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**JONATHAN
GRUBER:**

OK, I want to talk today about-- continue our discussion of oligopoly. Last time, we talked about non-cooperative equilibria, but in the start, we said, gee, life would just be better off if everyone would just cooperate. And someone even asked me, "Well, why don't they just cooperate?"

So let's talk about that. Let's talk about cartels. What happens when firms try to cooperate-- achieve the cooperative equilibrium in oligopolies?

Now, clearly, this is going to be the best outcome. So the fixed examples-- let's go back to our example of last time, American United. Recall, last time, we said that demand was in the form $339 - Q$. Price is $339 - Q$. And that the marginal cost was 147, OK?

Now, we talked about the fact that if American was a monopoly in this market, they would simply solve the monopolist's problem. They would set marginal revenue, which is $339 - 2Q$, equal to marginal cost, which is 147, and they would get that the optimal Q would be 96.

And then reading back off the demand curve, that would imply an optimal quantity of \$243, OK? So that was what we got last time.

Now, imagine that American is not a monopoly, but American United cooperate. What if they got together and said, "You know what? Let's behave as if we're one monopolist, flying 96 flights and just splitting them equally. We'll do 48, you do 48. So let's cartelize. Let's achieve the monopoly outcome, and we'll also share 50-50 the fruits of that outcome."

So in that case, each firm would fly 48 flights at a price of \$243, OK? And total profits in the market-- each firm would then make profits of 48 times-- price minus average cost, which is marginal cost, because it's flat-- times $243 - 147$ -- or since I'm not like you guys, I can't do that in my head-- 4,608 per firm, OK?

So each firm would achieve profits of-- take the 96 flights, split them in 1/2, and then each achieve profits of 4,608.

Now, what we can see is that these profits are much higher than what they got in the non-cooperative equilibrium. Remember, the non-cooperative equilibrium, they were each doing 64 flights at a price of-- they were each doing 64 flights at a price of 211. We saw that last time.

So what were their non-cooperative profits? Their non-cooperative profits for each firm was 64 times the 211 they were charging, minus the 147 in marginal costs, or their former profits were 4,096. So their profits used to be 4,096 when they weren't cooperating. They've gone up by 12.5% to 4,608 by cooperating.

So simply by getting together, saying, "Don't be an asshole. Let's cooperate. Let's figure how to make the most money." Getting together, they solve the prisoner's dilemma, get to the best outcome, and make a lot more money, OK?

So the question is, why don't they always do this in oligopolistic markets? And fundamentally, there's two reasons. Now, normal people-- you'll see when I'm done-- normal people will teach them in a different order than I will. But let me start with the two reasons the other economists would teach them.

The first reason why cartels don't form is that they're fundamentally unstable. Cartels are fundamentally unstable as long as firms are self-interested. Each individual firm in a cartel has an incentive to cheat, and that's because they essentially can solve the monopoly problem of poisoning by cheating.

Let me explain how that works. It's best to see this through numbers. Let's imagine that we start in this cooperative equilibrium, 48 flights each and profits of 4,608. And now let's imagine, that quietly, American increased its number of flights from 48 to 50. American says, "Well, I know I agreed 48, but on the sly, I'm going to fly two more flights and hope they don't catch me." OK?

Well, what's American's profits? Well, their quantity is 50. $Q_{sub A}$ is now 50. What's the price? If they're going to do 50 flights, what's the price? Yeah? I'm sorry?

It's 280-- the price is-- let's see if you got that right. I've got to check my notes. No, if the price was 243 when they're a monopoly, now they do two more flights.

Remember, they're adding two flights to the total. There used to be 96 flights. Now it goes to 98 flights. So the price falls to 241, OK?

So you were thinking about them as alone, but remember, there's still United doing the flights too. They're still doing 48 flights. So there were 96 flights total. Now it goes to 98. So the price falls to 241, OK?

So what's their profits? Their profits are now 50 times 241 minus 147, or 4,700. Their profits have gone up. OK, let me back up and do it again because I went fast, OK?

They say they're going to do two more flights. We have to respect the demand curve. So there's going to be two more flights. The price has to fall. If the price falls, then the price has to fall to 241. They now make profits of 4,700, OK?

Well, if United is caught with their pants down and continues to do 48 flights, what does United make? Well, United's still doing 48 flights, so the profits of United are 48 times 241 minus 147, or 4,512. So American's profits are up and United's profits are down through American cheating.

What happened? How by cheating did they drop? What's the intuition of why them cheating drove their profits up and United's down? And in fact, if you add these up, lowered total profits in the market. What's going on? Yeah.

AUDIENCE:

It's in the quantity. You're lowering the price that you can sell each unit for, but for American, because they're increasing the number of units they're selling, they still make a greater profit, whereas as United has stayed the same, because each unit is sold for less, then they're making less of that.

JONATHAN

GRUBER:

That's almost right. You got most of it, but there's one key wrinkle that's important, which is, a monopolist would have the same argument. The key thing is, what stops the monopolist from raising the price from where he is? Yeah?

The poisoning effect, but think about the poisoning effect. Who does the poisoning effect affect? Everyone in the market. Everyone sees a lower price, but only American gets more flights.

So they essentially get the benefit. It's like you said, they get the benefit of the extra flights, but only 1/2 the penalty of the poisoning effect. So for them, it is optimal to lower the price and sell more, because they share the negative effect, the negative part with United, but they get all the positive part.

Once again, a monopolist, when you try to sell more and lower the price, there's a positive part, which is sell more units, but a negative part, which is the poisoning effect. Well, here, American gets all the positive part and only 1/2 the negative part. So they make money by cheating, OK?

Well, of course, United knows this. They saw the price go down. They know American's cheating. So United wants to cheat, and the whole thing breaks apart.

So cartels are unstable, because by cheating, you get all the benefit but only part of the cost. And so cheating is incentivized in a cartel, and therefore, cartels will break down. They're not stable, OK?

So that's the primary reason economists say we don't see cartels. The other reason people like to bring up is this little thing, they're illegal. But you know, we don't let stuff like that bother the economists. But they are illegal. That's another reason why we don't see cartels.

In the late 1800, cartels were quite common. In the late 1800s, big industries like oil and railroad industries came to be dominated by a few large firms, and they tried to become cartels, but it kept breaking down. So in the late 1800s, with oil companies, Standard Oil, and the big railroad companies, they kept trying to have cartels and it kept breaking down.

So they come up with this idea. They basically said, "Look, we can't trust each other. So we're going to-- every firm is going to turn over all its decisions to a common trust. And there'll be a trust that's got representatives from every firm on the board. But we will publicly commit to what we're going to produce at what price, and therefore, we can make sure there's no cheating."

So essentially, every firm's still involved. They're all on this trust board. But they're making that decision in a way that's at least public to them, not public to the public, but public to them, so they can make sure they're not cheating.

So they formed these trusts, and essentially cartelized, and made huge profits. And it worked. It solved the stability problem because cheating could be observed more readily.

Now, would it solve this for very long, we don't know, because the government-- the public got pissed, and the government came in and passed what's called antitrust laws. And antitrust laws are laws which do not permit the cartelization of oligopolistic industries in this way.

So let's talk about antitrust laws and how they work or how they don't work. I want to do a couple examples.

One example is the movie industry. Now, the movie industry, you know, is a classic oligopolistic industry. There's a few players. There's new players. A24 is huge now, what didn't exist 15 years ago. But by and large, there's sort of a few players you've heard of which dominate the industry, OK?

And the way the industry works is movie companies make-- they produce the movies and then sell them to movie theaters that show the movies. They show a variety of movies at any one time.

But what happened was in the '30s and '40s, the production companies started buying up the movie theaters. And what they do when they bought the movie theaters, they said to the movie theater, "We now own you and you will only show our movies." So they say to the movie theater, "We now own you, movie theater on the corner of Lincoln and Kennedy streets, and we're MGM, and you'll only show MGM movies."

And essentially, what that meant was essentially, they were taking over, monopolizing, a given distribution network. And they essentially carved it up. They agreed, OK, you get these theaters. We'll take these theaters. And essentially, that was the way they formed their cartel, was through distribution.

And the federal government jumped in and said that that was an antitrust violation. The federal government sued and won. And so that industry, that was broken up.

But did that mean-- that didn't mean folks stopped trying to cartelize. It just meant they stopping being so obvious about it. So later moves to cartelize were more hidden.

So for example, in the early 2000s, airline industries were in big trouble, because oil prices were going way up due to the Iraq war and other factors. Oil prices were

going way up, and the airline industry was in trouble.

So in 2004, British Airlines and Virgin Atlantic had secret talks about essentially cartelizing the cross Atlantic market from the East Coast to London. And what they did is they said, "Look, if we sort of obviously set our prices together, people are going to notice. So to do this instead, we're going to add fuel surcharges to the bill. We're going to say, 'Oh, oil is getting more expensive. Your price haven't changed, but there's now a fuel surcharge on your bill.'

And that fuel surcharge is going to be something people won't pay attention to because they won't notice that we're rising it together." And these fuel surcharges rose quickly from \$10 to \$120 per flight, and essentially rose in lockstep. They essentially coordinated, but tried to hide it by making the coordination not over the sticker price, but over this thing that's sort of at the bottom of your ticket, which is the fuel surcharge.

So this worked for awhile, but then what happened? Well, what happened was the prisoner's dilemma. Was it lawyers for-- lawyers for Virgin Airlines started worrying they were to get busted. And they said, "Well, if we go to the feds first and bust British airlines, maybe we'll get a better deal."

So they were essentially the prisoner that ratted. So Virgin Atlantic was the prisoner that ratted, and the whole thing broke down. There were penalties, more on British Airlines, because Virgin Atlantic ratted on them. But just like the prisoner's dilemma breaks down, it broke down in reality.

And so that was something not where the law really worked, but where the cartel was unstable. And the end result was Virgin Atlantic paid no fees, paid no penalty, and British Airlines paid more than \$500 million. So British Airlines clearly did not study the prisoner's dilemma, and did not realize that they should have gone first in ratting out Virgin Atlantic.

Now, that said, sometimes cartels operate openly in the public and get away with it, OK? Let's talk about probably the biggest open cartel perhaps in America today, the National Football League, OK?

The National Football League-- football is the most popular sport in America, the

most profitable sport in America. There are 32 teams, and they're essentially 32 businesses whose job it is to produce football wins, OK?

Now, these businesses have a huge incentive to collude with their fellow business, however, because they can-- because of television rights. So if the New York Giants and the New York Jets competed over the television rights for their area, they would compete away the profits that could be made by getting a big contract.

If they collude and say, "No, you can only-- we will only agree to a contract together," they could get a higher price for that contract, because it's either you give them the contract or you're out. If they competed, TV companies would compete against each other and fight the price down, OK?

And in general, actually, this goes more than this. The League sells the rights to televise games as a package. So in fact, the National Football League literally sells, explicitly says, "We have a cartel of 32 teams. We are selling the monopoly right to televise these games."

Somebody's got Sunday. Somebody's got Thursday. Somebody's got Monday night, et cetera. But it's a monopoly product they're selling.

Now, how did they get away with that? Well, basically, actually 1957, they were busted. That's a long time ago, I think even before I was born, that long ago.

OK, they were busted and the court ruled that the NFL was violating antitrust laws, OK? Now, that was 1957. That was 60 years ago. The NFL still makes about \$40 billion on its television contract.

What happened? Congress just exempted them. Congress said, "Well, you know what?" We know they violate antitrust, but we're going to pass a law which exempts them from antitrust law and let them do it. So it proves basically that Americans like football more than free markets, and basically, we now have a cartelized football industry that-- because Congress basically exempted them from the laws, OK?

So those are some examples. Yeah?

AUDIENCE: Is this also true for other sports teams?

JONATHAN GRUBER: Other sports teams, it is not as-- they are-- it's largely true for other sports leagues. It's largely true. Some of it aren't as explicit as football, but it's largely true for the other sports leagues as well.

AUDIENCE: What about on the international level, with things like soccer, that are--

JONATHAN GRUBER: I don't know, actually. I presume it's-- I mean, I don't know they have international antitrust laws. I'm not sure how that works with international leagues. It's a good question.

OK, now, another form of cartels-- we talked about cartels and how companies have incentive to put them together. Actually, sometimes, the government can make a cartel. Yeah?

AUDIENCE: How well [INAUDIBLE] working?

JONATHAN GRUBER: How's what?

GRUBER:

AUDIENCE: How well is OPEC working?

JONATHAN GRUBER: OPEC? So OPEC is, as I mentioned in the first lecture, a series of countries that get together to produce oil.

It's not working as well as it was when I was a kid. It worked really well. Because more countries-- A, more countries are cheating, and more countries-- there's more oil being found outside OPEC. But it still works. It's sort of a partially functioning cartel, is I think the way to think about it.

OK, so let me actually-- let me go on and talk about-- let's do one more example about a time when a government made a cartel. Here's one more interesting example.

So in the early 1980s, before the early 1980s, the US dominated the car production business. Starting in the late '70s, Japan started making huge inroads into car production, and by the early 1980s, we're in recession and car manufacturers in the US were really pissed that Japan was taking so much of our market.

And we'll talk in a couple of lectures about international trade and all those sort of

issues, but put those issues aside. Right now, you just have this issue that car manufacturers wanted to limit the amount of Japanese cars to come into America.

Now, you guys have been reading in the paper about international trade and why economists typically don't like limiting international trade. And Reagan was a standard Republican, the party of free trade. So Reagan said, "Well, we're not going to limit the cars that Japan wants to send in, but we're going to tell Japan, if you guys were willing to agree to a voluntary export restraint, we wouldn't mind."

So we said to Japan, they imposed what they called a voluntary export constraint, which basically said, we won't negotiate a deal with you. You will voluntarily agree to reduce the number of cars you send to America, OK?

It's not a government policy. This isn't big government. This is negotiations of a private company, voluntary agreement. OK.

Japan happily agreed to this, why? Yeah.

AUDIENCE: [INAUDIBLE]

JONATHAN GRUBER: No.

AUDIENCE: Sold cars at higher price.

JONATHAN GRUBER: Because? Because you made a cartel. The Japanese companies used to have to compete with each other to sell the cars in America. Now it's like, OK, you guys get together and limit how many cars you send.

They're like, great, you've given us an ability to form a cartel, by essentially telling us, get together and figure out how you're going to sell this many cars to America. So essentially, this voluntary export constraint essentially cartelized, and no company could cheat.

So if you had a cartel, and a company tried to cheat, they couldn't sell the cars to US. US wouldn't let them come into the US. So essentially, the US provided them a way of enforcing their cartel.

What happened? Well, the average price of a Japanese car in America went up by

\$1,200, OK? US auto profits did go up, but US consumers lost out by way more than producers gained. And on net, the estimates are that US consumers were about three billion-- overall, US was about \$3 billion worse because of this policy.

Just examples of how different government policies can interact with the cartelization of industries. Yeah.

AUDIENCE: Company price matches, isn't that sort of like making a cartel? Because the other company would see it. They're going to price match. They wouldn't want to set a price lower than what the--

JONATHAN GRUBER: Well, it's a great question, and you're pointing out this is not a solid line. And in some sense, the question is, if it's true that-- so for many years, tobacco industry worked this way. There was one large player, Philip Morris. Philip Morris would sort of raise the price that everyone would match.

Now, as long as there's no evidence that they agreed to do that, that is not illegal. If there is evidence they agreed to do that, it's illegal. But as long as it's just like, no, this is the way it's going to work, then that's not illegal. So basically, that's sort of an implicit cartel.

Now, once again, what's holding it together? Nothing. A company could cheat and try to charge less. But basically, that essentially-- they figured they were working better as a cartel, and essentially, it was hard to-- there was no way to bust it. Yeah.

AUDIENCE: I mean, if a company says to consumers like, "If you can bring in a lower price, we'll sell it for that price."

JONATHAN GRUBER: That's sort of a different-- I mean, you could imagine you would need every company to do that. That would be a cartel enforcing way if every company had that deal in a market. But if one company had that deal, it doesn't enforce the cartel. Every company needs to have that deal.

And so the question is, if every company on their own, OK, we've decided we're going to have that deal, that would essentially be a way of trying to bring-- enforce a cartel, but I think that would be hard to say it was an antitrust violation. Good questions. Other questions?

OK, so now, let's ask why do we care about all this. We care about all this because it matters for ultimately what matters to us in this class, which is economic welfare, OK?

So now, let's go to a second thing I want to cover, which is comparing the equilibria.

We've now covered three types of market structures, perfect competition, monopoly, and oligopoly. Now, let's compare them, and I want to compare them in two ways, quantity sold and profits per firm, profits earned per firm. And we're going to stick with the United, American market, OK?

We know, if this is a monopoly, if this is a monopoly, if they can perfectly cartelize, then there'll be 96 flights total. Each will fly 48 flights, and profits per firm will be 4,608. OK, we solved that already. That's the cartel outcome.

The non-cooperative outcome, which we call the oligopoly outcome, is they each sell 64 flights. We solved that last time. And as we solved here, they each make profits of 4,096.

What's the competitive outcome in this market? What's the competitive outcome in this market? First of all, what's the price? Somebody raise their hand and tell me. If this is a perfectly competitive market, what would the price be? And then what would the quantity be? Yeah.

AUDIENCE: 147.

JONATHAN GRUBER: Price would be 147, because in a perfectly competitive market, price would be marginal cost. So profits would be?

AUDIENCE: Zero.

JONATHAN GRUBER: Zero. And quantity would be 339 minus 147, or 192, OK? So here we have, for a given market, a nice table which lets us compare the three different possible outcomes. And what you see is essentially, the more you can monopolize, the higher your profits but the smaller the market, OK?

So basically, three lessons here. First of all, generally speaking, the oligopoly outcome is somewhere between the monopoly and perfectly competitive outcome.

Where in between, take 14, 12. If 14, 12 was bad, it's how you figure out where in between this outcome comes between these two. It's all about game theory, OK?

So that's what's exciting about game theory is, this is a wide range, and game theory is a set of sophisticated tools that let us pin down where in this range companies will end up in a realistic case. 0.2 is, the more you can monopolize, the higher your profits will be.

But let us come to welfare. Now, I haven't computed social surplus here. But here's the cheat, I don't really need to. I don't need to because essentially, roughly speaking, social welfare is proportional to the quantity sold.

In other words, we know that in a perfectly competitive market, this is-- the welfare-maximizing quantity is 192. We know that there's 192 flights that maximize welfare, because that's the competitive outcome. What we're saying is the more--

Oh, this shouldn't be 64. It should be 128. That's my bad. 128. It's each doing 64.

We know that as we monopolize the market, there are fewer and fewer flights. Therefore, we're creating a deadweight loss. Essentially, deadweight loss is proportional-- actually, it's sort of exponentially proportional-- to the gap between the quantity sold and the competitive quantity.

Welfare is maximized here by definition. We proved that. So any reduction for that means it increased deadweight loss. So the more you reduce quantity, the more you lower welfare. So essentially, as we go down the column, we lower profits but raise social welfare. Yeah.

AUDIENCE: When we're-- I'm not really sure. Are we talking about an oligopoly that acts like a monopoly?

JONATHAN GRUBER: Yeah, cartel/monopoly.

AUDIENCE: So there's [INAUDIBLE]--

JONATHAN GRUBER: Yes. But otherwise, you do 96, your profits would be twice that. But the bottom line is that essentially, you've got essentially more profits in this market. OK? Other

questions about that?

So the bottom line is, the more competitive the market, the higher the welfare, but the lower the profits, OK? So that's kind of our bottom line of how we think about this. Questions about that?

OK, next I want to cover-- we've only covered the case of two firms. What if there are many firms? After all, most oligopoly markets are not just two firms. We've talked about cars and movie producing studios. There are many firms, OK?

Well, the Cournot model is super hard to do when there's more firms, but there's no reason you can't. It literally just becomes three equations and three unknowns or four equations and four unknowns. Literally, as you can see, you could simply see, if you take that model and add more firms, it just expands the state space. It becomes impossible the graph, but you could solve it. Eventually, you've got n equations and n unknowns.

The key bottom line result is that as the Cournot-- as the number of firms gets large, the Cournot equilibrium approaches the competitive equilibrium. That is mathematically, if you solve this-- you don't have to solve this-- but the bottom line condition is, the markup that firms earn is equal to minus 1 over n times the elasticity.

In sort of a market-- this is sort of in a symmetric Cournot market of the kind we've been working with. The markup is 1 over the number of firms times the elasticity of demand.

So think about this for a second. Imagine there is one firm. Then this equation says the market is equal to minus 1 over the elasticity of demand. Where have we seen that before? That's the monopoly condition. That's the monopoly market condition.

So when n equals 1, this is an equation we've seen before, the monopoly market condition. When n equals 2, the firms are making $1/2$ as much. When n equals 3, a third-- it goes a fact-- factor third, et cetera.

What this says is n approaches infinity, we approach a competitive outcome. We'll never get there, but we're asymptoting towards a competitive outcome, which basically says-- you know, it's sort of like my point about contested markets. You get

a market that's sort of competitive enough, you're going to shrink the markup as more and more firms enter, OK?

So that's sort of a general condition that we could derive, that shows that as more firms are in, then you get a lower markup. Now, I want to make-- there's actually--

But this actually understates the case, for an important strategic reason, which is, more firms lowers the markup in a-- more firm lowers the markup in a Cournot non-cooperative model. But more firms also makes a cooperative model harder.

So this is for the non-cooperative model. The non-cooperative model, your profits fall as there more firms. But it also gets harder to cooperate as there are more firms, because there are more people you have to trust, more people you have to keep hold of.

So a great example of this, actually, for a long time, mercury, the stuff we use in thermometers and such, only was found in Italy and Spain, in the mines in Italy and Spain. And they had a cartel between the two countries to sell mercury. What happened, other countries discovered mercury, and they couldn't keep the cartel together, and the price of mercury fell a lot.

With the question about OPEC, similar thing-- OPEC was much more successful in the 1970s, when essentially, the only source of oil were basically these Arab nations that form OPEC. What happened over time is we discovered more oil around the world, in particular, in Russia and in the US, which has sort of broken the power of this cartel to a large extent.

So the reason why a bigger market moves us towards a competitive equilibrium is that it makes it harder to maintain a cartel, OK?

Now, let's actually-- the other issue I want to cover here is, I want to talk about what does all this teach us about a key policy issue, which is the issue of mergers? What does everything we've learned here tell us about thinking about mergers?

OK, we know about mergers. It happens all the time. Two companies merge.

Well, it turns out when companies merge and they're large enough, the federal government regulates that. The federal government gets a vote on whether that

merger is going to be allowed to go forward, either the Department of Justice or the Federal Trade Commission, depending on what industry it is.

So the federal government has to decide how to evaluate whether two firms merging is a good idea or not, and essentially, what it comes down to is a simple trade-off, economies of scale versus market power.

The benefit of two firms merging is economies of scale. If two firms have sort of redundant production processes and they merge, they can be more efficient. There can be positive economies of scale for merging firms. So it's cost efficiencies, basically. Economies of scale deliver cost efficiencies.

On the other hand, the more firms merge, the more this n goes down, and the more markets go up, and the worse it is for consumers. So the trade-off is, do you want to reduce-- is reducing n worth it in terms of the economies of scale? Or in other words, does the producer efficiency go up enough to make up for the potential loss to consumers of this less competitive market, OK? People understand that?

Now an interesting case of this, which has got very big implications for all of us in America, is hospital mergers. During the decade of the 2000s, there was a rash of hospital mergers, where hospitals said, look, here's a classic case for economies of scale, because hospitals have what's called a peak load problem.

They have to have empty beds. Hospitals can't be full all the time, because there might be a car accident, and people need beds. So by definition, it's inefficient for hospitals to be 100% capacity. Hospitals want to have excess capacity.

The problem with that, there's two hospitals next to each other, each with excess capacity, that's inefficient. It'd be more efficient to have one hospital, one merged hospital, then they just manage the proper amount of excess capacity. And hospitals made this argument, and we basically approved any hospital merger that they wanted in the 2000s.

Well, what happened? What happened is the hospitals lied. They kept both hospitals open, kept all the empty beds, and just raised prices. So essentially, the hospital mergers did not deliver any of the economies of scale they promised, but did deliver a lot of the market power we feared.

So a huge cause of the increase in medical spending in the 2000s was these hospital mergers, which essentially took a lot of the competitive pressure out of the medical market and didn't really deliver economies of scale.

And this is the hard part of being a regulator. Most of what public policy economists do in the world is regulate. All over the world, there are thousands of economists employed all over the world, hundreds of-- tens of thousands, whose job it is to make regulatory decisions of this nature, and they're really hard.

Because we've drawn nice, clean theoretical models here, but we have to know what's epsilon. You know, how much-- what's epsilon, to figure out the effect to consumers. What are the economies of scale? Will they exploit those economies of scale, et cetera? So these are really hard and interesting decisions.

Now, let's go on to the last topic I want to cover today, which is price competition. Price competition.

Now, the models we've been discussing so far have been what we call quantity competition, that United and American compete on how many flights to send, and then the demand curve tells them what they can charge. But in fact, in many markets, that's not how firms compete. In fact, we even mentioned it. Someone mentioned about best price offers, et cetera.

They don't compete on quantity, they compete on price, and that's a different model, named after another French economist. A model of Bertrand competition is a model of price competition, is a model we call Bertrand competition.

This model says that basically, two firms compete over what price to set, and then the quantity is determined by the price that results from that competition. So they don't compete over quantity. They compete over price, and the demand curve then tells you the quantity, OK?

Now, in this case, what's really striking about Bertrand competition is that unlike the Cournot model, under Bertrand competition, two firms can be enough to get us to the competitive equilibrium. Why? Why do we only potentially need two firms to get to the competitive equilibrium? Yeah.

AUDIENCE: I'll do you lower.

JONATHAN Why don't you explain a little bit more what you mean?

GRUBER:

AUDIENCE: One firm [INAUDIBLE] the other one what price are lower, and like--

JONATHAN Exactly. As long as there's profits to be made, it's like our entry/exit decision, right?

GRUBER: As long as there's profits to be made, I'm going to come in at a price one penny below you, make one penny less profits, and steal all the business from you.

So if there's perfect competition between firms in a Bertrand sense, then you only need two firms to get to the competitive equilibrium in theory, OK? So it's a very different idea. Cournot competition, we need many, many firms to get close to this competitive outcome.

With price competition, because firms are always kind of competing on one penny below each other, in a market that's otherwise competitive, you can actually drive the price to competitive price through-- essentially, you can actually drive the price down to marginal cost.

It's sort of like I talked about contestable markets and as long as there's profit to be made, someone would enter. Here, as long as there's profit to be made, someone will lower their price, and that'll keep happening until price equals marginal cost. So in Bertrand competition, you actually can get close to or at-- to the competitive outcome with a small number firms.

Now, two points to make about this. Your first point is, well, holy shit, how do I say which one of these to use? You've just taught me-- you've just spent a lecture and 1/2 on this fancy model, spent 37 seconds on this model.

How do I know which one to use? You didn't write down any math, so I don't know what to do. I'm freaking out. OK, how do I know which one to use?

Well, the bottom line is, we're not going to ask you to do much math about Bertrand competition, other than sort of the intuition about competing over price. The more relevant question is, how do you think about the situations where Cournot competition is more likely and Bertrand competition is more likely?

So what do you think? In what types of markets do you think Cournot competition would be more likely, and what kinds of markets do you think Bertrand competition would be more likely? Yeah.

AUDIENCE: Wouldn't the Bertrand be really efficient in an elastic market?

JONATHAN GRUBER: Well, no. Elasticity is the same. So basically, elasticity is going to have a similar effect in both. It's going to basically drive the price down in both, OK? Because the elasticity is higher, it drove the markup. Bertrand, it's going to drive down in both.

So it's not actually about elasticity. It's something about production processes. What type of production processes are going to lend themselves to price competition versus quantity competition? Think about it this way, if I offer a price, what do I have to do?

AUDIENCE: I think the better the production is dominated by the capital costs, or is it [INAUDIBLE] the variable costs?

JONATHAN GRUBER: That's roughly speaking right. Basically, if there's long lags in production, I can't do price competition. So if I say I'm going to compete, people would say, "Great, I want all your product." I'm like, great, you can have it in a year. That doesn't work.

So things like auto companies are going to have a hard time with pure price competition, because if Toyota says, "OK, I'm \$1 less," someone says, "OK, great. We want a million Toyotas tomorrow," they can't do it.

So things which are capital-intensive lagged production processes it's going to be hard to have pure-- real life, of course, there could be some mix of these. But it will tend more towards quantity competition, because you're really going to know what you're going to sell, because that's sort of-- you can't just infinitely supply it.

With other things like cereal sales, where you can sort of immediately crank up a million more boxes of cereal in like a day out of your production processes, there would be more likely to be price competition. Things with small production lags, then you'd be more likely to have price competition, because if you lower the price, all of the sudden, you dominate the market. You can meet that demand, OK?

So essentially, we can think about price competition as being more likely the

smaller the production lag, or maybe the less capital-- it's not really about capital intensity, because you can have a capital-- you can create things quickly. It's more about production lags.

Now, we're never going to ask you to tell us which is right, and of course, in reality, it lies somewhere in between. But this just gives you a sense of kind of when one type of competition is more likely than the other. Yeah?

AUDIENCE: Does it have anything to do [INAUDIBLE] to protect the cereal in the grocery store?

JONATHAN GRUBER: Great segue. You've jumped ahead to the last point I want to make, which is, imagine you're in a Bertrand competition world, like with cereal. That's a pretty awful world if you're a producer, OK? Basically, that's where your markup's tiny, because any time you try to raise the price, you get undercut.

What can you do? Well, we've already gotten the answer. What you can do is you can engage in product differentiation. You can engage in product differentiation.

OK, so basically, the reason why you're in Bertrand competition is because you're selling the same thing. Once I'm selling something different, I take on the features of a monopolist again. So if I can get consumers to not think of my good as identical to my competitors, then I can price above marginal cost, and people would still buy it.

The reason Bertrand competition drives price to marginal cost is because people view the goods as identical. But if they don't view the goods as identical, then I can keep price above marginal cost, OK?

And the example-- breakfast cereals is the perfect way to illustrate this. So back around World War II, there were essentially basically like three types of cereal, OK? There was Cheerios, there was cornflakes, and Quaker oats. OK, that's basically what cereal was, not very exciting.

Now, but by 1970, there were more than 150 breakfast cereals to choose from, including some which are variations of Cheerios and variation of cornflakes. In fact, you could all say in some sense, all cereal is variations of Cheerios, and cornflakes, and oats.

And then-- and moreover now, if you go to a store today, you can actually buy generic versions of brand name cereal. You can buy Oatios or Marshmallow Mateys, which are Lucky Charms, or what's the other one? I love buying these big bags.

You guys ever buy these generic Lucky Charms, Marshmallow Mateys. Generic Captain Crunch is like, you know, Ahoy Matey or something. I don't know. They've got these generic things which you can buy, which are really just the same.

So essentially, what you do-- what companies want to always do, which are in Bertrand competition, is always try to product differentiate, always try to figure out a way they can create a market where they can price above marginal cost, OK?

So for example, let's take General Mills, a company that makes Cheerios, OK? They're making Cheerios, and then all of a sudden, Oatios and stuff started coming along and they weren't making money.

What do they do? They created different kinds of Cheerios, like Apple Cinnamon Cheerios. General Mills did not create Apple Cinnamon Cheerios out of the goodness of their heart. General Mills created Apple Cinnamon Cheerios because they were getting killed in the Cheerio market, and so they tried to differentiate by having a new product on which they could charge a higher price, which is Apple Cinnamon Cheerios.

Now, how do we feel about this? Well, it's not clear. On the one hand, by introducing Apple Cinnamon Cheerios, General Mills was able to push its price greater than marginal cost. And as price pushed above marginal cost, quantity sold in the market falls. It created deadweight loss. Quantity fell, and that's bad, OK?

On the other hand, Apple Cinnamon Cheerios are quite good, OK? So it actually ends up being much like our patent discussion, which is, essentially, by differentiating, they've had two effects. They've lowered consumer surplus and welfare by pricing above marginal cost, but raised it by shifting up the demand curve, by creating a new good that people want. Yeah.

AUDIENCE:

Isn't like-- doesn't like consumer [INAUDIBLE] not necessarily have to happen, because then different people have different demand curves, and the demand curve for like Apple Cinnamon Cheerios is not-- hasn't been this good.

JONATHAN GRUBER:

No, the point is-- OK, it's another way of stating my point. Even if the demand curve-- let's say there's a new demand curve for Apple Cinnamon Cheerios. It's way out, OK? That's great, OK?

But still, the fact that they're pricing above marginal cost means they'll sell fewer than they would in a competitive market. If they had invented Apple Cinnamon Cheerios and sold it at marginal cost, they'd still be way better off. So the trade-off is, essentially, how far out do we shift demand by creating this new product, versus how much do we restrict sales by pricing it above marginal cost?

So essentially-- now, and now what we have is a market with about five firms that dominate it, and about 5,000 brands of cereal, OK? So it's constant product differentiation. And essentially, this is the trade-off with product differentiation, which is we get reduced sale-- we get deadweight loss, because they're not pricing it at marginal cost, but we get new products that people might like. Yeah.

AUDIENCE:

So if there's a product with like--

JONATHAN GRUBER:

Differentiation.

AUDIENCE:

Yeah, differentiation. Is brand loyalty between things like Adidas and Nike, or like, Apple and Android, where there are various [INAUDIBLE] where you feel strongly towards one, is that good for both of the two things That you're choosing between?

JONATHAN GRUBER:

Well, actually, that's really interesting. It depends on whether that brand loyalty is based on innovation or blind faith. So this is, once again, this gets into the deep, interesting issues of industrial organization.

You talk about game theory, which is, if I can create brand loyalty in a way that makes you slightly better off, but keeps you in my brand forever, then that might be worse. By creating it in a way that makes you much better off, that might be better.

So essentially, that's why, for example, you may have noticed you may be getting one or two credit card mailers. Are you guys getting inundated with credit card offers? OK, it's not because they love you guys. It's because if they hook you now, then you might stick with that credit card later.

So trying to exploit-- trying to get you, they're trying to give you a good deal now to get you hooked later, so they can charge up closer to monopoly price later on. So essentially, there's a trade-off, which is, if that loyalty is based on real differences in quality, that might be good. If it's not, it might not be, but the welfare gets very murky. It's a good question. Other questions?

OK, so these are exciting real world topics. It's more reasons to go on and study more economics. But let's stop now. We will come back and we'll start talking about factor markets on Monday.