[SQUEAKING]

[RUSTLING]

[CLICKING]

JONATHAN GRUBER: So let's continue our discussion of welfare economics. Just to review where we are, the first set of lectures in the course were about positive economics-- about understanding where supply and demand curves come from and what they mean. Now, last lecture, we turned from positive to normative economics and actually making judgments about whether things are good or bad.

And we introduced the concept of welfare, economic welfare or well-being. And we talked about consumer surplus, which is a measure of how well-off consumers are made by a given exchange of goods and services, and producer surplus-- how well-off produces are made.

We're going to start our lecture by proving what's modestly called the first fundamental theorem of welfare economics, which is that competition maximizes welfare. So this is basically taking our positive economics and meeting our normative economics. That is, we are going to talk about how the model we've derived so far, which is the equilibrium under perfect competition, happens to also be the outcome that delivers the maximum well-being to society.

So let's step back. Well-being we called welfare. How do we define the well-being of society? Well, we're going to start with a simple definition, which is we're going to at least say that social welfare-- social welfare, the total welfare of society-- is simply consumer surplus plus producer surplus.

That is, we're not going to put any different weights. We're not going to say we like somebody better than another. We're just going to say, look, surplus is produced by a transaction. And we just care about the total surplus that's produced.

And later, we can come to help you about consumers versus producers, and we will.

But right now, let's just say we care about the total surplus that's produced for society. How much benefit is produced by this transaction?

Well, the benefits produced by this transaction is going to be the surplus generated for consumers by that transaction and the surplus generated for producers by that transaction. So our total measure of social well-being is going to be the sum of consumer and producer surplus.

And we are going to prove-- as I said, you don't need to know this. But in [INAUDIBLE] it's called the first fundamental theorem of welfare economics, which is that under the assumptions we've made-- which are many-- under the assumptions we've made, the competitive equilibrium where supply equals demand is the point that maximizes social welfare.

That is, the key insight is the point that the market naturally delivers. The equilibrium that's gained by the market naturally happens to be the point that also makes society as well off as possible-- a very profound result. That is, the positive conclusion, which is that supply and demand will meet at a certain equilibrium, delivers a normative conclusion, which is that equilibrium is the point which maximizes social welfare.

Now, the best way to see this is just graphically. So let's go to Figure 10-1. Figure 10-1 has supply and demand curve. Once again, whether these are curved or linear, it's still the basic idea of supply and demand curve. So curve, supply and demand curve, are things which are more constant elasticity type curves. But that doesn't really affect the intuition.

We have here the triangles of consumer surplus and producer surplus. So consumer surplus-- give me the letter. Somebody raise their hand and tell me which letters on this diagram correspond to consumer surplus, and why. Which areas denoted by which letters correspond to consumer surplus, and why? Yeah?

AUDIENCE: R and v.

JONATHAN GRUBER: R and v. And why is that?

AUDIENCE: Because the price is-- it really [INAUDIBLE] here in between the supply and demand

[INAUDIBLE].

JONATHAN GRUBER: Exactly. Everything below the demand curve and above the price consumer surplus. So, r plus v. So therefore, what's producer surplus? Same person.

AUDIENCE: S, t, and u.

JONATHAN GRUBER: S plus t plus u is producer surplus. So, consumer surplus-- r plus v. Producer surplus is s plus t plus u. You can see, those of you who are graphically oriented, can immediately see the sum of those two triangles will be maximized at the intersection of the curves and nowhere else.

So for example, let's think about the case where I say, well, look, it's a shame the price is that high. We ought to make the price lower. Let's set a new price. So let's have the government mandate a new price at P2. Suppose the government intervenes and says, we're going to set a price ceiling. We're going to say no one can charge more than P2 for their product. And won't that be a good thing because the consumers will be better off? They'll pay lower prices. Well, what does that do? What does that do to consumer surplus? Well, consumer surplus used to be r plus v. It instead becomes r plus s, which is bigger. Consumer surplus rises. You lose the triangle v, and you gain the rectangle s. But the key point is at the price P2, yeah, that becomes the new consumer surplus.

The new producer surplus is what? At that price P2, what's the new producer surplus? Someone raise their hand and tell me. Yeah? It's t. It drops to t. Producers just get below the price above the supply curve.

So what has happened to total social welfare? It has fallen by the amount v plus u. Total social welfare has fallen by v plus u. So in some sense, two things have happened here. We've set this price.

The first is a transfer. We have transferred the rectangle s from producers to consumers. s used to be part of producer surplus. We're now giving it to consumers. So first thing we have is a transfer. That was probably the idea of this policy-- make consumers better off. So we transferred what used to be producer surplus to consumers. That's the rectangle s. That's the first thing that's happened. So thing one that's happened is a transfer of s.

But the second thing that's happened is we have created what we call a deadweight loss of u plus v-- a deadweight loss of u plus v. DWL-- Deadweight Loss. What is a deadweight loss? That is the net reduction in welfare from trades that are not made.

The deadweight loss-- this is a key concept we'll come back to, and I'll expect you know it in your sleep. It's that deadweight loss is the net reduction in social welfare from trades that are not made. The intuition here is that every trade that makes at least one party better off without making the other party worse off is a good trade to do.

Under the assumption we've made so far, if you ever trade that increased consumer surplus or producer surplus or both, that's a good thing to have. Right? If my daughter has any song she wants to buy by Kendrick Lamar that she values at more than $1.00-- she gets them for $1.00-- anything which stops her from buying those songs is bad. She's losing surplus.

So basically, the key point is that deadweight loss is an inefficiency. We talked about how competition leads to maximally efficient production through cost minimization. Competition also leads to the maximum welfare outcome because that point is the point which makes society best off, defined as the sum of consumer surplus plus producer surplus.

But once again, I cannot highlight enough the depth of this insight. That this point which before today, you knew as the outcome. I showed you in the first lecture this is what happens when you have supply and demand. You get to this equilibrium that happens to be the very best place to be. And that's why we call it the first fundamental theorem. It's very important. Yeah?

AUDIENCE: But the idea then of since we're caring about social worth, even though the consumers are better off, there is not as many trades because the consumers don't get as much out of it?

JONATHAN GRUBER: I want to come to that. Let's talk about that. Let's go to another example to talk about that. Let's talk about interventions. Let's do it. Let's do an example. That was just to teach you the basic idea, but let's go on to a more explicit example of a

government intervention. Actually, I'll do it here.

Let me do an explicit example of a government intervention. And that will address the question which was just asked because I skipped over a key point, here. I'm always not sure the right order to teach these things.

So let's take example of a market. Let's consider the market for gas. So go to Figure 10-2. This is a market we talked about before, the market for gas. Imagine the market for gas is initially in equilibrium with supply curve S1 and a demand curve D. And it's initially in equilibrium at point little e1, with Q1 gallons of gas being sold at a price P1. That's initial equilibrium.

Now, imagine that there is an oil crisis because, for example, the oil company decided it would be good idea to drill eight miles underground horizontally. And it busts, and there are spills everywhere-- something like that, some random example like that. And there's a supply crisis. What happens now is suddenly, it gets more expensive to produce gas.

So the supply curve shifts upwards-- we talked about this last time-- leading us to a new equilibrium at point E2. And you remember, we talked about how the equilibrium works. Initially, if we think about it in steps, initially you've created an excess demand because gas companies no longer want to supply Q1 gallons at a price P1 from their new supply curve. So you shift along the demand curve to the new point E2, which is a new equilibrium. And all is well and good. Prices go up. That's what happened after Deep Water and things like that.

Now, imagine the government doesn't like that. Imagine the government says, well, we don't like that. We don't like the fact consumers have to pay more for gas. Consumers vote us out of office when they have to pay more for gas. So we are going to solve this by imposing a price ceiling. We are going to announce the price of gas must remain at its old level P1.

So let's go to Figure 10-3. Figure 10-3 shows what happens when the government imposes that price ceiling. Well, the first question is if the government imposes a price ceiling of P1, how much actually gets sold in the market? This comes to the question that was just asked. Well, this is sort of a new thing we've looked at, which is we have the situation where there's excess demand.

At the price P1, consumers still want Q little d. But suppliers are only willing to supply Qs, Q little s. See? Consumers still are working off the same demand curve. If the government says we still want the price to be P1, they're like, great. We still want as much gas as we had before. Supplies are like, no way. We're not going to supply it. If you're going to keep the price at that level, we're going to produce less gas because we have a rising marginal cost.

So if you're going to force out that same price, we're going to work our way back down the supply curve and produce less gas. So suddenly, you have a situation of excess demand that doesn't get resolved. Remember, last time, we said excess demand got resolved by moving up the demand curve. Well, you can't, here. You can't resolve that because the price is forced to be at P1.

Now, what determines what actually gets sold when there's a price restriction? Here's the way I like to think of it. I like to think of the actual quantity gets set by the constrained party.

So in this case, a price ceiling means that suppliers want or are asked to supply more than they're willing to, so they just say no. So you actually get the ultimate quantity in the market is Qs. It doesn't matter that demanders want Qd. They can't buy stuff that's not produced.

Likewise, we'll do examples later with a price floor, where consumers want less than suppliers want to provide. Then, it's consumers that decide what gets sold. So basically, whoever wants less gets to decide because you can't force the producers to produce more. We have a private oil industry, gas industry.

So you end up with Qs units of gas sold at a price P1. So what the price ceiling does is move you from E1 to E3. You would have moved to E2 without the government intervention. Instead, it moves you to E3.

And as a result, you end up with consumers-- consumer surplus-- being A plus C, producer surplus being E, and relative to an unconstrained world, not relative to the world before, but relative to without government intervention, you have a deadweight loss of B plus D. Yeah?

AUDIENCE: Why can't [INAUDIBLE] by producing stuff yourself?

JONATHAN GRUBER: Well, that's a very deep question. As I said, that we don't have a nationalized gas industry. We just have a private gas industry. There's a separate issue of-- a larger issue about whether private or public sector should be producing things. And that's beyond the scope of what we're discussing here. But for now, assume the government just has a regulatory role, not a gas production role.

The government, by the way, does have a little of a gas production role because the government actually has something called the Strategic Oil Reserve where they have millions of barrels they can actually release and release onto the market at certain times. The government does have a way to try to deal with this. But for now, let's assume that they're not going to use the Strategic Reserve, just regulate price.

So they regulate price. And what they've done is they've created a deadweight loss. So basically, if we think about it, what are the costs and benefits of government intervention?

The costs of government intervention are twofold. What are the costs of this price ceiling? There's two costs. Cost one is you've created an inefficiency. You've just created this deadweight loss because basically, if you didn't restrict things, there are people who would have bought gas to the right of Q sub S and to the left of E2. Those units between Q sub S and E2, where E2 intersects the x-axis, those are units where the consumer surplus plus the producer surplus is positive. Right?

You look at the unit right to the right of Q sub S. That's a unit that consumers would have happily bought at the new higher price and producers would have happily sold at the new higher price, but the government isn't letting it happen. So that's a deadweight loss. So that's an inefficiency. So that's the first cost-- the cost to society of trades that don't get made. And we call this an efficiency loss because there are efficient trades. Things are efficient if they make the whole-- the joint surplus is positive, if on net, people are better off. They're efficient trades which both sides were happy to make, and they can't make. So we call this an efficiency loss. But that's not the only cost to this policy.

What's the other cost? This is a hard question. Yeah?

AUDIENCE: Do we have to force the price to not be [INAUDIBLE] what it'd normally be?

JONATHAN GRUBER: Yeah, so there's enforcement. You have to go around and send regulators around to gas stations, make sure they're not charging the wrong price. That's true. I sort of say that's small. Let's think more of a theoretical-- not theoretical, but what's the other big source of-- yeah?

AUDIENCE: Isn't it the loss to producers? There's no new producers wanting to innovate and stuff like that?

JONATHAN GRUBER: There's sort of a dynamic. But once again, the producers think this may be a short-run thing. And once the Deepwater Horizon gets fixed, prices will be back down or whatever. But what's the other miracle of the market that we lose here? We talked about this the very first lecture. Yeah?

AUDIENCE: It felt like, related to [INAUDIBLE] entering and exiting?

JONATHAN GRUBER: No, there's entry and exit. But once again, let's rule out [INAUDIBLE] because it's just a short-run deal. Yeah?

AUDIENCE: Is it like how do you ensure that the people who value it the most--

JONATHAN GRUBER: Yes. There is allocative inefficiency. Remember, one of the things we talked about in the very first lecture-- I think we did. Maybe not. Anyway, one of the most important benefits of the competitive equilibrium-- it doesn't just deliver the right quantity, it delivers it to the people who want it the most.

So let's go back to figure 10-2. It's easy to see there. If you think about who gets gas at the initial equilibrium E1. And actually, no. But let's go 10-3. That's fine. So let's say we hadn't interfered, and we'd allowed the price to go to E2. Well, fewer people would have bought gas, right? The quantity would have fallen from Qd-- would have fallen all the way from E1 to E2. But the people who dropped out would have been who? The people who valued gas the least, the people who got the lowest surplus from it.

However, now, suddenly, you only have Qs units of gas, and you have Qd people who want them. Well now, who decides who gets them? Before, the market did the magic. The market made sure the people who wanted the units got them. Now, all

of a sudden, something else has to decide. So how do you resolve this?

Well, we actually an answer to this. We had a gas crisis in the 1970s. And the government imposed a price ceiling. And how did it get resolved? How did we decide then who got the gas? Does anyone know? Raise your hand and tell me if you know. Yeah?

AUDIENCE: [INAUDIBLE]

JONATHAN GRUBER: People waited in line. People basically sat in their cars and waited in line. Now, so essentially, if you think about it, goods are going to get allocated somehow. If the market doesn't allocate them, there'll be another less efficient allocation mechanism.

And basically, why is it inefficient that people waited in line for gas? There's actually two reasons. One is sort of cute. But what's the main reason it's inefficient for people to be waiting in line for gas? Yeah?

AUDIENCE: They're wasting [INAUDIBLE].

JONATHAN GRUBER: Yes, the opportunity cost. Point little 1, you have the opportunity cost. You have the fact that that time I spent waiting in line, I could have been working or having fun, but certainly something I would've enjoyed more than waiting in line for gas. I think we'd all agree that there's something we'd rather be doing with our time than waiting in line for gas. Unless you really like the music in your car stereo, and you can't listen anywhere else. I don't know what the story would be. But I can't imagine that many of us would prefer to wait in line for gas than do something else. So there's the opportunity cost.

That's an inefficiency. Society is losing out because you are not using your time in the most productive way-- in the way that maximizes your welfare. What else? What's the other small, other cost? Yeah?

AUDIENCE: Isn't waiting in line [INAUDIBLE]?

JONATHAN GRUBER: Yeah, people used gas waiting in line. So there's literally the technical inefficiency. And remember, this is back when cars got like 8 miles to the gallon. So you'd get to the front line, get gas, and have to go back to the back of the line again because

you used so much gas, plus not to mention the pollution and all that other stuff. So basically, this is the inefficiency from a non-market allocation mechanism, which is that people could be doing more productive things and not wasting gas waiting in line. Yeah?

AUDIENCE: Is the excess of demand Qs minus Qd, or Qs minus E2?

JONATHAN GRUBER: No, Qd-- because we fixed the price of P1, so it's Qd minus-- since we fixed the price of P1, people want-- what's the demand at that price? Qd, but it's supplied at that price Qs. So that's the excess demand. So now, yeah?

AUDIENCE: You mentioned how the market makes sure that people who want the gas the most can get it. But isn't the one thing it involves like however much they're willing to spend on it? So does this market assume that all people make the same amount of income?

JONATHAN GRUBER: No, it doesn't. But it does assume that basically, the market-- and this comes to the tradeoff. What's the benefit of this policy? Which you've raised with your question, which is equity.

I've defined consumer surplus as simply being what the market delivers. So basically, rich guys have more consumer surplus than poor guys. That might not seem fair to people. As a result, the benefit is equity, which is that if you-- that everyone gets gas at a lower price. Rather than the price rising, the people who drop out may actually not be the people who don't need to drive. They're people who can't afford to drive, so they drop out. Remember, where does the main curve come from? It comes from utility maximization. That's a constrained maximization. So the people who drop out may be people we want. Maybe they're people who have to lose their jobs because they can't drive to their jobs anymore. That's unfortunate.

So basically, the benefit of this is equity. And that raises something we're going to come back to over and over again in this class, which is what we call the equity-efficiency tradeoff. The equity-efficiency tradeoff, which is there are many government policies which make society more equal, but along the way deliver deadweight loss. And I'll actually tell you later in the class how to optimize across that problem-- how to optimize across the tradeoff between equity and efficiency.

But for right now, I just need you to understand that there's a tradeoff. Yeah?

AUDIENCE: [INAUDIBLE] equity. Like [INAUDIBLE] let the people who [INAUDIBLE] because if there's no price ceiling, then the people who are able to pay the most money will get it, right?

JONATHAN GRUBER: Yeah, exactly. So the point is-- right, the people who-- was there more to your--

AUDIENCE: Yes. But if there's a price ceiling, then wouldn't it just [INAUDIBLE]?

JONATHAN GRUBER: Exactly. At issue is a different kind of inequity. So if you're worried about-- so in some sense, the rich guy would say, well, that's not fair to me, Just because I've got a productive job I could be doing. And someone else has extra time. Why should they get the gas instead of me? So you're right. There's always an inequity. That's a great point.

When I say "equity," I implicitly mean what we call-- ethics is a very important point. Whenever I say equity in this course, I implicitly mean what we call vertical equity. Vertical equity is rich versus poor.

There are other kinds of equity you might care about like who has extra time versus who doesn't have extra time. And that's a good point. But for now, when I say equity, I'm only thinking about rich versus poor. When we're thinking about government policy and the equity-efficiency tradeoff, we're really thinking about vertical equity. Other questions about that?

So let's do a couple more examples to drill this intuition home. Let's do a couple more examples because this is a very important point. Example A-- let's talk about ticket scalping.

I love going to music concerts. I went to my 51st concert of the year last year-- last night, sorry. Went to my 51st concert of the year. I love going to music concerts, so I know a lot about the music business. And ticket scalping at concerts is a big deal. For those of you who don't know the term, this is the idea of buying tickets essentially on a secondary market.

So let's use the example of Adele. So Adele, about two years ago, went on tour for

the first time in four years to back up an incredibly successful album. And folks really wanted to see her life because she had a big fan base. She was quiet for a while. She made an album. People really wanted to see her live.

She wanted to make sure her fans could afford to see her. So what she did is she said, I'm going to price many tickets for $40 and the highest tickets at $150, which is really, really cheap. So my daughter's going to see J. Cole tonight. And she's paying like $150 for a mediocre ticket, so $40 to $150 is really cheap. But she's saying, I want to deliver consumer surplus to my fans. I want to make sure my fans can really enjoy this and get surplus.

But what happened? Well, what happened is that the tickets sold out instantly-- like, literally instantaneously. And the major purchasers were what we call scalpers, who are essentially professionals who buy tickets and then resell them on what we call the secondary market. You might have heard of StubHub or other sites like that, where you essentially go on and buy tickets to sold-out events. And the prices on StubHub were much higher. It was about $1,500 for good ticket-- about 10 times what she'd set the price at.

So basically, who's getting the surplus? Not the fans, the scalpers-- the people who were quick enough to get online who had bots set up, so that the second it went online, they went online and got the tickets. They had thousands of bots set up, essentially. Somehow, they got around the "click this if you're human" box. I don't know how they do that. But essentially, I'm sure it's smart programmers. You guys can probably do that in an hour as an extra-credit project. They got around it, and they bought. And so essentially, Adele actually didn't create surplus for her fans. She created surplus for scalpers.

Now, it didn't used to be this way. When I was a kid, we didn't have a secondary market. We waited on line. So when I saw my first concert in 1981-- can you guys believe that? In 1981, I saw The Cars. How many of you guys have heard of The Cars? Oh, god. Anyway, I saw The Cars, and I had to wait on line for hours to get tickets because that was the allocation mechanism.

So let's think about whether life is better or worse. Because on the one hand, scalpers get money. On the other hand, people don't waste time waiting on line. So

it really comes down to the same equity tradeoff we talked about before. Now. As a 16-year-old in 1981, I could not have afforded to pay, probably, the secondary market price. But as I was 16, I had nothing do with my time, so I was happy to spend hours waiting on line.

But on the other hand, you could say someone is very productive, who is a big fan who is very productive and could be out inventing new products if they weren't standing on line. They might say that's really inefficient. I'm happy to pay $1,500 and spend my time inventing new things, rather than have to sit around waiting on line. So it's not clear which is the better or the worse system. It's hard to say. Yeah.

AUDIENCE: [INAUDIBLE]. So like the demand for [INAUDIBLE] will be only changing prices and all--

JONATHAN GRUBER: Well, no, but here's the point-- that's a great point, which is that, in some sense, what the scalpers do is undo Adele's action and create a truly efficient market. So think of the scalpers as essentially undoing Adele's action, which distorted the market.

So you have a market for Adele tickets which is at equilibrium at $1,500. Adele tried to set a price ceiling at $150, seemingly selfishly, saying, I'm going to give up my surplus for my fans.

But unfortunately, it didn't work out that way. What happened was the market re-equilibrated at $1,500, but that extra surplus didn't go to Adele. The consumer surplus still remained above $1,500. The difference was that extra gap between 150 and 1500 didn't go to Adele. It went to the scalpers.

So it's probably more efficient than waiting online, because waiting online has inefficiency, whereas instantaneous bidding is more efficient. But in some sense, the efficiency gain is being delivered not to consumers, as Adele wanted. It's being delivered to scalpers.

So basically, now, there's another alternative. What could Adele have done instead? What's another way Adele could've approached this?

She could have auctioned her tickets online. She could've said, look, I know that I can't manage to deliver $40 tickets to my fans. I just can't defeat the scalper

system. But why should the scalpers have the money? I'm going to auction my tickets.

And essentially, she could have set up an efficient market online, where people bid. And then you would have gotten the efficient outcome. And you wouldn't wait on line. You would have bid.

Now, it would've been inequitable outcome, but basically, the same fans would have gotten the tickets as in the end got them from scalpers. But instead of paying $1,500 to the scalpers, they'd pay $1,500 to Adele. And probably that's a better outcome. I mean, Adele doesn't need the money, but at the end of the day, if Adele's generating that amount of goodwill from her fans, it seems like she should get the money, not a bunch of scalpers. So I guess probably I'd rather have her have it than the scalpers.

Now, Ticketmasters tried to set up auction systems, recognizing this problem, and they're not really taking off. And it sort of speaks to the fact that people don't really like to think about economics. That basically, people were like, yeah, but if you auction, that's ripping off the fans. That's no fair.

And Ticketmasters would say, well, you're getting ripped off anyway, just by scalpers. And they said, no, I can still get online first and get my ticket. And people just didn't like it, thought it was unfair, even though it's almost certainly a better outcome for society that Adele should have the money rather than the scalpers.

Which speaks to the fact that morals matter in markets. We like the way these markets abstract amoral concepts, but morals do matter. And that basically, it sort of matters you sometimes can't do the right thing because it might not be the thing that makes consumers willing to participate.

So that's one example, scalping. Another example-- food banks. Food banks are organizations which provide-- oh, yeah, go ahead.

AUDIENCE: What if you force everyone, I mean, when you buy a ticket you have to put your name on the ticket, so that only you--

JONATHAN I've thought about that. So if I could do anything I wanted in life, I'd be a rock star.

GRUBER: And I thought if I was a rock star, it would be cool.

I'd have a concert for my mega fans, where they'd have to prove who they were, and I'd have a bracelet and stuff. It just seems like it's too hard. It seems the technology is just too hard.

So actually, there's a really cool example. So I was on the phone this morning with rock and roll promoter who's doing a super cool thing. So as the election approaches, I will nag you guys to vote. Voter turnout among the young is an enormous problem the US.

So she is running a series of concerts around the country where if you show a picture of yourself outside a polling place, you get into the concert for free, to try to promote voting among young people. It's super cool. It's called "I voted."

You can look it up on the web. It's kind of a cool thing. There's a couple of concerts here in Boston. They're all over the country.

So you could think about things like that. The question is ultimately, do people Photoshop their picture in front of the polling place? It's all just a question of enforcement.

Let's talk about food banks. So basically, these organizations provide free food to the poor. And the biggest one is called "Feeding America." Feeding America has food banks all over the nation, and they provide free food to the poor.

Now, their goal, then, is they have to figure out where to send the food to get it to people who need it the most. Now, a market does this naturally. Basically, if people want more turkey in location A, then all of a sudden, the price for turkey goes up.

All of a sudden, the store runs out of turkey. It says, wow, I can charge more for turkey. It raises the price, and it equilibrates the market.

So a market solves for sending the right food to where people want it. But the problem with Feeding America is that they didn't have that market. So they had to decide where to send stuff. And they'd screw up. They'd send potatoes to Idaho, where they're drowning in potatoes, stuff like that.

So it was very hard for them to figure out where to send the food exactly where people wanted it the most, because they didn't have the market mechanism. They wanted to give it away for free. That defeats the purpose if they charge for it.

But they didn't really know, they didn't have the market to tell them where folks wanted which foods. In the real market, if you want real food, you bit the price up. In their market, you couldn't.

So Feeding America came up with a really clever solution. They made a virtual market. They said to each food bank, we are going to give you a fake budget of x $100,000, and you bid for which foods you want based on what the people in your area want.

And we'll then allocate it according to those bids. So they got the market mechanism working without the food banks having to actually give any money. So in that way, they massively reallocated food.

They suddenly said, hey, the one from Idaho is bidding really high for turkey and not at all for potatoes. Maybe we should send them more turkey and the potatoes elsewhere. So they essentially got market signals from a non-financial transaction. It was a super cool idea.

And it was a huge benefit. They were able to effectively allocate about 50 million pounds of food through this mechanism, making sure that food got to the folks that needed it. So there's an example how you can use a market mechanism without actually-- while not violating equity.

The food was always free, but by setting up these virtual prices, they managed to get the food delivered to where people wanted it the most. They let the market send its allocative signals. They let the market be allocatively efficient, send signals of where people wanted the food, without actually violating equity. Questions about that?

Now, let's go to the hardest, but my favorite example, which is taxi medallions. This is a hard example, but it's a really cool one, and it ends with a great story. Taxicabs-- now, cast your mind back pre Uber. Go back 10 years, or even-- yeah, about 10 years.

Taxicabs were the only way you could get around town if you didn't have-- if you wanted to get from point A to point B in a car, you didn't own one, you took a taxi. And this was a great example of an economist's perfectly competitive market, in theory. It's identical product-- you want to go from point A to point B.

There could be lots of them riding around the streets. You can price compare, because cabs are coming by all the time. It should have been a very effective, perfectly efficient, perfectly competitive market.

But it wasn't, because every city limited the amount of taxicabs that were allowed in their city. Every city had a system where to be a taxicab, you had to have what was called a "medallion." It wasn't really a medallion. It was originally a medallion. It's just a piece of paper, actually.

And they regulated the number of taxicabs allowed in the city. They said, we're only going allow x many taxicab drivers in the city. And every city did this.

Now, we're going to do both a positive and normative analysis of this policy. Let's start with a positive analysis. What did this policy do?

Now I'm going to go to figure 10-4. Figure 10-4 will be one of the most complicated figures we do in this class. I'm going to go through it as slowly as I can, but please stop me if it's not clear. This is one of these figures we'll go back and forth between the two sides.

So on the right-hand side is the market. On the left-hand side is the cab firm. We're going to start by assuming all cabs are identical. We assume all cabs are identical, so one representative firm tells us about every cab firm.

Now, we start with the market. We have an initial demand, which is d. The line d, the blue line, is the demand for taxicabs. An initial supply curve s1, we're going to assume that essentially, in a perfectly competitive market, you have a flat, long run supply curve.

You have perfectly elastic supply. Anybody can just grab a cab and start driving. Once again, in a cab market without medallions, anyone could throw a taxi sign on the car and start driving around, picking people up. So it's effectively perfectly entry

and exit, so it's a perfectly competitive long run market, therefore, flat supply at s1.

So the initial equilibrium is at point big E1. We have Q1 rides, big Q1 rides per month. And that amounts to-- so you have q. That's the equilibrium.

Now, how many firms are there? Well, we know many firms there are, because we say at that price, p1, we go to the left. We know that firms will produce where marginal cost equals the average cost at the minimum of long run average cost. We proved that a couple lectures ago.

Therefore, if the price is E1, we know each efficient firm will produce little q1. If each firm's going to produce little q1, and the total amount of rides is going to be big Q1, then that implies little n1 firms. So let me go through it again.

Supply equals demand at big Q1. That gives you a price P1. Now we shift to the left. At that price P1, we know that each firm will choose to produce little q1 rides, because that's where price equals marginal cost equals average cost.

Now we go back to the right. We know if each firm is providing little q1 rides, and you need big Q1, then there must be N1 firms. Questions about that? That's the initial equilibrium.

And at that point, there are long run zero profits. Consumer surplus is a plus b plus c. c, by the way, is the gray area on either side of the dashed line. a plus b plus c, we mark it twice because it's confusing, the dashed line there.

So the blue area, the green area, and the gray area are the consumer surplus. And what's the producer surplus? What's the producer surplus? Raise your hand and tell me. Yeah.

AUDIENCE: [INAUDIBLE]

JONATHAN GRUBER: Zero because?

AUDIENCE: [INAUDIBLE]

JONATHAN GRUBER: Yeah, there's no-- in long run equilibrium, there's no profits. In long run equilibrium, price-- remember, profits are price minus average cost, but price equals average

cost. So there's no profit, so it's all consumer surplus-- all well and good.

Now let's say the government comes in and says, we're going to have a medallion system. So let's say we're going to have a system where only little n2 cabs are allowed in the market. Little n2 are the only number of cabs allowed in the market.

So what is the new market supply curve? Start on the right. What's the new market supply curve? Well, up to little n2 times q1, nothing's changed.

Each cab company used to provide little q1 rides at a price P1. So up to the point little n2 little q1, we're on the same supply curve we used to be on. But then things change.

Why do they change? Because now, let's say riders want more than little n2 q1. Well, you can't deal with that by entry. You have to deal with that by the existing cab drivers working more.

But if they work more, supply curve is upward sloping, because now marginal costs can be rising. Before, the reason the supply curve was flat when you went to the right of little n2 little q1, as you moved to the right, you just got more entry. And everyone still produces their efficient level of little q1.

Now, when you can't allow more entry, firms have to produce more. And suddenly, they're not at the cost minimizing point. They're riding up their marginal cost curve.

So the supply curve becomes flat to that point, and then becomes upward sloping. And that's s2. s2 is the red line that is flat to the left of little n2 little q1, and then becomes upward sloping.

And the new equilibrium is at point E2. With n2 firms-- by law, you can only have n2 firms-- producing little q2 rides each. And your new equilibrium is big Q2. And that new equilibrium price is P2. The new equilibrium price is P2.

Now P2, if you go to the old-- P2 is the point, if you look at the price as P2, but forget the a c2 curve. Focus on the a c1 curve.

The average cost function hasn't changed. It's still a c1. So if the price is P2 and the average cost curve is a c1, they're going to produce where price equals marginal

cost at little e2. So let me back up. Let's go back to the curve on the right.

The equilibrium is now big E2. That's at a price little p2. Now shift to the left. At a price of little p2, firms produce where price equals marginal cost.

Price equals marginal cost at a quantity little q2. So firms produce little q2, because that's the point at which price equals marginal cost. They produce at little q2, if they're making little q2 units at a price p2, their earning profits of pi, the shaded area, because they are producing units at price above marginal cost.

And they're producing little q2 units, so every unit they produce, they're earning profits on. So the taxi medallion workers or the taxi companies are now making money. They're making profits. Questions about that? Yeah.

AUDIENCE: [INAUDIBLE] the idea that if you allowed for people, more people to go then, profits would be [INAUDIBLE]?

JONATHAN GRUBER: Yeah, but they're not allowing them in. They're making profits. So imagine where we started at E2 and allowed free entry.

Then you'd see, basically, more firms willing to drive the price down to P1. But we don't allow that, so it's profits. It's a barrier to entry, which creates profits, which breaks us from our long run flat supply curve. We talked about one of the reasons why that loop won't be flat.

So now, let's move to the normative. Is this a good idea or not? Well, let's look at the welfare implications. What's happened?

What's happened is consumers used to have a surplus of a plus b plus c. Now, their surplus is what? What's the new consumer surplus? Raise their hand and tell me. Yeah.

AUDIENCE: A.

JONATHAN GRUBER: Just a, because the line below the demand above price is just a. Producers used to have zero surplus. What's their new surplus? Behind you, yeah.

AUDIENCE: B.

JONATHAN GRUBER: B, because it's the area above the supply curve, below the price line. And c is what? The deadweight loss. Those are transactions no longer happening-- the deadweight loss.

So basically, normatively, you can pose the problem as the following-- is it worth society losing the area c in order to transfer the area b from consumers to taxicab drivers? That's the way to think about this problem. Let me say it again. It's very important.

Essentially what the government policy is doing is saying, I'm going to transfer b from consumers to producers, even though it's going to cost me c in deadweight loss. That's what the government's saying. That's the government's position.

Now, why is the government wrong? Why, in fact, is that not the proper statement of what happens? It's very complicated.

What does the government miss when it says, I've made the drivers better off? Sure, I've created deadweight loss, and I make consumers [INAUDIBLE], but at least I made these drivers better off. They live terrible lives.

There's articles in the paper all the time about suicides of taxicab drivers. It's terrible. What did they miss? Yeah.

AUDIENCE: The cost of taxis goes up.

JONATHAN GRUBER: They've missed the fact that the taxicab drivers have to buy the medallions, that the limited number of medallions aren't just given to taxicab drivers, they're bought. And the taxicab drivers-- what is a taxicab driver willing to pay for a medallion? They are willing to pay, in the limit, the total surplus they get from driving the cab minus $1 or minus some amount that they need to eat.

So if suddenly, in a world with no restrictions, with no taxicab medallions, if you said we need a piece of paper to drive a taxi, but anyone can have it for free, what would it be worth? Zero. But in a world where you say if you have this piece of paper you can drive, and drivers earn profits pi, what will the taxicab medallions sell for? Pi minus some small amount.

So actually, who wins? The taxicab medallion owners. And who are they? They are

random folks who happened to get these things in 1920 when they were issued, and their descendants, and people who bought them.

So this leads to my great story, the taxicab medallion king of Long Island was a guy who happened to have a bunch of these taxicab medallions. And as they went through the roof, they got worth a lot. In New York, New York had 12,000 permits, and that number did not change since they originally sold for $10 each in 1937.

1937, you could have bought [INAUDIBLE] for $10, and they issued 12,000 of them. They've never increased it. Right now, a taxicab medallion in New York is worth $400,000.

The taxicab King of New York is a guy who lives in Long Island who made so much money that he actually, for his kid's bar mitzvah not only had rented out a hotel, whole basketball-themed bar mitzvah, but hired Nicki Minaj. This was paid for by area b. This was paid for-- so in fact, it's not the taxicab drivers that make out of this policy. It's the taxicab medallion King of New York.

Now, here's what happens-- what happens, then, when Uber comes in? Who's the big loser? Not the taxicab drivers, the taxicab medallion owners.

So everyone tells you Uber is a bad thing because these poor taxicab drivers are starving. Taxicab drivers were always starving. It was always a terrible life.

The difference is pricing medallions is down like 50%. And I cry no tears for the Nicki Minaj-hiring class of America. So basically, when you think about people saying Uber is bad, it steals jobs from taxicab drivers, no, it doesn't.

It steals money from taxicab medallion owners, and that is something we might be OK with. So feel fine taking your Uber. It's a great thing.

So let me stop there. I'm going to come back. We'll come back next lecture. And we will start talking about monopoly, the market structure, not the game.