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PROFESSOR: Once again to put this in the context of where we are. We're talking about producer theory. And we're talking about how firms decide how much to produce.

We started with a perfect competition, and that nailed down the fact that with under perfect competition we got the zero profit long run perfectly elastic supply curve.

We then, last time, talked about monopoly as another extreme and talked about how monopolists choose both their price and their quantity. They set margin around or equal to marginal cost. That gives them a quantity. And then they choose the price off the demand curve and how that leads to profits and how that leads to monopolists producing less than the competitive level.

And we also ended by talking about a perfectly price discriminating monopolist, one that can actually charge each consumer their willingness to pay and therefore, absorb all the social surplus.

Now, I want to come back and start, this morning, by talking again about price discrimination and realizing that, in some sense, we know that there's no such thing as perfect price discrimination. There's no monopolist out there charging us literally exactly what we're willing to pay.

But there are lots of examples of price discrimination in the real world. And sometimes they're kind of obvious. Sometimes they're not. But what they all have in common is the notion of trying to find some signal of our willingness to pay and using that to set the price.

So instead of being like our original monopolist, just setting one price. Monopolists are forever trying to find some signal, some underlying signal of our willingness to pay and using that to set the price.

OK. So for example, a classic example we know is airlines. OK. What airlines do-- Airlines charge you more, for example, if you book your ticket the last minute. And the notion of

course-- or towards the last minute. At the very last minute they may end up charging you less. But as you get close to the date when you want to leave, the price goes up.

The notion, of course, is that who is going to buy tickets close to the date they want to leave. It's largely going to be business people, not the vacation traveler.

The vacation traveler is going to plan ahead and buy far in advance. The one that's going to buy a week before is the business person who just got a meeting scheduled.

Business people are going to be less price sensitive. They're going to have a higher willingness to pay. They've got to get to the meeting. They're not paying anyway. The company's paying. And they're just to do what they need to get to the meeting.

So that's a less price sensitive population. So that's the population you want to hit with a higher price. So you want to price up tickets that you buy towards the end because those are more likely to be the people who are least price sensitive.

So let's ask another question. Somebody tell me why do movie theaters charge less for matinees than for movies at night? Why do movie theaters charge less?

If you go see the first movie of the day-- and you guys probably don't anymore. But when you were kids you did. And when I take my take my kids, I do. And that afternoon matinee movie costs less. Why is that?

Yeah.

Anyone want to take a chance at that? And related to it, you can also ask the question. Why do restaurants have early bird specials? Why, when you go to restaurant, often will they charge you less if you go there in the early hours as opposed to later?

So what's going on with that? Someone tell me.

Yeah.

AUDIENCE: They're not using up all their seats in the afternoon. So they might as well lower the price.

PROFESSOR: In the afternoon they're not. Although the truth is, a lot of the time they're-- If you look at a movie theater today, it's almost never full, except for like the opening night of a very popular movie. So that's part of it.

But let's talk about the demand side. What else is special about the type of people? Why don't you go on what's special about the type of people who want to see movies or go to restaurants at those different times?

They're not willing to pay as much.

PROFESSOR:

Yeah, they're basically people with a lot of free time on their hands. Right? The people who are going out to dinner early, the people who see movies in the afternoon, these are people who are unemployed or have little kids. And they're just looking to kill time.

And so basically, these are people who are willing to shop. These are people who are going to say look, I've got to fill in some time. I don't have to go right now. I can go any time. So I'm going to be more price sensitive.

The people who are going to dinner later, who are going out to the movie at night, they're working all day. They have no choice. They have to see the movie at night. Or they're in school all day. They have to see the movie at night. They're less price elastic.

So that's why you want to set the movie price higher at night. Alternatively, another reason could be-- One signal of willingness to pay is price sensitivity.

What's another signal? It's going to be income. Who's going to be seeing the movies during the day and going to the dinner early? It's elderly individuals and families with small kids who are the most resource strapped.

People who have plenty of disposable income are going at night. They're working. They're young. They're singles and young couples. They work all day or are in school all day. They go at night. They have more disposable income.

The people going during the day are the elders and the people with young kids who have less disposable income. And as a result they're going to be more price sensitive. So you want to charge them a lower price. So that's another example of price discrimination.

OK, why does Disney World charge you less if you live in the area than if you do not. This is true fact. Disney World charges you less if you're from Orlando than if you're not from Orlando. Why is that?

Someone tell me. Yeah.

AUDIENCE: I think the Disney can go any time. So you might as well you might as well take them to other places.

PROFESSOR: I mean, basically the idea is look, if I just spent a grand on a plane ticket to take my kids to Orlando to Disney World, I'm not going to kvetch over \$10 either way, getting in or not getting in.

But if I live in the area, I may or may not go. I can go to a park, instead. I can go do something else, instead. It's just one of many choices for me.

The point is, having paid the fixed cost of getting to Orlando, I'm going to be much less price sensitive about getting into the park than other people who live there, who have lots of other choices.

Likewise, having paid the money to get there, I have shown I have more disposable income because I paid the money to get there. I've shown I have enough disposable income that I'm willing to drop money on a plane ticket to take my kids to Disney World. So I'm going to have more income that we are willing to pay.

OK, so basically the point is companies are forever doing this. The ultimate example was, briefly, Amazon.com started pricing by IP address. For a while, it was a controversy over Amazon started literally charging, getting people's IP addresses and literally adjusting prices based on saying, oh, this person is from a university library. University libraries aren't price sensitive. We'll charge them more, et cetera.

That got shut down. But that was the ultimate form of trying to be price discriminatory. That was as close as we'll come to perfect price discrimination.

The point is, in general, people with market power, people that set the price above marginal cost will in general be looking for parties which are high income and low elasticity to which they can charge a higher price.

Yeah.

AUDIENCE: Another example, like MIT, they actually ask for your income statement. And then, based on that, they give you their price.

PROFESSOR: Well, see that's very interesting. That's very interesting. MIT-- What's tricky about that is-- Is

that about exploiting price sensitivity? Or is that about equity?

That's a bit harder because MIT could claim-- And probably, actually, it's true. They're not doing it. Because the truth is, MIT could charge whatever they want. They'd still fill the class. Right?

So it's not really about-- I think in MIT's case, it's not really about price sensitivity. It's about income redistribution and some notion of making sure low income people can come and afford to be here.

But that is a good point. The difficulty with empirical economics is often, correlation versus causation. The same fact can have many different descriptions, many different explanations. OK?

So just wanted to give you some brief examples to think about the fact that we see price discrimination in reality all the time. Nonetheless, we do our classic monopoly model. We assume there's one price.

And the truth is the one price monopolist is probably closer to the truth than the perfectly price discriminating monopolist. But the truth, as often in this course, is going to be somewhere in between.

OK, questions about that.

What I want to focus on primarily, for this lecture, is where do monopolies come from. How do monopolies arrive? How do we end up in this situation, where instead of many firms competing to sell a good, we only have one?

And there's basically two sources of monopolies, two sources that give birth to monopolies in modern societies.

The first source is cost advantages. The first source is cost advantages. Some markets come with natural cost advantages, natural reasons why there's a benefit to being one player in the market.

So for example, it could be that there's, essentially, only one usable input. So let's say there's a rock quarry in town. You've got to get rocks from. And there's just one rock quarry. And rocks are really expensive to transport.

So basically, if you live in that town, the person who owns that rock quarry is going to be the monopolist. No one else is really going to compete because it would cost them so much to transport rocks from another quarry in another town. OK?

Basically, the point is. Sometimes, there are these fixed costs. And whoever has paid the fixed cost has an enormous natural advantage over other players, over other entrants to the markets.

And we call those natural monopolies. Natural monopolies-- Natural monopoly is a firm where for all the relevant quantities over any relevant range, the average cost for one firm is always below the average cost of a new entrant.

The average cost for the one firm that's in the market is already always going to be below the average cost for any new entrant. And that is going to be true in markets with very large fixed costs and very small marginal costs.

A natural monopoly will occur when there's very large fixed cost and very small marginal cost. In that case, what we'll see is average cost is always declining. Natural monopolies arise when average cost is always declining.

If average cost is always declining, it's never going to make sense for another entrant to come in the market. And an example we could think of-- The best example I could think is like a water utility, the folks who deliver water to our houses.

The fixed costs of delivering water are enormous. You've got to lay the pipe to deliver the water all through the town. Those are enormous fixed costs.

The marginal costs are trivial. I mean, water is cheap. You get the water. You send it through the pipes. OK?

It would never make sense to have two companies deliver water throughout the town. It wouldn't make sense to have another company come in, rip up the roads, lay a competing set of pipes all through the town to compete.

It just wouldn't make sense because those fixed costs are so huge relative to the marginal costs. They could never make money.

That first company-- If a second company came in and threatened to do that, the first

company could always keep the price low enough that that second company could never recover their fixed costs. Because the first company has already paid the fixed cost, they're already in. A second company could never come in and cover those fixed costs.

So if we see figure 15-1. Here's an example of a firm, of a water utility, low marginal cost. There was a high fixed cost. So the initial average costs are very high.

But the average costs are declining constantly because the marginal costs are low, relative to fixed costs. OK? So if demand for the good goes up, over some relevant range-- If demand gets to be infinite, it may make sense to lay another set of pipes. You know, the first set of pipes may get overwhelmed. But as long as demand can be met by the set of pipes that's been laid, there's absolutely no reason for another firm to enter this market.

If another firm ever threatened to do so, the first firm would just lower price and say, look, you're going to have to spend so much money putting that set of pipes in through town you'll never be able to make it up. Because having laid those set of pipes-- Remember what the shut down condition is. As long as that first firm can charge price greater than marginal, can charge price above average variable cost, which is marginal cost in this case. As long as that firm can charge price above marginal cost, it will always stay in business.

And that second firm can't make any money at a price near the marginal cost because they can't cover their fixed cost. So they'll essentially chase them out. So essentially, the fact that they've had that set of pipes already laid down gives them a threat, a credible threat, that that second firm cannot enter.

Thus, we call natural monopolies are places where other firms face barriers to entry. Natural monopolies are where there are barriers to entry, where other firms cannot enter because they'd have to pay those enormous fixed costs. And it would never make economic sense to do so.

OK. And in that case, you're going to get a monopoly. And we call it a natural monopoly because, in some sense, the monopoly is the right thing to do. It is actually economically efficient for there to be only one provider of water in the town. That's the economically efficient outcome. It is economically inefficient to pay a second set of those enormous fixed costs.

Now, then you say, well what about the fact that monopolist will under produce water, charge too much. We'll get to that in a minute.

But when there's natural monopolies, the goods should be delivered by a monopoly. That's the right thing to do.

But there's a second reason why monopolies arise, which is a little more pernicious, which is government actions. Sometimes monopolies are unnatural and created by the government.

So a classic example is when governments actually decide that they're going to deliver a good and only they'll deliver the good, like the postal service. When a government decides look, we are just going to deliver this good. We're just going to have the postal service.

And for many, many years, if you wanted to send a package from one place to another, you had to do it through the postal service. Well, it turned out of course, that wasn't a natural monopoly.

As we know through the growth of FedEx and others, there was actually quite a good distance to compete in that market. And eventually, those other folks delivering packages came in and competed in that market.

And in fact, in the US, it's very rare to have a government provided good, a purely government provided good. It's very rare. Historically, it wasn't.

And in many other parts of the world, it's not. In many other parts of the world, governments run the banks, the airlines, all utilities. So in many other parts of the world, governments will actually set up these monopolies through government action. And basically, that is something which is not done much in the US but done elsewhere.

Now however, one place we do set up monopolies in the US, which is pretty important, is through the issuing of patents.

If you invent, say a new drug, and you patent it. You then have the exclusive right to sell that chemical compound for 17 years. So if you come up with some new chemical compound to treat whatever, you have the exclusive right to market that chemical compound for 17 years. That is a government sanctioned monopoly.

Now, is that a good thing or a bad thing? Are patents-- The government has just created a monopoly. Could someone tell me why that might be actually a good thing for the government to do?

Yeah.

AUDIENCE: Schumpeter talks about how it's a way to cause innovation. Because no one would put that many dollars into drug research, if they weren't going to be able to make money. Because the marginal cost was so low that other people-- The cost of establishing a pharmaceutical company [UNINTELLIGIBLE] is really low. So other people would come and cut out all their profits that they had.

PROFESSOR: Exactly, if you put all these resources into inventing a drug, it's not like laying pipes. Once you invented it, someone could just copy it the next day and produce it at the same cost you can. So why would you ever do that?

Why would you, as someone who, even if you cared about the benefits to the world, still want to make some money. Why would you spend billions and millions of dollars inventing these new drugs? If the next day, someone else can just say, that's a great idea. I'll produce that for \$0.47 a pill, just like you will.

And you won't make any money off it. And you'll have lost all this money you invested.

So the argument for patents is you want an incentive for innovation, which suggests there's a trade-off here. On the one hand, you want an incentive for innovation. On the other hand, once you create this monopoly, they can charge outrageous prices.

There is a drug. There are drugs. Genzyme is very big company started here in Massachusetts. And the whole reason they exist is to create drugs for very, very rare diseases. Diseases that strike like 100,000 people a year but are deadly. Like Gaucher's disease is a famous example of this one.

So they create these drugs. They put billions of dollars into research, create these drugs. And then, having created them and gotten a patent, charge like \$100,000 a year to use the drugs. Drugs that cost, you know, \$500 a year to produce.

Now on the one hand, if these drugs didn't exist, people would die. These are literally lifesaving drugs. These are people who used to die, who now live because of these drugs. And these drugs never would have been invented if Genzyme couldn't have made some money off them.

On the other hand, you've got a product which costs \$500 a year to make, and they're

charging \$100,000 a year to people to use. And in particular, when it comes to drugs like for treating AIDS in the developed world where people cannot-- There's no way they can afford that kind of money. That's a problem. Yeah.

AUDIENCE: But aren't you not only paying for them to produce the drug but paying for all the research that went into--

PROFESSOR: Exactly, that's right. You're paying for all the research. That's why they never would have invented it if they couldn't. So you're paying for the research.

They also take home a nice, hefty profit at the end of the day. But that is true. You are also paying for the research that goes into that. And people wouldn't put that money up front.

That research is funded by investors. And investors would not invest in Genzyme and give them money to do research if they weren't going to get a return.

So if Genzyme-- Of that \$99,500 Genzyme makes on that Gaucher's disease drug, most of it is going back to pay the people who funded the research. But a healthy chunk is not. A healthy chunk is market power monopoly profit.

Yeah.

AUDIENCE: Could the government then have subsidies for some types of licensing to ensure that the consumers are not affected because everyone cannot afford the drug without it.

PROFESSOR: I'm going to come to that in a second. Now actually, let me just hold that thought for a second because I want to actually show you how we think about whether patent is a good idea or not.

So let's go to figure 15-2. I just want to, sort of, show you how what you guys seem to understand intuitively, we can illustrate in the kind of graphs we've been using. Once again, we want to think about going back and forth between the intuition and the graphical and mathematical aspects of this stuff.

So here we have a monopolist. Imagine that you have a good where the original demand curve is D_1 . A good where the original demand curve is D_1 and the original consumer surplus is that dotted area C plus 1 plus that slashed triangle.

So it's based on the area above the competitive price PC under the demand curve D_1 . So you have a good. It's some drug, which people like. And there's some demand for it. And it's

produced competitively at a price P_C with the consumer surplus of that triangle.

Now, let's say a monopolist comes along and says, we can make this drug way better. We could make a much better drug, but we're going to need a patent for it. Well, two things happen.

On the one hand, the demand curve shifts way out. Now you've got something which people value a lot more. They're much more willing to pay for this better drug. OK?

And that's the benefit. That's the innovation effect on demand.

On the other hand, the price goes up to the monopolist's price. Where marginal revenue equals marginal cost, they're going to produce at Q_m and charge a higher price P_m .

Whereas, if this is a perfectly competitive firm, they produce much more, where D_2 hits the marginal cost and consumer surplus would be much larger. So the trade off is, on the one hand, you end up here. In this case I've drawn, you end up with a larger consumer surplus, even with monopoly.

But you could imagine drawing the same graph, in the case where consumer surplus falls. You can imagine demand doesn't go up that much. But the monopolist gets the monopoly price. And you could imagine drawing this triangle such that the new consumer surplus triangle is smaller than the old consumer surplus triangle. OK?

So it's not obvious which way this goes. You have two effects.

On the one hand, you have the effect that demand shifts out. That creates a potential for more social surplus.

On the other hand, you have the case that the monopolist artificially prices too high. That causes a reduction in social surplus. In this case, the former dominated the latter. But I hope you can see you can draw this in cases where that wouldn't be true. And that's the tricky thing with patents.

It's going to depend. If you're patenting something which is really demand increasing, that's great. But if you're patenting something which is just a copycat of something that exists and all you're doing is turning a competitive market--

In the limit, imagine I somehow snookered the government into giving me a patent for

something which literally does no more than what's existed. But somehow I could fool-- In that case, have to do a little more or people wouldn't buy it, just a little more than what existed. It wouldn't increase demand much. But I would then have these monopoly rents. OK?

So that's basically the trade off with patents.

All right, question about that.

Now, let me move on then and talk about-- The question was raised about-- Well, couldn't the government do something about this, in terms of trying to address this problem. And we just talked about the government as bad guy in creating this problem. Although, it's not necessarily a problem in the case of patents.

But there's also the role of government as potential good guy, which is can the government help in this case of natural monopoly? So natural monopoly, we've got this awkward situation where clearly a monopoly makes sense. It doesn't make sense to have competitive people delivering water in town.

But once you've got one person delivering water, they'll charge you a fortune for it, well above marginal cost. And that's inefficient. That lowers social surplus relative to the optimal level of provision.

So can the government solve this problem? Could the government, for example, come in and say look, we recognize there's a natural monopoly. We recognize that you, Rubrico, are the only company that makes sense to deliver water. But we are going to regulate you in a way to maximize the social surplus, given that natural monopoly.

So to see that, let's go to the highly complicated figure 15-3. OK, we'll have to walk through this slowly. It's a lot of stuff going on here at once. OK?

15-3. We're back to the usual curves we were using last time. The demand curve is $P = 24 - Q$.

The cost curve is $12 + Q^2$. So the marginal cost is just $2Q$.

The competitive outcome was to produce eight units at a price of 16.

The monopoly outcome was to produce six units at a price of 18. OK?

And you ended up with the monopolist causing a deadweight loss of C plus E. That was where we were last time in this example.

And let's say this was a natural monopoly. So that's why there's a monopolist there.

Now, what if the government came in and mandated that the monopolist can charge no more than the competitive price? Let's say the government knew what the competitive price was. The government says, look, I took 14.01. I see this graph. I know the competitive price is 16.

So I'm going to say, monopolist-- You're the monopolist. You go ahead. And no one else can deliver water. It makes sense for you to do it. But I'm going to regulate that you cannot charge consumers a price above 16.

What you can see in that case, is the government will turn the monopolist from a price maker to a price taker. And in doing so, the government will undo the poisoning effect we talked about last time and cause the monopolist to behave as if it was a competitive firm.

So to see that, we have to ask, well what's the marginal revenue curve now for the monopolist, given this government mandate that it can charge no more than 16?

Well, the marginal revenue curve, up to the point it sells six, is the old marginal revenue curve. So we're working down this marginal revenue curve. And up to that point, where marginal revenue intersects marginal cost, that's the marginal revenue curve. And that's where the monopolist would stop.

But the problem is the monopolist isn't actually able to charge more than 16. So now, if it's charging 16, now it asks itself well, should I produce that seventh unit.

Remember last time we did the math. The monopolist should not produce the seventh unit. Because last time we showed that, because of that poisoning effect, profits would fall if it produced that seventh unit.

But now it's not true because now it's only charging 16. So if it's charging 16, and if it produces that seventh unit, it's still going to charge 16. The poisoning effect has gone away.

There's no more poisoning effect. There's no loss to producing the seventh unit because the most it can get is 16.

It would like to price it much higher. It can't. Since the most it can price at is 16 he says, well

gee, then there's no poisoning effect. I might as well produce at the competitive level.

And basically, what you can see is if you tell the monopolist they can't charge more than the competitive price, then they will produce at the competitive level. And you'll end up at that competitive outcome, even with a monopolist, because that will be the profit maximizing thing for the monopolist to do.

So sounds like we've got a pretty good solution here. Right? If there's a natural monopoly, we just come in and say you can't charge more than the competitive price.

So in theory, government can fix this. We've been talking about government as a bad guy. Here's government as a good guy. Government can come in and fix this.

What's the problem with that? What's the problem, in practice, with carrying out what I just laid out here in theory?

Yeah.

AUDIENCE: How does the government know what the competitive price is?

PROFESSOR: How does the government know what the competitive price is? How does the government know what these curves look like?

Now, let's think about both curves. OK, first the government needs to know-- If it wants to know the competitive price, it's got to know the demand curve and the supply curve.

Well the demand curve, in principle, the government could learn. The government could go out and survey people and get a sense of kind of, could collect some data, could run some experiments and try to find out from people. Gee, how much are you willing to pay for another unit, another unit, another unit?

So in principle, the government could actually measure demand curve by doing market research. Although in practice, this is quite hard. It turns out in practice-- The first rule of economics is believe what people do, not what they say.

Turns out, if you ask people what they're willing to pay, you get very silly answers, relative to actually do it. So for example, this comes up a lot in when the government needs to value environmental damage. So if we need to ask how much should we charge BP for the damage they did to the Gulf, we need to value how sad are people that the wetlands are ruined.

Well, the only thing to do is to ask people. And it turns out when you do that, you get incredibly silly answers. Things like, for example, if you ask people how sorry are you if 10 ducks died, they'll say I'm this sad. Say how sad are you if a million ducks died? They'll say, I'm the same amount sad. OK, that doesn't make sense.

You ask people what's it worth to save a duck versus saving a whale. And you ask in that order, they'll say saving a duck is worth \$100, saving a whale is worth \$100. Or it's worth \$150.

You ask the other order. You say, how much is it worth to save a whale and then a duck. Well then, saving a whale is worth \$300. And a duck's only worth \$50, same question just a different order. People do not give sensible answers when you ask them what things are worth.

The best way to know is to actually vary the price, is to actually run experiments where you actually say, OK, we have to actually give people different prices and see how they behave, actually trace out the demand curve. That turns out to be very hard to do, especially for things like valuing damage to wetlands.

But even for things like valuing prescription drugs, you've got to literally-- It's hard to run the experiment where, literally, I give you a different price than you for a prescription drug. That's a little bit tricky. So it's hard to get the demand curve.

So that's the first problem the government faces. But in some sense, that's the less difficult problem. It is tracing out the demand curve. In principle, there are ways to do it. In principle, you could run experiments where you vary the price and you get that demand curve.

In practice, the difficulty is firm supply curves are much harder. And why is that? Because let's say the government comes to you and says, look I'm doing great. I've nailed down the demand curve. I just need to know your supply curve, so I can set your price. What's your supply curve again? OK, what are you going to say?

AUDIENCE: [INAUDIBLE]

PROFESSOR: Aw, this stuff costs a fortune to make. You would not believe what it costs this stuff to make. My supply curve-- $12 + Q^2$? Ha! That's a joke. It's $30 + 18Q^2$. Are you kidding? My supply curve is crazy high.

And the problem is, the government doesn't know. Because with consumers, at least I can run experiments to get the demand. With the firm, I can't get inside their books. I can't really know.

And if I get inside the books, they can cook their books and make it look like stuff costs more. How can I really know?

Just like it's difficult for the board of directors to figure out whether the CEO of a company needs his own plane, it's very difficult for government regulators to figure out what it actually costs to produce these drugs. And as a result, it's very hard to get this right.

And the problem is if the government gets it wrong, it can make it worse than not regulating at all. So for example, if the government came in, and let's say, the government said look, I can't believe this firm. $12 + Q^2$ sounds way too high for cost. I think marginal costs are much lower than that. And I think the competitive price should be 10 because I know the firm is going to lie to me. I know they're going to tell me numbers too big.

So I'm going to say that equilibrium should be competitive, should be a price of 10. And at a price of 10, the firm is now operating off the marginal revenue curve at that low price because it's below 16.

So at a price of 10, the firm is going to set marginal revenue equal to marginal cost. Well, marginal revenue at a price of 10 is the price. That's all they can charge is 10.

So they're going to set price equal to marginal cost. The marginal cost with a production of 10 - The marginal cost is $2Q$. So set price equal to $2Q$. Or $10 = 2Q$. Or $Q = 5$. They'll produce five units.

They'll say look, if you're only going to let me charge 10, I'm only going to produce five units. That's what I'll produce. That's what's optimal for me at a price of 10.

What you see is-- Now if you look at this graph and you look at the firm producing five units. What you see is the firm produces five units.

Now, the total surplus has fallen. It's just A plus B plus D. The consumer surplus is very high.

We don't have the horizontal line of 10 here. But draw yourself that horizontal line of 10, which is where the dashed line of five intersects the marginal cost curve.

You could see there's a big consumer surplus. It's A plus B plus half of D and a little producer surplus, which is that triangle that's the lower half of D. But look what's happened to social surplus.

Before the government got involved, the deadweight loss was just C plus E. Now the government, by misregulating the price, has created deadweight losses of C plus E plus F plus G plus H. The government has just increased the deadweight loss a lot, by getting involved and misregulating.

And in particular, that area that increases it-- Here's the interesting thing. Falling from eight to six caused that little triangle. Falling from six to five, just one more unit, causes a trapezoid, which is probably bigger than that triangle.

Why? Because we're moving farther and farther away from the optimum. We're losing more and more trades that were socially beneficial. Remember at the optimum, deadweight loss is very small. But as you move farther and farther away, that deadweight loss gets bigger and bigger.

So this government misregulation, instead of moving us to what's optimal, by just moving us one below where we were as a monopolist has caused all this huge extra deadweight loss and made things worse. Indeed, it could be worse. Imagine the government chose a price so low the firm just said, forget it. I'm going to shut down.

You could lose all surplus in this market. If the government came in and said, no, we don't believe you. The price should be whatever. It wouldn't be, in this case, because in this case, price is always greater than marginal cost.

But let's say the government came in another case and set a price that was too low. It could just cause the firm to shut down. Then all social surplus in the market would disappear. OK?

So basically, there's these difficulties with the regulation, which is it's hard to know how to set the price. Now in practice, of course, what happens is governments set the price too high. In practice, the government would much rather err on the side of letting monopolists make a little money than err on the side of there being too little of the good.

So government, facing uncertainty about what the right level to set is, will typically end up erring on the side of monopolists, partly because of the way of the nature of regulation.

So let's say you are president whatever. And you want to regulate this new good. OK, somebody made the new good and you want to regulate it. Well who are you going to hire to be the regulator? Well clearly, someone who knows something about the market.

So there's a new good. My favorite example of an outdated technology is the umbrella. I really think we've got to figure out a better way to do umbrellas. They suck. In the wind, they blow up. They're useless, right. There's got to be a better umbrella out there.

Let's say somebody finally figures out a better umbrella. But they've got a patent on it. And so you want to regulate it.

It's got some natural monopoly producing it. It uses unobtanium. And the only can find it in one place, Pandora. So they've got to-- They're the only guys--

Isn't that the stupidest name ever for a material? How could they have not come up with a better name than unobtanium?

Anyway, so it uses unobtanium. And basically they have this natural monopoly. So you want to regulate it

Well, who are you going to find to regulate it? Well you know, once there was an expert in making umbrellas with unobtanium. That person who you're going to hire. That's the right person to hire.

Unfortunately, that probably means they're probably friendly with all the guys that make umbrellas with unobtanium. And they're not going to want to be too tough on their buddies. So the natural person who's going to regulate, by their nature, is going to tend to be someone who's going to think sort of on the industry's side.

Moreover, what are they going to do after they're done being the regulator? They're going to go back into the business of making umbrellas with unobtanium. So they're not going to want to be too mean to the business because they're going to be making money off it five years hence.

So you've got this problem that regulators are going to have a natural tendency to be sort of friendly towards industry they're regulating. And that's going to lead to an upward bias.

The question is, how much is that upward bias in the price relative to what the monopolist

would actually do. And much like a patent, it depends. You can draw examples where the government regulation would improve things and examples where the government regulation would make things worse. You can do examples either way.

And what, at least, is interesting here is this is the first example we've seen or one of the few examples we've seen where the government, at least, could possibly make things better. Even though it's not clear they will. At least, they could possibly make things better. And that's because--

Why is that? This is a very important insight. Why is that?

That's because everything we've dealt with so far, the market does everything well. We haven't needed a government.

What natural monopolies do is they say, wow, here's a case of what we call a market failure. The market has failed to maximize social surplus. And that opens the door for potential gains for government intervention.

Basically, as long as markets are functioning well in a competitive manner, there's no door open for the government to make things better. The government can just make things worse.

It's only when there's market failures, of which natural monopoly is one example, can the government come in and potentially make things better. It won't necessarily do so. But at least there's a door open to doing so.

Questions about that--

OK, the last thing I want to talk about, today, is an example that's in between a natural monopoly and no natural monopoly, which is what we call a contestable market. A contestable market-- A contestable market is one which says that there is a natural monopoly, but it's not so big that someone couldn't come in and compete if the profits got too large.

Or another way of saying this is, just because there's a monopoly doesn't mean there's a whole lot of market power. Just because there's a monopoly doesn't mean there's a whole lot of market power.

So imagine a natural monopoly market with a very modest fixed cost, a fixed cost that's, you know, real but not enormous. As long that monopolist who gets in first keeps their price near

marginal cost, no one will ever enter. As long as they get their price near marginal cost, no one will enter, even if they're making a small profit.

No one will enter because no one could ever make money then and pay the fixed. No one could ever come in, pay the fixed cost, and still make money. So no one's ever going to enter.

But if that price ever got too far above marginal cost, then someone would say, ah, there's so much profit to be made. That'll cover my fixed costs. I'm coming in.

That's what we mean by contestable market, a market which can exist with a monopoly and can exist with someone making money. And yet ultimately, there's sufficiently easy entry that, basically, the monopolist is forced to behave almost like a competitive firm.

So it's sort of like market pressure on monopolists. It's a weird outcome where you get a monopoly market but pricing close to competitive levels because of this threat of entry. Now the most famous example of this is in airlines and airline deregulation.

Until the 1970s, the way airlines worked in the US is there were private airline companies. Many of them don't exist anymore, Eastern, Pan Am. Ones you don't know about, don't exist anymore.

And they were regulated. It was a regulated oligopoly. We haven't really talked about oligopolies yet.

It was a few firms competing. But think of it as a monopoly. It's basically regulated monopoly.

In particular, they had monopolies on different routes. So what happened is the government would say New York to Boston. That is the route that Eastern Airlines owns. And they fly that without competition.

But in order to make sure they don't rip off the consumer, we're going to regulate their prices. So Eastern Airlines, you fly this without competition. But we're going to regulate what you can charge the consumer. And this was because the government viewed airlines as a natural monopoly.

It said, look, airplanes are really big and expensive. There's huge fixed cost to becoming an airline. So we think this is a natural monopoly. And we're going to regulate it.

However, economists started pointing out, and experts started pointing out that no, in fact, this

was actually a very contestable market. That it turned out it wasn't that expensive to produce airplanes.

There were a lot of older airplanes you could refurbish, et cetera. And that basically this is a market where, if the government opened it up to competition, you could actually get some-- That threat of entry eventually could drive prices down.

And so basically, after a lot of debate, the government, in the late 1970s, did deregulate airlines. One of the most important changes in government policy in the 1970s was they deregulated airlines.

And what happened? Well, three things happened. First of all, prices fell enormously. Prices fell by about a third. Flying from point A to point B fell by a third, other places more extreme.

When I was an undergraduate at MIT, I could fly from Boston to Newark for \$19 each way.

There was this airline called People's Express that was introduced in the wave of deregulation in the 1980s. People's Express-- It was fascinating. I don't know what their planes were held together by.

And the thing was, you didn't even buy a ticket. You just went and waited on line. They let you on the plane. And when the plane was full, they took off. And they made you pay on the plane.

I still, to this day, don't know what happened if you didn't have the money, if they like threw you off, get parachutes or something. I don't know what they did.

But literally, they'd come down the middle of the aisle with a little credit card thing. And they'd make you pay on the plane.

I mean literally, it was cheaper than taking a bus. It was incredible, \$19 each way. So prices came way, way down.

The second effect was many more routes were offered to consumers. Suddenly, routes which the government had said, no that's not profitable. You shouldn't fly that. New entrants said, no, in fact, it is profitable, government. You just had the cost structure wrong. And it is profitable to fly from Pittsburgh to Akron, or whatever, wherever they now fly.

There are hundreds more places you can fly now than you could in the 1970s. Hundreds and hundreds of routes that just didn't exist because the government regulators assumed they

weren't profitable. But in fact, they were. Once there was competition in these contestable markets, they did turn out to be profitable.

And the final thing that happened was that quality of airline travel deteriorated massively. When I was a kid, and you flew on planes. It was really nice. I mean there was tons of leg room. You got tons of free food, free movies, free drinks.

And I didn't do that when I was a kid. My parents did. Basically, it was an unbelievably nice experience.

It's not so nice now. I think as any of you who have flown will attest to. Now they're charging you for everything. And you can barely fit your legs in if you're over 5'2".

Now, why did this happen? Somebody tell me. Why did this happen? Why did deregulation lead from a world where flights were unbelievably comfy to a world where flights are uncomfy?

Yeah.

AUDIENCE: It's more profitable to have more people taking it. And--

PROFESSOR: Sure, but that was always true. It was always more profitable to have more people on a plane. It was always more profitable to not give them nice stuff. That hasn't changed. What has changed? Yeah.

AUDIENCE: You have-- there's competition. So they need to reduce their cost more.

PROFESSOR: What's that?

AUDIENCE: There's more competition. So they need to reduce their cost.

PROFESSOR: There is more competition. But there was some competition before. But you're right. You're about halfway there. What else?

AUDIENCE: Consumers aren't willing to pay for leg room and all that stuff.

PROFESSOR: Basically before, if there was a route with two airlines on it-- A lot of them, I said there's two airlines. And you wanted to compete. How did you compete?

You couldn't compete on price. Right? If Eastern and Pan Am were flying New York to Boston, they couldn't compete on price. The price was regulated. So how did they compete, by being

as nice as possible on everything else, even though consumers didn't really value it.

Well, once they competed on price, they said, look, consumers don't really care so much about this crappy airline food. We're going to get rid of it and charge 20% less. And lo and behold, they did.

What's ironic, of course, is everyone bitches about how bad airlines are. But they don't bitch about how cheap they are. It is so cheap to fly now, compared to when I was a kid.

Based on what happened is they went from competing on non-price factors to competing on price. There's always competitive pressure. There's always competitive pressure.

It's just before, the competition had to be on things which consumers didn't like. But they liked it enough that you might as well compete on it. Because it was not that consumers didn't like it all. Obviously they liked it some, or they wouldn't have bothered.

Now they've moved to a more efficient form of competition, which is to compete on price rather than on quantity.

Yeah.

AUDIENCE: When you said the government regulated the price, only wasn't that just on the upper level that you got that?

PROFESSOR: No. The government just regulated the price. Now, so this is a big victory for economists. Yay for economists-- We did a great job. But we whiffed on one thing. We whiffed on one thing, which we did not foresee, which has led deregulation to be much less beneficial than we thought it was going to be.

What we whiffed on was the hub and spoke system. We whiffed on the fact that, while building airplanes is contestable, building slots at airports is not. That there's a limited number of slots at airports. And it's incredibly hard to build a new airport because of environmental regulations and other things.

What that meant was there is still a natural monopoly in airport slots, even if there's not much of a natural monopoly in planes. The result is that now what airlines do is funnel everyone through their hub and then out to the spokes. And as a result, because of that they have developed new quasi monopolies.

So to fly from point A to point B, for many A's and B's, only one airline flies it. Because it's economical for them because point A is their hub. But airline B can't get into that hub. They can't get a gate at that hub. So as a result, they can't effectively fly from A to B.

So my wife is from Minneapolis. We had to go to Minneapolis. Northwest had a monopoly on going to Minneapolis. So I could fly from Boston to LA for half the price of Boston to Minneapolis. Why, because Northwest controlled all the gate slots in Minneapolis. They had a natural monopoly on that resource.

And that's what economists missed. So deregulation worked in some markets with a lot of competition. Like the New York to LA market is very competitive.

It did not work in other markets, where there was this natural hub. And so one airline could dominate. Or a few airlines could dominate.

And that's why you could see some crazy pricing differentials. That's why, for example, I could fly to Baltimore for \$127. But to DC, it cost me \$500, even though they're less than an hour apart by car.

This is because the constraint on slots has limited the amount of competition that can go on. And so that's sort of an example of where competition can work and where it can't to try to deal with these natural monopoly problems.

All right, let me stop there. And we'll come back on Wednesday and talk about oligopoly.

Good luck tomorrow night on the exam. It's tomorrow night? Yeah, tomorrow night. Good luck.

Everyone looked confused for a second. Next week-- Oh-- OK, just joking, April fools, Halloween fools. Good luck next week on the exam.