14.01SC Principles of Microeconomics, Fall 2011
Transcript – Lecture 13: Welfare Economics

PROFESSOR: We want to turn this course to now start talking about some normative economics, which is how do we feel about the actions firms and consumers take. And to do that we need to pause, and starting last lecture now through this lecture, talk about welfare. Well-being. How do we measure the well-being implications of individual and firm actions?

Now, we talked last time about the first concept of this, which was consumer surplus. Consumer surplus was the amount of utility consumers derived above and beyond the price they had to pay for the good. Now, since it's utility, remember, it's not ordinal, it's cardinal. We redefine that. That is the consumer's willingness to pay above the price that they pay for a good. So, anything a consumer's willing to pay that was higher than the price they actually paid is consumer surplus. And that was at the individual level. That was the individual consumer surplus.

Now what we want to do is move on and talk about market consumer surplus. So for an individual, consumer surplus is a willingness to pay above the price actually paid. At the market level, it's the same thing. It's just the aggregation of individual consumer surpluses. So let's think about a simple example. Let's think about the case of the consumer surplus that you derive from my lectures. Let's think about the consumer surplus you derive from my lectures.

So we have some demand curve for my lectures. Let's look at figure 13-1. Let's say this is the demand curve for my lectures. So basically, this is a willingness to pay. So the notion is that there's some student who's willing to pay a large amount because they recognize the brilliance of what they're hearing here. And they're willing to pay a large amount for my lectures. Then the next student's willing to pay slightly less. All the way down to the student who falls asleep every time who's not willing to pay anything for my lectures.

So you've got some demand curve for my lectures. And, once again, the key to all this, the key to the welfare analysis, is to remember what this demand curve represents. It's a willingness to pay curve. But

in this case, it's not an individual's willingness to pay. It's the market's willingness to pay. Where each point is a unit of demand. So in this case, one unit equals one person. So each point represents the willingness to pay of that person. So the point on the y-axis represents the willingness to pay of the person who most enjoys my lectures. Or derives the most value out of them.

The intersection of that line with the x-axis is a willingness to pay of zero, someone who's not willing to pay anything for the lectures. Obviously, could go negative. People could be willing to pay not have to come to the lecture, but we won't consider that. We'll just say zero's the minimum.

So, basically, what is the key determinant of the equilibrium outcome? It is the point where, equilibrium is the point, where the price is set equal to the willingness to pay of the marginal consumer. So if you think about typical supply-demand diagram, and we get some equilibrium price. So here's our equilibrium quantity, Q-star. And here's our program price, P-star.

Now, let's focus in on this demand curve. With that price P-star, it represents-- it's on the demand curve, so it's a willingness to pay. Whose willingness to pay is it? It's the willingness to pay of person Q-star. It's the willingness to pay of the person who's exactly willing to pay the price. That is, the equilibrium in a perfectly competitive market, of the kind we've discussed so far, the price represents the willingness to pay of the marginal consumer. The willingness to pay of the consumer who exactly is indifferent between consuming and not consuming the good. So this consumer, Q-star, this person Q-star in our example, is the person who's indifferent. Who derives, what, zero consumer surplus. This person, since their willingness to pay equals the price, equilibrium is achieved where the price is set-- In equilibrium, you have that the marginal consumer, the last person consuming, is deriving zero consumer surplus. They're indifferent between consuming the good and not consuming the good at that price.

If it was free, they'd be happy to consume it, but at the price, at that equilibrium price P-star, they're indifferent. So basically, looking at the diagram, what this is saying is that the price was $100 a lecture. Then person 100, that hundredth person, would be the marginal consumer who's indifferent between paying the $100 and hearing my lecture or paying nothing and skipping my lecture. So that person 100 is the person who's indifferent between paying $100 and hearing my lecture or paying zero and not hearing my lecture. That person drives no consumer surplus. Because their willingness to pay equals the price.

What that means is that every consumer up to the first 100, by definition, must be deriving some consumer surplus. As long as the demand curve is downward sloping. As long as the demand curve is

downward sloping, every person to the left of person 100 must be deriving some consumer surplus. In particular, the first person is driving enormous consumer surplus.

How can we prove that? Well, the proof is simple. We know their willingness to pay is higher than person 100. And we know person 100 is willing to pay $100. Therefore, by definition anyone to the left is deriving consumer surplus from this. Because we know they like it more than person 100, and person 100 is willing to pay $100. They only have to pay $100, it's one price to everybody. So by definition, they're deriving consumer surplus.

So the first guy, he or she gets a big consumer surplus. Then it dwindles and dwindles and dwindles until the hundredth person derives zero. But, if you integrate, and the entire consumer surplus for the market is that entire triangle, that entire shaded triangle. So market consumer surplus is defined the same as individual consumer surplus, as the difference between the demand curve. It's the area under the demand curve above the price. So it's the integral of that area, under the demand curve, above the price.

But here we're thinking of it not in terms of a person's decision but the market's decision. And when you think about that, it is the last unit be representing the person who's indifferent. And everybody else deriving surplus from it. Questions about that?

Now, let's ask what, then would happen if the price of my lecture rate rose. So let's say I was charging $100 boxes at the door. You guys are all the guys to the left of person 100. Those people who were here for the first lecture and don't show up any more, they're the people to the right of person 100. And now let's say I change. Instead of charging $100 at the door, I charge $110 at the door.

So let's look at figure 13-2. What happens there? Well, in that case, if I charge $110, the hundredth guy is no longer willing to come to lecture. Remember, the hundredth guy, he or she was indifferent between paying $100 and hearing my lecture and paying nothing and missing my lecture. Well at $110, clearly, they'll say forget it, it's not worth it any more. They'll drop out. Likewise, the way I've drawn this diagram, everybody above person 90 will no longer attend. That is, person 90 is now the person, where at a price of $110 they're indifferent between paying and attending or not paying and not attending. Everybody to the left of person 90 still gets consumer surplus. It's not shaded, but if you shade the triangle above the $110 dashed line, the triangle under the demand curve and above with a dashed line at $110, that's the new consumer surplus. That's the new consumer surplus. Those people still derive consumer surplus because they love me so much that they're willing to pay more than $110. So even

$110, and they prefer to pay $100. But even $110 they'll still come and they'll still be happy about it. But now 10 people have dropped out because they're not willing to pay $110. They were only willing to pay $100.

So what we see is that the total consumer surplus has shrunk. It's shrunk by this trapezoid, by this shaded trapezoid. And it's shrunk for two reasons. One reason is that some people who used to derive consumer surplus now are out of the market. That's the triangle. That's the shaded triangle. It's also shrunk because even people staying in the market are now sadder. They've lost consumer surplus. The consumer surplus is still positive. They're still coming to the lecture, but it's smaller than it was, and that's the rectangle.

So the triangle is the people who drop out of the market. The rectangle is the reduced consumer surplus, the reduced consumer surplus of people who stay in the market but now have to pay $10 more. The consumer surplus is still positive, but it's smaller.

So, a question to you. What is the key economic concept that's going to determine, for a given market, whether the consumer surplus is large or small? Yeah?

AUDIENCE: Elasticity.

PROFESSOR: The elasticity. And why is that?

AUDIENCE: Because it changes how steeply--

PROFESSOR: Exactly. So if we look at figure 13-3, now here is a case with a steeper elasticity of demand, where consumers are more inelastic. If you compare it to figure 13-1, you'll see the consumer surplus triangle is much bigger. Likewise, if we drew a flatter demand curve, a more elastic demand, the consumer surplus would be much smaller. So hopefully you can see graphically what will determine consumer surplus is the elasticity of demand. Now, can someone give me the intuition for why that's true? Graphically, I hope you can see it's true. The triangle will be smaller as that curve is flatter. Can someone give me the intuition for why that's true? Why is it that consumer surplus is larger the more inelastic is demand, and consumer surplus is smaller the more elastic is demand. Want to give it a try?

AUDIENCE: I guess if it's more inelastic, then consumers don't have--

PROFESSOR: They don't have what? [UNINTELLIGIBLE] What determines it?

AUDIENCE: As many choices, I would say.

PROFESSOR: They don't have as many substitutes. So with inelastic demand is when consumers don't have as many substitutes. In that case they get a lot of surplus from consuming this good. So think about insulin versus McDonald's. The consumer surplus from insulin is very, very high. Because regardless of the price, I die without it. And there's no substitute. So it's a very inelastically demanded good, and as a result, at any price, I derive a huge consumer surplus because as long as that price is less than the value of my life, I derive a big consumer surplus.

Now let's take McDonald's. I can always go to Burger King and be equally happy. Maybe not quite equally happy, the curve isn't perfectly elastic. I like McDonald's a little bit more. I like the prizes in their Happy Meals better. So it's a little bit elastic, but the point is, if McDonald's raises the price, I'm not that much sadder because I just go to Burger King where I was perfectly happy as well. So there's not much lost consumer surplus if McDonald's raises the price. There's not much consumer surplus arising. There's not that much consumer surplus-- forget the loss. Go back. That's a different issue. I'm talking the sides of the consumer surplus. There's not much consumer surplus arising from consuming at McDonald's. Not much consumer surplus arises from consuming McDonalds because I can always just go to Burger King instead.

So what determines consumer surplus is the elasticity of demand, which is fundamentally about your willingness to pay. Inelastic goods have higher willingness to pay. And so as a result, the consumer surplus is essentially inversely related to the elasticity of demand. The higher the elasticity, the smaller the consumer surplus.

Now, let's shift and talk about producers. The analysis for producer surplus is exactly the same type of analysis, just flipped to the other side of the market. Now, here the question is, what determines my producer surplus? Well, what determines consumer surplus? It's the difference between my marginal

willingness to pay and the price. What determines producer surplus, that's going to be the difference between the firm's marginal willingness to supply, and the price.

So my marginal willingness to pay as a consumer is what determines my consumer surplus. Producer surplus will be determined by my marginal willingness to supply. My marginal is supply, which is simply represented by the supply curve. A little bit easier for producer surplus. The supply curve represents the price at which I'm willing to supply a good. That's what a supply curve is. As we learned a couple lectures ago, in the context of competitive firms that's my marginal cost. So the supply curve is my marginal cost. That says that is how much it costs me to produce the next unit. In a perfectly competitive long-run equilibrium, or short run equilibrium, that is basically what I'll set my price to.

So if we go to figure 13-4, now let's look at my producer surplus. My surplus from delivering lectures. Let's say that-- this is a bit harder to imagine-- but imagine that I prefer deliver smaller lectures. Maybe because as the number of kids gets smaller I can learn your names. I don't have to look around as much, I don't have to pace as much, whatever.

So imagine that I'm most happy delivering a lecture to one student. And that's the lowest cost to me, the lowest effort. I can just come in and sit down, and we have coffee and I just riff, and I don't have to worry about notes or any of that stuff. But when there's two students I feel a little bit guilty doing that, so I make some notes to myself. When there's three students I make some more notes. By the time there's all you students, I have to type up all these notes. So every student that adds to my lecture, imagine, is a marginal cost.

Now, you know that's not true, of course. I wouldn't change my notes if six more students walked in. But let's just imagine that it's linear. Imagine with every student that comes in here, I have to put in a little more effort in my lecture. So it's a marginal cost to me with the additional students. So that delivers the supply curve, this upward sloping supply curve.

Now let's say at a given price, P, I'm willing to lecture-- so that, given the supply curve, if the price is equal to p, I'm willing to lecture to Q students. That is, if you're going to give me a price of P, at that price my marginal willingness to supply is that I'll supply Q lectures. So another way to say it is that if you want me to supply Q lectures, you've got to pay me a price P. That's the point where I derive no producer surplus. I'm indifferent at that point. If at that point you said, would you want the Q-th student or not, I'd say I don't really care. I'm indifferent. I get zero producer surplus. But, I got a huge surplus on

that first student. Because I was willing to work with them and it wouldn't have cost me anything. But I'm getting paid P to work with all of you. So I make a producer surplus on that.

So producer surplus is made on every unit to the left of Q, because those are units with a positive producer surplus. They're the units above the supply curve and below the price. They're the units where it's above the supply curve, so I'm willing to supply, but below the price which means that I'm getting paid more than I would have to to supply that unit.

Can anyone think of another name for this triangle, roughly? How else you might think about that triangle. Well, I can talk about producer surplus. And I said, what's the difference between the price producers receive and the cost that they have to produce it.

AUDIENCE: Profit.

PROFESSOR: Profit. Roughly speaking, producer surplus is profit. Now, technically, in the short run, that's not true. Because in the short run there's fixed costs and you might lose money on fixed costs and still make a long run profit. So in the short run it's not technically true. In the long run it is technically true, and for the purpose of this course we'll say it's technically true.

So producer surplus is profit. It's a lot easier to think about. Consumer surplus is this vague concept we have to measure my willingness to pay versus what I pay. Producer surplus is easy, it's profit. So producer surplus is profit, it's the difference between the price at which I'm willing to produce the good and the price you actually pay me for it. So that's producer surplus. Questions about that?

OK. Putting this together, we can now measure the total welfare of society. We now have it. We can measure the entire happiness of all of society. And we define social welfare of society as consumer surplus plus producer surplus.

Now, that doesn't have to be. You could say, gee, Jon, don't you care more about consumers than firms? Or gee, Jon, don't you care more about firms than consumers. I'm going to leave that alone for now. We're just going to do the simplest thing and just say, we're going to define social welfare as simply the sum of how much surplus consumers get plus how much surplus producers get. OK?

This is a particular representation. When we talk about efficiency and equilibrium, we're talking about efficiency-- I'm sorry-- versus equity, which we'll talk about towards the end of the course. We'll talk about alternative definitions, and how we weigh different definitions of this. But for now, this is the standard economic definition. Which is, let's not draw a judgment about who's better than who. Let's just talk about the total amount of surplus in society. So the amount of social welfare, is the total amount of surplus in society.

And here's the key result. That the competitive equilibrium, where demand equals supply, in competitive equilibrium, is the welfare maximizing outcome. The competitive equilibrium of the market, which is where demand equals supply, is also the welfare maximizing outcome. And that's the key thing we want to go to now, which is that basically moving away from that equilibrium point, where demand equals supply, will by definition lower the amount of social welfare.

So to see this, let's go to Figure 13-5. And we've got some supply and demand curves. This is from the book now. We've got some supply and demand curves. And we're initially in equilibrium at P1 Q1, at the point E1. So we're initially at equilibrium at E1. At E1, at that initial equilibrium point, consumer surplus is equal to R. Now, going by the letters that label the areas, R plus S plus V. That's the amount of consumer surplus. The amount under the demand curve, above the price. That's consumer surplus. Stop me if this is not clear, this is important stuff. So under the demand curve above the price, R plus S plus V. The producer surplus is T plus U. The profit is the amount above the supply curve and below the price.

And so total social welfare is the sum of all these. R plus S plus V plus T plus U. That's our starting point. That's our competitive equilibrium starting point.

Now, let's see. You should be able to immediately see, those of you who are good with your geometry, that there is no point you could choose which can make social welfare larger. As a simple comparative statics exercise, imagine I had the government come in and say, we're going to raise the prices in the market to P2. We decide that producers aren't making enough. Look, the consumers get three letters, the producers only get two letters, that's unfair. So we're going to raise the price to give the produces more letters and the consumer fewer letters. That sounds like about the rational basis for government policy making these days.

So we're going to do that. And so we're going to raise the price to P2. With a price of P2, we'll have a new equilibrium. If you force the price up to P2. You have a new equilibrium at little e sub 2, and a quantity of Q2.

What happens now? What's happened to consumer surplus? Consumer surplus, you've now lost S and V. Consumer surplus is now just R. Because at that new price, P2, that's the area under the demand curve above the price. Producer surplus has grown, however. Now, instead of being T plus U, it's now T plus S. So what's happened, effectively, is you've transferred S from consumers to producers. And you've lost V plus U, forever. So what's involved in this change is a transfer and a loss. The transfer is the area S, which used to belong to consumers now belongs to producers.

But now we have what we call a dead weight loss. Dead weight loss, of V plus U. That's welfare that has disappeared. Welfare has disappeared. And the definition of dead weight loss is a net reduction in efficiency from trades that are not made. Remember we talked about efficiency early on in the course. We said the efficient outcome is one where trades that make both people better off are made. Here we have trades, which absent the government would have made both parties better off, and they're not happening. That is surplus that's just gone. It's into the ether. That is social surplus that is now social welfare, that is now gone because there are trades that would have made both parties happier that are now not happening. And that's a total waste from society's perspective. Because society's best off if all the trades that make both parties happier, happen.

So the bottom line is, any price you would impose other than the market price of P1, and you can work this out for yourself, any price you would impose would by definition lead to a lower social welfare. It may shift. It may lead to a bigger or smaller consumer surplus relative to producer surplus. Once again at this point we're just using the sum of them as a measure of social welfare. Social welfare has fallen. So social welfare is maximized in this case.

So this gives us a framework to think about. We started the course with supply and demand, and talking about how things like the minimum wage reduce efficiency. Well, this gives us a welfare framework, a more formal welfare framework, for thinking about that. I said it reduces efficiency before because you had less labor in the market. But now we can actually more formally say why does the minimum wage reduce efficiency? We can actually look at that. Let me just do the always-risky thing of trying a freehand diagram.

You remember our market for labor, you had the amount of labor on the x-axis, the wage on the y-axis. You had some supply of labor that comes from workers deciding to work as the wage goes up, they want to work more. You've got demand for labor. That comes from firms demanding workers. As the wage goes up, they want fewer workers. And you have some initial equilibrium, L-star, W-star. When the government came in with its minimum wage and the government said, we're going to impose a minimum wage of W-bar, W-super bar. OK Remember, we said what happened was, well, of course then firms are only going to want L1 workers.

We talked before about how that led to some unemployment. What we didn't mention is how this leads to an efficiency loss to society. This area is now dead weight loss. These workers, who would have been happy to work at the prevailing wage, and firms would have been happy to hire the workers at the prevailing wage, and those trades no longer happen.

So here's an important question to help you think-- you're going to have to draw dead weight loss triangles in your sleep now. So here's the trick with these. Why is the dead weight loss triangle smallest here and grow like that? Why does the dead weight loss triangle grow as you move away from the competitive equilibrium? Yeah.

AUDIENCE: There is less amount of people who are willing to work at that price.

PROFESSOR: Say it again?

AUDIENCE: So there's less people that are willing to work for that smaller price.

PROFESSOR: Well, here we're imposing a higher-- less people are willing to work for, are you referring to here or here?

AUDIENCE: To all the way to the right.

PROFESSOR: All the way. So basically, the point is-- another way to put it is, at that wage the consumers there are pretty indifferent. So in other words, they're willing to work but barely. So at this wage, at this

point here, the L*-th worker is getting no surplus from working. It's not a crappy wage, he's happy to take it. But he'd also be happy to sit at home. He's indifferent. So for that L*-th worker, you make him not work, he doesn't care. So if you raise the minimum wage and this guy sits at home instead of working, he didn't care. He was getting no surplus from working anyway. Likewise this firm, who's hiring the L*-th worker, they were paying this worker exactly what he was producing. The marginal cost of that worker exactly equalled what they were paying him. What that worker's producing was exactly equal to what they paid him. They were earning zero profit on that worker. So they don't care if he stays home.

So if the government set a minimum wage, such that one guy stayed home, the minimum wage was so close to market wage that one guy stayed home, there would be no social welfare loss. Or infinitesimally small. Because that last guy, there was indifference on both the worker's side and the firm's side.

However once you start displacing more and more, these workers aren't indifferent anymore, right? These are workers who were making a lot of surplus at that wage. And firms that were earning a lot of profit at that wage. Now they're not indifferent. So as you move farther and farther from the competitive equilibrium, the distortion gets larger and larger. Very important intuition to have. That for that last person, there's no distortion from moving epsilon away from the competitive equilibrium. Because they weren't earning any surplus anyway. And the firm wasn't making any surplus on them.

But as you move away, the loss in social welfare gets larger and larger because these are people who are making all sorts of surpluses on these transactions. And you're stopping them from happening. So if the government interferes with the transaction--

So imagine, this guy and I were negotiating over a baseball card and I ended up paying him exactly what the baseball card was worth to him. And I ended up paying exactly what it was worth to me to have it. And then my parents come in and say, you can't do that. Then it doesn't really matter, because we weren't making any surplus of that trade anyway. But, if he had three of these cards and was delighted to get rid of it for $50, and I have always wanted this card and valued it at $200, then if my parents come and sink this trade, then that's a real bummer. That's a huge loss in social welfare, because the trade that made both parties better off is not happening. Questions about that?

Let's look at a particularly good example of this. Of when the government interferes with trades and the implications of that. The TAs on Friday are going to go through a bunch of interesting examples. I'm just going to do one today. And then you'll do some more in section, because this is hard and important.

I want to today focus on the example of taxicab medallions. It's the example in the book, which is a particularly good example. Taxi drivers, we've all taken taxis, we know how they work. But taxi drivers in virtually all cities, you cannot just start a cab and drive people around. In virtually all cities, you need to get something from the city that allows you to call yourself a taxicab. And that's typically called a taxicab medallion. It originally was literally something you had on the hood of your car. Now it's a certificate you have in the back of your car. So you see the certificate whenever you ride in a car, which says, So-and-so is licensed by the city of whatever to drive this cab.

The government issues a certain amount of these taxicab medallions. And almost always issues less than would be demanded in the free market for taxicabs. And let's see what effect that has. So go to 13-6. This is getting kind of complicated, but this is an example of the kind of welfare analysis we can do. Once we understand these concepts.

Let's say we start at point E1. Big E1 on the right, little E1 on the left. So on the right-hand side, this is like our other profit diagrams. The right-hand side is the market. The left-hand side is an individual cab firm. Initially, if the government doesn't interfere, you are in equilibrium at point E sub 1. Which is, that the price is P1, and the individual cab firm delivers q sub 1 rides. And let's assume cab firms are identical, just to make it easy. And that there are n of them.

Well in that case, the total amount delivered is N1 Q1. So Q sub 1 is q sub 1, which is the amount delivered by a given cab firm at that price, times the n cab firms in the market. N1 cab firms in the market. So there's N1 firms. Each delivers little q sub 1 of rides. And you can see at that point, they each make some profit. So what you can see at that point is that at E1, at a price of P1, they're making some profit. The price is set equal to their marginal cost.

I'm sorry, they're not making a profit. My bad. You see at that point they're not making profit. Because what you can see is price is equal to the minimum of average cost. Remember, the no-profit condition is where marginal cost equals average cost. You can see at that point, little e1 in the diagram at the left, there is no profit. Because price equals marginal cost, equals the average cost. So we're making no profit, and that's a perfectly competitive equilibrium. That's what we derived last time.

Now, let's say the government comes in and says, you know what? And the welfare here. Just to do the welfare here. You see that the welfare of society is, producers make no surplus. There's no producer

surplus, there's no profits. Consumers have surplus of A plus B plus C. So consumer surplus is the area on the demand curve above the price. That's A plus B plus C. Producer surplus is profits, which are zero. Because it's perfectly competitive. So you end up with a total social surplus of A plus B plus C. And it all goes to consumers.

Now let's say, the taxicab owners aren't so happy about this. They don't like making zero surplus. And they manage to get a restriction. Such that the government says, there's only a certain number of medallions. And we're only going to let people drive the cabs if they have a medallion.

Now, let's say that the taxicab owners say, we're only going to limit the number of medallions to N sub 2. Instead of there being n sub 1 cab firms-- let's say medallions aren't for cabs, they're for cab companies. Instead of being n sub 1 cab companies, we're going to limit medallions so there can only be n sub 2 cab companies.

So what happens? Well, it's a little complicated so let's follow along. If there's only n sub 2 cab companies, then what that means is that given the same market demand, that means firms are now going to be able to make some profit. So up to, if you look at the right-hand side diagram up to N2 Q1, the supply curve is the same. But at that point, once you pass N2 Q1, then you have a point where that's-- at the old, efficient level of cab rides, the efficient level is, each cab company provides Q sub 1 rides. Well, you then run out of rides, but people still want more. So what happens?

Well, cab companies start to be able to charge more. The supply curve becomes upward sloping. They start to be able to charge more for their rides. Because now you don't have extra cab companies entering and competing those profits away. They start to be able to charge more for their rides. And you see that that upward sloping supply curve meets the demand curve at N2 Q2. So up to N2 Q1 it's the supply curve which it was, which is flat. Once you get beyond that, now firms can charge a higher price. Because they don't have to worry about entry. So you get a new supply curve that's flat until N2 Q1 then starts to slope up. That's S super 2. And S super 2 intersects the demand curve at point E sub 2. And that is the new equilibrium, with the higher price of P2 and a lower total quantity of Q2.

Now let's what that does to the firm. Well, a given firm at a price P2, they now-- they always set the price equal to marginal cost. That's the rule. Every profit maximizing firm does that. Well, they now are at a point little e sub 2, making a huge profit. Because at that point, their marginal cost is well above their average cost. So at that point, they make the profit of the shaded area pi in the left-hand side diagram. They make the profit pi, because once again [INAUDIBLE] go to the right-hand and then back to

the left-hand side. The right-hand side is, the new supply curve intersects the demand curve. At point E2. That's the price of P2. Carry that over the left-hand diagram, you see at a price of P2, they make a profit, the difference between that price and the average cost curve, which is that shaded pi box. So firms now make profits. And they didn't before.

What's happened to welfare in the market? Well, what's happened is consumer surplus has now fallen from A plus B to just A. Because the price is now P2. The consumer surplus is the area under the demand curve above the price. That's just the triangle A. Just the triangle A. At that new price, that's the consumer surplus. What's the producer surplus?

Well, now producers are making profits. And what they're making a surplus is the area below the price above their supply curve. The supply curve is this funky kinked thing I just described. So their new producer surplus is this, I don't know what the name is for, like a trapezoid with a curved side. Does that have a name? It's still a trapezoid? I don't know. Anyway. Curvazoid. B. Their new surplus is B. So producers now make surplus B. Consumer surplus is reduced to A. And what's happened to C? C is gone. C is dead weight loss. Consumer surplus is now A. Producer surplus is now B. The darkly shaded area C is now the dead weight loss. And that's the dead weight loss, because once again, at the old marginal cost curve, at the old supply curve, these are trades which both the producer, which is the taxicab company, and the consumer, which is a person riding the taxi, were happy to make. And they're not being made now. So we've now lost an amount C, dead weight loss. Sorry about the confusion.

Questions about that? Now, here's my question for you. You can go home and think about that, and hopefully it'll be clear in the examples on Friday. But let's ask a slightly deeper question.

Does this mean that if you become a taxi driver today, you will derive producer surplus of B from driving a taxi? Why not?

AUDIENCE: Because you have to pay that lump sum to get--

PROFESSOR: Because the point is, you have to get into the market, and to get into the market you need a medallion. And the guys with the medallions isn't going to hand them over to you for free. So let's say this guy's retiring as a cab driver. He's got his medallion. You come up him and say, I want to be a cab driver because I see this big producer surplus area B. [INAUDIBLE] medallion. What's this guy going to say? He's going to say, well, wait a second. If I give you my medallion, you're going to make that profits

of pi. That's the profit you make by being a taxi driver in this market. So what should he do? What should he do?

AUDIENCE: Sell it to you.

PROFESSOR: He should sell it to you. And how much should he sell it to you for? Pi minus a penny. And you might say, well, that's ridiculous. I won't pay pi minus a penny. Then I'll make nothing. Well, but he will. He'll pay minus a penny because at least he'll make a penny. Now, you might say a penny, a dollar, $5, $10 whatever. But the point is that he'll sell it for very close to pi. Because there's someone out there who's willing to pay close to pi to get that. As long as there's a little bit left. So it's a little bit less than pi. They'll pay it. But what that means is having paid it, you don't make any money.

So let's do the extreme example where he's willing to sell it for $1 less than pi. What that means is you having bought it for $1 less than pi, you don't make any money as a cab driver. So wait a second. This is weird. We've just restricted the market. We've said there's all this profit to be made. And yet you're a cab driver and you make no profit. What happened to the profit? Who got it?

AUDIENCE: [UNINTELLIGIBLE]

PROFESSOR: The cab drivers who were originally issued the medallions. The first generation cab drivers who got the medallions got all the money. So in fact, taxicab medallions do nothing [INAUDIBLE] taxi drivers. All they do is enrich the set of people who originally lobbied for them and got them. OK. Yeah.

AUDIENCE: But wouldn't he make his money back the same day he sold it, given that he can get the same price for his--

PROFESSOR: Wouldn't he-- No, but the point is that basically, what he's done, or you're saying that when he goes to sell it. So, in other words, the taxicab medallion is worth a certain amount of money. But that would be embedded in the money he would charge you. So he's not dumb. He's straightening out the supply curve, he's a smart guy, you should have picked someone else to negotiate with. He's going to say, look, I'm going to charge you enough so that you'll only make $10 forever on having this. I'm going to charge you enough so that basically, you will not make any money even when you go to get rid of it. So basically, what you'll do is, you'll have to pay him so much. So let's say the way it works.

Let me give you an example. Let me come back to that one in the context of an example. So what we know is that basically-- and this is in Perloff, give you some interesting facts on this. We know that taxicab medallions are really limiting. For example, we know that Tokyo has five times as many cabs as New York City, despite the fact that New York City's bigger than Tokyo. And Washington DC has ten times as many cabs as San Francisco. Despite the fact that Washington DC is smaller than San Francisco. I'm not from San Francisco. You can always get a cab in Washington, I don't know how hard it is to get in San Francisco. But there's 10 times as many cabs in Washington.

And this is reflected in the value of a permit. So in San Francisco, what you do, and this is sort of an easier way to think about it. What he does is, he doesn't sell you the permit. In San Francisco they don't sell it. He rents it to you. So you never get to own it. He rents it to you. And in San Francisco, the typical permit costs $42,000 a year to rent. So if you want to be a cab driver, you've got to pay $42,000 off the top before you earn a dollar. And then he rents to you, when you're done, he takes it back. So in substance the way-- now, if he was selling it, I can describe it to you. Involves the fact that he would embed your future asset in his sale price. That involves some complicated finance that we'll get to later in the course. So think about renting it, that's easier. He'll rent it to you for the entire surplus pi, or pi minus $10. And in San Francisco that amounts to $42,000 a year.

In New York, New York originally had 12,000 permits they issued in 1937. They issued 12,000 permits for $10 each. They have not issued a new one since. Literally, there are no more cabs allowed in New York City than there were in 1937. A typical taxicab medallion, which sold for $10 in 1937, now sells for $400,000. Now once again, you typically don't sell. You typically rent it out. But the point is, that taxicab medallion, which embeds the entire future stream of having the right to drive that taxicab, is worth $400,000.

So what have we done here? What we've done-- and in Boston, by the way, a taxicab medallion's worth about $250,000. Think about that the next time you're standing in the rain waiting for a cab. You're standing in the rain waiting for a cab because some guy in 1930-something got a grant from the government worth $250,000.

But the current cab drivers don't get crap. A taxicab driver in your city makes $10-12 an hour. It's not a very fun job being a taxicab driver in New York City, unless you like taking your life in your hands every time you go out on the streets of New York City. They make $10 to $12 an hour. After paying the enormous amount they have to pay to rent their taxicab medallion.

Now, this is not the only example we have in the world of something we call occupational restrictions. There's lots of examples. Probably the most prominent example, that may be relevant to some of you. I hope the taxi cab driver won't be relevant to you guys. But the doctor example might be. A great occupational restriction is the AMA and the education, the institute that educates doctors puts a limit on the number of medical residency slots, that determines how many doctors there can be in America. As a result, we all pay more to go for our medical care, than we would if more doctors were allowed. And you might say, that's outrageous. But why, obviously, how would the AMA defend this? And how would you defend any occupational license? Yeah.

AUDIENCE: The smaller the amount of [UNINTELLIGIBLE].

PROFESSOR: Yeah. You don't want everybody being Dr. Nick. You want-- come on, you guys got to get Dr. Nick. Raise your hand if you know what I mean when I say Dr. Nick. Good lord, what is wrong with you people? OK, homework for this course, you've got to watch one episode of The Simpsons. Before the end of the term. This is crazy. Dr. Nick is the terrible doctor on The Simpsons. You don't want this terrible doctor. You don't want these terrible doctors operating on people, so we have these restrictions to make sure doctors are good.

And it sounds like a good idea. But next time you hear it, remember. It's not just making sure there are good doctors. There are probably plenty of people who would be good enough doctors who aren't let in because there are not enough slots. It's also a way to make sure doctors earn lots of money.

And it's not just the government that does this. There's no government involvement here. These are private associations which license. And they restrict, plumbers, and doctors and optometrists, and all these other things are limited. Ostensibly to keep quality up, but in reality often to make sure that there's some surplus being earned by this initial generation who puts puts them in place. Yeah.

AUDIENCE: So is the relative effect on the market smaller for doctors because they're not selling each other permits?

PROFESSOR: Well, what's different with the doctors is, since it's not a permit but an ongoing limit, then every doctor makes the pi. There's no selling. So the effect on the market is no different. So imagine

here, instead of it being a medallion, there's a limit on how many cabs could run. And that limit was randomly reallocated. Cab ran out, and then new people went in. Then each generation would-- then you wouldn't get the thing where the first generation wins. Each generation should win. But you still get the same distortion of the market. The same profit being made. It's just that instead of the profit all accruing to the first generation, there'd be an ongoing approval of that profit to each generation of doctors. Yeah.

AUDIENCE: Professors and tenure, is that also related to--

PROFESSOR: Professors and tenure would be another very good example. Basically, an occupational restriction. The difference is there's no limit to how many tenured professors there can be. So basically there's no sense in which, if there's more demand for education, a new university couldn't start up and have tenured professors. There's no situation in which a university couldn't just say, we're given tenure to any Tom, Dick, and Harry who walks in off the street. There's no stopping that, because tenure is determined by the institution. So in that sense it's not an occupational license, because there's no board which determines tenure standards. Thank goodness.

So we'll come back. So that's what we were talking about welfare. You'll review this more in section on Friday. On Wednesday we'll come back to talk about monopoly.

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