

Recap

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Total Surplus

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Intro to Price Controls

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Price Floors

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Price Ceilings

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Intro to Economic Analysis: Microeconomics

EC 201 - Day 9 Slides

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25 October 2021

Logistics

- ▶ Official homework 4 due this Saturday at 11:59pm, covering last week's material
- ▶ Next news assignments posted, due this Wednesday (October 27)
- ▶ Midterm Wednesday, November 3rd
 - Read the announcement about class-designed note card
 - Bring non-graphing, non-algebra calculator
 - Bring #2 Pencil (yes it has to be #2)

Willingness to Accept

- ▶ Motivating and defining producer surplus looks a lot like consumer surplus

¹ Again, "last", depending on context

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- ▶ Producers have a “willingness to accept”: the minimum price that a producer will take in order to sell a product

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- ▶ Producers have a “willingness to accept”: the minimum price that a producer will take in order to sell a product
- ▶ A producer's **Total Willingness to Accept** (TWTA) is the minimum amount a producer will take in order to sell a specific quantity of a good

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- ▶ A producer's **Total Willingness to Accept** (TWTA) is the minimum amount a producer will take in order to sell a specific quantity of a good
- ▶ A consumer's **Marginal Willingness to Accept** (MWTA) is the minimum amount a producer will take to sell the next¹ unit of a good

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Producer Surplus Motivation

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

² One could conceive that a producer is endowed with some goods, and still has some minimum price they are willing to sell at. Thus, producer surplus need not always equal profit

Producer Surplus Motivation

- ▶ Suppose it only costs Caspian \$2 to make a breakfast pita, so they are willing to accept \$2
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- ▶ Other sellers of breakfast pitas may be willing to accept \$1, some \$3.50, etc.

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- ▶ Other sellers of breakfast pitas may be willing to accept \$1, some \$3.50, etc.
- ▶ Each of them gets an individual surplus from getting a “deal” on their pita, as long as their WTA is low enough to sell the product ($\leq \$4$)
- ▶ If we add these surplus values up, for everyone who sold the pita, then we get what we call the producer surplus

² One could conceive that a producer is endowed with some goods, and still has some minimum price they are willing to sell at. Thus, producer surplus need not always equal profit

Producer Surplus Definition

- ▶ [Individual] Producer Surplus is the difference between a seller's WTA and the price they actually sell for ³

³ Throughout: assuming this value is positive, i.e. assuming they sold the product

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- ▶ Producer surplus is our measure for the overall utility (often thought of as profit), or "welfare", on the seller's side of the market

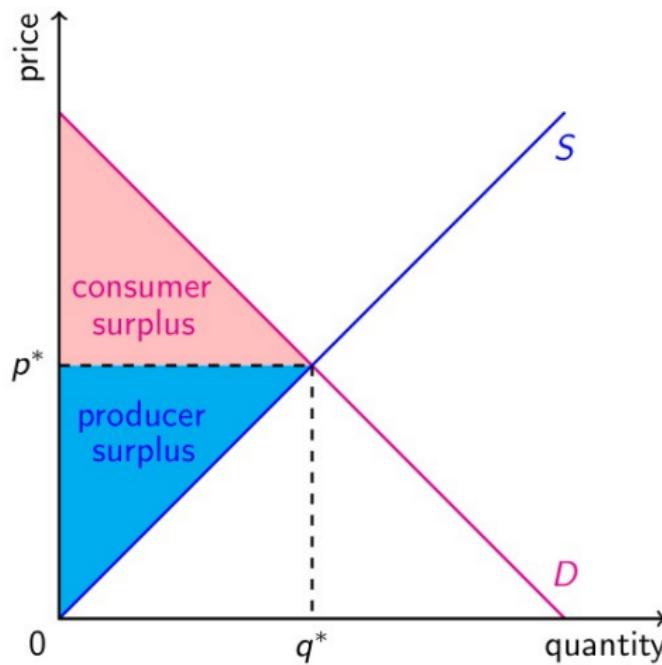
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- ▶ Producer surplus is our measure for the overall utility (often thought of as profit), or "welfare", on the seller's side of the market
- ▶ Selling a product gives the producer happiness through money, but working to produce and parting with the product took away some happiness. Whatever is leftover is the economic well-being of producers in the market

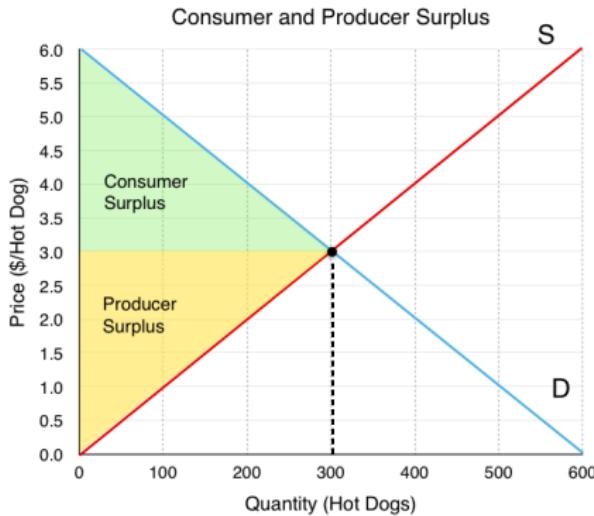
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Graphical Representation of CS & PS



CS/PS Exercise 1

- ▶ Recall that the area of a triangle is $\frac{1}{2}$ base times height
- ▶ Compute consumer, producer, and total surplus for hot dogs



CS/PS Solution 1

- ▶ In both cases, the base of the triangle is 300

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- ▶ Consumer surplus is given by

$$CS = \frac{1}{2} (300) (6 - 3) = (150)(3) = 450$$

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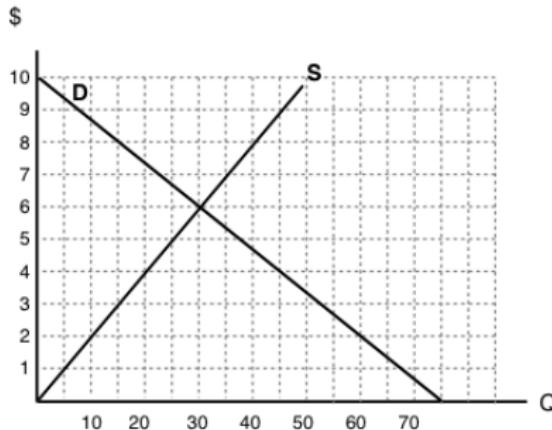
$$PS = \frac{1}{2} (300) (3 - 0) = 150(3) = 450$$

- ▶ Therefore, the total surplus

$$TS = CS + PS = 450 + 450 = 900$$

CS/PS Exercise 2

- ▶ Recall that the area of a triangle is $\frac{1}{2}$ base times height
- ▶ Compute consumer, producer, and total surplus for the market below.
Assume supply and demand intersect at $Q^* = 30$



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$$PS = \frac{1}{2} (30) (6 - 0) = 15 (6) = 90$$

CS/PS Solution

- ▶ In both cases, the base of the triangle is 30
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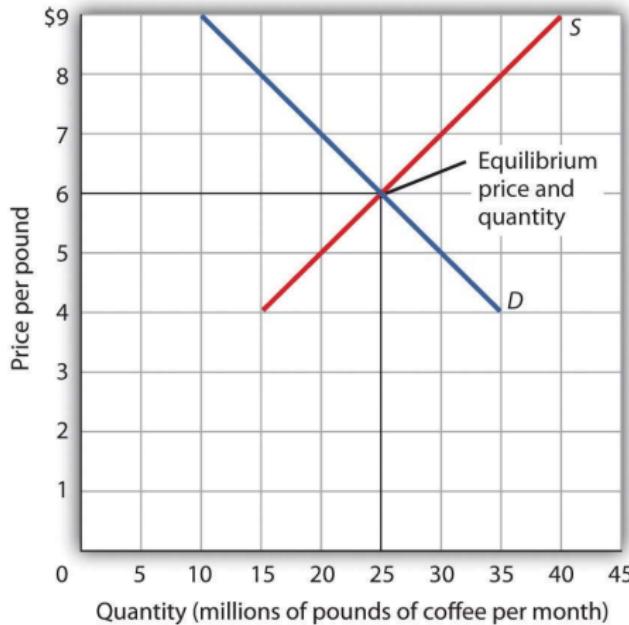
$$PS = \frac{1}{2} (30) (6 - 0) = 15 (6) = 90$$

- ▶ Therefore, the total surplus

$$TS = CS + PS = 60 + 90 = 150$$

CS/PS Challenge

- ▶ Recall that the area of a triangle is $\frac{1}{2}$ base times height
- ▶ Compute consumer, producer, and total surplus in the market for coffee



CS/PS Challenge Solution

- ▶ You can use the method described in the previous set of slides to derive the y -intercept for supply and demand, which I strongly recommend you are familiar with

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$$CS = \frac{1}{2} (25) (11 - 6) = \frac{1}{2} (150) = 75$$

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- ▶ Producer Surplus is given by

$$PS = \frac{1}{2} (25) (6 - 1) = \frac{1}{2} (150) = 75$$

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- ▶ Therefore, the total surplus

$$TS = CS + PS = 75 + 75 = 150$$

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 - By this, we just mean who gets what in the economy
 - Notice that, in a market equilibrium, there are some people who value a good, but who may not buy, because their WTP is below equilibrium price
 - Likewise, some seller's may "want" to sell, but their WTA is above market price

The Social Planner

- ▶ The book describes a “benevolent social planner”, a dictator whose sole interest is maximizing welfare

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 - If we assume, for simplicity, that the planner must charge the same amount across consumers, then we get a market price

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 - If we assume, for simplicity, that the planner must charge the same amount across consumers, then we get a market price
- ▶ Keep in mind that as the price goes up, producers are better off ($PS\uparrow$) but consumers are worse off ($CS\downarrow$), and vice versa⁴

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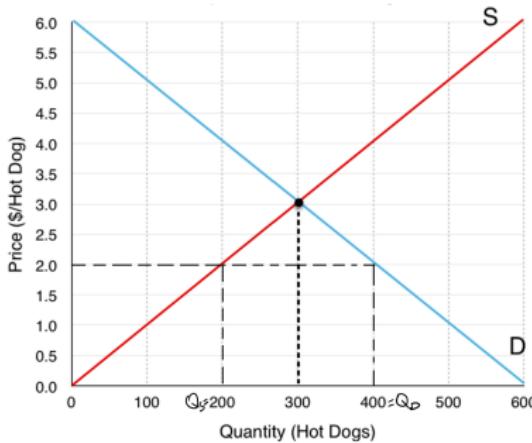
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 - If we assume, for simplicity, that the planner must charge the same amount across consumers, then we get a market price
- ▶ Keep in mind that as the price goes up, producers are better off ($PS \uparrow$) but consumers are worse off ($CS \downarrow$), and vice versa⁴
- ▶ Thus, based on valuations, the planner decides upon a market price, such that the total surplus in the market is maximized

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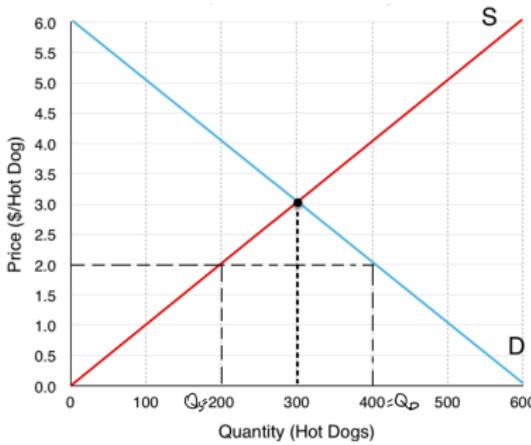
Visualizing the Social Planner 1

- ▶ Suppose the social planner sets the price to be \$2 in the following market:



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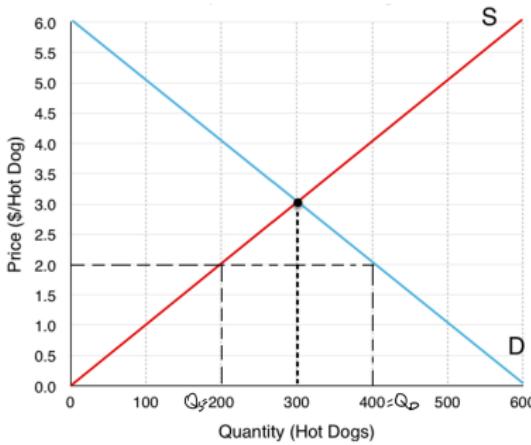
- ▶ Suppose the social planner sets the price to be \$2 in the following market:



- ▶ In this case, the quantity demanded is 400, while the quantity supplied is only 200

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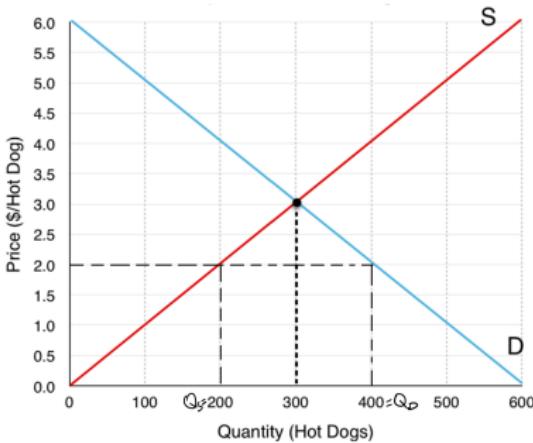
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- ▶ So how many units get traded?

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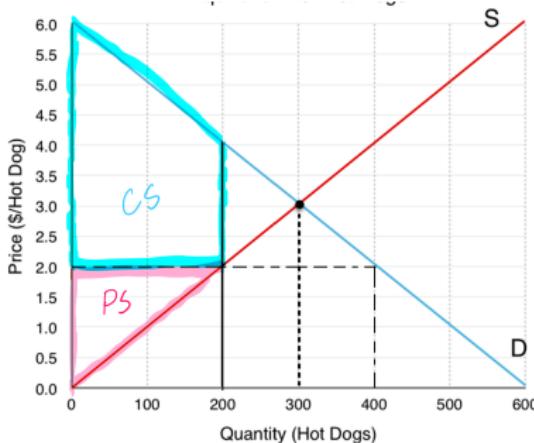
- ▶ Suppose the social planner sets the price to be \$2 in the following market:



- ▶ In this case, the quantity demanded is 400, while the quantity supplied is only 200
- ▶ So how many units get traded?
 - Only 200, because only 200 people are willing to sell

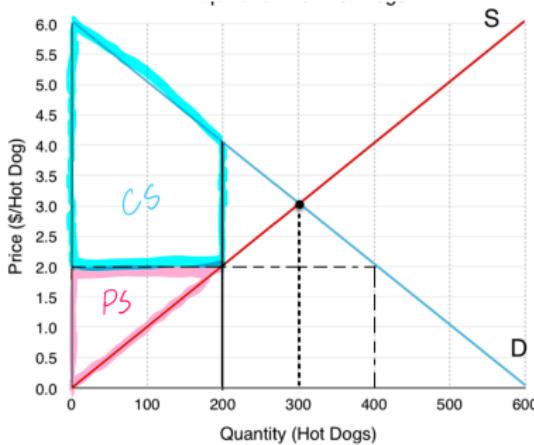
Visualizing the Social Planner 1 (cont.)

- So what are consumer and producer surpluses in this market?



Visualizing the Social Planner 1 (cont.)

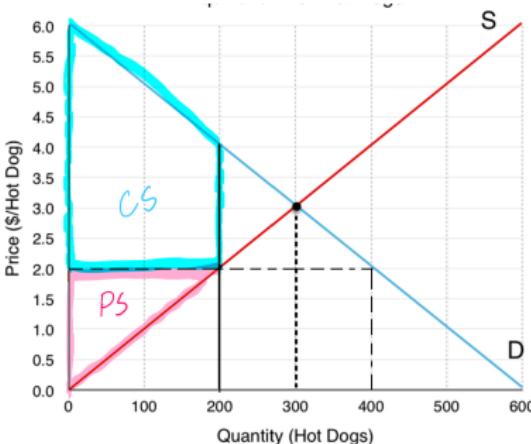
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- Since the amount being traded is 200, we have to cut we have stop at $Q = 200$; those other 200 demanders do not get the product, so their surplus is not counted

Visualizing the Social Planner 1 (cont.)

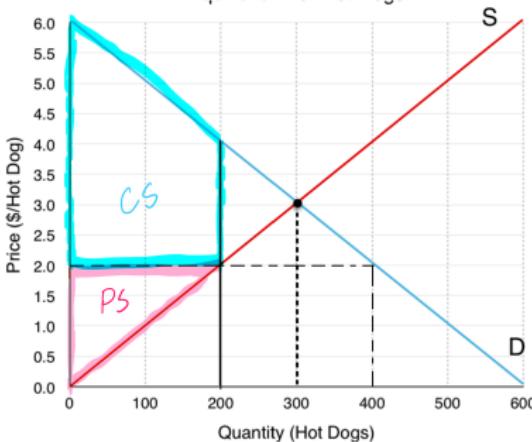
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- Since the amount being traded is 200, we have to cut we have stop at $Q = 200$; those other 200 demanders do not get the product, so their surplus is not counted
- Remember that CS is WTP (demand curve) - price, and PS is price - WTA (supply curve)

Visualizing the Social Planner 1 (cont.)

- So what are consumer and producer surpluses in this market?⁵



$$PS = (1/2)(200)(2) = 200$$

$$CS = \underbrace{(1/2)(200)(6 - 4)}_{\text{Triangle}} + \underbrace{(200)(4 - 2)}_{\text{Rectangle}} = (100)(2) + (200)(2) = 600$$

⁵ Note that you have to break up CS into a rectangle and a triangle, to get the area

Visualizing the Social Planner 1 (conclusion)

- As we can see, consumers who were allotted the product benefited greatly

Visualizing the Social Planner 1 (conclusion)

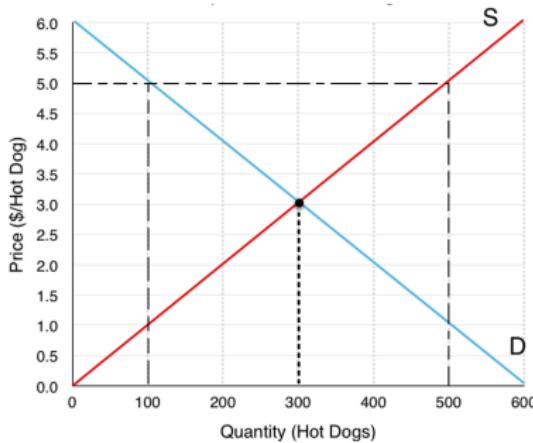
- ▶ As we can see, consumers who were allotted the product benefited greatly
- ▶ However, 200 consumers valued the product at greater than or equal to the price, but didn't get allocated a hot dog. Plus, producer surplus looks a little small

Visualizing the Social Planner 1 (conclusion)

- ▶ As we can see, consumers who were allotted the product benefited greatly
- ▶ However, 200 consumers valued the product at greater than or equal to the price, but didn't get allocated a hot dog. Plus, producer surplus looks a little small
- ▶ Our TS in this case is 800

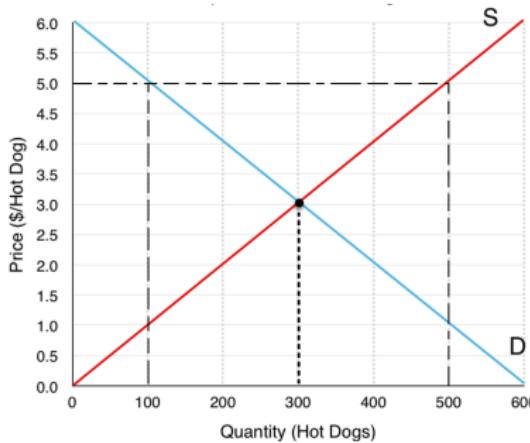
Visualizing the Social Planner 2

- ▶ Now suppose the social planner sets the price to be \$5 in the market:



Visualizing the Social Planner 2

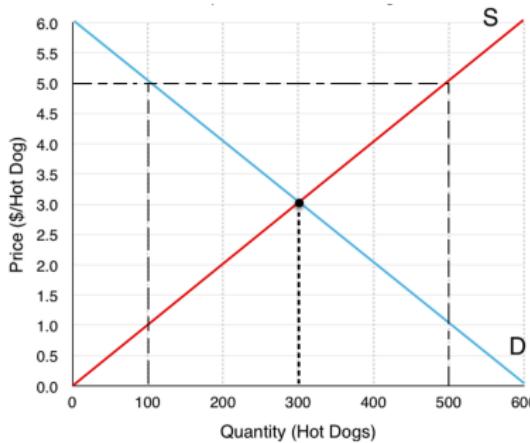
- ▶ Now suppose the social planner sets the price to be \$5 in the market:



- ▶ In this case, the quantity demanded is 100, while the quantity supplied is all the way at 500

Visualizing the Social Planner 2

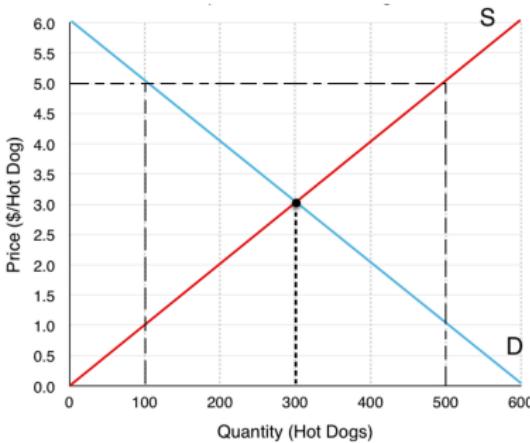
- ▶ Now suppose the social planner sets the price to be \$5 in the market:



- ▶ In this case, the quantity demanded is 100, while the quantity supplied is all the way at 500
- ▶ So how many units get traded?

Visualizing the Social Planner 2

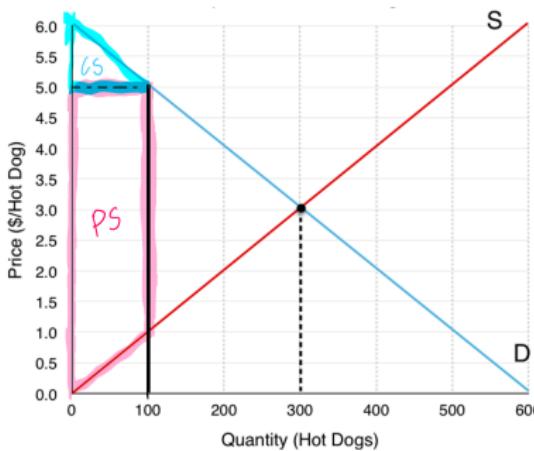
- ▶ Now suppose the social planner sets the price to be \$5 in the market:



- ▶ In this case, the quantity demanded is 100, while the quantity supplied is all the way at 500
- ▶ So how many units get traded?
 - Only 100, because only 100 people value the product enough

Visualizing the Social Planner 2 (cont.)

- So what are consumer and producer surplus now?



$$CS = (1/2)(100)(1) = 50$$

$$PS = \underbrace{(1/2)(100)(1)}_{\text{Triangle}} + \underbrace{(100)(5 - 1)}_{\text{Rectangle}} = 50 + 400 = 450$$

Visualizing the Social Planner 2 (conclusion)

- ▶ As we can see, producers who were told to produce and “sell” the product benefited greatly

Visualizing the Social Planner 2 (conclusion)

- ▶ As we can see, producers who were told to produce and “sell” the product benefited greatly
- ▶ However, 400 producers were willing to spend the time producing the product to sell it for \$5 to the social planner, but didn’t get to; also, CS is low

Visualizing the Social Planner 2 (conclusion)

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Visualizing the Social Planner 2 (conclusion)

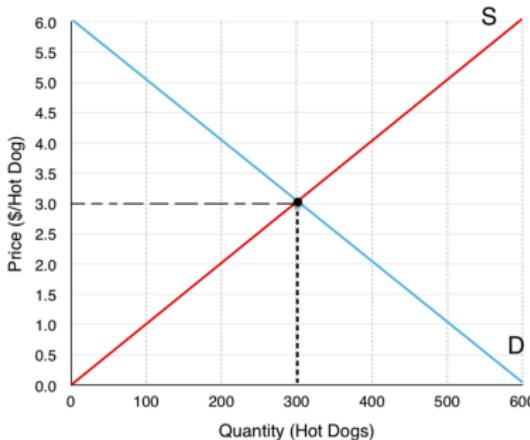
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- ▶ Our TS in this case is 500
- ▶ This is less than before, only by chance: if I had said the price was \$4, we would get the same TS

Visualizing the Social Planner 2 (conclusion)

- ▶ As we can see, producers who were told to produce and “sell” the product benefited greatly
- ▶ However, 400 producers were willing to spend the time producing the product to sell it for \$5 to the social planner, but didn’t get to; also, CS is low
- ▶ Our TS in this case is 500
- ▶ This is less than before, only by chance: if I had said the price was \$4, we would get the same TS
- ▶ Nonetheless, we would say that the first allocation of resources is *more efficient* than this one, because the old TS was 800, and the new TS is only 500

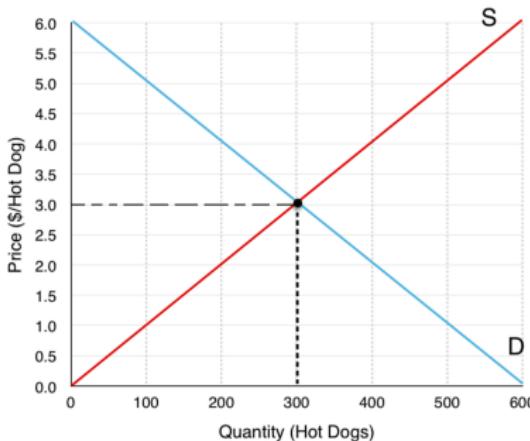
Visualizing the Social Planner 3

- ▶ Now suppose the social planner sets the price to be \$3 in the market:



Visualizing the Social Planner 3

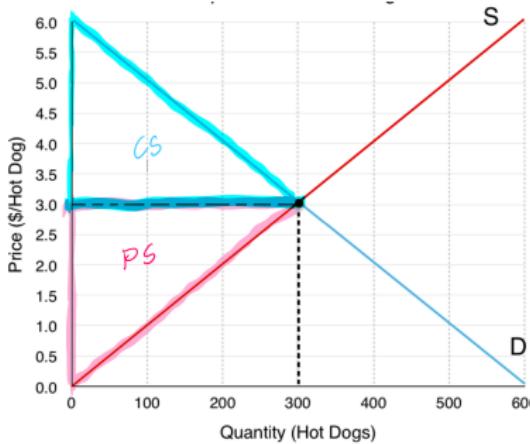
- ▶ Now suppose the social planner sets the price to be \$3 in the market:



- ▶ In this case, the quantity demanded and quantity supplied are both 300

Visualizing the Social Planner 3 (cont.)

- ▶ So what are consumer and producer surplus now?



$$CS = (1/2)(300)(6 - 3) = 150(3) = 450$$

$$PS = (1/2)(300)(3 - 0) = 150(3) = 450$$

Visualizing the Social Planner 3 (conclusion)

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 - The way Mankiw describes the planner is akin to just making the market mechanism into a person, other versions of the social planner can be more interesting, but are outside the scope of this class

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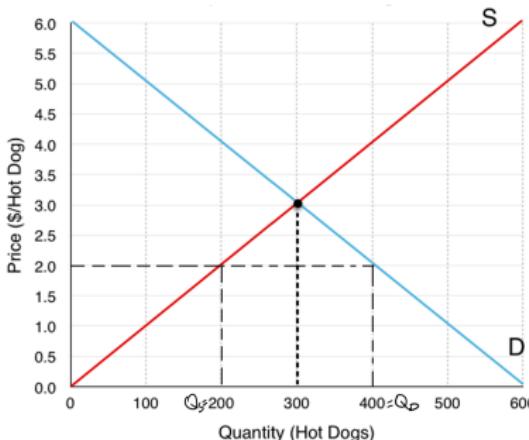
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- ▶ The sum of consumer and producer surplus is known as Total Surplus, and a market is known as “efficient” if it maximizes total surplus

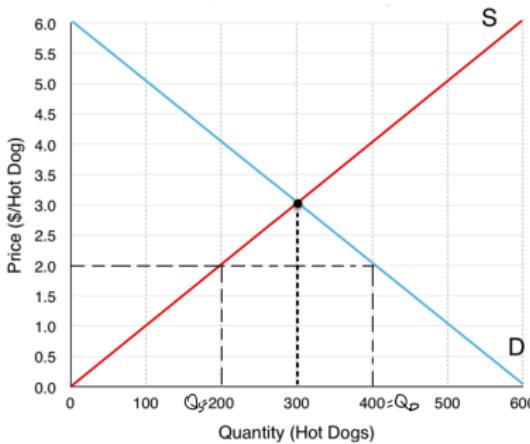
Below-Equilibrium Price

- ▶ Consider the previous social planner examples, but without the lens of the social planner (i.e., we are just imagining that the price is not in equilibrium)



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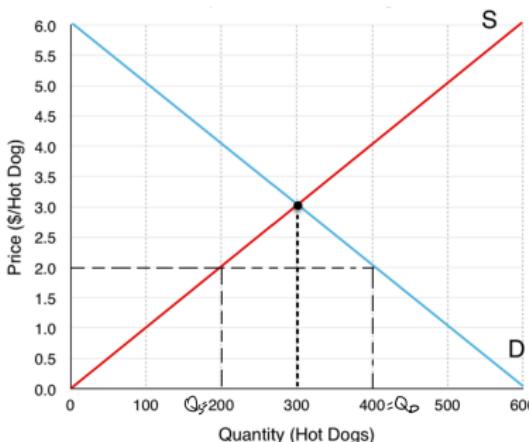
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- ▶ A shortage, because the quantity demanded exceeds the quantity supplied

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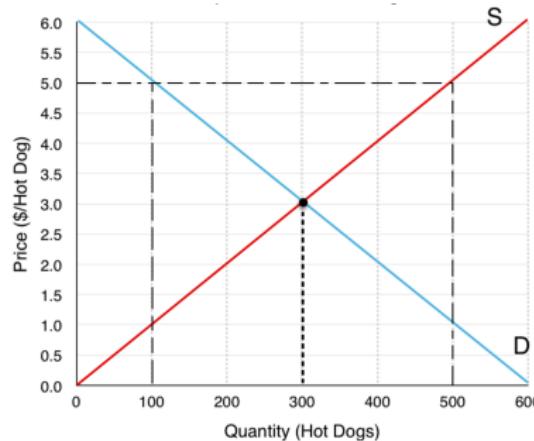
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- ▶ Once consumers offer to pay more, the price rises, the size of the shortage (in our example: 200) falls, and we repeat until equilibrium

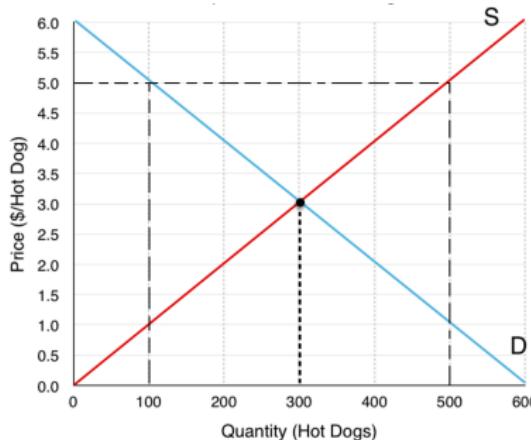
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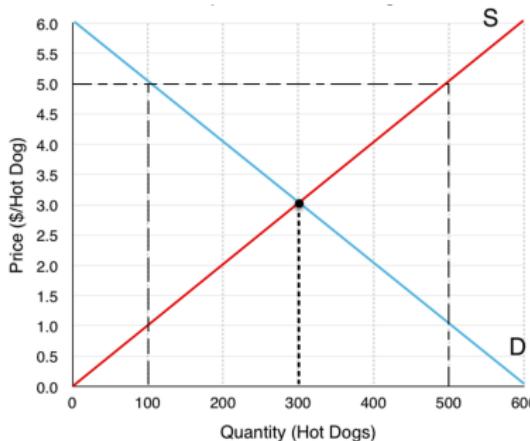
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 - Quotas are also a hard limit, but on quantity instead of price; we may not discuss quotas in great detail

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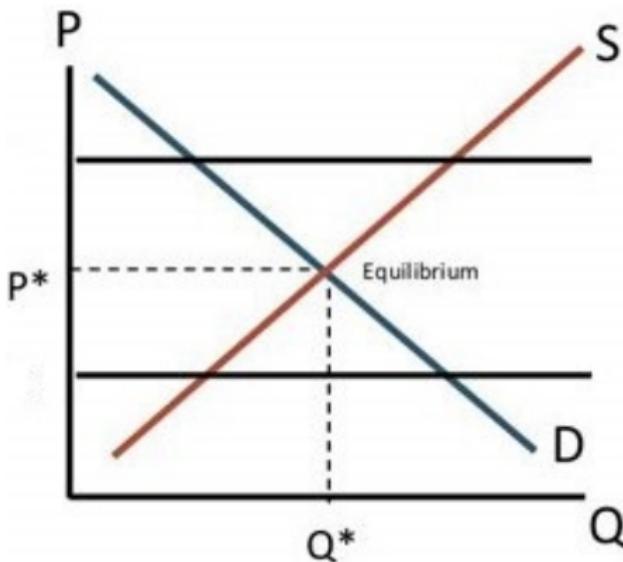
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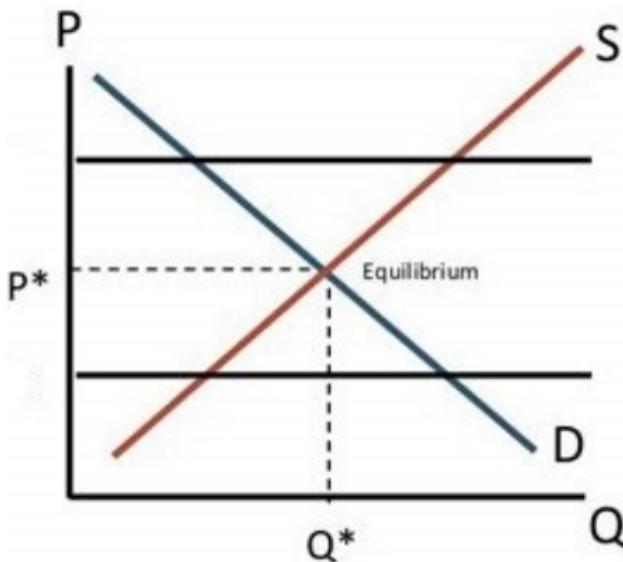
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Effective Price Ceiling/Floor



Based on common sense, which of these should be called an effective price ceiling and effective price floor?

Effective Price Ceiling/Floor



Based on common sense, which of these should be called an effective price ceiling and effective price floor? The top one is the ceiling, and the bottom the floor?



Unfortunately, it's the other way around

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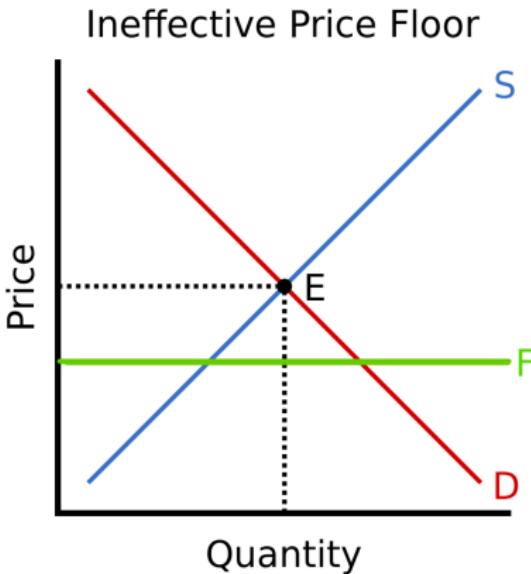
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 - While modelling this on a S/D graph looks a little different, it is *de facto* a floor

An Ineffective Price Floor

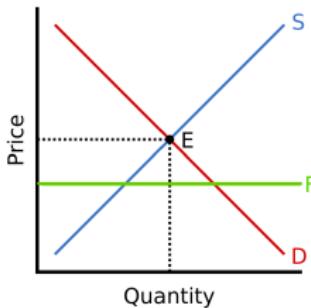
- So what happens when a price floor is below the equilibrium price?



To help you remember which is a floor vs. ceiling, you may want to include up arrows on your floor, to show that the price must be above it

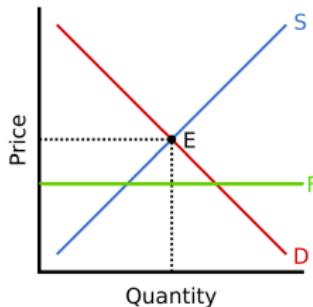
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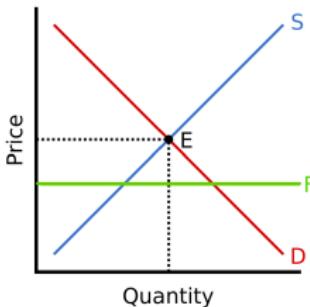
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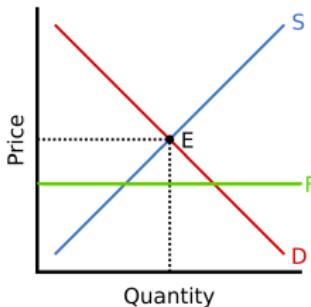
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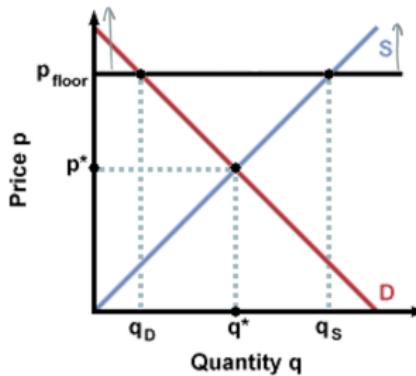
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- ▶ Thus, a price floor below the equilibrium price does nothing; it is useless

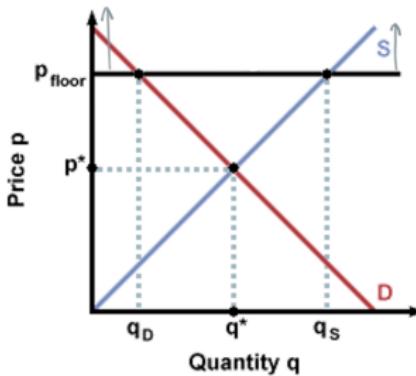
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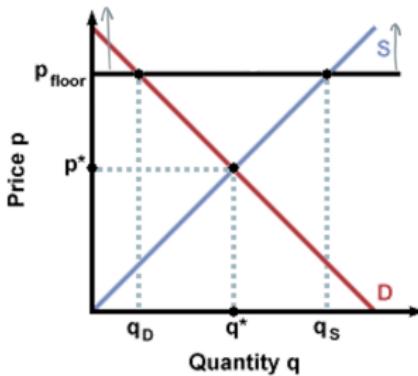
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- However, the same market forces which drive us toward equilibrium will drive us to the price floor

An Effective Price Floor (cont.)

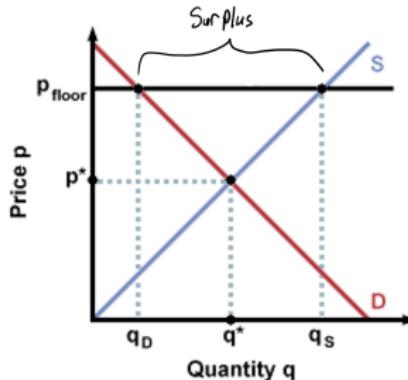
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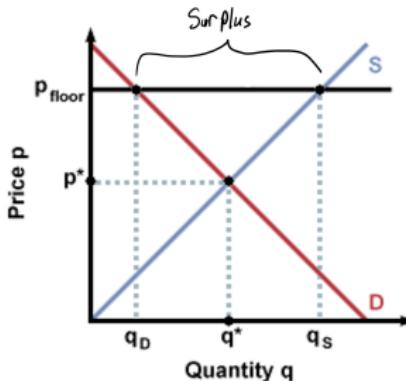
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- ▶ The size of the surplus will be $q_S - q_D$

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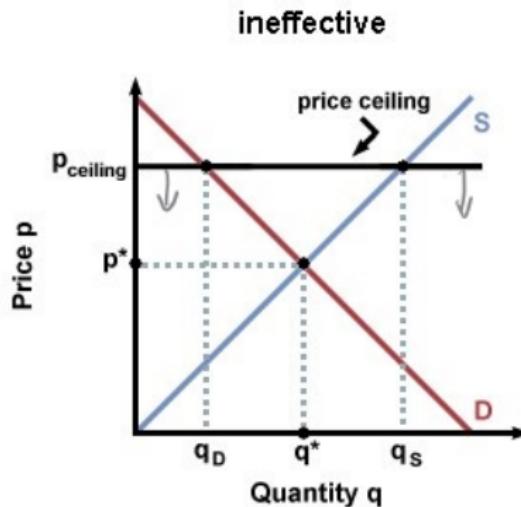
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 - Related: Other than an actual price ceiling, governments sometimes put a ceiling on how much a price can grow in terms of percent, such as rent in some states, or the price of housing in California

An Ineffective Price Ceiling

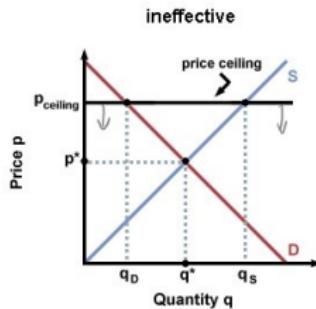
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To help you remember which is a floor vs. ceiling, you may want to include *down* arrows on your ceiling, to show that the price must be below it

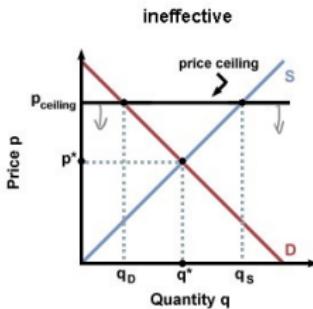
An Ineffective Price Ceiling (cont.)

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An Ineffective Price Ceiling (cont.)

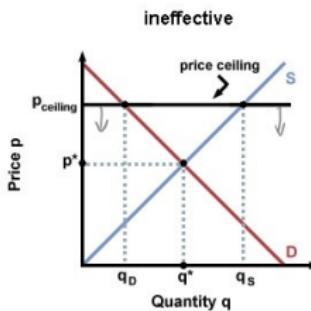
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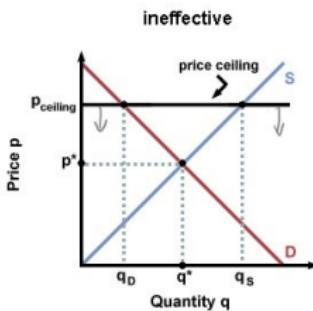
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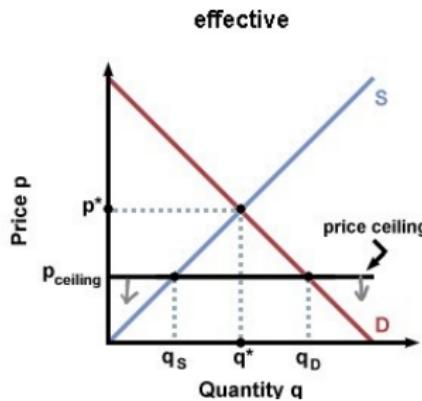
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- ▶ Thus, a price ceiling above the equilibrium price does nothing; it is useless

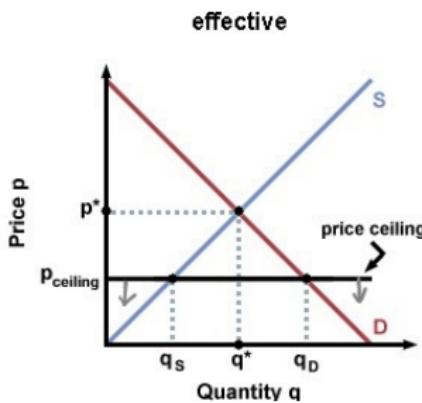
An Effective Price Ceiling

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An Effective Price Ceiling

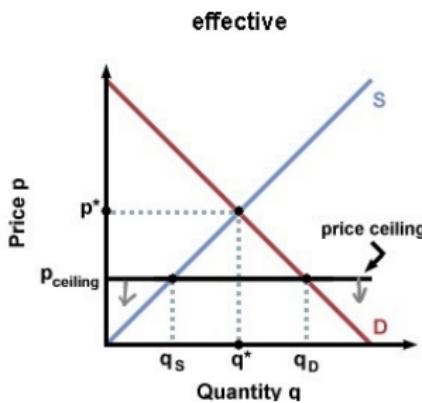
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- Now, since the price is not allowed above the ceiling, we cannot be at equilibrium
- However, the same market forces which drive us toward equilibrium will drive us to the price ceiling

An Effective Price Ceiling (cont.)

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- ▶ The size of the shortage will be $q_d - q_s$

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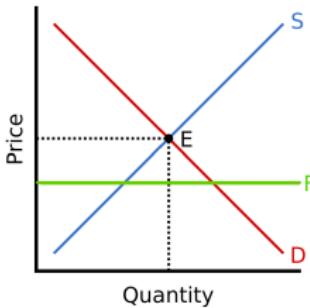
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- ▶ In general, either of the lines shown in the aforementioned graph can be a price ceiling or floor, but if I also qualify that the price control is "effective", you should be able to tell which is which
 - An effective floor is above, an effective ceiling is below

A Note about Ineffective Controls

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Why?

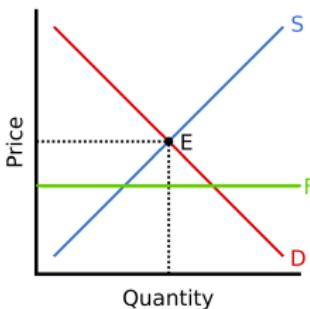
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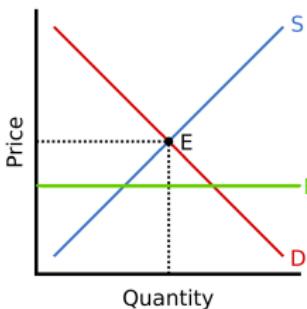
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- ▶ In the above figure, a negative demand shock or positive supply shock would lead to the price dipping below the floor, which the government may not want
- ▶ The reverse justification would be valid for protecting consumers from negative supply or positive demand shocks