**W11 V4 Collusion**

0:09  
Now that we have a sense of how firms compete, let's think about both forms of competition, price and quantity competition.

0:16  
Let's think about whether they want to collude and whether it may be sustainable or not.

0:21  
Using the Nash equilibrium as a concept, Cornell and Bertram.

0:25  
The difference is what they're choosing.

0:27  
But for both of those cases, remember in one O 1, we're only focusing on choices.

0:32  
At the same time, if we're going to think about collusion, we first need to think about why they would collude, why they're going to collude if they're going to increase their profits.

0:43  
OK, good, So what increases our profits?

0:45  
Is there some best case scenario that is possible?

0:48  
You already know what the best case scenario is because we've done that already in the monopoly.

0:53  
We're saying what's the best case scenario in terms of total profits in the market?

0:57  
That was the monopoly price and quantity.

1:00  
OK.

1:00  
So if you have, you're starting from the biggest pie, which is the monopoly in terms of the profits, then our secondary thing would be to figure out how we're going to divide the pie.

1:09  
You get more, we get I get more right secondary once we've got the maximum pie possible.

1:16  
So let's just start with that assumption to say if they were to collude, what they're going to do is that they're going to pick the monopoly outcome and then the secondary part is going to be how they're going to split it.

1:26  
And that can depend on a whole a bunch of other stuff.

1:29  
Let's do this with calculations because sometimes that's easier to see.

1:33  
We've already done this in those individual parts in here.

1:37  
So for example, when we talked about corner competition, the first kind of example we talked about was why it is not the monopoly outcome.

1:45  
Because if we agree to collude and if we say, look, both of us producing a total quantity of eight is the best because we then get the highest size of the pie and then let's think about splitting the pie, whatever.

2:04  
Still in that case, firms have an incentive to deviate.

2:08  
And the reason for that was because of this dampening of the price effect relative to monopoly, right.

2:14  
I only sold 4 units.

2:17  
I'm kind of going from 4:00 to 5:00, and 4:00 is half the market quantity.

2:21  
So relative to the monopolist, the price effect is dampening.

2:25  
And that gives me an incentive to deviate.

2:28  
If we say we agree, we say, OK, you're going to pick 4, I'm going to pick four.

2:31  
We're going to look at this the other night.

2:32  
We're going to say, yes, we're going to do it.

2:33  
I go back to my factory and I'm going to say, you know what?

2:36  
I'm not going to stick with four.

2:37  
I have an incentive to deviate.

2:39  
The other firm anticipates that and collusion is not going to be sustainable.

2:43  
OK.

2:44  
So from a Nash equilibrium point of view, we're like do you would you expect to see the monopoly outcome in quantity competition?

2:52  
And as an economist, you're going to say no, because firms have an incentive to deviate.

2:56  
That's how we found the core no equilibrium because the monopoly was not a possibility.

3:01  
What about with changing the size of the pie and who gets larger?

3:06  
Fraction doesn't really do anything because it goes back down to this dampened price effect.

3:13  
OK, so collusion gives you the highest possible profits, but every firm has an incentive to deviate.

3:21  
Is this the same outcome for Bertrand?

3:23  
Let's do the same kind of thinking.

3:25  
If we both look at each other in the eye and say, OK, the best case scenario, highest profits are both of us post 60, and if we both post 60, we can share well be sharing consumers rights.

3:36  
It'll be a good thing for us.

3:37  
Look at the highest possible profits.

3:39  
And then I go back to my factory and I got to actually put $60.00 on the shelf.

3:43  
And I'm going to be thinking about, you know what, if I post 5999, I can go from selling half the market quantity to the entire market quantity while losing only one cent.

3:54  
Again, huge incentive to deviate.

3:57  
And so even from a Bertrand perspective, there's going to be no incentive to collude because that incentive to deviate is so high, gives you the highest possible profits.

4:07  
We both know that, right?

4:09  
So it's we both kind of know that your profits and my profits and the total market profits will be maximized at the monopoly outcome.

4:18  
But if I deviate, I can increase my profits more than the share of the monopoly profits, right?

4:26  
Deviating is profitable if the other firm is going to stick with the monopoly quantity.

4:33  
Oh, sorry.

4:34  
In this case, the monopoly price, right.

4:37  
That means that the monopoly outcome again, is not sustainable because each firm has an incentive to deviate.

4:45  
OK.

4:46  
But we do know that sometimes firms collude, right?

4:52  
Sometimes this is explicit.

4:54  
So if you're thinking about OPEC, right, we call that a cartel because they have an explicit agreement.

4:59  
Everybody knows this.

5:01  
They are going to be limiting the amount of oil that they produce, quantity competition, because they directly want to affect the market price for oil and that gives them the highest profits.

5:12  
This is an explicit agreement.

5:16  
And so in our case, right, we're going to be like, do you have an incentive to deviate?

5:21  
Yes, they do have an incentive to deviate, but somehow making this explicit seems to lead to something different.

5:27  
OK, let's think about this as well.

5:28  
OK, now this is not an option in Canada because it's illegal, OK?

5:32  
In Canada, what firms can do is that they can collude, right.

5:36  
So we say, oh, grocery prices are really high.

5:39  
Grocery firms cannot be a cartel because that's illegal.

5:43  
But what they can do is come to an agreement.

5:46  
So, you know, Metro law, laws, all of the CEOs, they sit together.

5:49  
There has to be verbal because there has to be no evidence of this.

5:52  
If there's evidence found, then it's illegal.

5:54  
And then they have a problem, oh, with the government.

5:56  
But they come to an agreement and they're going to be like, you know what, let's all make sure prices stay high.

6:01  
We're going to get the highest profits and no one's going to deviate.

6:05  
Right.

6:05  
It can be explicit in some places, but in Canada it's illegal.

6:09  
So it would have to be implicit, right.

6:12  
So then you as an economist or or people are looking at high grocery prices and they're like, oh, this is because the grocery firms are colluding.

6:18  
They're doing this.

6:18  
This is bad.

6:19  
You should.

6:19  
Government should step in.

6:21  
Economists would say, well, think about it, they have a huge incentive to deviate.

6:25  
If Metro posts, let's say, a high price for milk, then Sobeys has an incentive to undercut them by a little bit, a lower price.

6:34  
If we're thinking about price competition, if we're thinking about quantity competition, Metro has ordered a very little low quantity of, I don't know, bread.

6:43  
Sobeys will say I'll produce a little bit more.

6:45  
Sure.

6:45  
Market price will drop a little bit, but I'm gonna get increased profits relative to my profits before huge incentive to deviate.

6:52  
So if we're going to say that it is sustainable because there's an explicit agreement or grocery firms are actually colluding, there has to be something else that's allowing them to collude.

7:05  
And typically this is something that changes the incentives to deviate.

7:12  
OK, some form of punishment that's could be maybe explicit.

7:18  
If you have a written verbal, a written contract that says if you don't do what's asked and these are all the punishments and these punishments actually affect your payoff because there are fines, explicit fines you need to pay that lowers your profits from deviation, then you can sustain collusion because you're changing the payoff.

7:36  
This is the insight from game theory.

7:37  
Without changing the payouts, you're not achieving anything because nobody has any incentive to change their behavior.

7:43  
Changing the payouts through punishments explicit for example, in the case of cartels, because you have a contract in there.

7:49  
But if you don't have a contract and it's illegal, so you kind of need to do this without any paper trails, then what kind of punishments can we have, right?

7:58  
Because if grocery firms are colluding, they have to be some form of punishments, otherwise they're going to deviate.

8:03  
Here's when you have to think about different types of punishments and you can get really creative in here.

8:10  
And typically what we do here is talk about repeated games, OK, it's not a one time if you post a high price of milk and I post, I undercut you by a little bit.

8:22  
This is not the one day that it's happening.

8:25  
This is going to happen this week, this day, tomorrow, the next week, the month's years.

8:29  
And there can be other ways of punishing people.

8:33  
That's not just fines.

8:35  
For example you can use the fact that other firms payouts are affected by your choice.

8:41  
OK, so if Sobe says, you know what I see Metro posting $10.00 for a bag of milk.

8:47  
I'm gonna post 999.

8:49  
Metro sees this, right?

8:51  
And then Metro is going to say fine, you undercut me by 1 cent today.

8:54  
Tomorrow I'm posting a price of milk of $4.00.

8:58  
Guess what?

8:58  
You're going to have nobody tomorrow, OK?

9:02  
You're going to have absolutely nobody showing up, which means your profits are going to be 0.

9:05  
Metro says maybe I'll lose money, but you know what?

9:08  
Punishing Sobeys is good because then it's going to take away any profits.

9:12  
Sobe can get that one cent deviation.

9:16  
It's a punishment.

9:17  
Now this requires what we call repeated interactions, right?

9:21  
It's not just the one time that we're posting prices, repeated interactions, that's a little bit beyond the scope of 101.

9:28  
However, informally, you can kind of think about this and repeated games, grim trigger strategies and it gets much more interesting in here.

9:36  
So there are ways even for grocery firms to sustain collusion, even though it's illegal, and even though our one O 1 insight tells us that there is a huge incentive to deviate, It comes in from thinking about this as a repeated interaction and possible punishments that are available and repeated interactions that needs to affect the payoffs.

9:56  
That's the punch line I want you to take from here.

9:59  
Anything that is changing behavior has to change.

10:03  
The payoffs has to be credible.

10:05  
Metro should really want to punish Sobeys, even though it may mean that Metro also gets affected for a short while.

10:14  
OK, both types of competition price and quantity competition firms have an incentive to collude higher profits.

10:21  
In both cases they have an incentive to deviate.

10:25  
Right now.

10:26  
Different reasons because the the strategic interaction channel is different, but they both have an incentive to deviate.

10:31  
So if you want to say collusion is sustainable or if you want to find evidence of collusion, you need to be looking for external enforcements.

10:38  
Anything else, that's punishments that changes the payouts, because without that you are not going to be able to sustain collusion or cartels, and that's where you need to be looking for evidence.

10:53  
So if you want to find evidence that grocery firms are colluding, you really, you can't find verbal evidence or agreements because they're gonna make sure they don't have any traces of that, which you can find is ways about how they're punishing deviations.

11:06  
And that could be a more interesting way to proceed.

11:09  
We need a little bit more structure than we have in 101 to talk about this.

11:13  
You can read about it in the textbook, you can informally discuss that.

11:16  
But we're going to stick with choices made at the same time and kind of what we call a simultaneous games, one shot games without repeated interaction officially for the examples that we do in one O 1.