

LECTURE 21

9 April 2013

ANNOUNCEMENTS

- HW 9 due next Friday
- Midterm results posted next week
- Monopoly worksheets on Moodle for recitation this week
- Recitation mandatory this week to sign up for platform debate groups (debate in 2 weeks)

OUTLINE

- Broad Applications of Consumer Theory
- Introduction to Monopolies

TOPIC 15

Applications of Consumer Theory

BIG PICTURE

- How can we use consumer theory to illustrate that price-affecting taxes are distorting and inefficient while lump sum taxes are efficient?
- How can we extend consumer theory beyond the realm of economics into other behavioral sciences?

CONSUMERS AND GOVERNMENT

- We developed a nice, simple way to look at a more complete method of how consumers make choices
 - Remember, the budget constraint tells me what I can afford
 - Utility tells me what among those things I can afford I like the most and would be happiest to consume
- But, we left out the government
- We can now check my claim that lump sum taxes (transfers) are better than taxes (subsidies) on goods

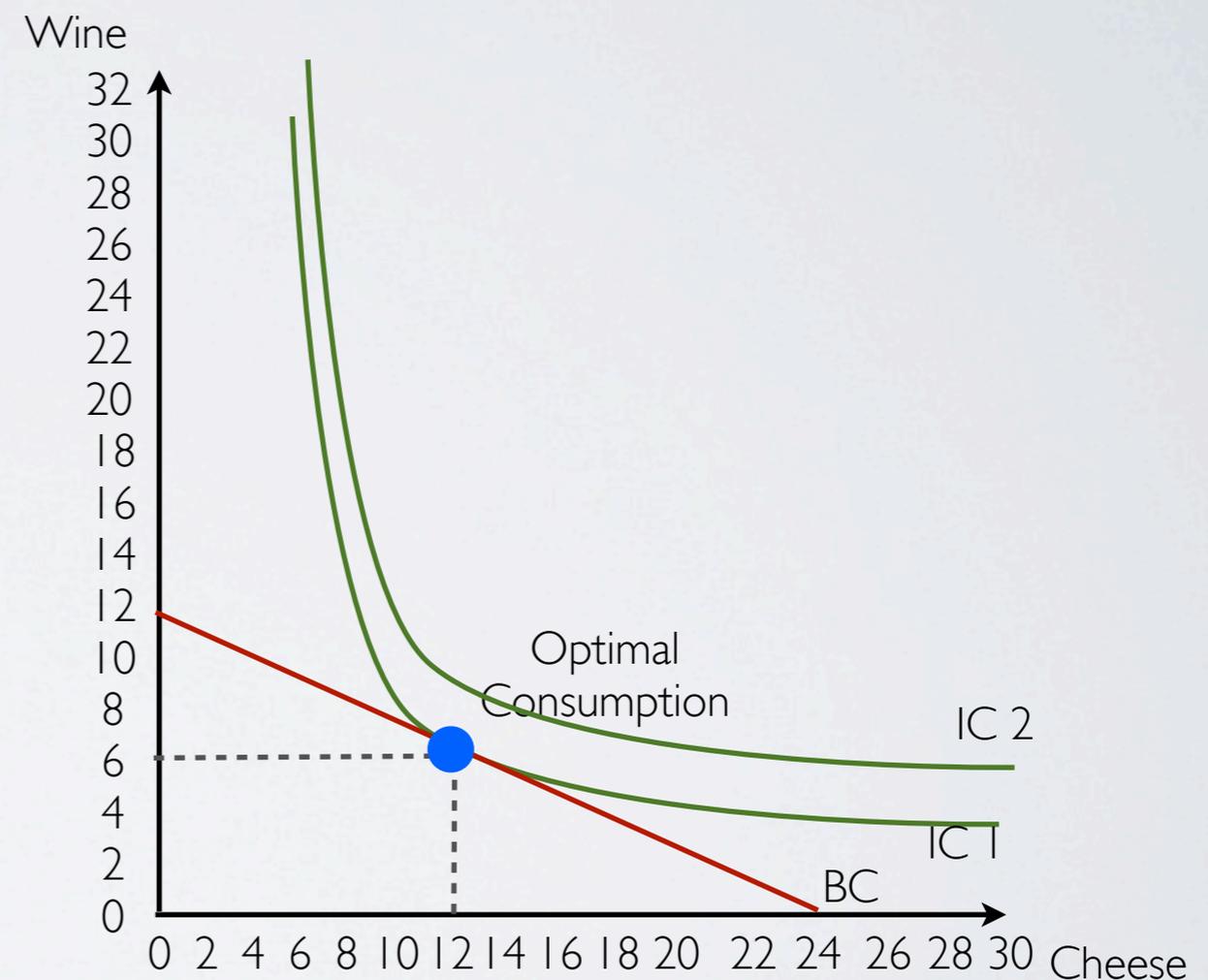
FOOD STAMP PROGRAM

- Suppose, President Obama's social welfare programs kick in for our poor Donald Trump
- The program offers Donald food stamps worth \$3 per cheese wheel
- Let's assume Donald's income is \$24 again, cheese price is \$4 and wine price is \$2
- The food stamp effectively let's Donald buy cheese for \$1

FOOD STAMP

- So the food stamp affects Donald's budget constraint by lowering effective price of cheese to \$1
- So Donald will choose to consume 6 wine and 12 cheese with this food stamp program
- You can check his demand for cheese has increased (since lecture 16)
- But this program costs the government \$3 per unit of cheese = \$36

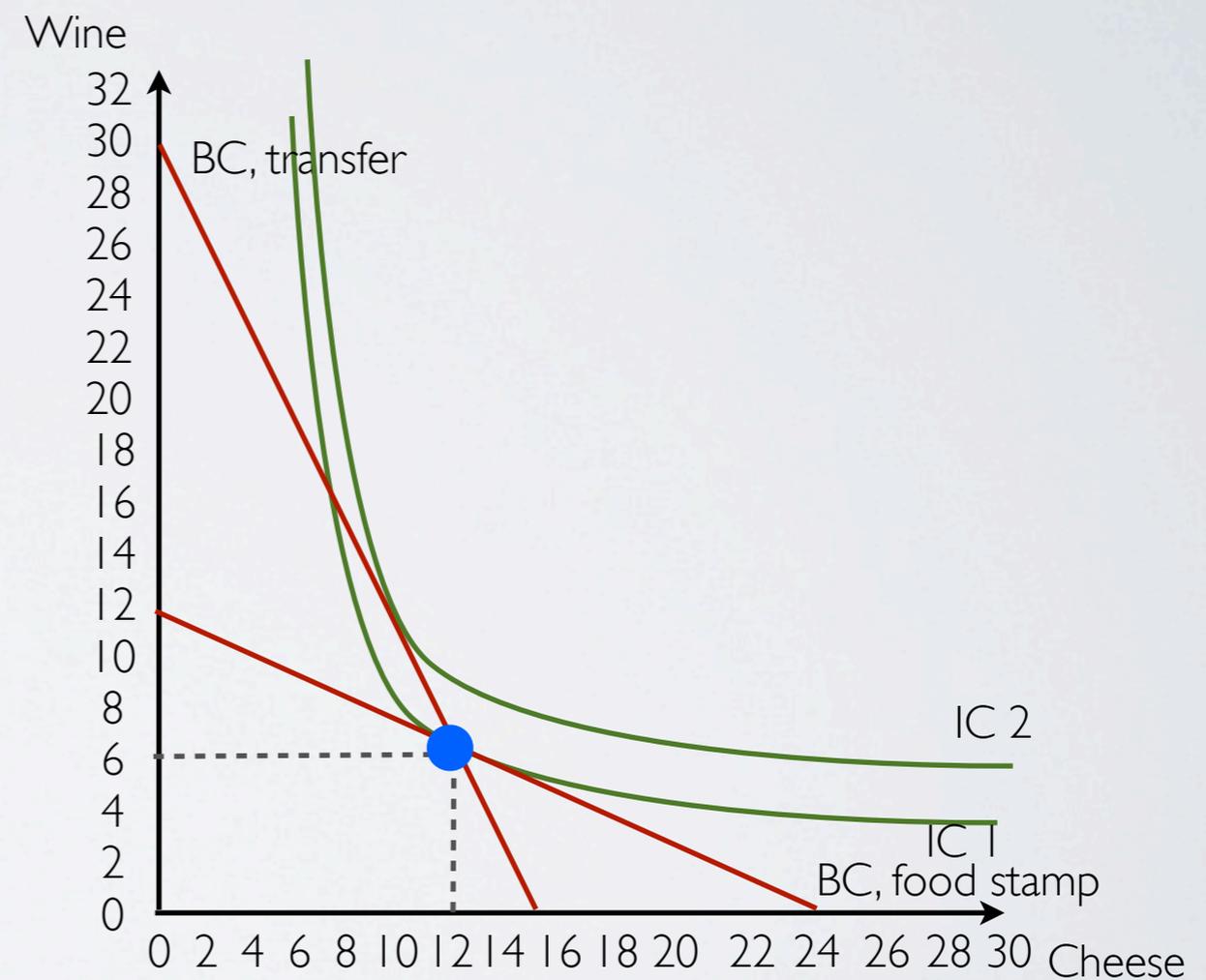
Donald's Consumption



WELFARE CHECK

- Instead the government decides to just give Donald the \$36 straight off the bat
- This is called a **lump sum** transfer - the quantity of money he receives is unrelated to any decision he makes
- Budget constraint changes again with $I = \$60$, wine price = \$2, cheese price = \$4

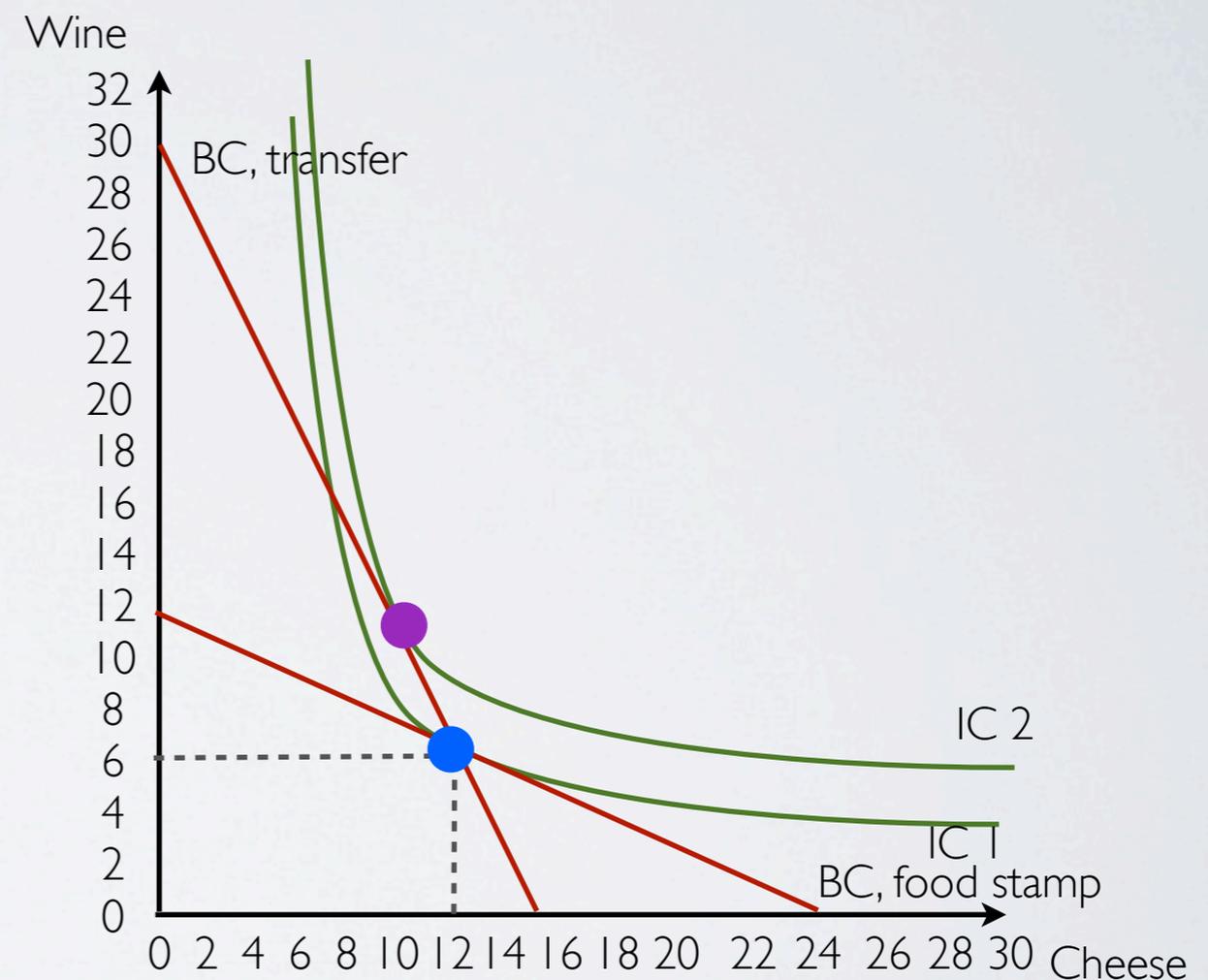
Donald's Consumption



WELFARE CHECK

- Notice that the new budget constraint goes through his optimal choice with the food stamp
- So Donald *could* choose the blue dot (the food stamp bundle)
- But the purple dot is affordable now and gives him higher utility
- So the lump sum transfer makes him better off than with the food stamps and the government is just as well off either way: **Pareto improvement**

Donald's Consumption



SUBSIDY INEFFICIENCIES

- That we can have a Pareto improvement over the subsidy, shows it must have been *inefficient* (just like we saw in MacLand)
- In fact, consider the following two policies, like we did with Donald
 - Tax (subsidize) a product
 - Lump sum tax (lump sum transfer) an amount so the person can just afford to buy the optimal good under the first policy
- This type of lump sum tax always ensures optimal consumption under my product tax is affordable so I can at least be as happy as that **or better**
- A lump sum tax (transfer) *will always* (in this course) leave a person at least as well off or better off than with a product tax (subsidy)
- Why don't we just use lump sum taxes then?

IN REALITY DIFFICULTIES

- How much should I be transferring to every person and to whom?
 - No idea
 - Very complicated economic models deal with this question
 - So why not offer homeless shelters rather than cash since it is too hard to distribute “correctly”
- Maybe the government wants Donald spending tax money in a particular way, like on food rather than booze so will prefer to use a cheese subsidy
- It all depends on what we want to achieve through our tax program (progressive taxes on income, for example, are usually not efficient but help with equality)

RATIONAL CHOICE THEORY

- The idea that humans act in a rational way to solve problems and make decisions (not necessarily about what type of cheese, wine bundle to buy..) is useful in many fields
- In sociology, for example, in which we might examine criminal behavior, it is called **rational choice theory**
 - Rational choice theory can also be applied to our family decisions (kids, marriage, divorce) -- some economists do work on this actually
 - In political science might be applied to how people vote or whether people vote
 - In international relations, it might be (loosely) applied to how countries act

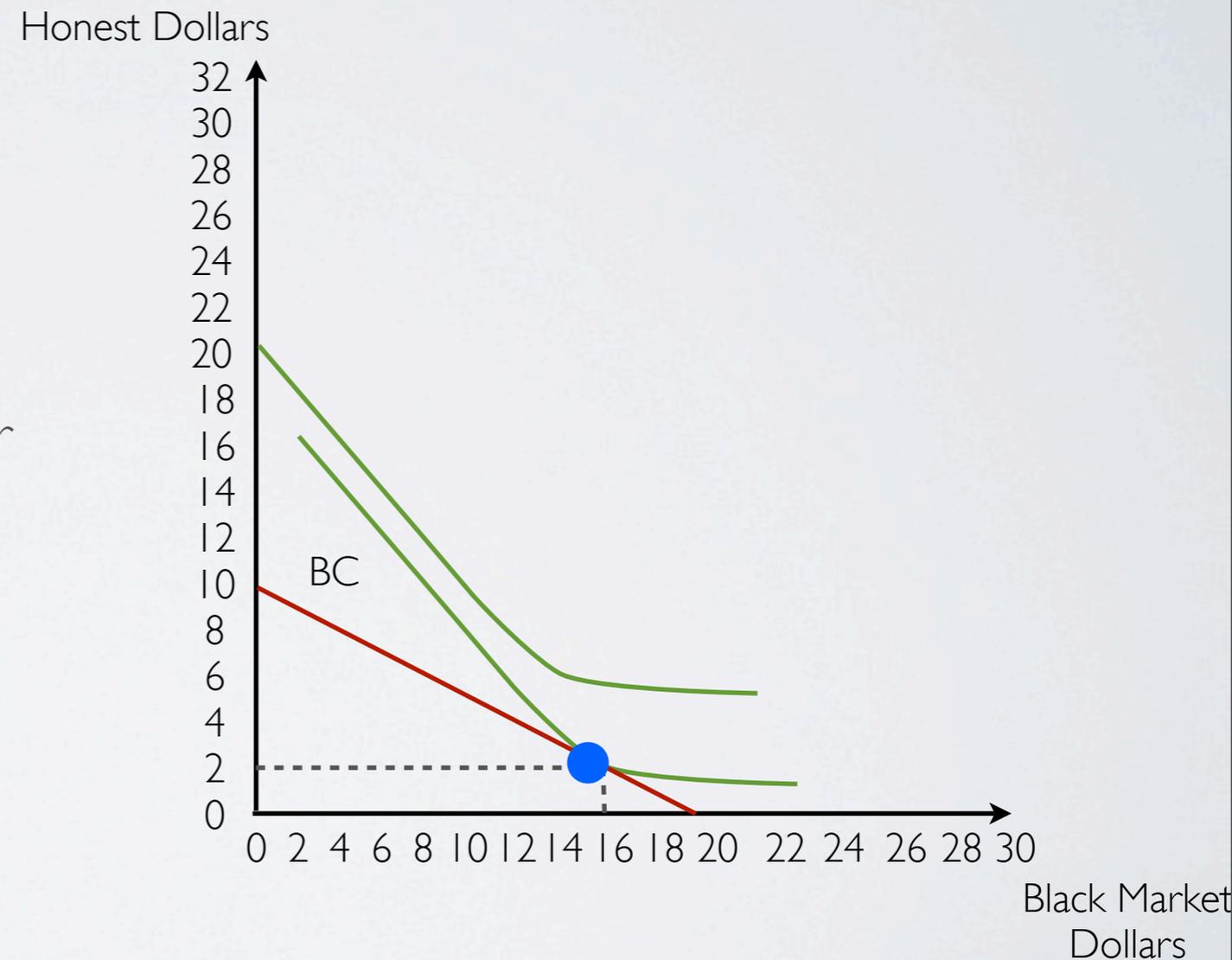
CRIMINOLOGY

- Let's consider the case of Donald Trump, who is now considering turning to a life of crime
 - Donald can work 10 hours a day and earn \$1 / hour
 - Or he could do some dishonest work (selling drugs, giving hair styling advice and calling it credible) at \$2 / hour
- We can think of these as two different "goods"
 - Honest dollars earned comes at the honest wage \$1/hr
 - Illegal dollars earned comes at the black market wage \$2/hr
 - There is no income here, just his limited resource time to work 10 hours

CRIMINOLOGY

Donald's Working Decisions

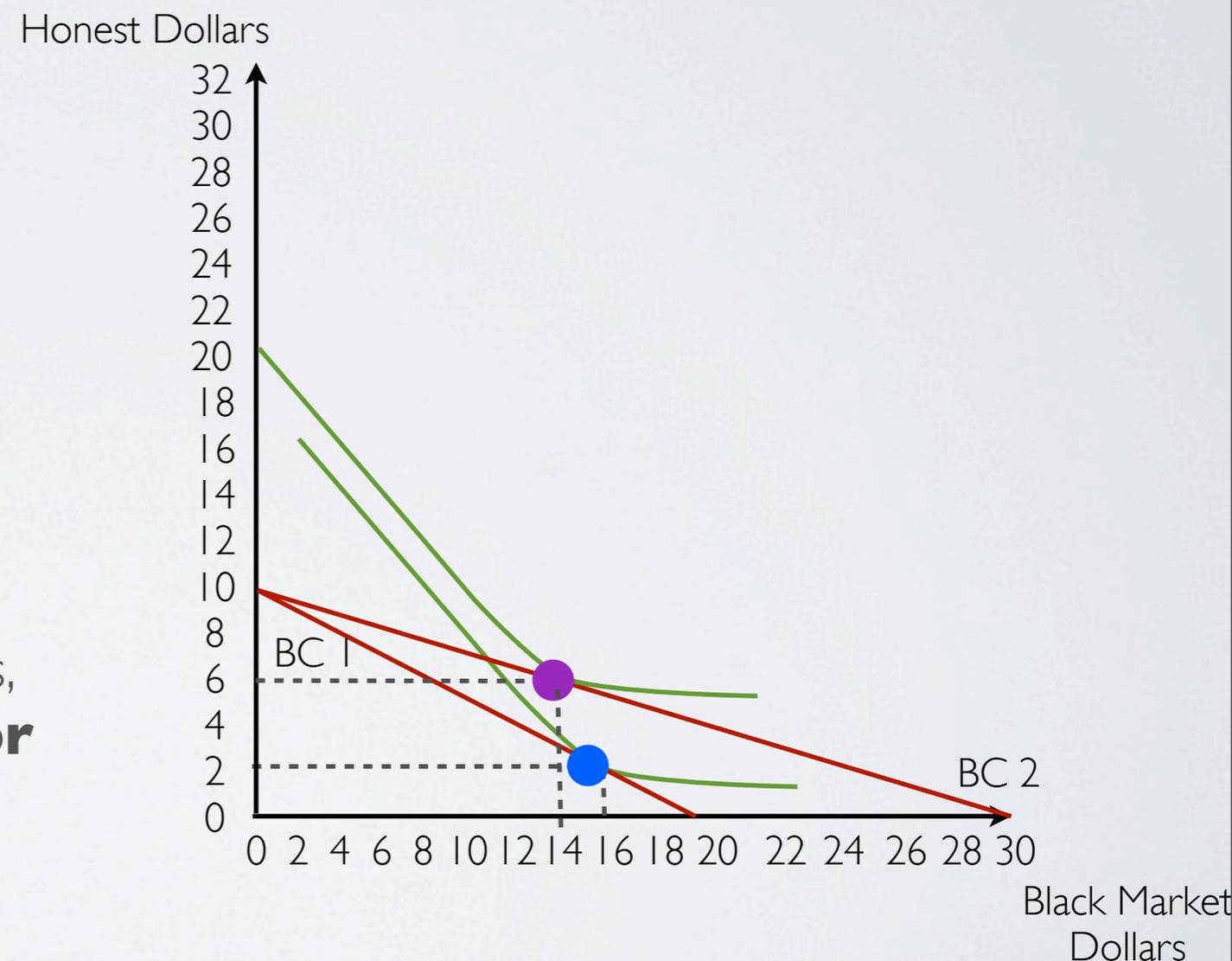
- We can plot the budget constraint:
 - Working only honest hours yields \$10
 - Working only illegal yields \$20
- “Optimal consumption” tells us how much honest money and dishonest money is best for Donald
- We can also figure out hours spent at his honest job (which is that...) and hours at his dishonest job
- So he works 8 hours at his dishonest job and makes \$16 (2 hours at his honest and makes \$2)



SUBSTITUTION AND INCOME

- What if he gets a raise at his drug pedaling job and makes \$3 / hour?
- We can see time spent working at his dishonest job falls (~5 hours down from 8)
- But the substitution effect suggest he would increase the amount of time spent at dishonest work
- It must be that the income effect dominates, that is dishonest work money is an **inferior good**
- So with higher wealth, he decreases the amount of his dishonest work

Donald's Working Decisions



EXTENSIONS

- The key is his utility, and we might expect
 - He gets disutility (unhappiness) from doing something illegal
 - Takes into account expected cost of getting arrested or getting killed from dishonest work
- Models by sociologists, economists, political economists can all be very rich and based on this simple idea that people are rational and make decisions to maximize their livelihood
- The interesting question is what do we mean by maximize livelihood

SUMMARY

- In general lump sum taxes are efficient while price-distorting taxes are inefficient
- In the simple 2 good case, we saw directly how lump sum taxes improve consumer welfare
- Rational choice theory can and has been extended to many areas to develop a richer understanding of how and why people make decisions

TOPIC 16

Monopolies

BIG PICTURE

- What differentiates a monopoly from a perfectly competitive firm? And so...
- How is the marginal revenue of a monopolist calculated?
- What is the profit maximizing condition for a monopoly?
- What are the welfare impacts of a market with a monopoly instead of perfectly competitive firms?
- Under what circumstances does a natural monopoly arise?
- How does our analysis change when a monopolist can price discriminate?

MONOPOLY BASICS



THE WINDOWS PROBLEM

- So far we have assumed that firms are perfectly competitive, that is they are so small they cannot affect price
- Why did firms like Microsoft draw the attention of the Justice Department because of “anti-competitive” market activity?
- Reality is that we do not live in a world with perfect competition (nor only monopolies)
- Monopolies depict the opposite extreme of a firm with no market power (no effect on price)
- Monopolies have total market control up to what consumer demand allows

SIMILARITIES / DIFFERENCES

- Similarities

- **Profit maximizers:** We assume monopolists and perfectly competitive firms both want to maximize profits
- The **profit maximizing quantity** is where $MC = MR$ (for competitive firms we said $P = MC$)

- Differences

- Competitive firms take price as given so price stays the same as quantity sold changes (and so $MR = P$)
- The monopolist can **set prices or quantities;** generally *price will fall with quantity sold* (will see $MR < P$)

SIMPLE EXAMPLE: DONALD'S WIGS

- Suppose Donald is out to make it on his own again and starts a wig monopoly (no one else sells the unique stylings he offers)
- He can sell 1 wig for \$1.00 or 2 wigs for \$.50
 - Is the price at 2 wigs the marginal revenue?
 - Revenue for the first unit is \$1.00 (my revenue moves from \$0 to \$1)
 - Revenue for the second unit is only \$.50, so from the first to second wig my revenue does not increase
 - So marginal revenue = 0!

PERFECT COMPETITION PRICE

- Suppose Donald's firm has **constant returns to scale**, so $MC = ATC$ (see lecture 18)
- Assume demand has the form to the right
- In perfect competition?
 - Remember MC curve is the supply curve
 - So equilibrium price is 4 and quantity is 6



REVIEW: PROFIT MAXIMIZATION

- **Condition for profit maximization**

is set quantity so $MC = MR$

- Intuition comes by comparing cases when $MC < MR$ and $MR < MC$

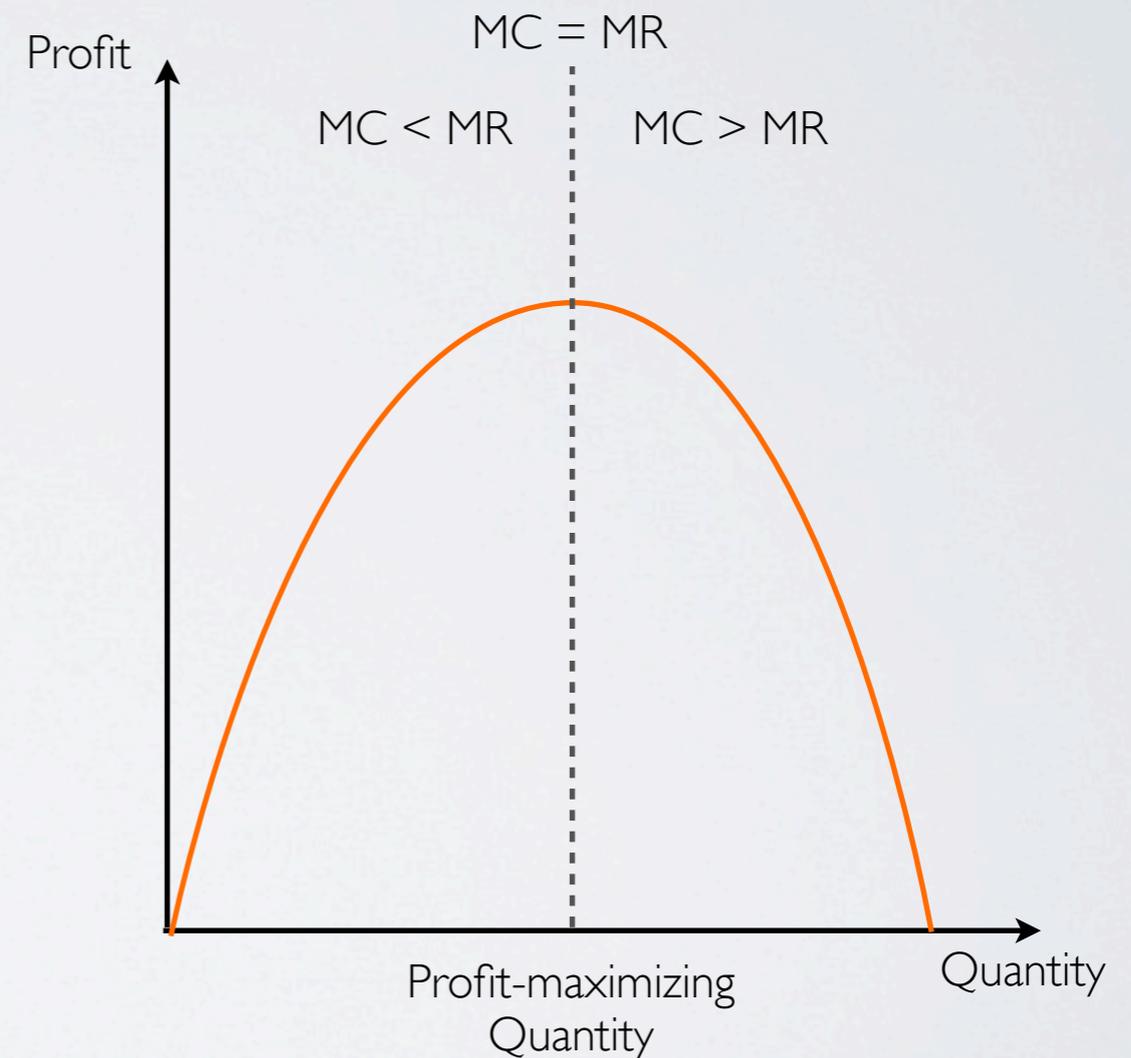
- $MC < MR$:

- Increase by production a bit, then my gain in revenue is high than the cost paid
- So total profit should increase

- $MC > MR$

- Decrease production a bit, then the amount I gain back from not producing (MC) is higher than amount I received from making (MR)

Theoretical Profit Curve



THE MONOPOLIST

- But Donald is a monopolist and maybe his profit maximizing price / quantity is not at $Q=6$ and $P=4$
- We need to figure out where $MR = MC$
- How can we find marginal revenue for a monopolist?



MARGINAL REVENUE

- For a given price, notice that I got the quantity demanded from the demand curve
- Since the monopoly is the only firm selling, all demand is supplied by this single firm
- Revenue is always just $P \cdot Q$ (value of all sales)

Q	P	Revenue
0	\$10	\$0
1	\$9	\$9
2	\$8	\$16
3	\$7	\$21
4	\$6	\$24
5	\$5	\$25
6	\$4	\$24
7	\$3	\$21
8	\$2	\$16
9	\$1	\$9

REVIEW: CALCULATING MARGINAL REVENUE

- Similar to how we calculated marginal cost last week
- **Example: To find the MR at 1 we need to use a midpoint formula**
 - E.g. MR at 1 is the midpoint of the MR between $Q=0$ and $Q=1$ (\$9) and MR between $Q=1$ and $Q=2$ (\$7)
 - MR at 1 is then \$8
- Notice that marginal revenue is *declining* after we produce enough

Q	P	Revenue	MR
0	\$10	\$0	--
1	\$9	\$9	\$8
2	\$8	\$16	\$6
3	\$7	\$21	\$4
4	\$6	\$24	\$2
5	\$5	\$25	\$0
6	\$4	\$24	-\$2
7	\$3	\$21	-\$4
8	\$2	\$16	-\$6
9	\$1	\$9	-\$8

MARGINAL REVENUE TRICK

- When demand is linear (and it will always be for us), there is an easy way to calculate marginal revenue
- Vertical intercept is the same and horizontal intercept is half of the demand horizontal intercept
- There is a mathematical reason for this (next slide) unnecessary for our course



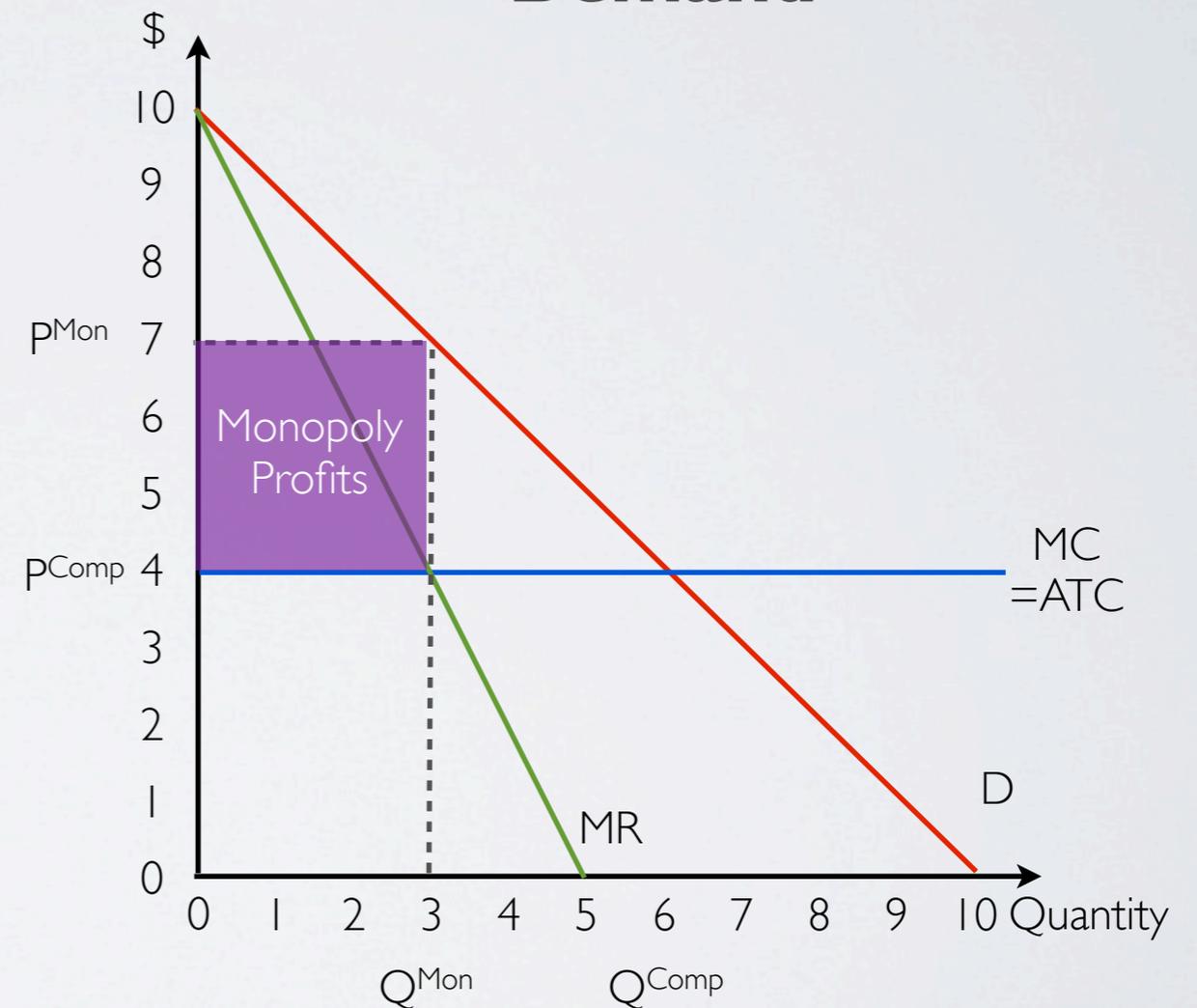
MARGINAL REVENUE CALCULATION

- Recall that $\text{Revenue} = P * Q$
 - We can find a formula for the **inverse demand function**, which tells us at a given quantity demanded what is the price that yields that demand
 - Here $P = 10 - Q$
 - So we can replace P with $10 - Q$ in the monopolist's revenue equation
- Revenue = $P * Q$, then $\text{Revenue} = (10 - Q) * Q = 10Q - Q^2$
- Marginal revenue is the slope of the revenue function (again do not worry about deriving this), i.e. $MR = 10 - 2Q$

OPTIMAL PRODUCTION

- Remember the optimal production (profit maximizing production) is the quantity that guarantees $MR = MC$
- So the monopolist will produce 3 units
- To find price, we need to use the demand curve to figure out what the price must be for quantity demanded to be 3
- So price = \$7
- Recall $\text{Profit} = Q*(P-ATC) = 3*(7-4) = \9

Donald's Wigs Costs and Demand



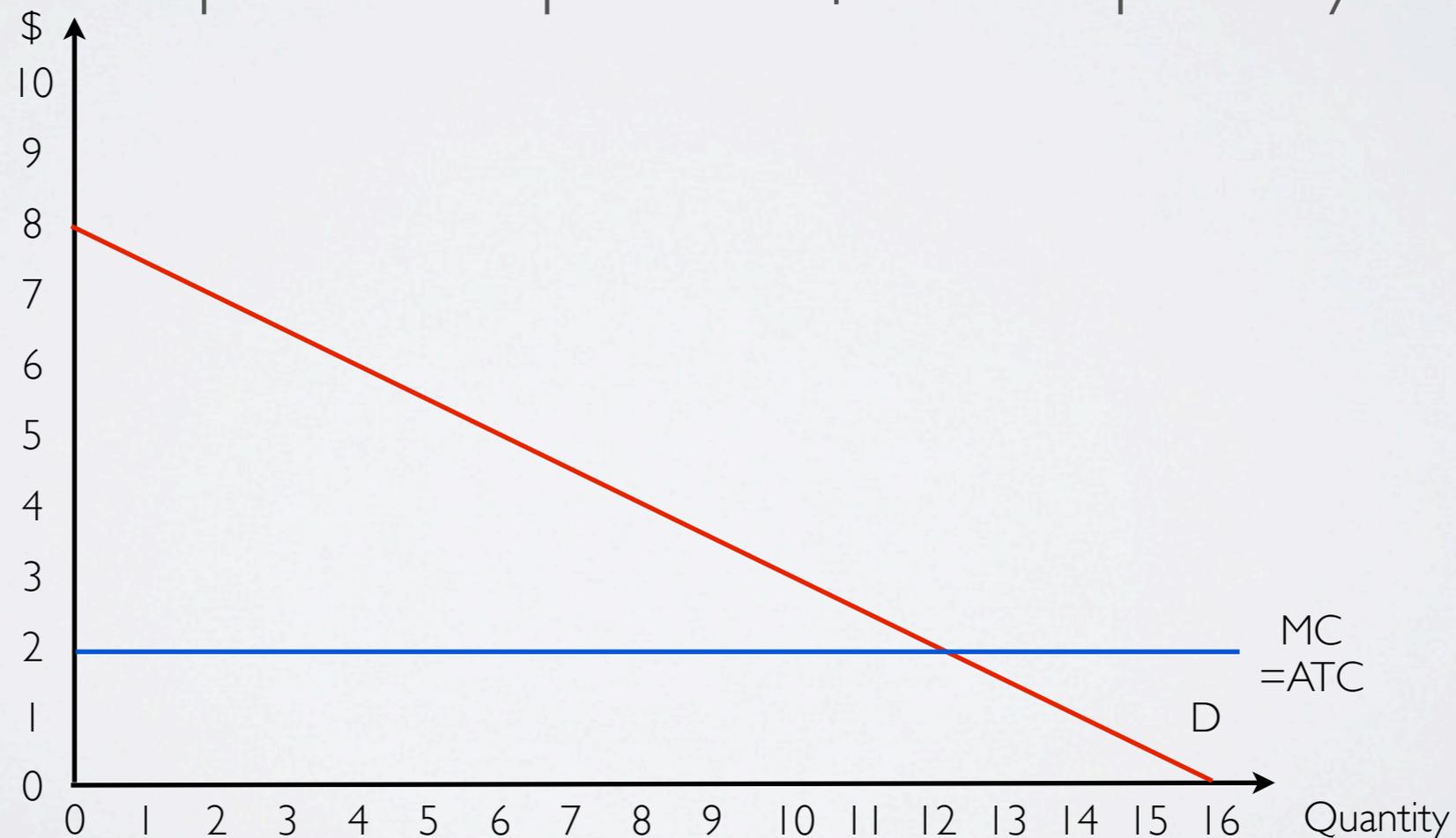
PROFIT MAXIMIZATION

- We can check that $Q = 3$ is indeed the profit maximizing quantity by checking profit at other quantities
- Because there are no fixed costs and MC is constant, total cost is just quantity * MC (lecture 18)
- Note that any quantity other than 3 yields a profit lower than \$9

Q	P	Revenue	TC	Profit
1	\$9	\$9	\$4	\$5
2	\$8	\$16	\$8	\$8
3	\$7	\$21	\$12	\$9
4	\$6	\$24	\$16	\$8
5	\$5	\$25	\$20	\$5

SELF CHECK

- Suppose that this firm has constant marginal cost $MC = 2$
- Check that the equilibrium price is \$5 and quantity is 6 units



THE “MONOPOLY TAX”

- Back to Donald, notice how the monopoly price is three dollars than the competitive price
- This difference is a **wedge** between demand and the competitive supply curve (recall $MC = \text{Supply}$ in a perfectly competitive market)
- So having a monopoly is just like having a tax, in this case a \$3 tax
- Unlike a tax, though, the monopolist gets the revenue
- In a perfectly competitive world and a \$3 tax, the purple box would go to government



WELFARE IMPACT

- Because the monopolist is imposing a “tax” we would expect total surplus to be *lower* than in the perfectly competitive market
- Note the monopoly causes a huge loss in consumer surplus (makes sense: lower quantity, higher cost)

	Competitive	Monopolist	Change
Q	6	3	-3
P	\$4	\$7	+3
CS	18	4.5	-13.5
PS	0	9	+9
TS	18	13.5	-4.5

WELFARE IMPACT

- What is the root of these losses?
 - Part of the CS loss in transfers to the monopolist called the **monopoly rent** (this is the purple box)
 - Part of the CS is lost to deadweight loss
- Why is the monopoly equilibrium inefficient?
 - Violation of condition 3 (go way back to find that): marginal benefit \neq marginal cost
 - Marginal cost at the quantity in equilibrium is 4, but marginal benefit is 7
- So because condition 3 is violated, the FWT does not hold when we have a monopoly (remember that “perfectly competitive market” was one of the assumptions of the theory)

RENT SEEKING BEHAVIOR

- Another cost imposed on society is **rent seeking behavior** - these are efforts taken by firms to secure a monopoly
 - E.g. Maybe Donald pays off a politician to grant him exclusive wig producing rights
- Rent seeking is partially contrast to profit maximizing; we typically associate rent seeking with firms trying to manipulate legal, political, economic institutions to keep out rivals
- Rent seeking behavior can cause more deadweight to loss by misallocating resources like time and money to lawyers, lobbying, etc. that adds no wealth to society

RENT SEEKING EXAMPLES

- The case of margarine
 - The invention of margarine in the late 1800s was a big problem for powerful dairy farmers
 - Dairy farmers lobbied to force margarine producers to color their product pink so no one would want to eat it...
- Real estate market: preventing entry of too many real estate agents
 - Why? 1) Higher chance of selling home, 2) Can charge higher commission on sale
 - Entry is prevented by control of the Multiple Listing Service (access to which is necessary to do any type of real estate transaction) by existing real estate brokers

NATURAL MONOPOLY



NATURAL MONOPOLY

- In some industries monopolies may not arise because of unfair competition or rent seeking, but because of peculiarities of the industry's costs
- Consider energy or (old) telephone companies
 - HUGE investment is needed in the infrastructure of telephone and power lines
 - These investments are large fixed costs required of firms in the industry
- The result will be that the large fixed costs curb new firms from entering the market, and we end up with one firm

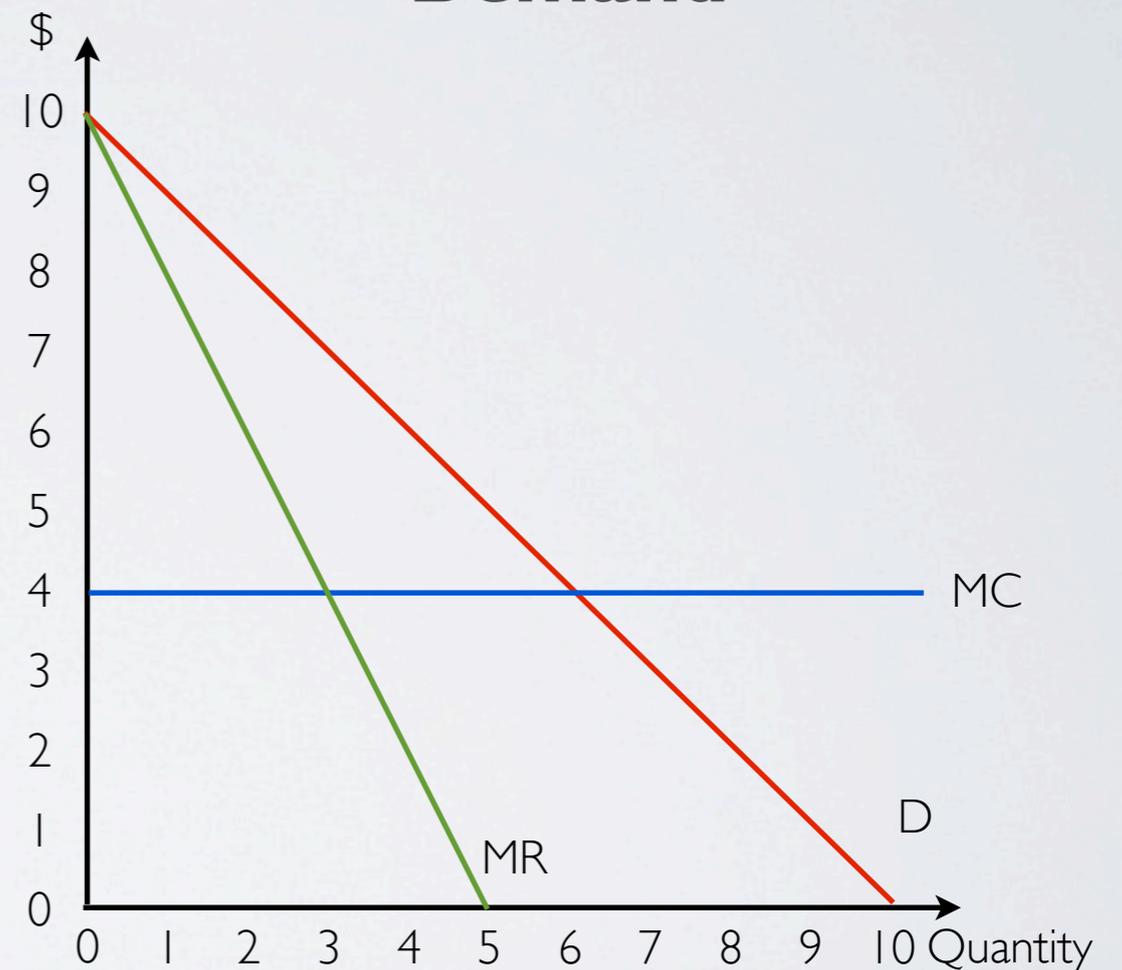
QUICK EXAMPLE

- Recall that as a monopoly, Donald's Wigs made \$9 in profit
- Suppose he has a \$6 fixed cost needed to license some hair replication technology, then his profits would fall to \$3
- Now suppose another firm considered entering the market to kill Donald's monopoly
 - She would also have to pay the \$6 fixed cost
 - Even if they act like a monopoly (believe this is the best they could possibly do) instead of compete, they only have \$9 in profit to share but have to then pay \$12 in fixed costs
- So Donald will be the "natural monopoly" for this wig industry

INTRODUCING FIXED COST

- To be more realistic, suppose Donald has branched out and is now providing sewage services to his town
 - There are high fixed costs in terms of installing the pipes, etc.; suppose $FC = \$6$
 - Let demand for his services be the same as in the wig industry and and keep marginal cost constant at \$4
- So far the picture hasn't changed; how has ATC changed?

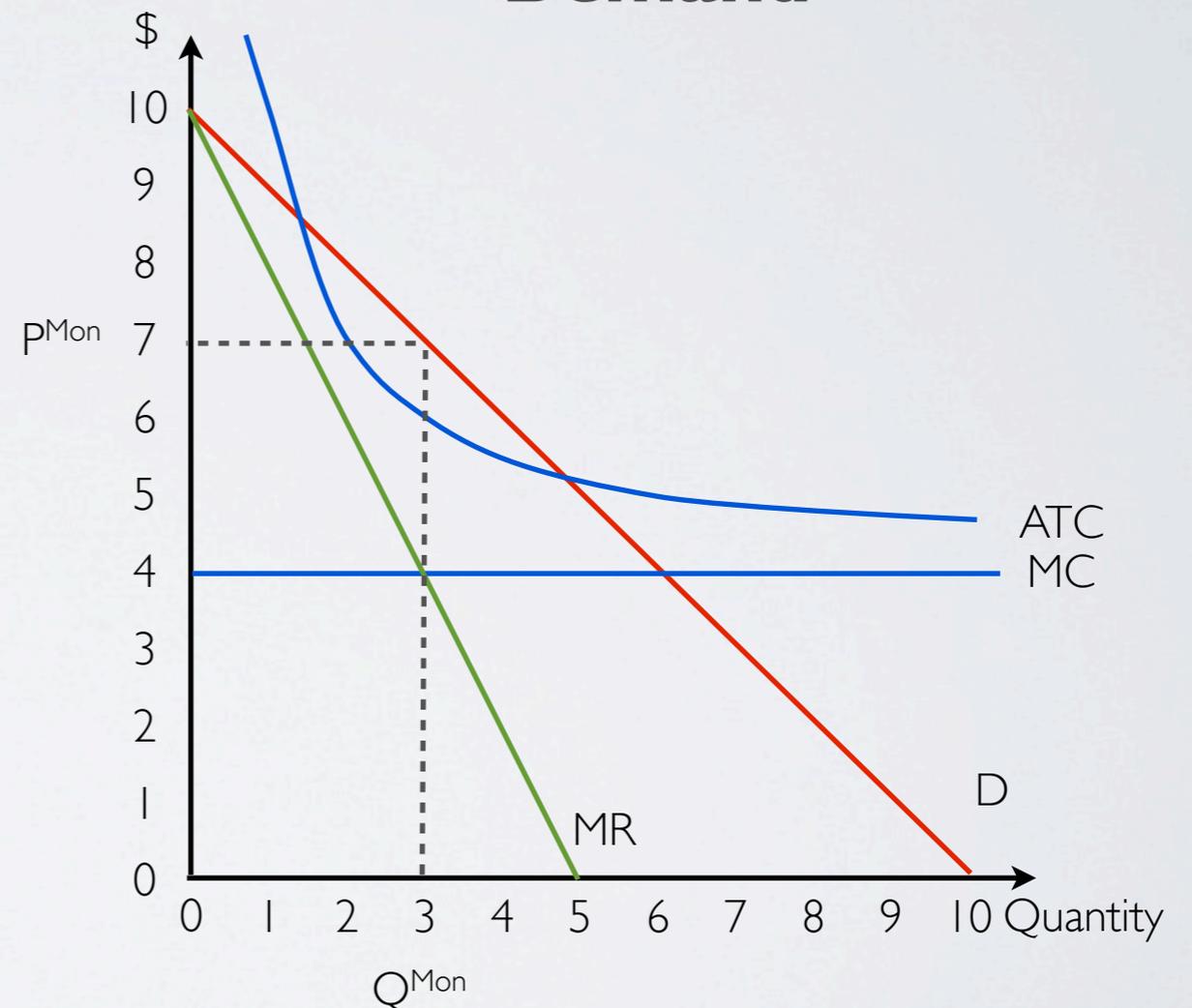
Donald's Sewage Costs and Demand



INTRODUCING FIXED COSTS

- Remember when MC is constant and there is a high fixed cost, the firm will experience **economies of scale** over its entire production (see Lecture 18)
- That is ATC is constantly falling
- Notice that the optimal production quantity has not changed here because marginal costs are the same as before
- **Provided Donald is producing,** the fixed cost is irrelevant in his production decision

Donald's Sewage Costs and Demand



CHECKING PROFIT MAXIMIZATION

- We can confirm that the profit maximizing quantity is indeed still 3 (if you don't believe me); but profit will be lower

Q	P	Revenue	FC=0		FC=6	
			Cost	Profit	Cost	Profit
1	\$9	\$9	\$4	\$5	\$10	-\$1
2	\$8	\$16	\$8	\$8	\$14	\$2
3	\$7	\$21	\$12	\$9	\$18	\$3
4	\$6	\$24	\$16	\$8	\$22	\$2
5	\$5	\$25	\$20	\$5	\$26	-\$1

PROFIT DIFFERENCE

- Graphically, we can again use the old formula $\text{Profit} = Q^*(P - \text{ATC})$
- The purple rectangle is now the profit of this firm
- The red rectangle is the profit Donald doesn't have compared to the regular case because of the introduction of this fixed cost

Donald's Sewage Costs and Demand

