

# ECO 182: Summer 2015

## Market II : Gains from trade

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August 3, 2015

## How do people gain from trading?

- ▶ Look at the graph for any market. Do you notice something peculiar about the price?
- ▶ The price is same for all the quantity sold. So if the quantity traded is 50 units and the equilibrium price is \$10 per unit, then every unit is sold for \$10.
- ▶ But we know from the Law of Diminishing Marginal Utility, the first unit of the good is worth more to a consumer than the second and so on.
- ▶ So in a way, the consumer is paying less than the MWP for some quantities.
- ▶ Similarly, for a upward sloping Supply curve, which shows increasing MC, the seller is getting more than MC for some units.
- ▶ This happens in PC and Monopoly and in other types of markets too !

## Consumer Surplus, Producer Surplus

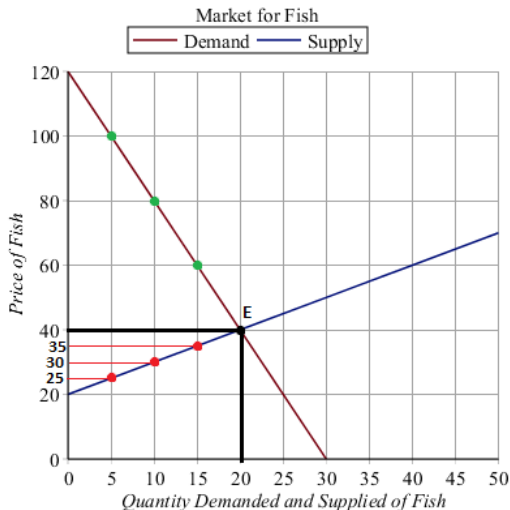
**Consumer Surplus:** This is the amount the consumer gains from trading in a market. Basically the extra MWP the consumer saves from buying an extra unit of a good.

*Total Consumer Surplus:* The sum of the CS for each unit of good the consumer buys.

**Producer Surplus:** This is the amount the producer gains from trading in a market. Basically the extra profit the producer makes from selling an extra unit of a good.

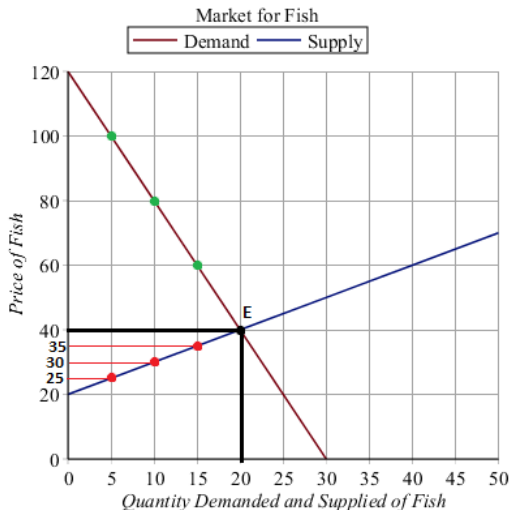
*Total Producer Surplus:* The sum of the PS for each unit of good the producer sells.

# Extra Consumer Surplus - Graph : Perfect Competition



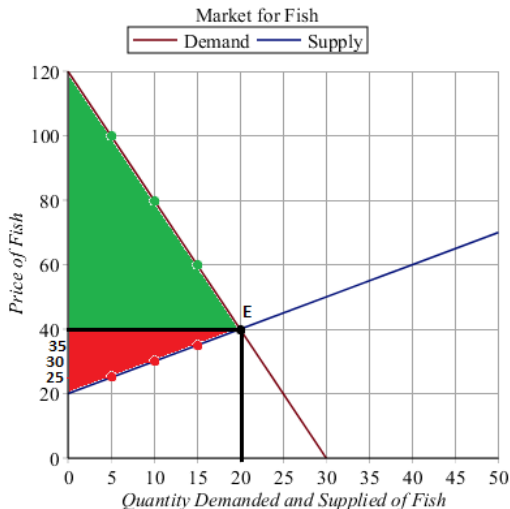
- ▶ For the 5<sup>th</sup> unit of output, the MWP for the consumer is \$100. But the price paid is \$40. The consumer gains  $\$100 - \$40 = \$60$ . \$60 is the *extra consumer surplus* the consumer gets for the 5<sup>th</sup> unit of output.
- ▶ Similarly for the 10<sup>th</sup> unit, the extra CS is \$40, and for the 15<sup>th</sup> unit is \$20.
- ▶ What is the extra CS for the 20<sup>th</sup> unit?

# Extra Producer Surplus - Graph: Perfect Competition



- ▶ For the 5<sup>th</sup> unit of output, the MC for the producer is \$25. But the price paid is \$40. The producer gains  $\$40 - \$25 = \$15$ . \$15 is the *extra producer surplus* the seller gets for the 5<sup>th</sup> unit of output.
- ▶ Similarly for the 10<sup>th</sup> unit, the extra PS is \$10, and for the 15<sup>th</sup> unit is \$5.
- ▶ What is the extra PS for the 20<sup>th</sup> unit?

# Total Consumer and Producer Surplus - Graph: Perfect Competition



- ▶ Add up the *extra* CS for all the traded units, and you get the Total CS. This is the green triangle. The value of TCS for this example is:

$$\frac{1}{2} \times \frac{\$(120-40)}{\text{unit}} \times 20 \text{ units} = \$800.$$

- ▶ Add up the *extra* PS for all the traded units, and you get the Total PS. This is the red triangle. The value of TPS for this example is:

$$\frac{1}{2} \times \frac{\$(40-20)}{\text{unit}} \times 20 \text{ units} = \$200.$$

## Consumer and Producer surplus: some details

- ▶ The TCS is bounded above by the demand curve and below by the equilibrium price.
- ▶ The TPS is bounded above by the equilibrium price and below by the supply curve. (For PC)
- ▶ For Monopoly, TPS is bounded above by equilibrium price , below by MC and to the right by the Monopoly quantity.
- ▶ You have already calculated the PS once before.
- ▶ The following example is from *Production & Cost*.
- ▶ Extra PS is the same as extra profit. TPS is Revenue - TVC. Be careful, if you have fixed costs. Always calculate TPS by adding up extra profit or PS for each unit.

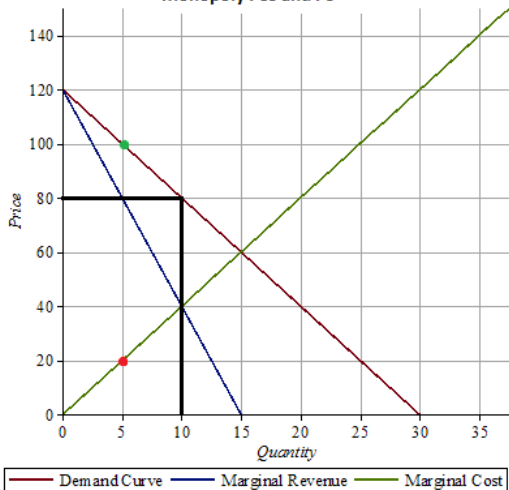
# Producer Surplus Calculation - Example: Perfect Competition

Output	Labour	MR(\$)	MC(\$)	TVC	AVC	Extra PS	TPS
1	1	15	3	3	3	12	12
2	3	15	6	9	4.5	9	21
3	5	15	6	15	5	9	30
4	7	15	6	21	5.25	9	39
5	9	15	6	27	5.4	9	48
6	13	15	12	39	6.5	3	51
7	17	15	12	51	7.2	3	54
8	22	15	15	66	8.25	0	54
9	29	15	21	87	9.67	-6	48
10	40	15	33	120	12	-18	30



# Consumer and Producer Surplus: Monopoly

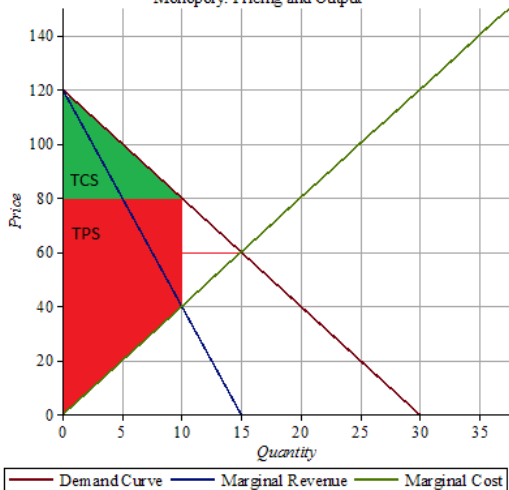
Monopoly : CS and PS



- ▶ The Monopolist's price and quantity supplied are \$ 80 and 10 units respectively.
- ▶ For the 5<sup>th</sup> unit the MC = \$20 and the MWP is \$100.
- ▶ Thus, for the 5<sup>th</sup> unit, the CS = \$100 - \$80 = \$20 and PS = \$80 - \$20 = \$60.

## TCS, TPS under Monopoly

Monopoly: Pricing and Output



- ▶ TCS is the green area: \$ 200.
- ▶ TPS is the red area: \$600.

## How to measure welfare?

Social welfare in economics is, loosely speaking, the measure of well-being of a society. Sounds imprecise? Maybe because your idea of what is good for the society is different from your friend's. Consequently, there are various (and by various, I mean a LOT) theories about how to measure welfare. Some of these theories are philosophical, some are mathematically abstract.

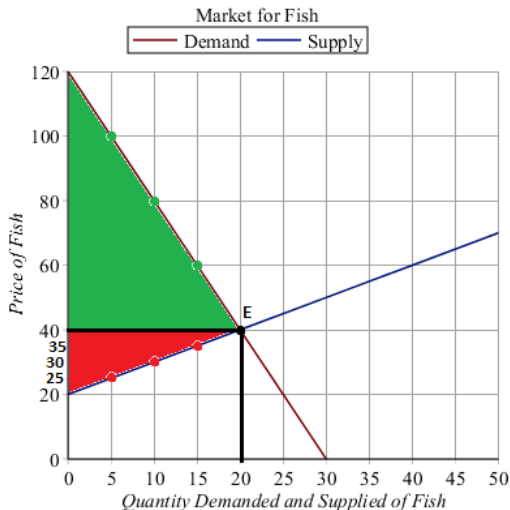
What we shall do, is calculate a popular measure of welfare in economics. The total gains from trading. Because through trading, people, as economic agents, gain (or lose) and this leads to their pay-off or income. The society's welfare, we shall consider, is the total gain of every economic agent in the society/market.

So let us assume, our market DD represents all consumers, and the SS represents all the firms. And we are under PC.

## Social Welfare

- ▶ Our concept of social welfare will involve the TPS and TCS.
- ▶  $\text{Welfare}(Q^T) = \text{TPS}(Q^T) + \text{TCS}(Q^T)$
- ▶ The reason why I put the  $Q^T$ , is to remind you, we calculate the TPS and TCS after we identify a quantity level that is traded in the market.
- ▶ So imagine yourself bargaining for an old laptop. You value it at \$200 and the seller's cost of producing it (like fixing, cleaning it, advertising etc.) is \$50. You strike the deal at \$150.
- ▶ Your TCS is \$50 and the seller's TPS is \$100.
- ▶  $\text{Welfare} = \$150 = \text{TCS} + \text{TPS}$
- ▶ The Welfare is the total *Gains from Trade*

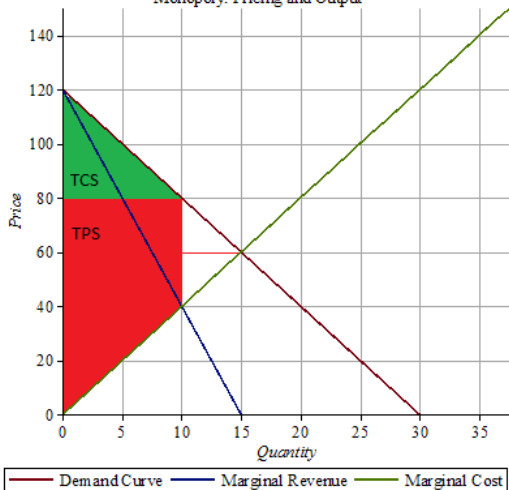
## Welfare: Perfect Competition



- ▶ The value of TCS is: \$800
- ▶ The value of TPS is: \$200
- ▶ Welfare = TPS + TCS = \$1000

## Welfare: Monopoly

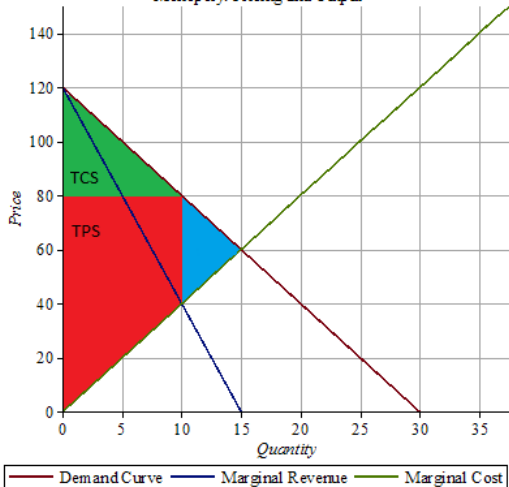
Monopoly: Pricing and Output



- ▶ TCS is the green area: \$ 200.
- ▶ TPS is the red area: \$600.
- ▶ Welfare = TCS + TPS = \$800.
- ▶ This type of market generates a loss in welfare, compared to the competitive case. Let's see how.

# Deadweight Loss

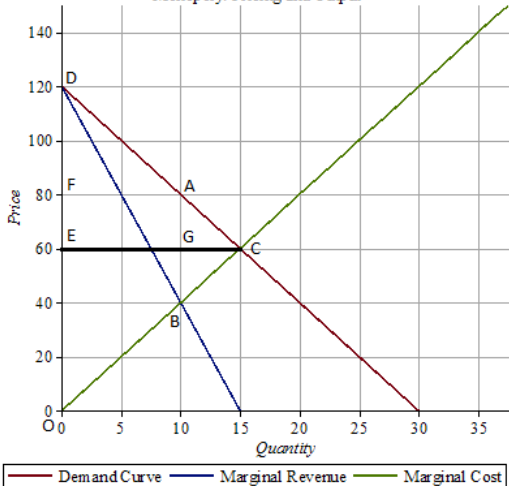
Monopoly: Pricing and Output



- ▶ If this market had PC, the Equilibrium price would be \$60 and quantity traded would be 15 units.
- ▶ But now, quantities 11 to 15 are not traded under monopoly.
- ▶ So gains from trade associated with those amounts are no longer available to the buyer and the seller.
- ▶ This creates a loss in welfare, something called **Deadweight Loss**. That is the area in blue.
- ▶  $DWL = \$100$ .

## Loss in surplus under Monopoly

Monopoly: Pricing and Output



- ▶ TCS under Perfect Competition (**DEC**): \$450.
- ▶ TPS under Perfect Competition (**ECO**): \$450
- ▶  $Welfare_{PC}$  (**DCO**) = \$900
- ▶ TCS under Monopoly (**DFA**): \$200.
- ▶ TPS under Monopoly (**FOBA**): \$600.
- ▶  $Welfare_{Monopoly}$  (**OBAD**) = \$800
- ▶  $Welfare_{PC} = \$900 = Welfare_{Monopoly} + DWL = \$800 + \$100$



# Monopoly vs Perfect Competition

So, which one do you think is better?

# Allocation

- ▶ A distribution of resources or goods between economic agents is called an **allocation**. Allocations must be *feasible*, i.e. you can't allocate more than what is available.
- ▶ Example 1: You and your friend order a pizza for dinner. There are 11 slices. You agree to divide the pizza(your share, friend's share) as A: (5 slices, 6 slices). You could also have decided B: (2 slices, 6 slices). Both A and B are allocations.
- ▶ Finland produces 1 million pounds of turkey meat and 2 million units of cellular phones by using all their resources. You can call 1 million lb. turkey meat and 2 million units of phones as the allocation of production between the meat industry and technology industry.

## Allocation...continued

- ▶ Australia finds that 40% of their labor force works in the seafood industry and the remaining in the mining industry. That is an allocation of labor force.
- ▶ Allocations can be due to the market forces i.e. through Demand and Supply only; it could be due to an authority i.e. Government deciding pension levels for different demographics; or it could be a combination of both i.e. Production and sale in tech industry with different import quota on raw materials for different type of firms.
- ▶ The production of a perfectly competitive equilibrium.  $P = MC$  at the equilibrium. The market is buying and selling all units its agents want. The quantity traded in Perfect competition can be called an allocation of consumption for buyers or allocation of production for firms.

# Pareto

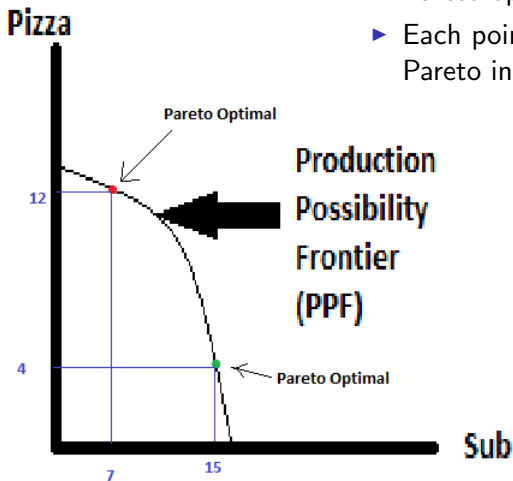
- ▶ Vilfredo Pareto devised a method of finding out if an economic outcome/allocation is efficient. His rule is referred to as *Pareto Optimality* or *Pareto Efficiency*.
- ▶ An allocation is Pareto Efficient if there exists no other allocation which makes everybody better off. In other words, if you are in a Pareto Efficient allocation, then you cannot make somebody better off without making someone else worse off.
- ▶ Consider the example of you and your friend sharing the pizza. Both of you like pizza, and none of you have a negative MU till 20 slices of pizza. Currently you have 3 slices and your friend has 8. If you get one extra slice of pizza, then your friend must give up a slice for you. Your utility goes up, your friend's utility falls. The allocation (3,8) is Pareto Optimal or Efficient.

## Identifying a Pareto Optimal allocation/outcome

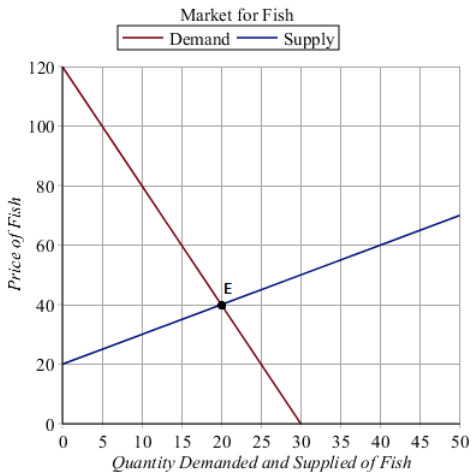
- ▶ For allocation of a good between two people the rule is quite simple. Consider two agents discussion how to share 100 units of a good. Suppose an allocation is agent A gets X units and agent B gets Y units, and  $X+Y = 100$ . Then the allocation (X,Y) is Pareto optimal if  $MU_A(X \text{ units}) = MU_B(Y \text{ units})$ .
- ▶ Example: For the pizza sharing example, Your  $MU(3 \text{ slices}) =$  Your friend's  $MU(8 \text{ slices})$ .
- ▶ For other allocations the pareto condition is slightly different and complicated. So we will restrict our analysis to graphs.

## Pareto and PPF

- ▶ Each point on the PPF is Pareto optimal or efficient.
- ▶ Each point inside the PPF is Pareto inefficient

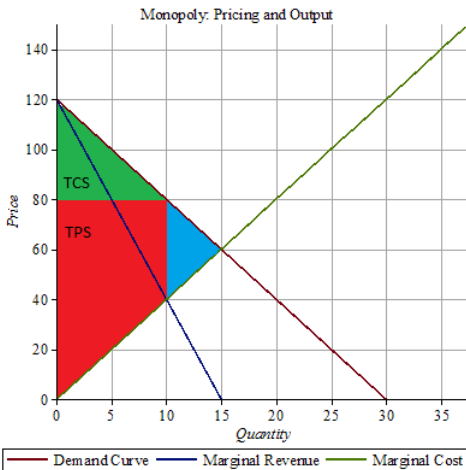


# Pareto and Perfect Competition



- ▶ The Perfect Competition Equilibrium is Pareto Efficient.
- ▶ For any unit of output, the sum of the CS and PS for that unit is the gain from trading that unit.
- ▶ Remember the Welfare = Total Surplus = Total gains from trade = TCS + TPS ?
- ▶ Every unit of output that offers a gain from trading is being traded at PC equilibrium.
- ▶ You cannot generate any more gains from trading.

# Pareto and Monopoly



- ▶ The Monopoly outcome is inefficient.
- ▶ Some units that generate positive gains from trade are not traded. Resources are not fully utilized.
- ▶ As you can see, the monopoly market has a deadweight loss.
- ▶ The monopoly market has a lower welfare compared to Perfect competition.



## Concluding Remarks

- ▶ There are various ways to measure Welfare.
- ▶ The Pareto Optimality however tells you what is the most efficient allocation/outcome.
- ▶ Even if you disagree on the measure of welfare used, it is hard to argue against the merits of the Pareto outcome.
- ▶ Remember, for a market, at the equilibrium quantity traded, if  $\text{Equilibrium } P > MC$ , then the outcome is not efficient.
- ▶ For PC markets, the excess demand/supply situation resolves to equilibrium, to the efficient outcome, on its own, by interactions between the buyers and sellers.
- ▶ Left to itself, the Monopolist has no profit incentive to produce the efficient level.