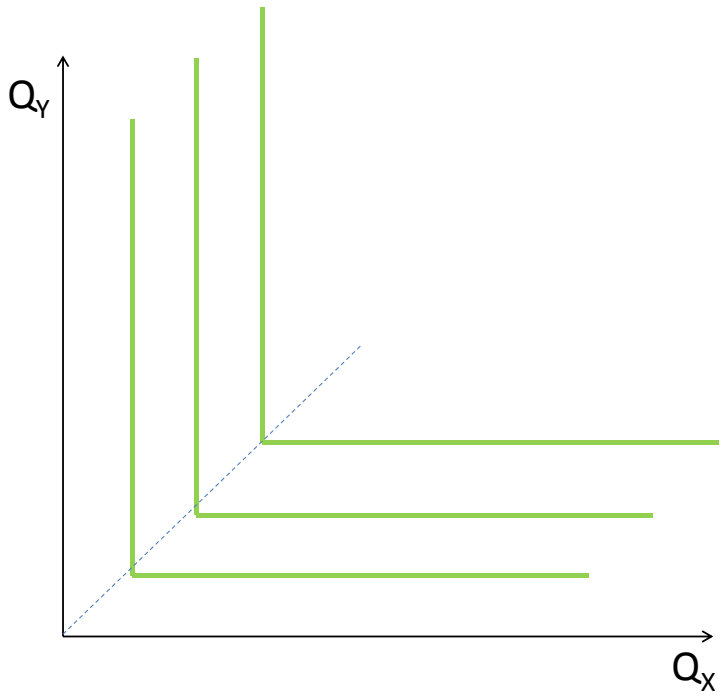

Curves for Substitutes

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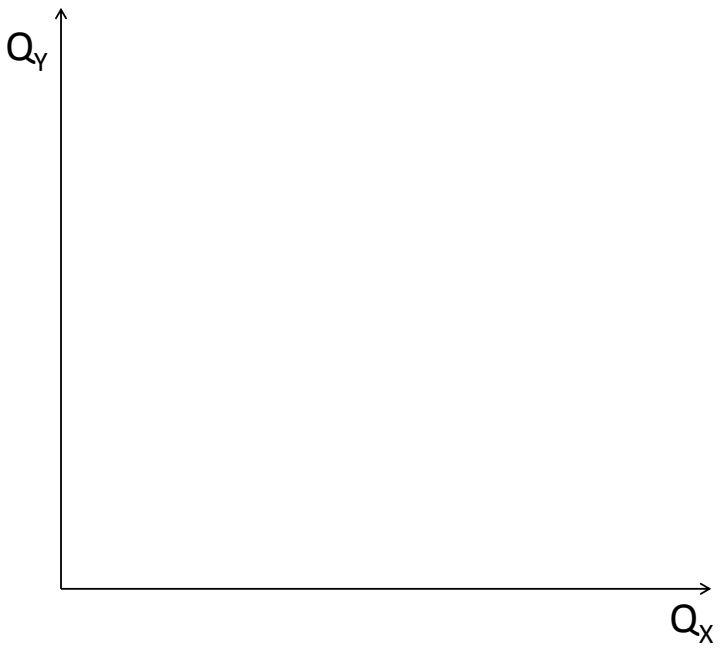

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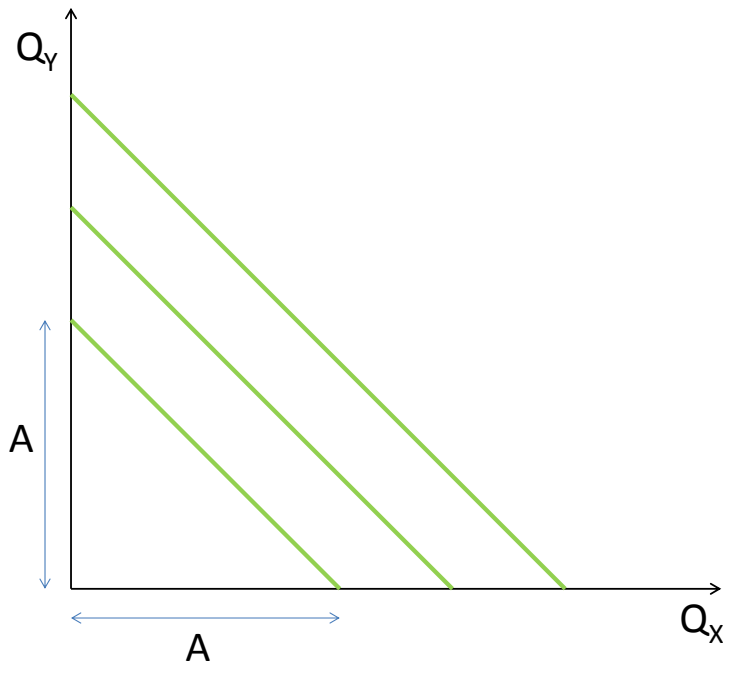


Budget Constraint Assumptions

1. Each good has a fixed price and infinite supply
2. Each consumer has a fixed amount of income to spend
3. The consumer cannot save or borrow

Defining the Budget Constraint

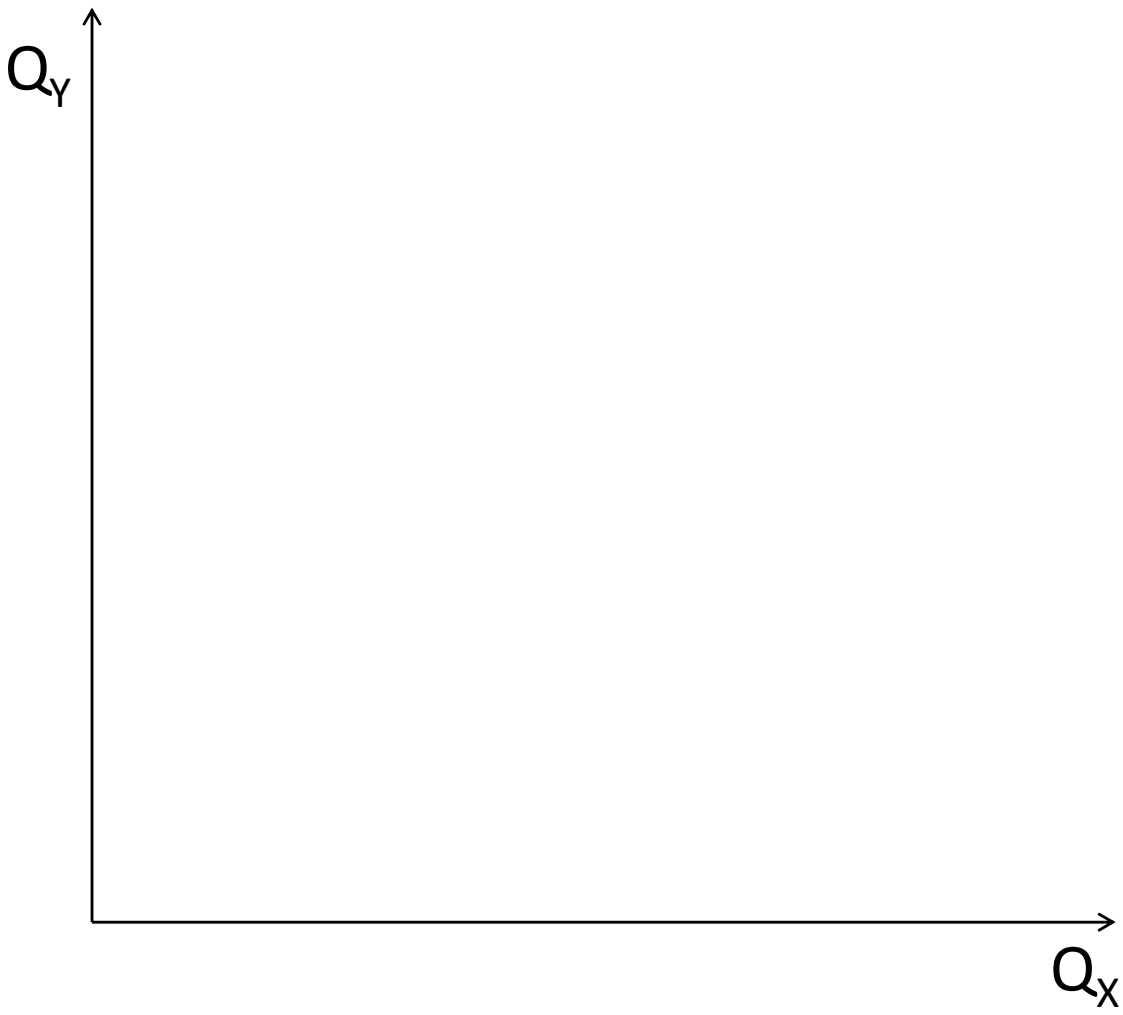
Budget constraint:

$$I = P_X Q_X + P_Y Q_Y$$

- **feasible bundle** $\equiv$ combinations of X and Y that the consumer can purchase with his income
- **infeasible bundle** $\equiv$ all the combinations the consumer is just too poor to get

Drawing the Budget Constraint

What if you spend all your money on X or Y?



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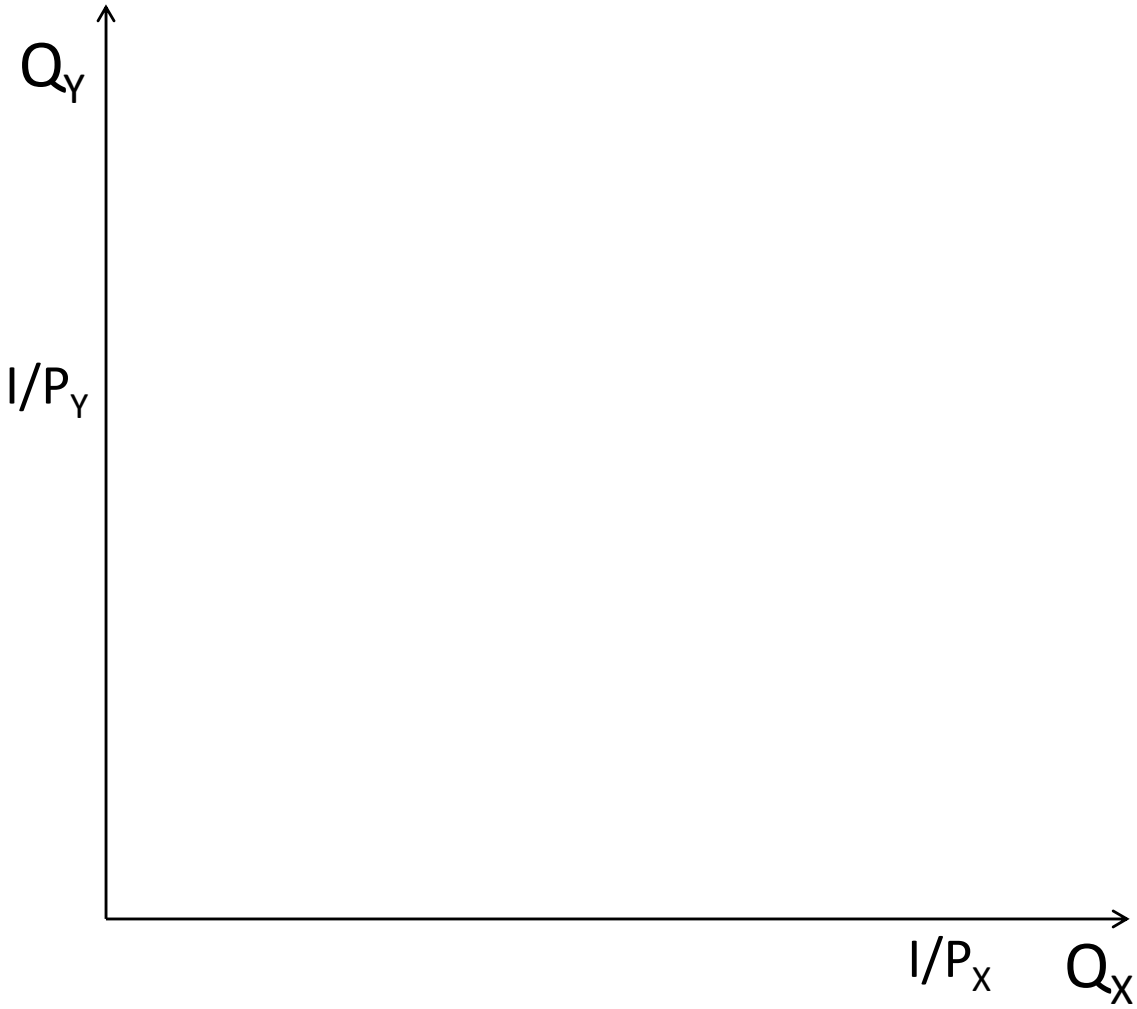

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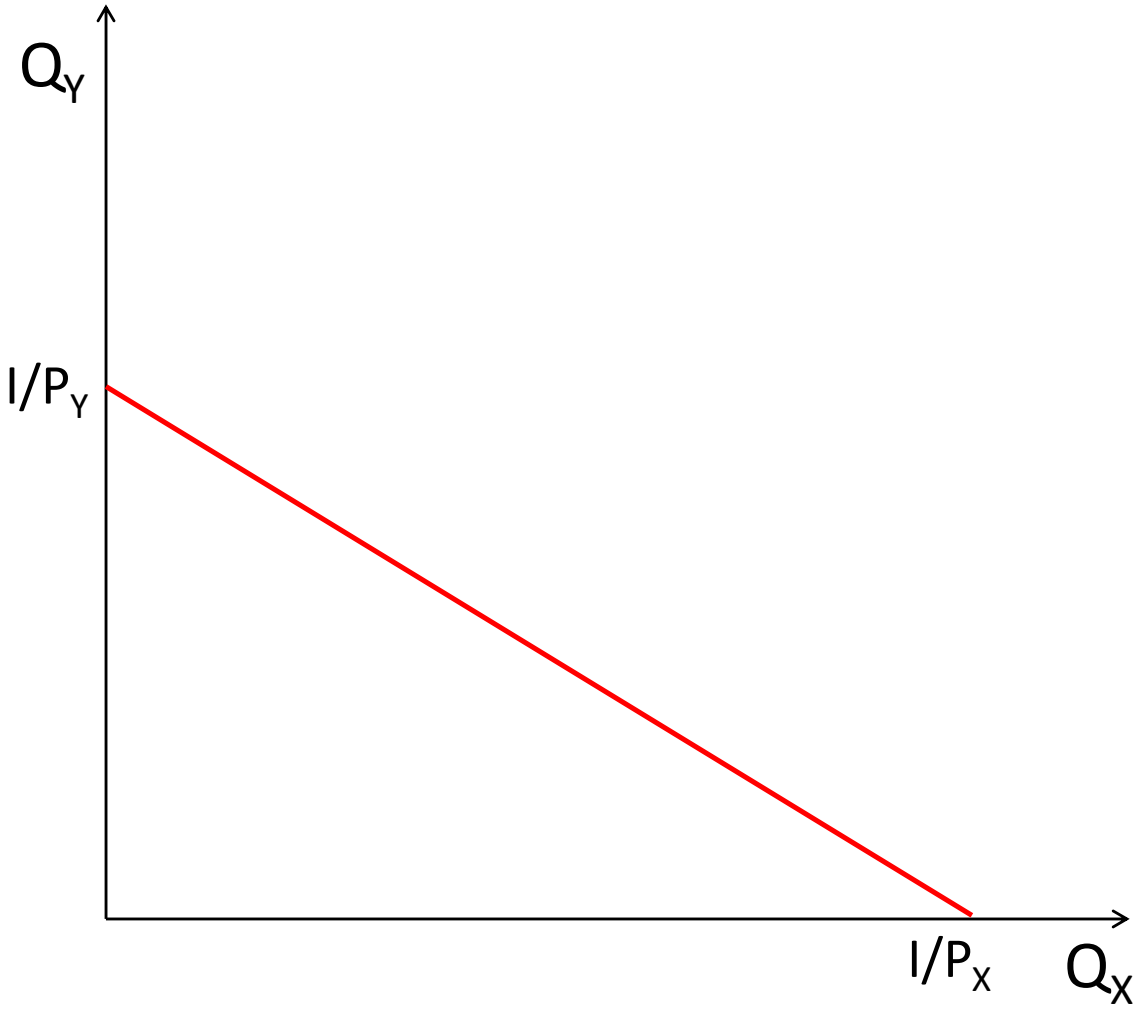

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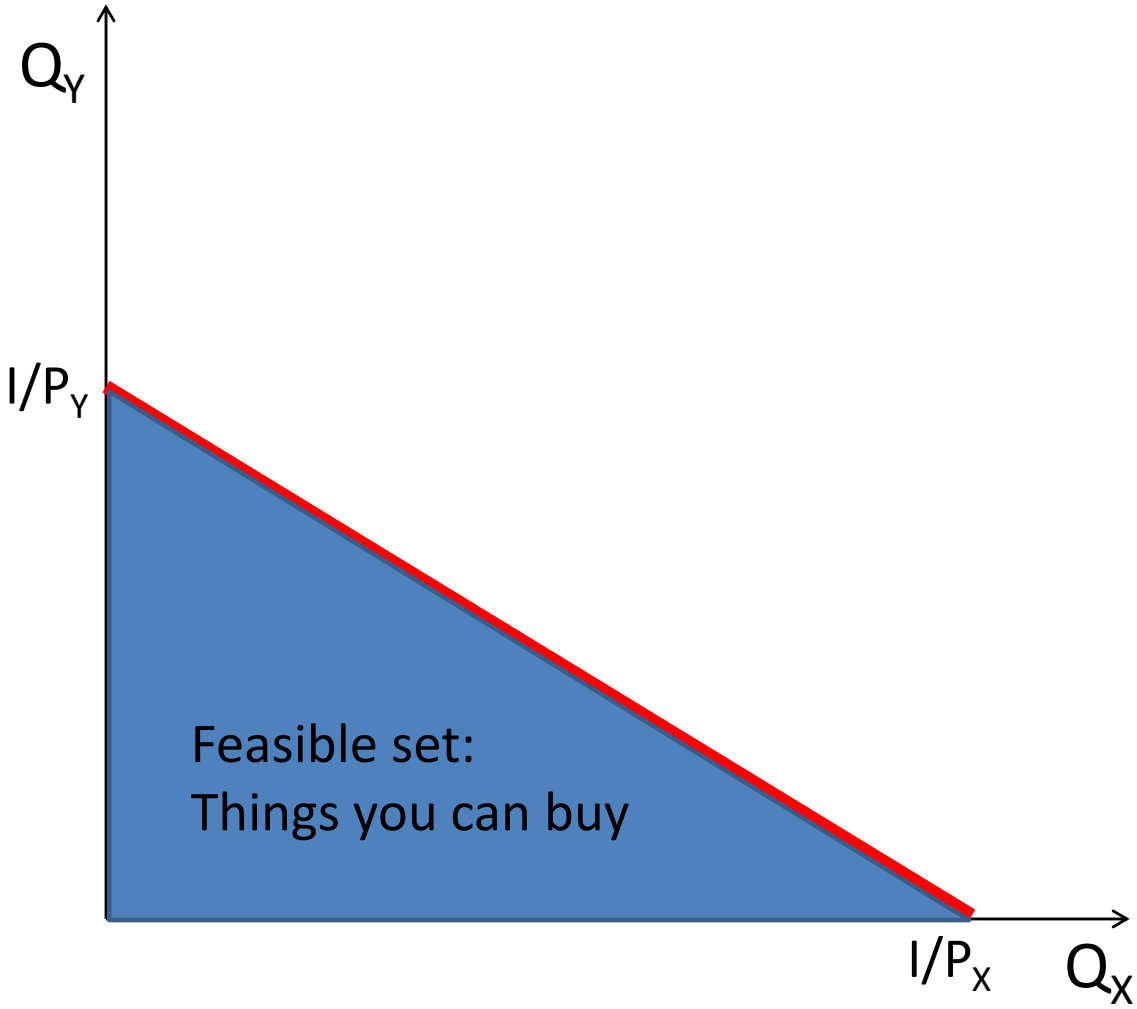

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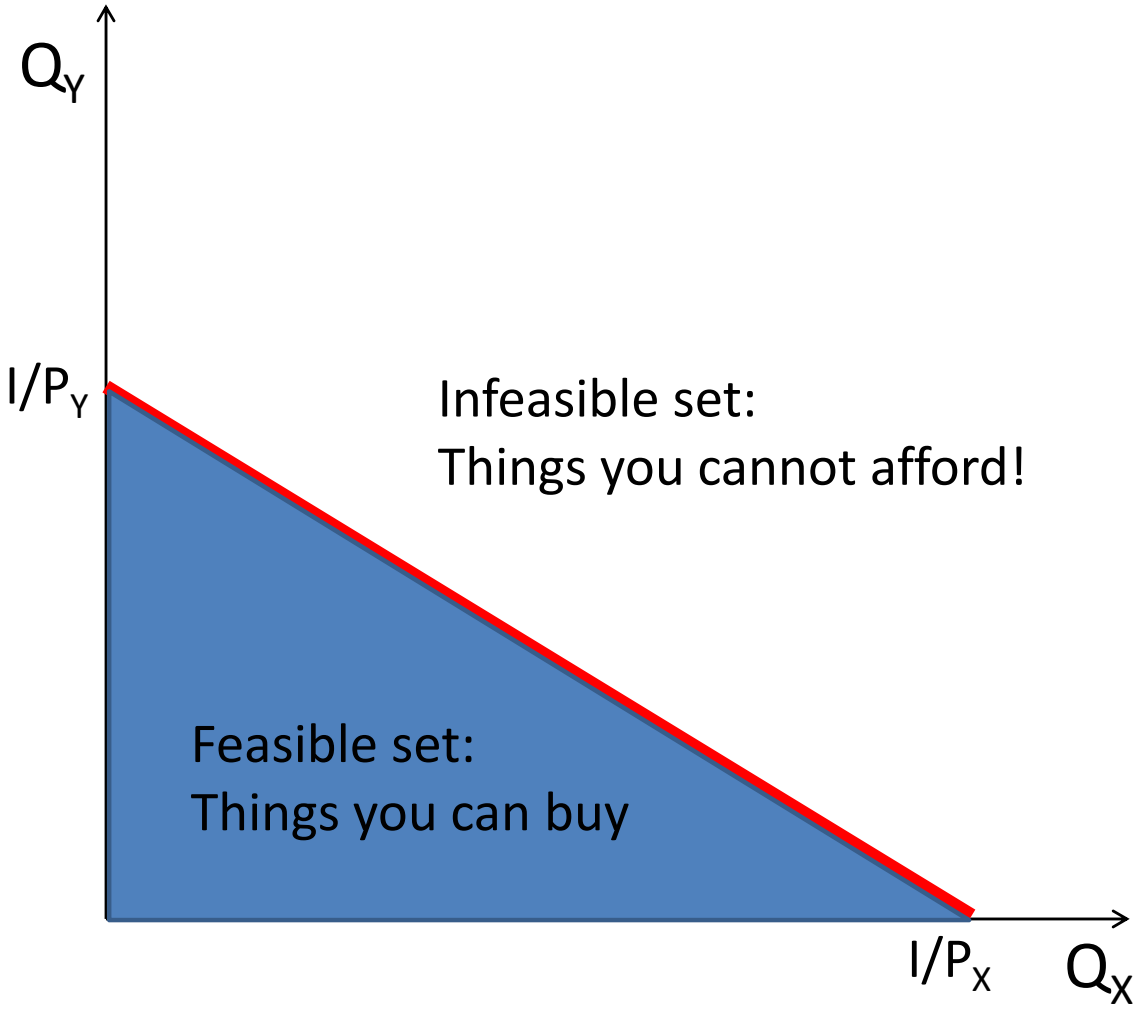

Slope of the Budget Constraint

Algebra of the slope

$$I = P_X Q_X + P_Y Q_Y$$

Slope of the Budget Constraint

Algebra of the slope

$$
\begin{aligned}
I &= P_X Q_X + P_Y Q_Y \\
P_Y Q_Y &= I - P_X Q_X \\
Q_Y &= \frac{I}{P_Y} - \frac{P_X Q_X}{P_Y}
\end{aligned}
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P_Y Q_Y &= I - P_X Q_X \\
Q_Y &= \frac{I}{P_Y} - \frac{P_X Q_X}{P_Y} \\
Q_Y &= -\frac{P_X}{P_Y} Q_X + \frac{I}{P_Y}
\end{aligned}
$$

So an additional unit of Q_X requires you to give up $\frac{P_X}{P_Y}$ of Q_Y

What Affects the Position of the Budget Constraint?

- Things that shift the slope

What Affects the Position of the Budget Constraint?

- Things that shift the slope
  - Change in prices, P_X or P_Y
  - And how do they change things?
- Things that don't change the slope, but move the line in and out

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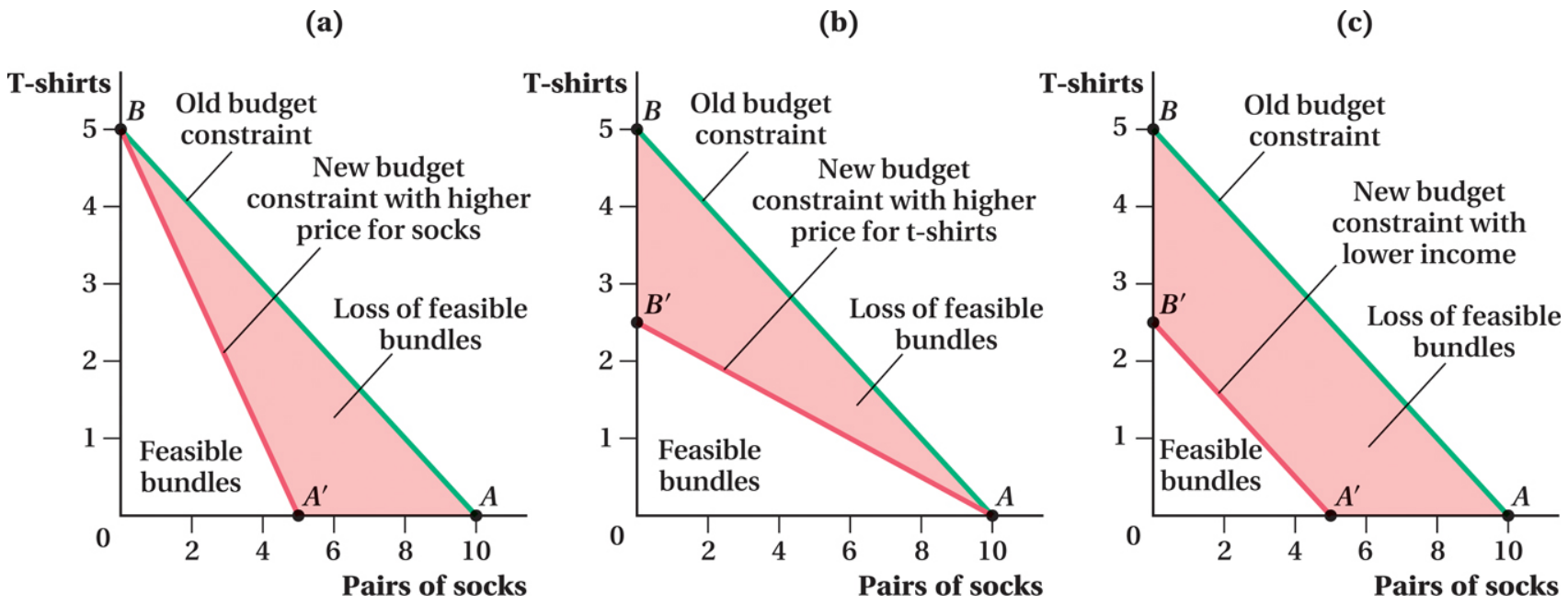
- Things that shift the slope
  - Change in prices, P_X or P_Y
  - And how do they change things?
- Things that don't change the slope, but move the line in and out
  - Change in income
  - How does this change the picture?

What Affects the Position of the Budget Constraint?



How to Be As Happy as Possible

- Maximize your utility given your budget constraint
- How do you do it?

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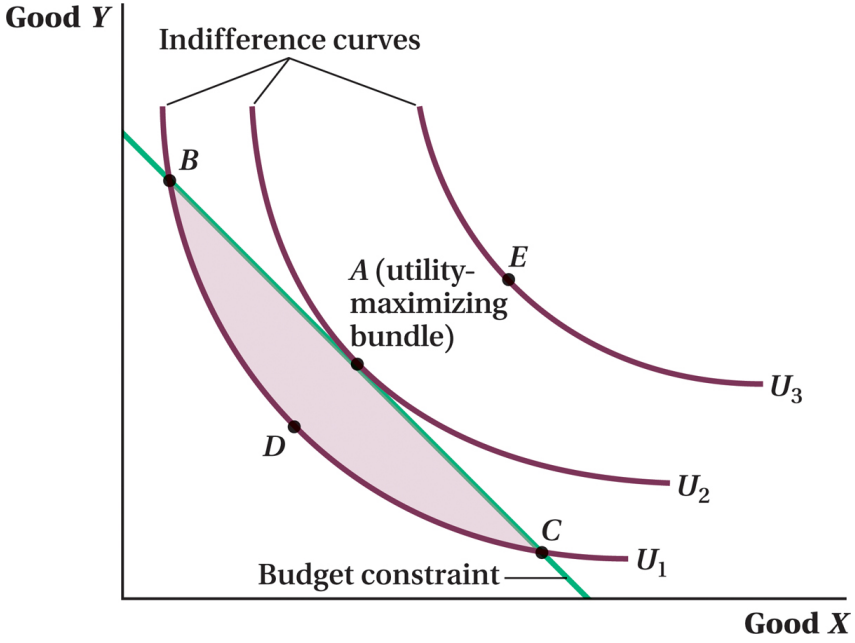
- Maximize your utility given your budget constraint
- How do you do it?



Algebra of Utility Maximization

- Utility is maximized, given the budget constraint, when the slope of the indifference curve is tangent to the budget constraint
- tangency $\rightarrow$ equality

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In-Class Problem

Sarah gets utility from soda (S) and hotdogs (H). Her utility function is $U = S^{0.5}H^{0.5}$, $MU_S = 0.5\frac{H^{0.5}}{S^{0.5}}$, and $MU_H = 0.5\frac{S^{0.5}}{H^{0.5}}$. Sarah's income is \$12, and the prices of soda and hotdogs are \$2 and \$3, respectively.

1. Draw Sarah's budget constraint
2. What amount of sodas and hotdogs makes Sarah happiest, given her budget constraint? (Recall that you have two equations and two unknowns.)

What We Did This Class

1. Quotas
2. Preferences and utility
3. Indifference curves
4. Budget constraint
5. Optimization

Next Class

- Turn in Problem Set 3
- Elasticity: GLS, Section 2.5 and read about avocados
- Paper assignment handout