Intro to Economic Analysis: Microeconomics

EC 201 - Day 8 Slides

Connor Wiegand

Department of Economics - University of Oregon

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Logistics

- Official homework 3 due this Saturday at 11:59pm, covering last week's material
- Next news assignments posted, due a week from today Wednesday (October 27)
- Midterm 2 weeks from today (Wednesday, November 3rd)
  - Bring non-graphing, non-algebra calculator

Welfare Economics

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- Keep in mind that in this class, we are covering simple models that are meant to introduce you to economic thinking, but are by no means cover the full scope of economic analysis

Welfare Economics

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  - Suppose we find that a certain program will cost the bottom 99.9% of Americans an estimated loss of 100 billion dollars, but the top 0.1% will gain 200 billion dollars. If we could re-distribute the wealth, everyone could be better off. But is this likely to happen?

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  - Suppose we estimate that a policy is likely to increase welfare by the equivalent to giving everyone in the country \$10,000. But, if we are off in our estimates in demand by 5%, it will be the equivalent to everyone losing \$5,000. Is it worth it?

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  - Suppose we estimate that a policy is likely to increase welfare by the equivalent to giving everyone in the country \$10,000. But, if we are off in our estimates in demand by 5%, it will be the equivalent to everyone losing \$5,000. Is it worth it?
- These are just some of the things to keep in mind when thinking about welfare economics in the real world. In this class, we will work with theoretical models and calculate their theoretical consequences, to motivate real-world thinking

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- That is, my utility from drinking 1 hot chocolate might be 1 util, while my utility from drinking 4 hot chocolates might be 2 utils
- This notion of happiness is very abstract, and does not bear a lot of meaning

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- If I am willing to give up \$3 to drink a hot chocolate, I should be willing to pay \$3 to buy a hot chocolate

Valuation

- The **Total Value** (or Total Utility) that a consumer gets from consuming a specific quantity of a good is the maximum amount they would be willing to pay for that quantity of said good

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- The **Total Value** (or Total Utility) that a consumer gets from consuming a specific quantity of a good is the maximum amount they would be willing to pay for that quantity of said good
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- The **Marginal Value** (or Marginal Utility) that a consumer gets from consuming a good is the maximum amount they would be willing to pay for an additional unit[1] of said good

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- The **Marginal Value** (or Marginal Utility) that a consumer gets from consuming a good is the maximum amount they would be willing to pay for an additional unit[1] of said good
  - If my marginal value of consuming a 3rd ice cream cone is \$1, then I am willing to pay \$1 for a 3rd ice cream cone

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Total and Marginal Value Table

- Consider the following table for pizza slices

Quantity Consumed (Slices)	**Total Value** (Dollars)	**Marginal Value** (Dollars)
0	0.00	–[2]
1	3.25	

[2] Note that the first entry to marginal value always must be undefined (denoted –)

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2	6.25	

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Quantity Consumed (Slices)	**Total Value** (Dollars)	**Marginal Value** (Dollars)
0	0.00	–[2]
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3	9.00	

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2	6.25	3.00
3	9.00	2.75
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2	6.25	3.00
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4	11.00	2.00
5	11.50	0.50
6	11.50	0.00

The marginal value is equal to the increased total value from the last unit to the current unit. Note that filling the table in this way allows us to say "the marginal value of your second slice of pizza is \$3".

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Diminishing Marginal Returns

- What is happening in the previous table is a very common and reasonable behavior in consumer theory

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- However, the principle of diminishing marginal returns is expected to happen *eventually*: after my 100th french fry, I am starting to get very full

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Oh no. Our table. It's broken.

- Fill in the following utility table for apples

Quantity Consumed (# Apples)	**Total Value** (Dollars)	**Marginal Value** (Dollars)
0	0.00	___
1	5.00	___
2	11.00	___
3	___	8.00
4	25.00	___
5	___	5.00
6	___	4.00
7	36.00	___
8	___	0.00
9	34.00	___

Valuation Exercise Solution

Quantity Consumed (# Apples)	**Total Value** (Dollars)	**Marginal Value** (Dollars)
0	0.00	–
1	5.00	5.00
2	11.00	6.00
3	19.00	8.00
4	25.00	6.00
5	30.00	5.00
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Most of the time, we as economists believe in the *more is better* principle: consumers always get positive utility from getting more of something. However, in this class, we will allow marginal utility to be 0 or even negative. This is interpreted as paying to not have to consume more of something.

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  - \$0.50? \$1? \$2? \$3? \$3.50? \$4? \$5?
  - The highest amount that you answer "yes" to is said to be your willingness to pay
- But what if you had already had an ice cream cone 20 minutes ago? Is your willingness to pay the same?

Defining Willingness to Pay

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- Seem familiar?

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- For now, we have that willingness to pay is equivalent to consumer valuation

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- Thus, our valuation table from before can be replaced with

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- Let's focus our attention to the first eight rows of the first two columns:

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- What does this remind you of?
- We have a relation between quantity demanded, and how much you are paying for each good (now expressed as willingness to pay)
- This is just a demand schedule!

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    (ii) We don't know exactly how many people are in the market and what their demand schedules are
- Let's start by addressing this first point

Consumer Surplus Motivation

- Suppose I value a breakfast pita from Caspian at \$5

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Consumer Surplus Motivation

- Suppose I value a breakfast pita from Caspian at \$5
- However, the market price for breakfast pita's is \$4
- In some sense, I get a "bonus" of \$1: I was willing to pay \$5, I only had to pay \$4

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- If we add all of these individual surplus utilities up, for everyone who bought the pita, then we get what we call *consumer surplus*

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- *[Individual] Consumer Surplus* is the difference between a buyer's WTP and the price they actually pay [6]

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- Consumer surplus is our measure for the overall utility, or "welfare" on the buyer's side of the market
- In some sense, buying a product gives the consumer happiness, but paying for it took away some happiness. Whatever is leftover (in the sense of WTP - price) is the economic well-being of consumers in the market

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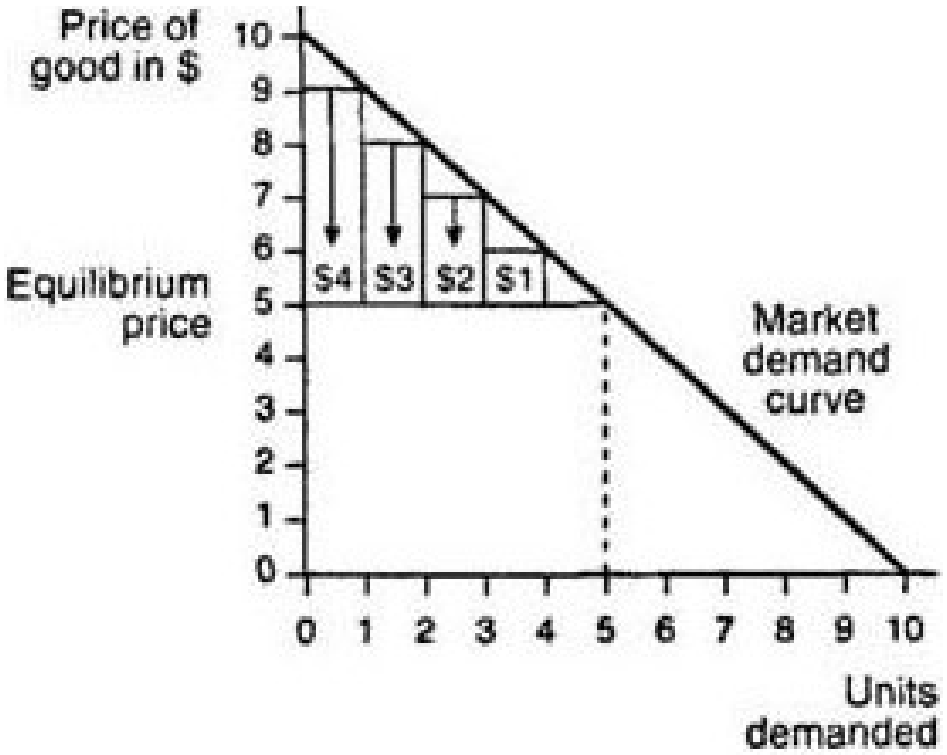
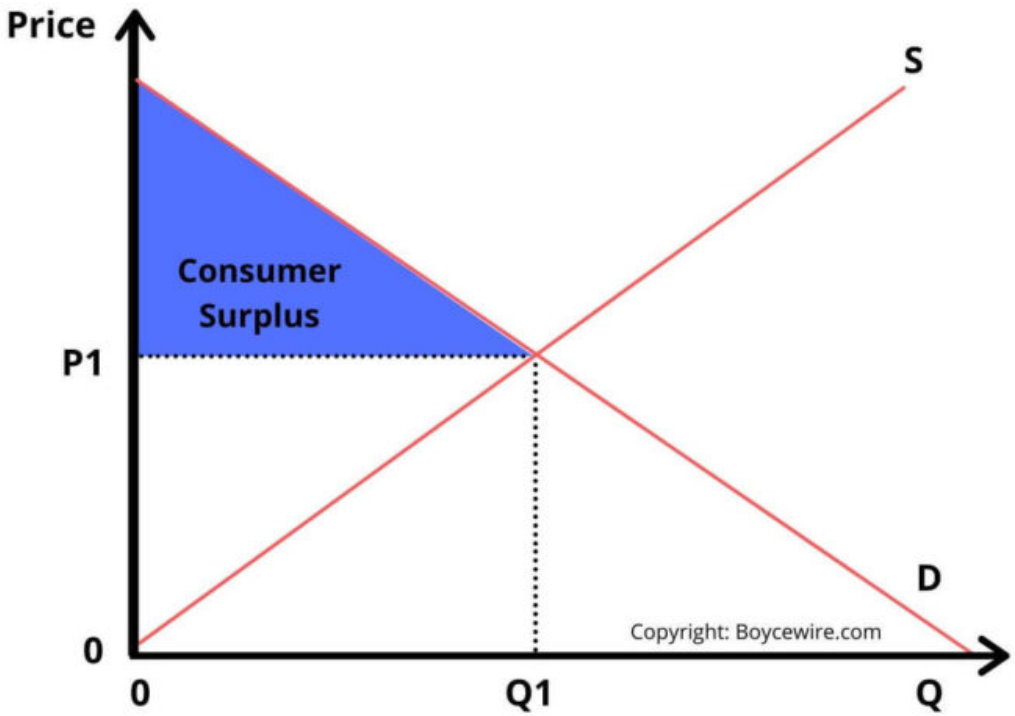
Graphical Motivation of Consumer Surplus



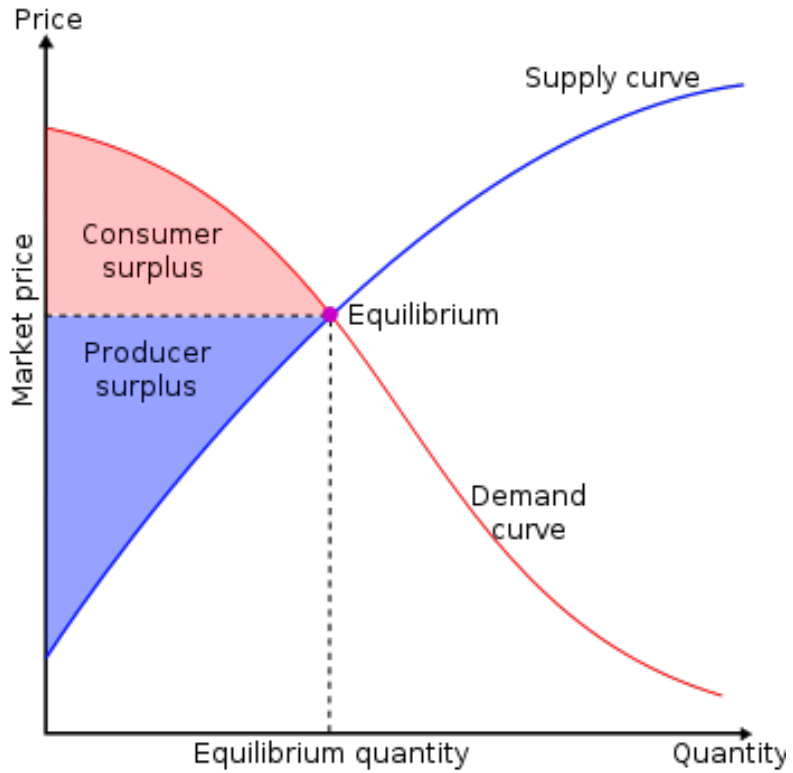
Adding up individual consumer surplus's, visualized by vertical boxes, yields what we call consumer surplus. Note that this will just be the area of the triangle shown.

CS with Linear Demand Curve



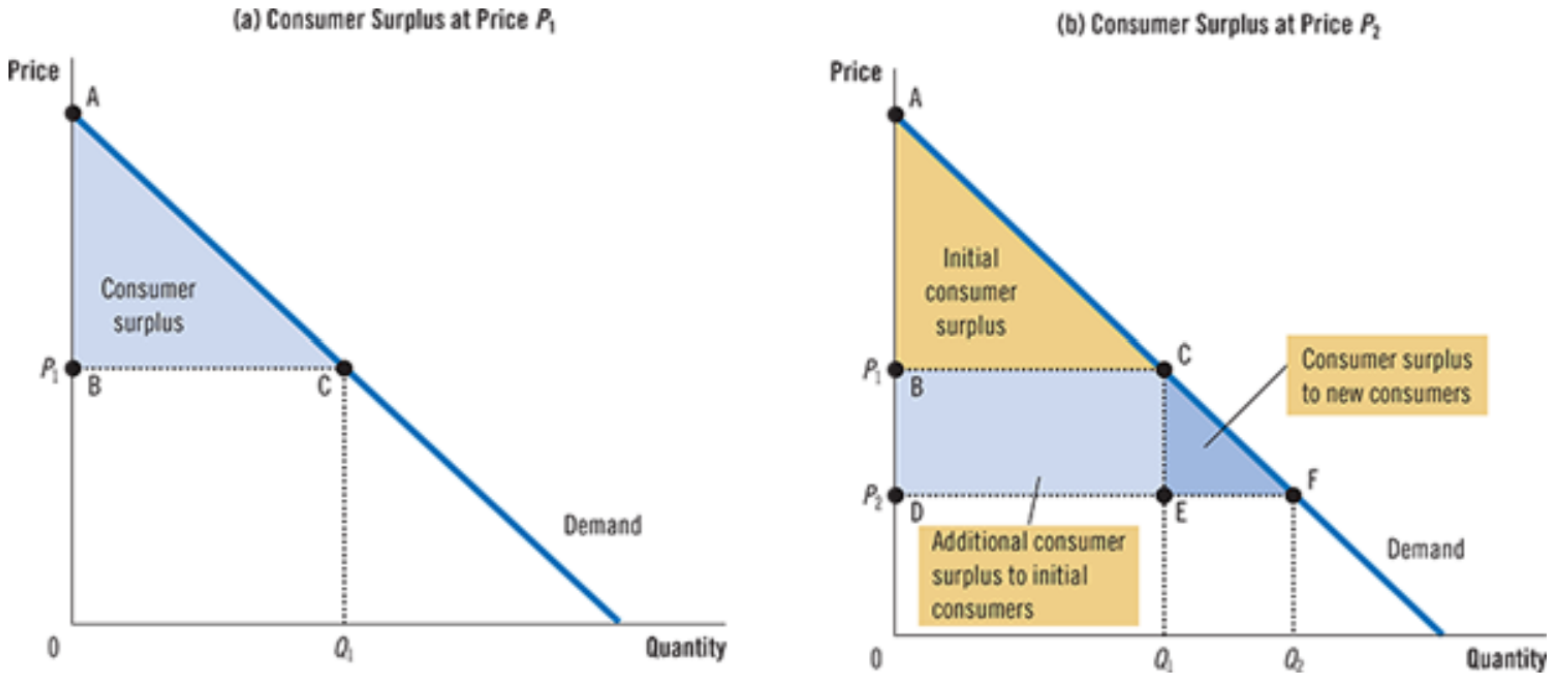
Here, consumer surplus is the area of the triangle, $\frac{1}{2}(b \cdot h)$ (one half base times height). In this example, $b = Q_1$, and h would be the difference between where the demand curve intersects the P axis (the y-intercept) and P_1.

CS with Non-Linear Demand Curve



CS with non-linear demand curve. You are not expected to provide a precise calculation of the area here; it requires calculus.

A Change in CS



When the price is lowered, more consumers can buy, some of which with surplus. The ones that were already buying get additional surplus, raising overall CS.

CS Exercise

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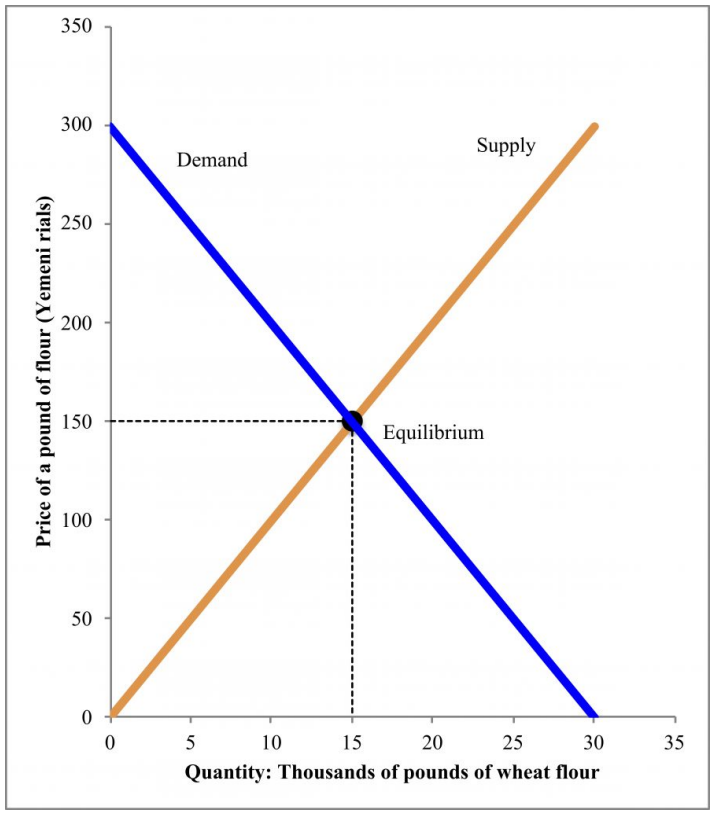
- Calculate CS in the following market



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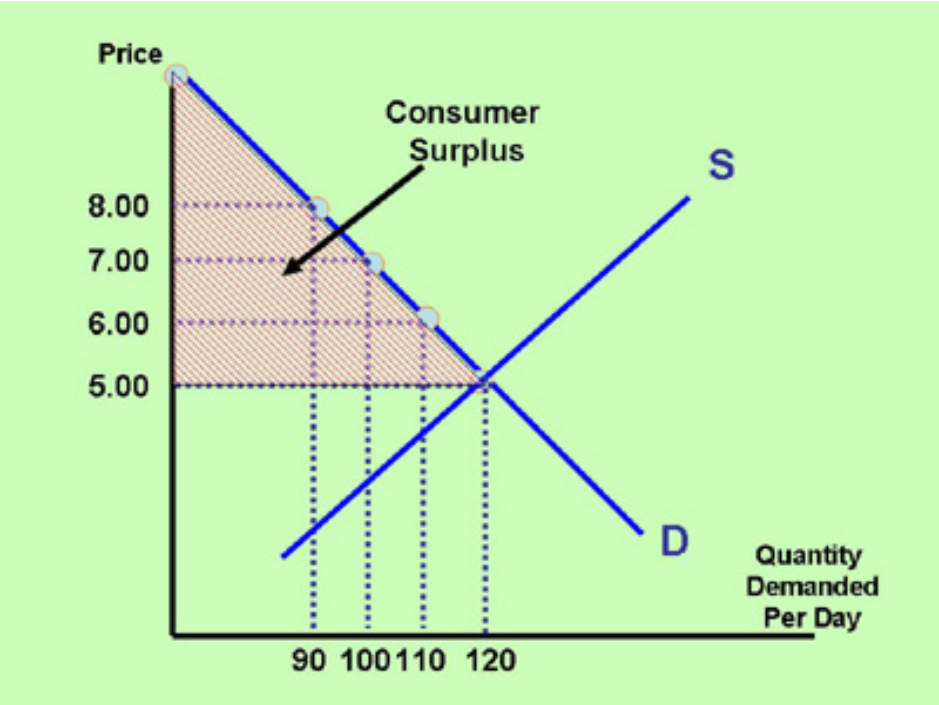
- Using the figure, the base of the triangle is $15 - 0 = 15$. The height of the triangle is $300 - 150 = 150$
- Therefore,

$$CS = \frac{1}{2}(15)(150) = 1125$$

Bonus CS Exercise

- Compute CS in the figure below. You have enough information.



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- Therefore, the P-intercept is 17. Thus, using the formula for a triangle,

$$CS = \frac{1}{2}(120 - 0)(17 - 5) = 60\,(12) = 720$$

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  - At $P = 6.5$, $Q_D = 4$, at $P = 8$, $Q_D = 3$ (barely), at $P = 9.5$, $Q_D = 2$, and at $P = 11$, $Q_D = 1$

Example à la Mankiw (cont.)

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  - This leftover (or *surplus*) happiness is what we are going to call Kendrick's consumer surplus

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- In order to think about a demand curve or adding up surplus's, we have to modify the example to allow more than one of the good to be sold, while still maintaining that everyone still demands at most one of the good
- This is better for thinking about market demand an consumer surplus informally, less good for actually doing a problem and thinking literally about a demand curve

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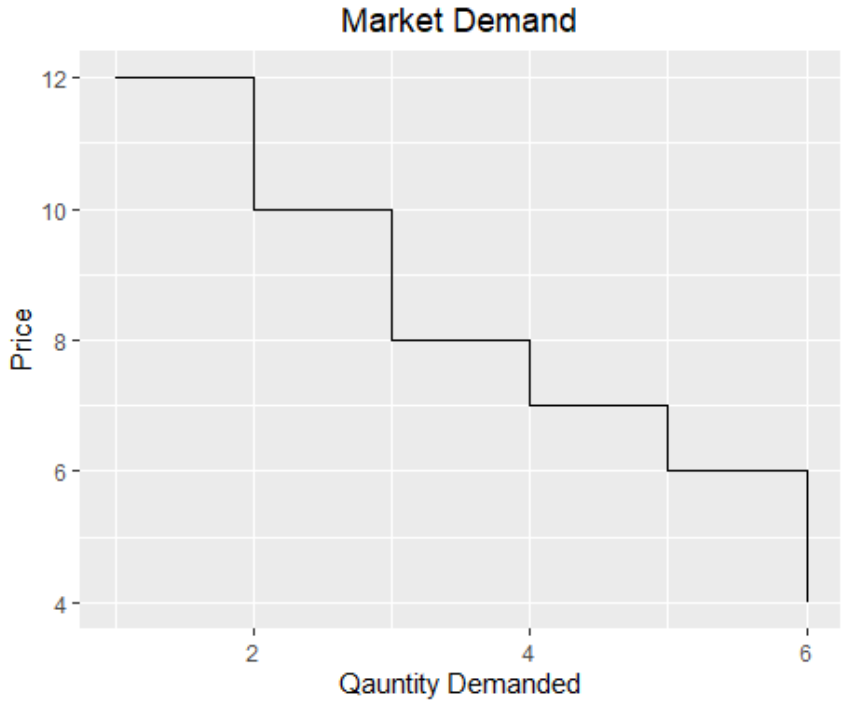
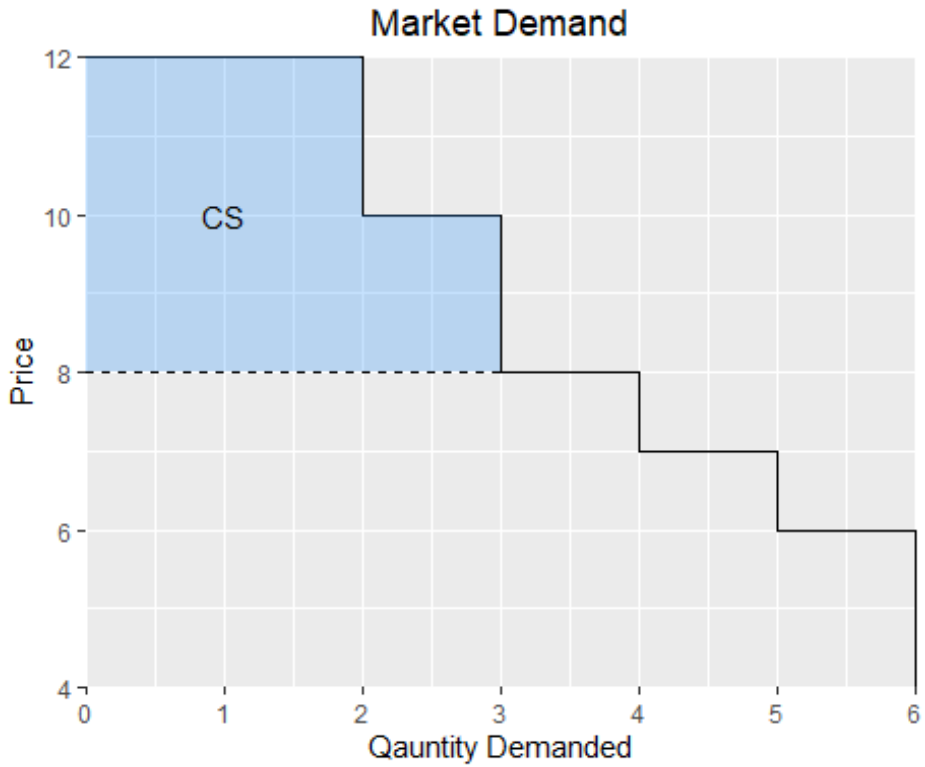
  - So, using the above demand information, the market demand curve would look like the following:



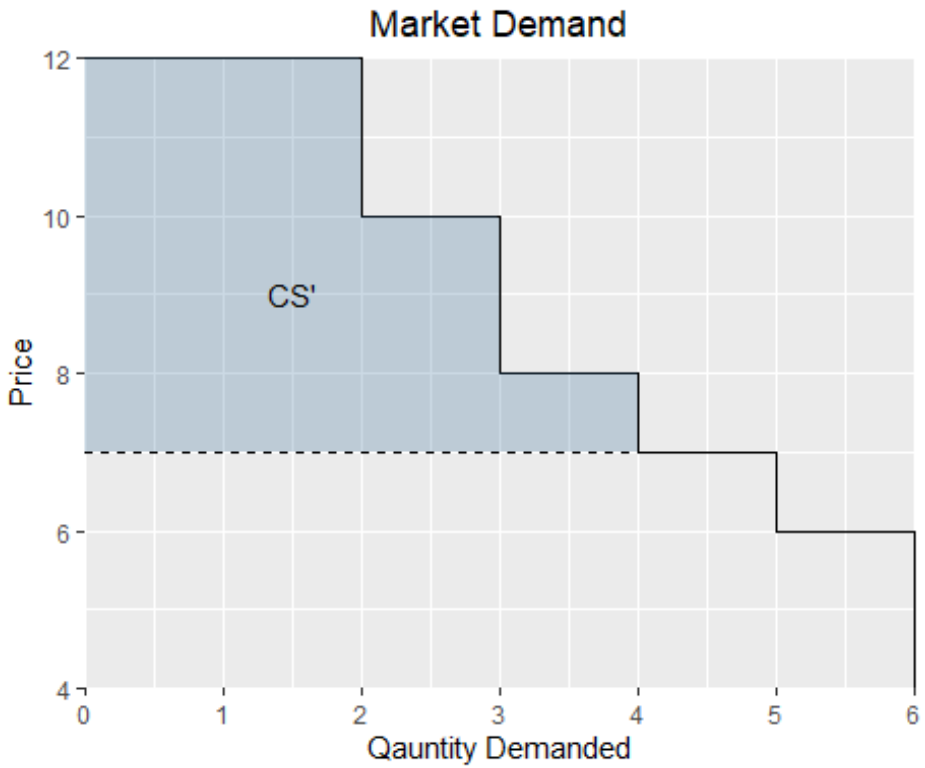
CS in Book-like Example

- With this step-wise demand curve, and allowing for the sale of more than one of the product to consumers, CS will look like



CS when $P = 8$. If you had numbers, recall that the area of a rectangle is length$\cdot$ width (or base$\cdot$ height, if you prefer to be consistent with the triangle formula).

Change in CS: Book-like Example



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  - Finally, you will have a couple homework problems that use this step-wise thinking

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WTA Schedule

- Just as with the consumer, a we can assign a WTA schedule for a producer:

Quantity Supplied (# Apples)	**Total WTA** (Dollars)	**Marginal WTA** (Dollars)
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1	14.00	14.00
2	20.00	6.00
3	25.00	5.00
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- This induces a supply curve for the producer

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- Suppose it only costs Caspian \$2 to make a breakfast pita, so they are willing to accept \$2

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- Selling a product gives the producer happiness through money, but working to produce and parting with the product took away some happiness. Whatever is leftover is the economic well-being of producers in the market

[9] Throughout: assuming this value is positive, i.e. assuming they sold the product

Producer Surplus Comments

- Just as before, Mankiw does all of this in terms of sellers who supply at most one of a good, generating step-wise supply curves

[10] Later, it will be a reflection of marginal costs to the producer

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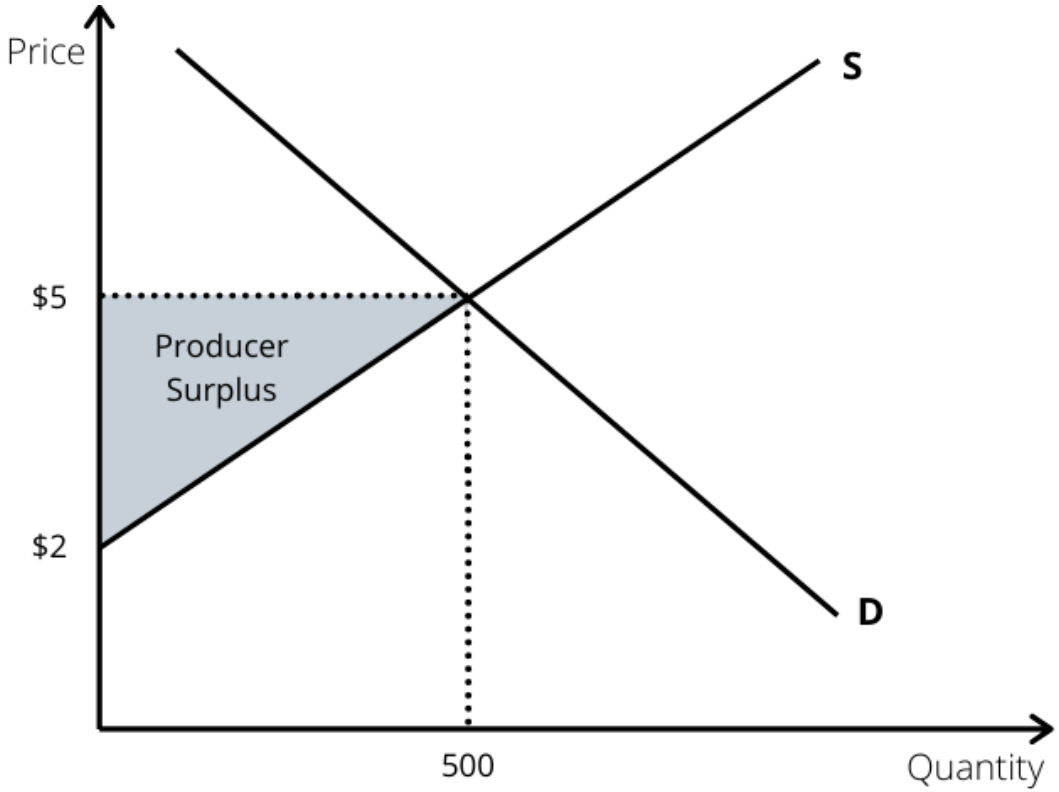
- To allow for generality, I will simply state that supply is a reflection of willingness to accept[10]
- For now, the **Total Surplus** in the market is the sum of producer and consumer surplus

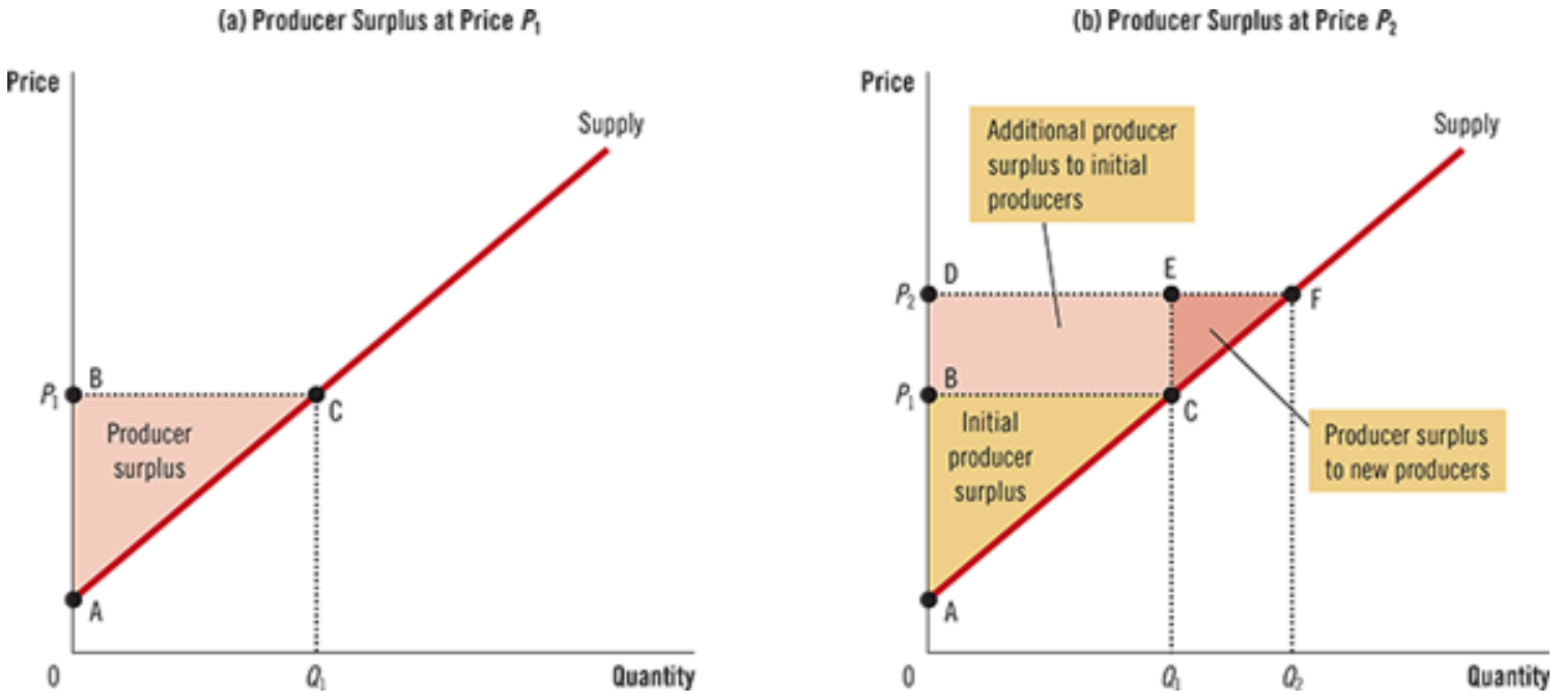
[10] Later, it will be a reflection of marginal costs to the producer

Graphical Representation of PS



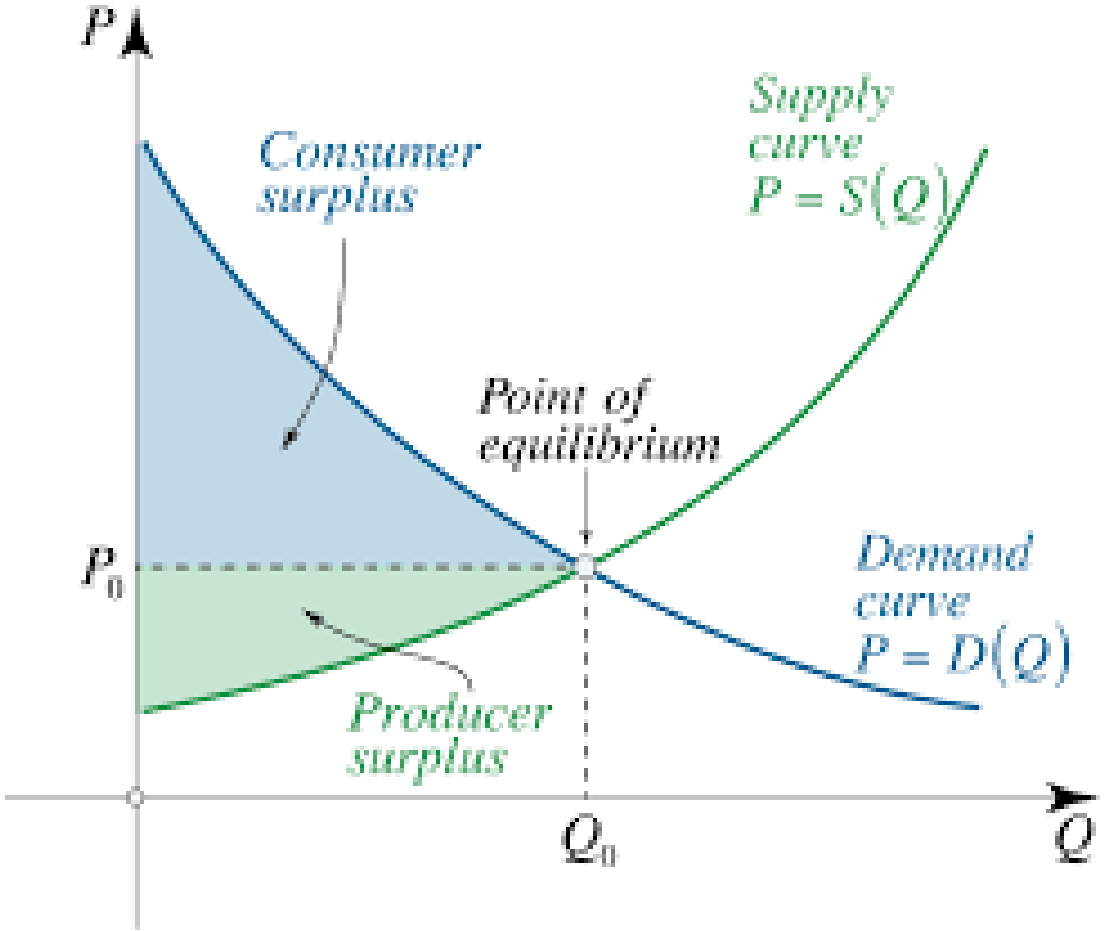
PS is the area enclosed between the price, the price axis, and the supply line (in the first quadrant)

Change in PS



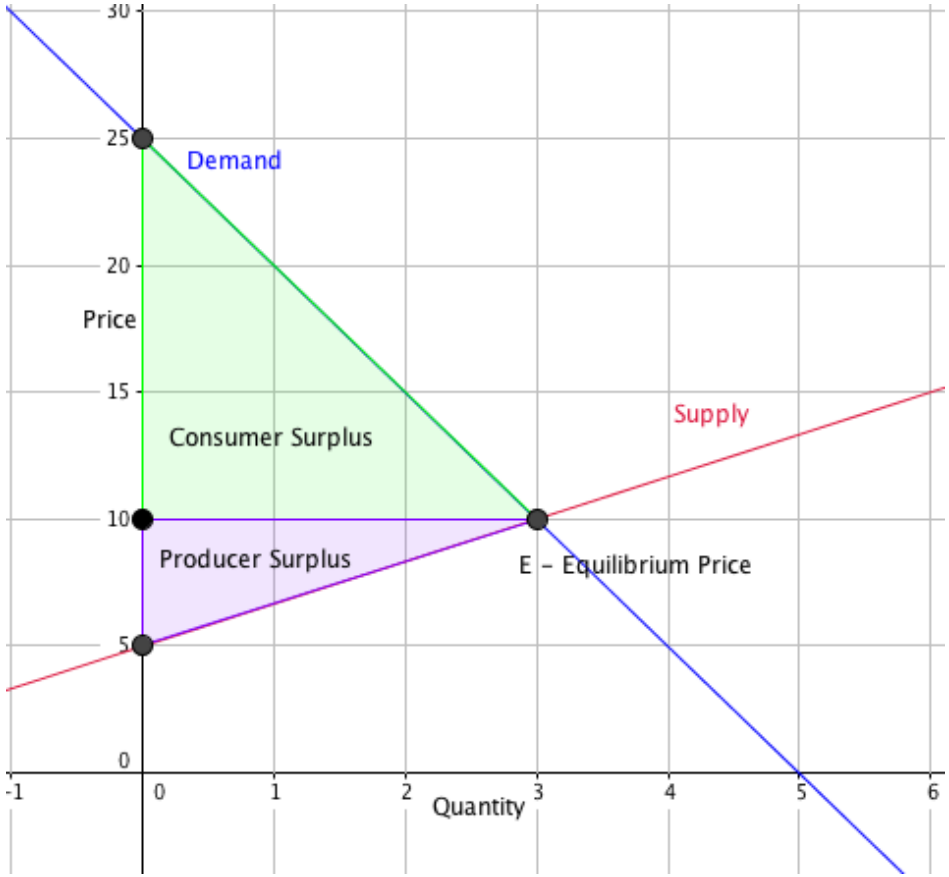
When the price is raised, more producers will sell, some of whom get surplus for their sale. The ones that were already buying get additional surplus, raising overall PS

TS With Curved Supply and Demand



Total Surplus Exercise

- Compute total surplus in the following economy



TS Solution

- Consumer surplus is given by

$$CS = \frac{1}{2}(3)(25-10) = \frac{1}{2}(3)(15) = \frac{1}{2}(45) = 22.5$$

- Producer Surplus is given by

$$PS = \frac{1}{2}(3)(10-5) = \frac{1}{2}(3)(5) = \frac{1}{2}(15) = 7.5$$

- Therefore,

$$TS = CS + PS = 22.5 + 7.5 = 30$$