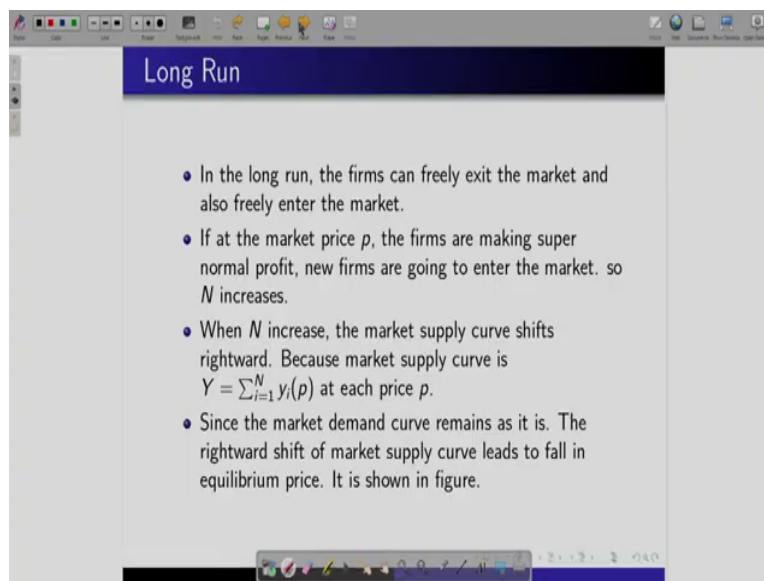**Introduction to Market Structure**
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Module 3: Perfectly Competitive Markets
Lecture 11
Long run market price and Pareto optimality

Hello, welcome to this course Introduction to Market Structures.
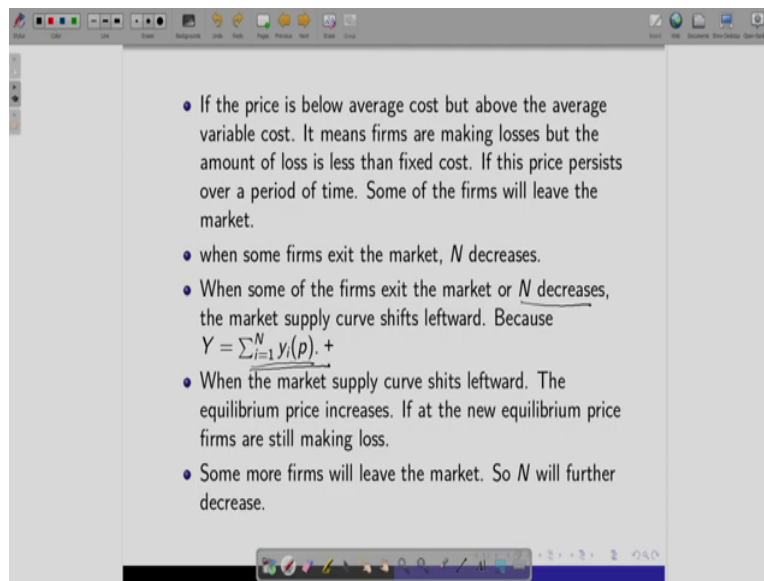
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Today we will first do the long run thing in a Perfectly Competitive Market. So in the long run the firms can freely enter and, freely exit the market and freely enter the market. What does this mean? It means that if I want to enter the market then I do not have to pay anything or I do not have to bear any extra cost and if I want to exit this market I do not bear any extra cost, okay. Now when the firms are making super normal profit, super normal profit that means the profit is a positive profit then the firms are going to enter, new firms are going to enter.

And the moment new firms are going to enter what is going to happen? This N that is the total number of firms present in the market it is going to increase and we know that this N determines the location of the market supply curve. So, now as this increases what it means? This is- $Y = \Sigma_{i=1}^{N} y_i(p)$ going to increase because it is sum over N, now we are having more N, so market supply curve is going to shift rightward, okay. Now what happens? So market

supply is shifting rightward and the demand curve is same, so it is going to, so the equilibrium price is going to fall and we will show this in a diagram.

- If the price is below average cost but above the average variable cost. It means firms are making losses but the amount of loss is less than fixed cost. If this price persists over a period of time. Some of the firms will leave the market.
- when some firms exit the market, N decreases.
- When some of the firms exit the market or N decreases, the market supply curve shifts leftward. Because $Y = \sum_{i=1}^{N} y_i(p)$. +
- When the market supply curve shits leftward. The equilibrium price increases. If at the new equilibrium price firms are still making loss.
- Some more firms will leave the market. So N will further decrease.

Next, so as the equilibrium price falls what happens, so super normal profit goes down, but still if the firms are still earning some super normal profit then what is going to happen? Then some more firms are going to enter and this will continue. So, it may happen that the number of firms has increased so many that the price has fallen by a very big margin and so the firms have started making losses and once they start making loss, so what it means?

So there are now huge number of firm and they are making losses. So, if the same firm, number of firms stays in the market then they are going to continuously make loss, so some of these firms are going to leave the market and once the firms start leaving the market what is going to happen? This supply curve will shift leftward and given the same demand curve, if supply curve shifts leftward then what is going to happen?

The market equilibrium price is going to rise and the moment the equilibrium price rises what happens, the firms are now, either they are going to make less loss or they are again going to make some profit. And if there is a and when they are going to make some positive profit that is super normal profit then again there is going to be an entry of firms and so again the N increases and again the supply curve shifts rightward.

And moment if the entry of the new firm is so much that the price has fallen by such a margin that again the firms have started making losses, then what will happen? After sometimes some of these firms will leave this market and moment they leave what happen, N decreases

and as N decreases this supply curve, market supply curve shifts again leftward and then again equilibrium price may rise, will always rise.

And this process will continue and it will halt or it will stop at that point where the price is such that the firms are making normal profit or that is 0 profit and at that price the price is always equal to average cost.

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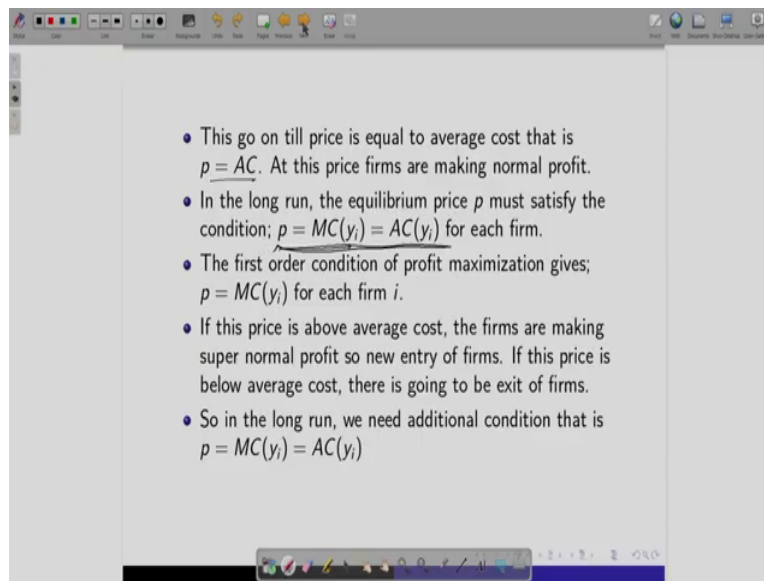
So, for this, in this market we see for the long run equilibrium price should always be equal to average cost and from the profit maximizing condition we know price is equal to marginal cost, so we get this condition- $p = MC(y_i) = AC(y_i)$ for the equilibrium point, okay. So, price should always be equal to marginal cost and marginal cost should be equal to average cost, for in that situation there is not going to be any entry or any exit of firms and so this is the long run equilibrium point, okay and now we show it through the diagrams.

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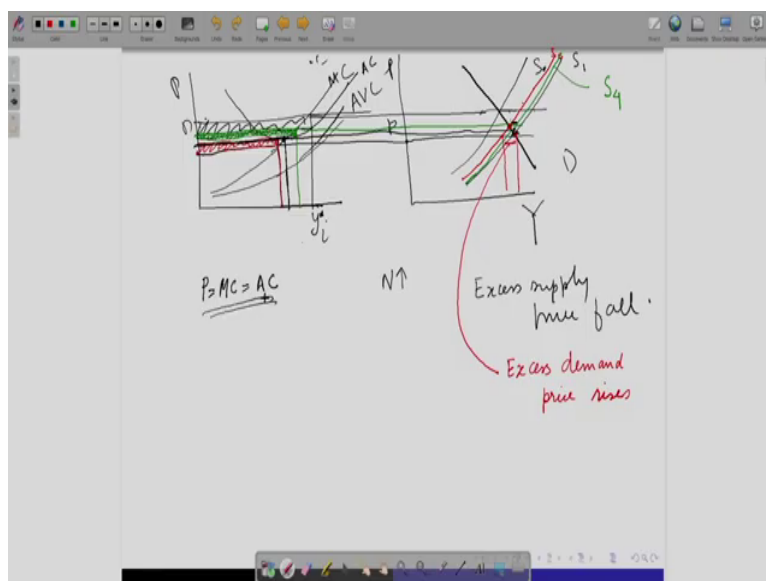
So, what happen this is the output of any firm I and we assume that the firms are suppose similar. This is the marginal cost, so average variable cost and so this is the average cost, okay. This is market outcome, price, suppose the, this is the market demand, this is the market supply, okay and this is the present equilibrium, this is the optimal output of each firm and this is the margin, oh sorry, okay, there is a problem in this diagram.

I have done the average cost curve in the wrong way, this is going to be the average cost curve and this is the optimal, so this is the AC, okay because it intersects the MC at the minimum average cost, so this amount is the, so this amount is the optimal output of each firm and this is the average cost, so this rectangle is the profit, right? because this average cost into quantity, average cost height into quantity, total cost this is the total quantity into price, total revenue.

So, the profit is this, so there is a positive profit, so there is going to be entry of firm, so it means n is going to increase, so moment that happens, what happens? the supply curve shifts like this, suppose this was the initial supply curve and this is the next period. So, at this market price since there is a entry of new firm, what do we see that there is going to be an excess supply.

And we have argued that moment there is excess supply, what happens? price falls, so it will fall till this point means this price will fall till this point, okay, this level and next equilibrium point is at this price. Now, at this and this whole process takes place instantaneously. So,

again this price is taken as given by the firm, moment this price, so this is the optimal amount of output and so firms are, now see average cost is this much, price is this.

So, firms are making a loss of this red amount, this red rectangle, so what is going to happen? Now, some firms are going to leave the market, the moment they leave the market what is going to happen, supply curve will shift like this and suppose this is S2. Now, this was the equilibrium at S, when the supply curve was S1, now supply curve has shift leftward like this, so what is this?

So there is, this much amount is the excess demand, so price rises and the new equilibrium price is going to be this price. Now, at this price we get this marginal cost intersects the price at this so this is the new optimal output for each firm, average cost is here, so firms are making some positive profit or super normal profit which is given by this green rectangle, so there is going to be entry of firm.

Moment there is going to be entry of firm, supply curve is going to shift rightward and this is going to be the next supply curve, this is S4, S4 okay. Now, here what is happening, I mean there is a S4, so we get this much amount of excess supply. Moment we have some amount of excess supply what is going to happen? Price is going to fall, right? and as the price falls what will happen, this point is going to be the new equilibrium price.

So, it will lie somewhere here and like this it will continue and suppose this is the price where we get this point where price is equal to MC is equal to AC- $p = MC(y_i) = AC(y_i)$, okay, at this point and so this is going to be the long run optimal amount of output for each firm and the long run price is going to be this price where this condition is satisfied, okay.

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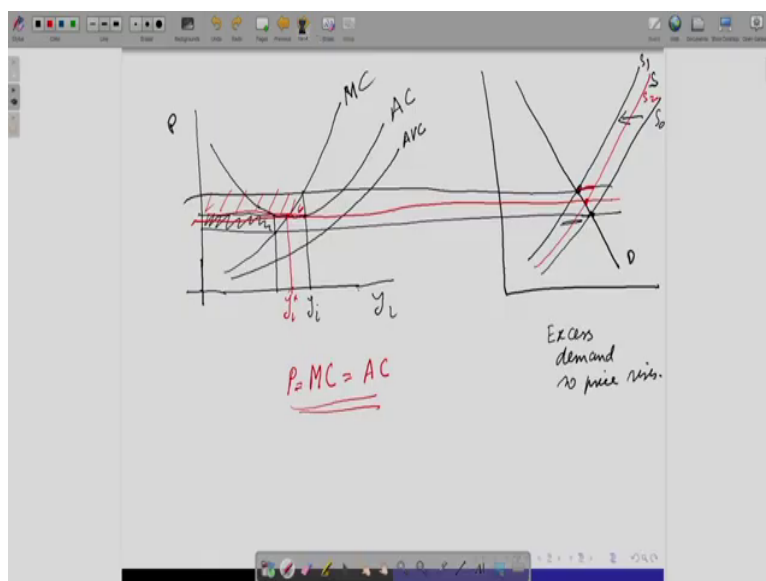
Now, let us take another example, let us start from the, supposed initially the firms are making losses, okay, this is the marginal cost, this is okay. Okay? and suppose this is the output of any firm, this is the supply curve, this is the demand curve, okay. Now here optimal output is this, so firms are making a loss of this amount, right? The moment they are making this loss what is going to happen? In the long run if the same number of firms persist in this economy some of them will leave because they are making losses.

The moment they leave what is going to happen, this supply curve is going to shift like this, so at this price what do we get here? we have, at this price this is the, we have something called excess demand, so price rises and that happens instantly and instantly price move from this level to this level and at this level when the equilibrium price is this each firm take that, price has given and the output they produce is this much.

And here see average cost is this so they are making a profit of this much amount, so moment they are making some profit there is going to be entry of firm and they are going to be of this much suppose and here you see that there is an excess supply and instantly price will move from this level to this level because moment there is excess supply it means that there is less demand than the quantity being sold in the market so the price will immediately fall and it will fall to this level and the firms are going to take this price as given.

And finally this is going to be equilibrium price and the optimal output is going to be this much and at this level of output what happens, price is equal to marginal cost and marginal cost is equal to average cost at this price and we get this as the, so if there is firms initially

they are making losses, then some firms are going to leave the market and then market price is going to rise.

And due to rise in the market price the firms may make some profit, super normal profit and if that happens then again some new firms are going to enter and this process will come to a halt or it will stop when the price is equal to marginal cost and marginal cost is equal to average cost, okay. So, this is the, how the we get, this is the outcome or the equilibrium outcome in a Perfectly Competitive Market in the long run.

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Now let us solve an example numerically. Suppose this- A-p=Y is the market demand curve, okay so you plug in prices the quantity demanded you are going to get is this, so if you look at this demand curve it is market demand curve it is something like this, okay this is A and this is, sorry. Suppose the cost function of each firm is this- $c(y_i) = cy_i^2 + F$, so this means that if we take output of this firm here in this case marginal cost curve is this.

Average variable cost is going to be something like this and average cost, so this is average variable cost, average cost is like this, right? so remember this we will be using these diagrams, means in while doing numerically we do not need to use them directly, but while, previously we have used this diagram so you can look at the relationship between this, numerical thing and the diagrammatic representation.

So, profit function is this- $\pi_i = py_i - cy_i^2 - F$, $i = 1, 2, ...N$, so this- py_i is the total revenue received by each firm and this amount is the total cost- $cy_i^2 + F$, okay. Now each firm wants to maximize profit taking price as given, so we maximize this profit with respect to yi and we get this- $\frac{d\pi_i}{dy_i} = p - 2cy_i$, first order condition gives that this should be always equal to 0, i.e $\frac{d\pi_i}{dy_i} = p - 2cy_i = 0$, , so this condition is actually, this first order condition is actually giving you price is equal to marginal cost so this is the marginal cost of each firm. From here we get this- $y_i = \frac{p}{2c}$, so if the price is p what is the optimal amount of output a firm is going to produce is p by 2c, okay, is the optimal amount of output of each firm.
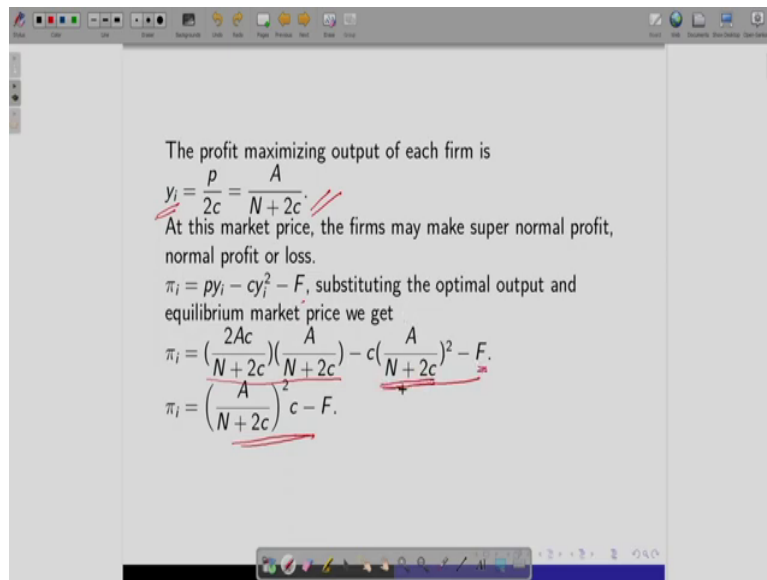
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Now, there are N firms and we have assumed that they are similar, each firm at p produces p by 2c and since there are N firm, so the market supply at p is this- $\frac{Np}{2c}$, it is some horizontal summation of each output at that price, so we get this-$Y = \sum_{i=1}^{N} y_i = \frac{Np}{2c}$, right? Now, so this if I plug in the price then what is going to be the market supply, it is going to be this much- $\frac{Np}{2c}$.

Now, market demand curve is this-$A - p = \frac{Np}{2c}$ and market supply is this-$\frac{Np}{2c}$ because we can write this as this equal to- $Y = \frac{Np}{2c}$, okay. Now, so this supply curve is something like

this, okay. So, at equilibrium this market demand should always equal to market supply, so we have to find that price where quantity demanded is equal to quantity supply.

So, we just solve this equation in this form- $A - p = \frac{Np}{2c}$ and we get this- $p = \frac{2Ac}{N+2c}$, so the market price when there are N firms is this- $p = \frac{2Ac}{N+2c}$. Now, here you note that this price is always a function of number of firms present in and the marginal cost, okay. So, in the short run suppose there are N firms then we know that the equilibrium market price is this.

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The profit maximizing output of each firm is
$$y_i = \frac{p}{2c} = \frac{A}{N+2c}.$$
At this market price, the firms may make super normal profit, normal profit or loss.
$\pi_i = py_i - cy_i^2 - F$, substituting the optimal output and equilibrium market price we get
$$\pi_i = \left(\frac{2Ac}{N+2c}\right)\left(\frac{A}{N+2c}\right) - c\left(\frac{A}{N+2c}\right)^2 - F.$$
$$\pi_i = \left(\frac{A}{N+2c}\right)^2 c - F.$$

And the moment we know the equilibrium market price from the optimal conditions that we have got that the output of each firm is this so we plug in this value we get this is the output of each firm- $y_i = \frac{P}{2c} = \frac{A}{N+2c}$. And then we find out whether firms are making super normal profit or normal profit or losses at this price. So profit is this- $\pi_i = py_i - cy_i^2 - F$, so we plug in this quantity and the price we get, the profit function in this form- $\pi_i = \left(\frac{2Ac}{N+2c}\right)\left(\frac{A}{N+2c}\right) - c\left(\frac{A}{N+2c}\right)^2 - F$ and we get it after simplification we get it this- $\pi_i = c\left(\frac{A}{N+2c}\right)^2 - F$.

So, this is the price into quantity of each firm, so this is the total revenue price and this is the quantity square, so this is the total variable cost minus the fixed cost, so this is total revenue minus total cost. And after simplification we get this.

Here we can see when a firm is making a super normal profit when the price is greater than average cost. Now average cost in this case is given by this a form- $AC = cy_i + \frac{f}{y_i} = c\left(\frac{A}{N+2c}\right) + \frac{F(N+2c)}{A}$, okay, and when we plug in this y1 we get the average cost to be this- $c\left(\frac{A}{N+2c}\right) + \frac{F(N+2c)}{A}$ and we know the price is this- $p = \frac{2Ac}{N+2c}$, equilibrium price, so it means whenever this price is greater than this average cost then the firms are making super normal profit. So, we simply look at this- $p > AC = c\left(\frac{A}{N+2c}\right) + \frac{F(N+2c)}{A}$ and we get this- $c\left(\frac{A}{N+2c}\right)^2 > F$, right?

So, the fixed cost has to be less than this amount- $c\left(\frac{A}{N+2c}\right)^2$ or we can simply say that this should be, fixed cost should always be less than this amount, okay. Now, we have got this, when they are going to make normal profit when fixed cost is exactly equal to this amount, when they are going to make losses when the price is less than the average cost, when this fixed cost is greater than this amount- $c\left(\frac{A}{N+2c}\right)^2 < F$, right?

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So, now depending on the actual value of F, A, C, N, we can get whether there is a super normal profit or there is a loss or there is a normal profit. Now, we see what is going to be the outcome in the long run? Okay. So, in the long run we know the equilibrium is at this- p=MC=AC, condition is this, so we find the minimum of the average cost because this is, this happens only at the at mean of AC, average cost.

So we take the average cost function and thus take the, minimize it with respect to output of each firm, so we get this- $\frac{dAC}{dy_i} = c - \frac{F}{y_i^2} = 0$ and from here we get this output- $y_i = \left(\frac{F}{c}\right)^{\frac{1}{2}}$.

So, in this case when the average cost is something like this so this is the minimum point and this is the, and so output is this. So, we know that in the long run each firm is going to produce at this, this much level of output, okay. So, now plug in this in the average cost, so this height is giving you the average cost.

And so this is the output, you plug in it in the average cost we get this, right? because the average cost function is this- AC=cq, right?, plug in here we get it, this amount and price is equal to, average cost is equal to marginal cost, so price is equal to this-$p = 2(cF)^{\frac{1}{2}}$, so price is we have got this in the long run. So, in the long run the equilibrium market price is this that is the minimum of the average cost, this much amount-$p = 2(cF)^{\frac{1}{2}}$.

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Now, you plug in this market price in the demand curve, we get the, this is the market demand which is given by this, this whole expression, this is the market demand- $A - 2(cF)^{\frac{1}{2}}$. Now in equilibrium market demand should always be equal to market supply, right? and we know each firm is going to produce this much because the price is always equal to the minimum of the average cost and the minimum of average cost is attained at this- $y_i = \left(\frac{F}{c}\right)^{\frac{1}{2}}$.

So, how do we find the number of firms that are going to be present in this market in the long run? So this total demand in the market, quantity demanded divided by the output of each firm, this at the equilibrium point and this, we get this N, i.e $N = (A - 2(cF)^{\frac{1}{2}})/\left(\frac{F}{c}\right)^{\frac{1}{2}}$, so this n is the number of firms that are going to be present in the long run, okay. So, in perfectly competitive what do we get? In the short run we know the equilibrium price and we know the optimal output of each firm.

So, we know these things in the short run. In the long run, so we know this, assuming that there are some given number of firm that is N, in the long run we find this equilibrium price, we find the optimal amount of output of each firm and also we can find the total number of firms that can be present, so this is also determined.

Here this is taken as given in the short run, in the long run this is also determined, so these three things are determined in the long run. So this is mainly Perfectly Competitive Market, where we have determined the price, we have determined the output that each firm is going to produce and we also know what is the total amount of demand that the consumers are going to demand. And from there what happens depending on the demand function of each individual we know the optimal amount of output that they are going to consume, okay.

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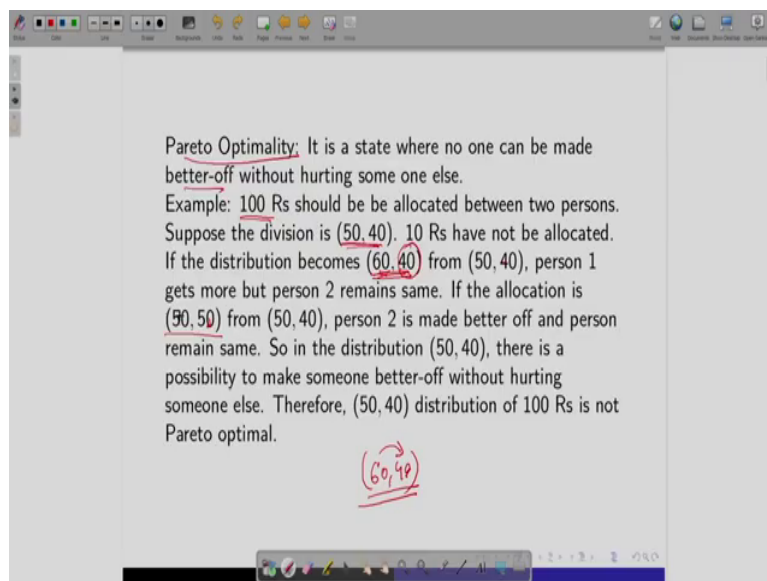
Next we define few concepts and then we, so a very important result that is a perfectly competitive outcome is always Pareto optimal and also social welfare maximizing, okay. How do we show this? So, first let us define what is Pareto Optimality. So Pareto Optimality it is a state where we cannot make anyone better off without hurting someone else.

So, if there are two persons and if I have to make someone better, then I have to hurt the other person if we are not in a Pareto optimal situation, but if we are in a Pareto optimal situation then I cannot make anyone better off by without hurting someone. So, this is, so suppose take a 100 rupees, now you want to divide it between two person, person one and person two. Now, you have done this division suppose fifty and forty, okay.

So, ten rupees left with you. Now, if you give 10 rupees to this person 1 then the allocation is (60, 40), right? Now, from here if you compare this and this what you have done, you have kept the level of person two same, but you have improved that person one, right? but from

here you cannot move to any other allocation, like from 60 and 40, since 100 is your total amount if you want to improve this person's share you have to reduce this person's share.

Or if you want to improve this person's share further you have to reduce this person's share, so then what it means, if you want to improve this person you have to hurt this person and if you want to improve this person, then you have to hurt this person, right? so this is a Pareto optimal allocation, but this is not a Pareto optimal allocation when you have 100 rupees because you can make one person better off without hurting another.

Now instead of this we could have done this division also (50, 50). So, this is also another Pareto optimal allocation because from this allocation if 100 is our total amount, we cannot make anyone better off without hurting someone else, so if I want to make person 1 better off i have to reduce some amount of person 2 and give it to person 1 and or if I want to make person 2 better off I have to take some amount from person 1 and give it to person 2. So, this will, this has to be done, so this is a Pareto optimal allocation, okay.

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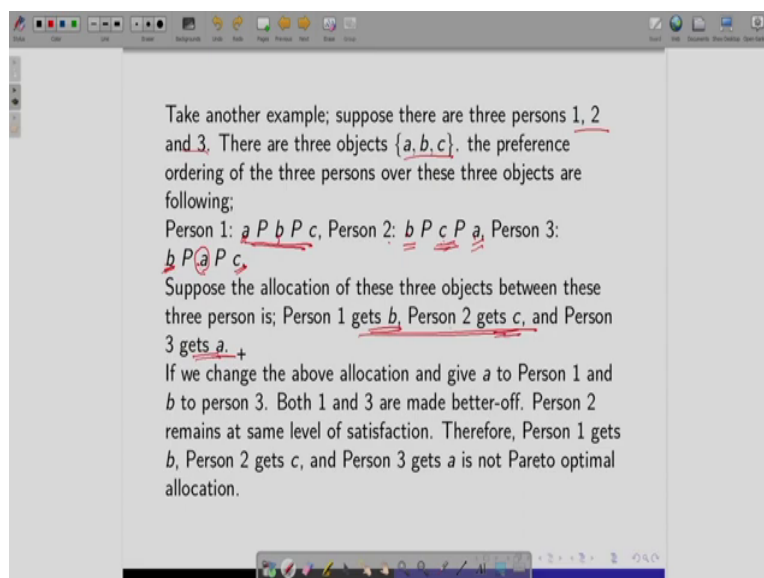
So, let us now do another example, suppose we have three person, person 1, 2 and 3, and there are three objects, these are a, b, c, okay, this can be anything like this is bat, ball and this is suppose wickets, okay or you can say this is suppose some chocolate, this is ice cream and this is suppose some biscuits or cookies, okay. Now, you have one person and we know the preference of this person is that person 1 prefers a over b and prefers b over c.

So, person will be the happiest person if he gets a will be slightly less happy if he gets b and it will be worse off if he gets c. Now, the preference of person 2 is, person 2 prefers b over c and c over a, so it means the person 2 will be will be very happy when it gets b, the object b, will be slightly less happy if it gets the object c and he will be worse off if he gets object a.

And person c preference is like this, like person c prefers b over a and a over c, so person 3 will be happiest and will be most satisfied if he gets the object b, he will be slightly happy or not that satisfied if he is, if he gets a and he will be worse off if he gets c. Now, suppose I have to allocate this three object among this three person a, b, c. And if I have done, suppose I have done the allocation in this way.

Person a, person 1 gets b, person 2 gets c and person 3 gets a, okay? now here we have to say whether this outcome, this allocation is Pareto optimal or not, that is from this allocation whether we can move to a better allocation such that, that I do not have to make anyone happy or better off I do not have to hurt anyone. If I cannot do such movement then it means that I am, in a Pareto optimal state.

Or if I cannot move to that situation from this where I can make someone better off without hurting someone else then I am in a Pareto optimal state. Now, here if you see, if we change the allocation of person 1 and person 3, that is if I give in this a, a to person 1 and this from, I take the a from person 3 and give it to person 1 and take the b from person 1 and give it to person 3 and leave person 2 same.

So, then what happening, see earlier person 1 was getting b and person 3 was getting a and when we have done this interchange what has happened, person 1 has got a, is more satisfied, and person b has got, has got b, is now more satisfied than a and person 2 is more or less in the same state because he earlier he was also getting b, now also he is getting b, okay so this is you can say is a this allocation is not a Pareto optimal allocation.
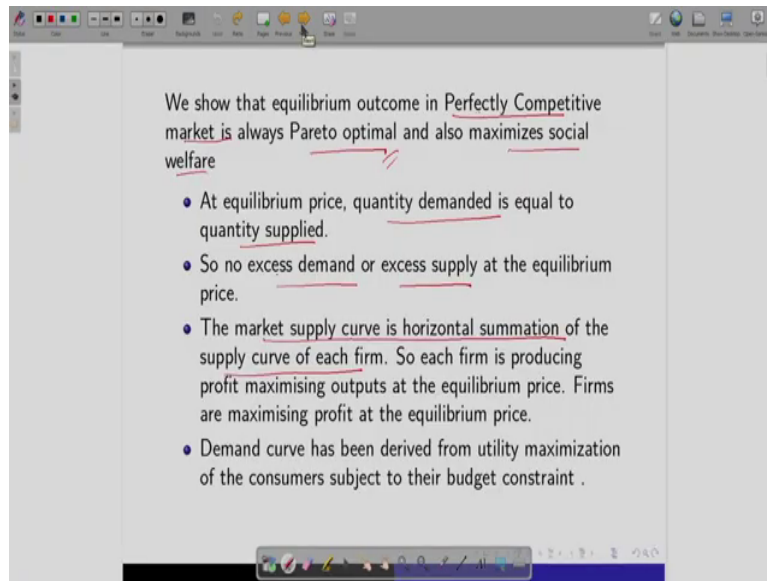
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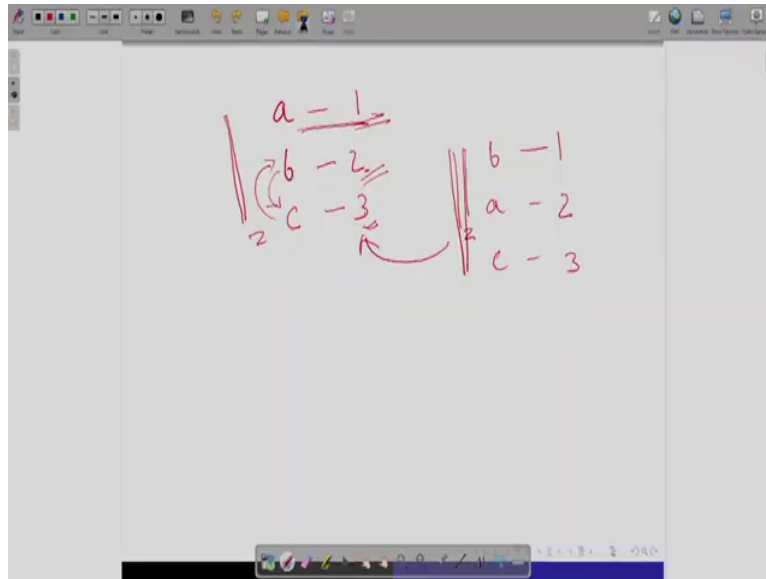
So, we can do some lot of combinations like this, suppose we take instead of this a to person 1, we give b to person 2 and we give c to person 3. This, now is this a Pareto optimal, yes, this is a Pareto optimal allocation. Why? Because now a is in the best position, he has got his most, that bundle which gives him the maximum utility or he has the most preferred one, b has also got that, he has got that object which gives him the maximum utility or the most preferred one, c has got this, he has got that object which is second best, not the first one.

Now, if I have to make suppose person 3 happier, how to do that? I have to do some interchange here, I have to either give this 2 and this, like this interchange I have to do but in that case what is happening, to improve the situation of person 3 I have to hurt person 2. So, that is why, and since he is always best, if I try to do any change here he will get only hurt, so that is why this is a Pareto optimal.

Now, here you can see that instead of this if we do like this to 1, a to 2 and this is actually not a Pareto optimal allocation this, because we can move from this to this and we can make both 1 and 2 happier, more satisfied or we give most preferred bundle to this person, okay. So, this is what Pareto Optimality is. Pareto optimality means that it is a state where you cannot make any person better off without hurting someone else, okay.

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We show that equilibrium outcome in Perfectly Competitive market is always Pareto optimal and also maximizes social welfare

- At equilibrium price, quantity demanded is equal to quantity supplied.
- So no excess demand or excess supply at the equilibrium price.
- The market supply curve is horizontal summation of the supply curve of each firm. So each firm is producing profit maximising outputs at the equilibrium price. Firms are maximising profit at the equilibrium price.
- Demand curve has been derived from utility maximization of the consumers subject to their budget constraint .

Now, let us do some more a, so now we have to, so the main result is that Perfectly Competitive Market is always Pareto optimal, so the total amount of output that is being produced in the competitive market, so it is produced at that level where quantity demanded is equal to quantity supplied and we have got a equilibrium price and that price determines the total amount of output, right?

So that output is Pareto optimal and it also maximizes social welfare, we will come to it what do we mean by social welfare, but we have defined Pareto optimality. Now, let us first do what do we mean? How do we show this? So, at equilibrium price in a competitive market all quantity demanded is always equal to quantity supply. So, there is no excess demand or no excess supply, okay equilibrium price is such that the market always clears that is quantity demanded is equal to quantity supply.

And market supply is what, it is the horizontal summation of the supply curve of each firm, so if we are in a market supply, so it means it is also taking some point in the supply curve of each firm, right? so in the supply, how we have derived the supply curve of each firm, we have derived the supply curve of each firm from maximizing the profit taking the price as given, so firms are actually maximizing profit when we are talking about this equilibrium price.

So, since it is a price in the supply curve also, supply curve, so and each point in the supply curve is, has been derived from some profit maximization, so it is maximizing the profit. And how we have derived the demand curve, the derived demand curve is the horizontal

summation of the individual demand curve and how we have got the individual demand curve, it is from a utility maximization of the consumer subject to a constraint that the consumer face in terms of the market price and the income.

So, so we have these two thing, so the moment we have this, what is happening, at that price both the utility of the consumers are being maximized and also the profits are being maximized, so that is why it is a Pareto optimal solution. Now, it may happen that we will discuss that slightly later, okay or just wait a minute, okay.

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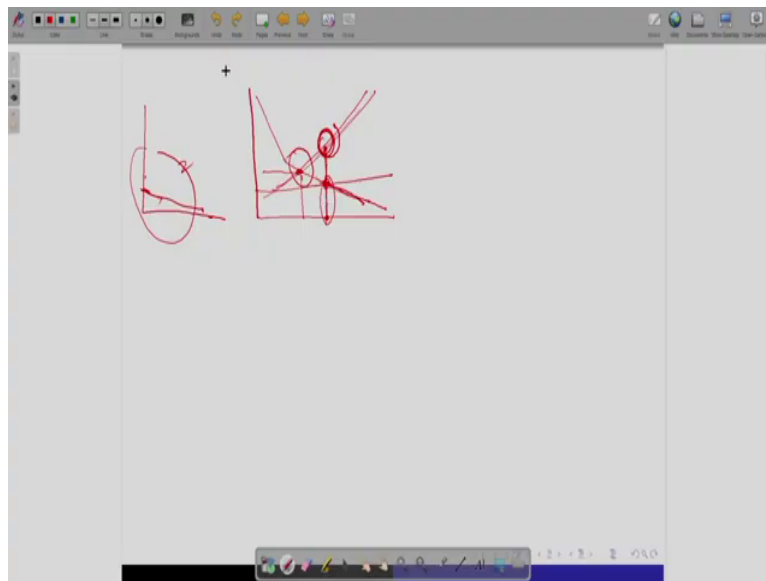
See suppose the market demand curve is something like this okay and because it is a horizontal summation or it is sum of a two demand curve, so and suppose the supply curve is like this, so equilibrium price is here, right? and we are saying that this point is an Pareto optimal thing. Now, why, so this point lies in this market supply, so each point here, firms are optimizing their profit, so or maximizing their profit, taking the market prices given.
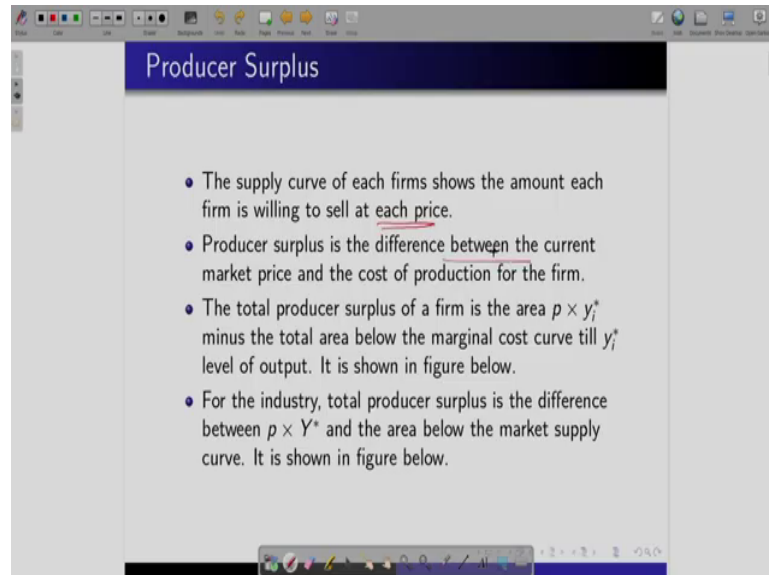
So, profits are being maximized. Now, it is also in the demand curve, market demand curve, but it may happen that in this demand curves, in this portion we may have some individual whose demand curve is like this and when we add this add all the demand curves we get like this, so this person, if this is the market price cannot buy any quantity of this, okay but there are many other individuals whose demand curves are like this, so we have derived the market even they can buy at this.

Now, why this is a Pareto optimal? Now, see this is in the market demand, so that means it is lying in the some demand curve of some individuals, but it may not lie, so for this person he or she cannot afford this price, so he is not buying, he or she is not buying any amount, but there are many other individuals which who can buy. Now, what happen? If I reduce this price suppose, suppose I make it like this, then at this price what happens this person can buy.

And the other persons are also buying and they are, since the price is less they can now buy more, and so the, what is happening total utility of all the consumers have increased you can say, but if I keep this price what is going to happen? You can say at this price, so but sellers are, so if we keep this price the demand is this much, at this demand, since this is the supply curve seller wants the price to be of this but the market price has been kept at this.

So, sellers are not in their supply curve, so this means what, so it is firms are not maximizing their profit, so when we are making some individual better off, this individual we are making the firms worse off, so that is why only this point is the Pareto optimal point, any other points are not Pareto optimal points, okay.

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Producer Surplus

- The supply curve of each firms shows the amount each firm is willing to sell at each price.
- Producer surplus is the difference between the current market price and the cost of production for the firm.
- The total producer surplus of a firm is the area $p \times y_i^*$ minus the total area below the marginal cost curve till y_i^* level of output. It is shown in figure below.
- For the industry, total producer surplus is the difference between $p \times Y^*$ and the area below the market supply curve. It is shown in figure below.
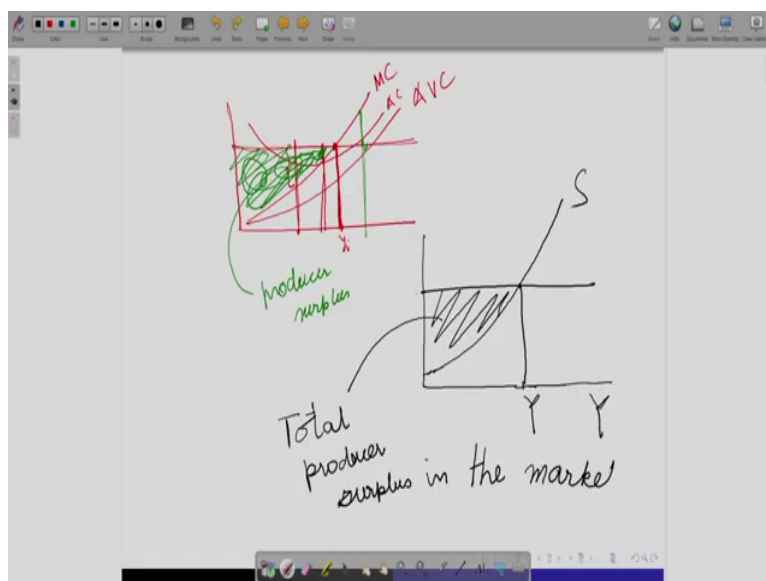
Now, let us define quickly define few terms and then we will define the social welfare. What do we mean by producer surplus? So, these are required to define the social welfare. Producer surplus is actually the difference between the current market price and the cost of production of the firm. So, you can think that suppose this is the marginal cost, this is the average variable cost and this is the average cost.

And we know the amount of output a firm is going to produce does not depend on the fixed cost, since we are doing optimization with respect to yi amount of output, so it depends only on the variable cost. So, here suppose the market price is this, okay. If the market price is this firms are producing this much amount of output, at the margin market price is, sorry, market price is this, it is taken as given by the firm.

And marginal cost at this output is this much, but marginal cost at this much level of output is only this much, so this much surplus it is getting, when it is producing this much suppose, so it is getting this much amount of surplus, so this is actually producer's surplus and this whole reason is the total producer surplus. So, the firm produces till the producer surplus is 0. Now, here if you look at this, the price is this much but the marginal cost is this, so at the margin firms are making a negative surplus, okay.

So, this region is the producer surplus. And what do we get from here? From here if you take the market thing this is going to be the market supply and suppose the market price, equilibrium price is this then firms are, market price is this so it is going to be total output
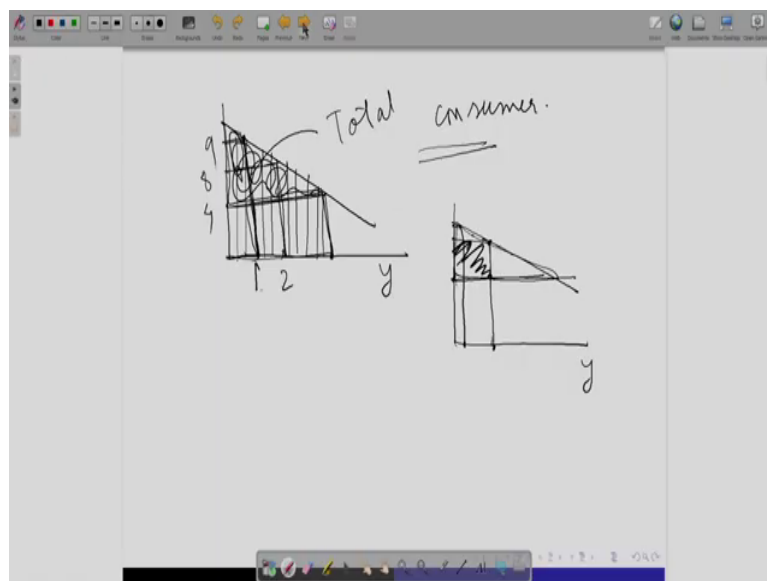
produce, this is going to be this. So, this whole region is the total market surplus or the total producer surplus in the market okay, so this is the surplus.

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Now, let us define another concept that is consumer surplus. So, when the demand curve is like this-10-p=y and suppose a consumer wants to buy two units, so now here you see, so the inverse demand curve is this, right? So, you buy one unit, you are willing to pay, you can say 9, you two unit, the second unit, you plug it two, you are willing to pay again 8, so this thing you can represent in this way.

So first unit you are willing to pay this much unit, first, second unit you are willing to this is suppose 9, this is 8 so what is happening here, see when you are buying two two units, you

are willing to pay this much amount, when you are buying one unit you are willing to pay this whole amount, right? 9, so when you actually pay 8, you are getting this much surplus, right? but suppose the price is at 4 and you have bought this much amount of output, okay.

So, you have paid this much this 4 into total output, but you are willing to pay for each dot this much amount the height of the demand curve, so this much amount is the surplus that you are getting, so this total amount is the total consumer surplus or you can say if you look at only, this is the total consumer surplus, but if this is the case and you are willing to pay, for this amount you are willing to pay this much this whole and you pay actually this is the price.

So, then this is the surplus you are getting, so like this for this unit you are willing to pay this much, so like this we can go on like this, the whole this triangle is going to be your surplus if we make it very smooth, each dot as one, okay. So, the consumer surplus means that the maximum you are willing to pay minus what the amount you pay, so that surplus. So, social welfare is actually the sum of producer surplus plus sum of consumer surplus, okay.

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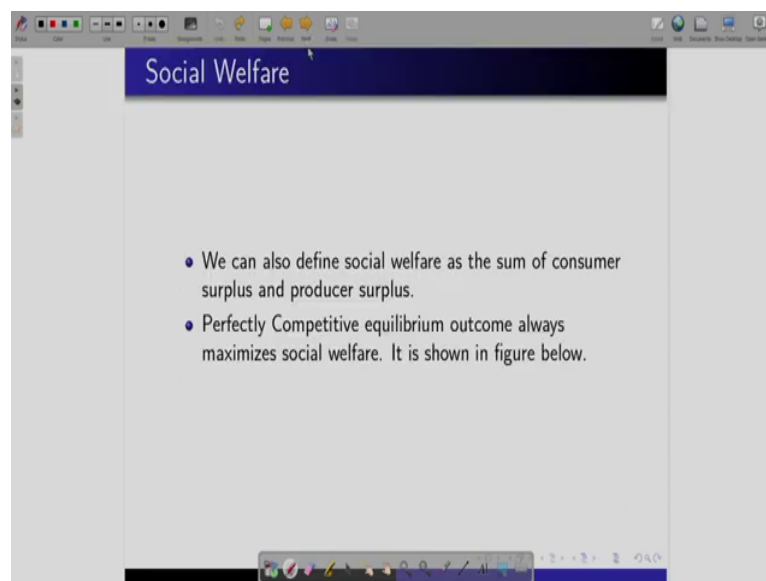
So, we have done this. So, social welfare is the sum of consumer surplus and the producer surplus and we have to show that this sum which is the social welfare is always maximized and when we are in a Perfectly Competitive Market equilibrium outcome, okay. When the outcome is perfectly competitive then this social welfare is maximized. We will do it in the next class. Thank you.