Business Data Management
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Lecture 3
Industry market structure and Concentration indices

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Professor M Suresh Babu: So, when we look at industries, one of the important issues from our discussions that emerged is how to characterize an industry or to put it very simply, how can we say that an industry is competitive and another industry is not competitive? Why we need this? Because a a lot of entry decisions are made on this characterization, should I enter to an industry which is very competitive?

Professor G Venkatesh: Should I invest in this industry?

Professor M Suresh Babu: Should I at all invest because after entering sometimes it is difficult to exit because of the sunk costs, fixed cost which we have already discussed earlier. So, understanding market structure in terms of firm behavior as well as industry behavior is extremely important.

Now, industry level data combined with firm level data will give us an idea to understand markets. So, that is why we talked about industry level data first and then firm level data. We combine these two and draw inferences on market structure, which we discussed earlier in our discussions. So, the basic question is that, how can you tell what market structure an industry has?

Professor G Venkatesh: There are too many people in the industry, this could be one of the parameters?

Professor M Suresh Babu: yes, indeed.

Professor G Venkatesh: Some people are making a lot of money some are making very less.

Professor M Suresh Babu: If there are too many people, but one or two players are controlling then there is a problem.

Professor G Venkatesh: Yes.

Professor G Venkatesh: And then there are some industries where it is impossible to have many numbers of players for example the telecom or electricity industry.

Professor M Suresh Babu: We call it a natural monopoly.

Professor G Venkatesh: Yes, only one company will be there.

Professor M Suresh Babu: It is not profitable to have more than one company.

Professor G Venkatesh: Because the cost of equipment and laying connections will be very high.

Professor M Suresh Babu: In these cases, the sunk costs are very high, which is not economical for having more than one player. So, this kind of inferences about industries can be drawn by combining industry level data and firm level data.

Professor G Venkatesh: That is what you mean by market structure.

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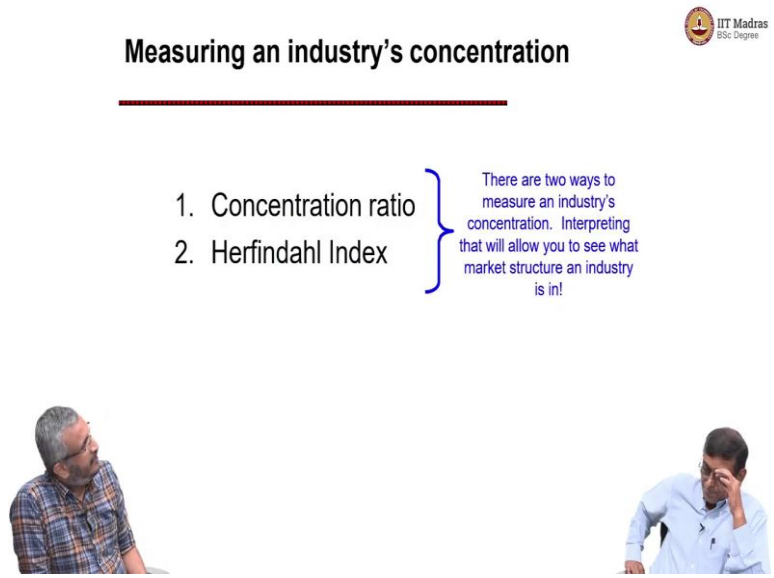

Professor M Suresh Babu: Now, inferences on market structure are drawn on the basis of two things; one concentration ratio, two what is known as an Herfindahl index. Now, one straightforward way of inferring is just to look at the number of players in the industry, as we have just discussed. And then we need to look at the market share of each firm, one firm might have a higher market share compared to another.

Professor G Venkatesh: Market share means the percentage of goods that are produced. If there are 100 units of that particular item which is being produced, how much percentage of that is being produced by one firm? Should we do it in terms of value and not in terms of number?

Professor M Suresh Babu: No, in terms of value if the total sales in an industry…

Professor G Venkatesh: Total sales, revenue should be taken care of.

Professor M Suresh Babu: Total sales in industry is for about 100 rupees, out of that 100, how much sales are done by firm X and how much by firm Y.

Professor G Venkatesh: That is called the market share.

Professor M Suresh Babu: Yes. Now, this is one kind of an analysis. Second is Herfindahl index, we will come to each one of this. So, the idea is to see what is the market share. Market structure uses both concentration ratio as well as Herfindahl index.

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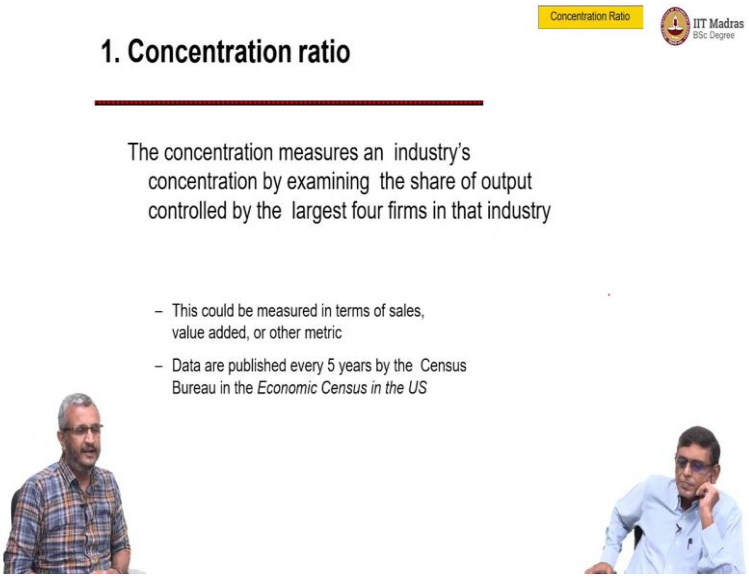

Now, let us start with concentration ratio. Concentration ratio is the first cap idea in terms of an industry's concentration, in terms of share of output controlled by the largest 4 firms. I have put 4 here, you can have 3 firm concentration ratio, you can have 5 firm concentration ratio, but generally 4 is kind of a number, like the top 4. How are they doing? The idea is that…

Professor G Venkatesh: In traditional large industries, this will be typically like that.

Professor M Suresh Babu: Typically, 3 or 4 players. Now the argument here is that in output share, we assume that whatever is produced is sold. So, it is a sales proxy. So, this is generally measured in terms of sales, value added or any other matrix. And in the context of India, it is slightly difficult to get this data because we do not have firm level data at this level. We have factory level data from inspectors of industries. Then to aggregate…

Professor G Venkatesh: Because usually the firms are conglomerates, they make many things.

Professor M Suresh Babu: There are many factories which are multiproduct firms. So, to arrive at that level of data is very difficult. That is why I highlighted the best available source of data in the context of U.S., Census Bureau or the Economic Census in the U.S. This comes out in every 5 years, which gives a kind of firm level data.

Now, in India, we made an attempt earlier which is known as the "Monopolies and Restrictive Trade Practices Act". Through which we try to aggregate at the firm level and to see whether there are monopolies by certain…

Professor G Venkatesh: One firm is dominating…

Professor M Suresh Babu: Industrial house is dominating. At that time, it was based on industrial houses concept.

Professor G Venkatesh: Like Tata's, Birla's…

Professor M Suresh Babu: Birla's etc. But now the problem is that industrial houses have what we call as "cross holding". Meaning, I will have some shares in some other holding company or somewhere else, in some other activity. So, this analysis has limitations.

Now, what we do in India is to look at the competition Commission's analysis, that is, whether our firms are practicing anti-competitive behavior, what we call as the kind of blocking competition behavior. But data in the Indian context is little difficult to get. We have to rely on what we saw earlier in our analysis from the Center for Monitoring Indian Economy, the CMIE…

Professor G Venkatesh: Which is private.

Professor M Suresh Babu: Yeah, which publishes firm level data.

Professor G Venkatesh: Oh, they do?

Professor M Suresh Babu: Yes, they publish firm level data.

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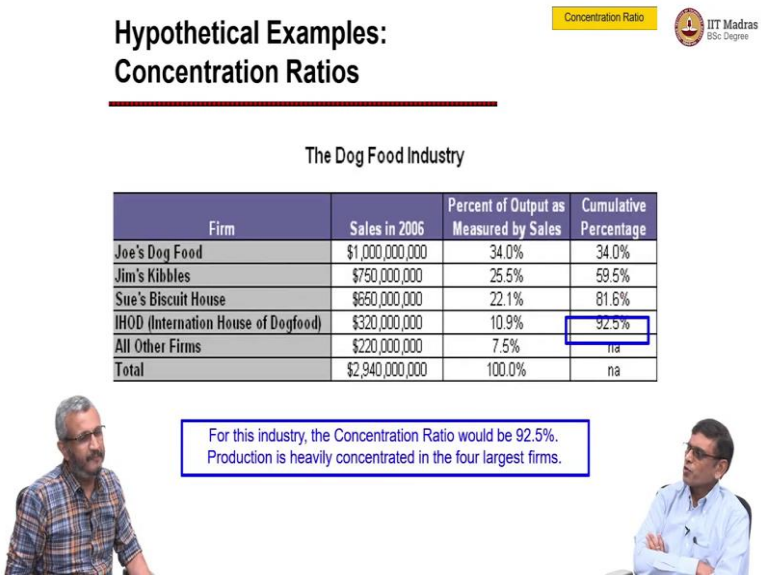

Professor G Venkatesh: You have to pay for it or you get it free? You have to pay for it?

Professor M Suresh Babu: Yes, you have to pay for it. It is not free. That is where CMIE data comes in. Now, I am just putting a hypothetical example of a computing concentration ratio.

This is the dog food industry. There are players like Joe, Jim, Sue. For. all these people sales values are given and also the total sales are given. And we have the percentage of output measured by each of the firm. And then I am computing the cumulative percentage of top 4 firms in this. Now what I get here is, top 4 firms account for 92.5 percentage of sales.

Professor G Venkatesh: Oh, I see. It is a very highly concentrated.

Professor M Suresh Babu: So, concentration ratio is 92.5. Production is heavily concentrated in the 4 largest firms. Now, this is all other firms that I have put here (referring slides). These all-other firms could have many different kinds of firms within them available. This all-other firms might have perhaps another two other firms attached. But does not matter, 4 firms account for 95, they control the market, that is the inference that we can draw from…

Professor G Venkatesh: This is very typical. For example, taking the case of potato chips. Lays would sale like 50 percent (I do not know); it is a very large amount actually. Then there are Pringles or something else. So by the time you come to number 4, you would already reach 90. Is not it typical?

Professor M Suresh Babu: Yeah. In India, in certain industries, yes. For example, Viscose, Rayon, these two firms control the major part. It is a control kind of thing. But in certain other industries like, food products in India are highly fragmented into a lot of firms or people. So, it typically depends on the industry also. And then in some industries, like, cement, we saw…

Professor G Venkatesh: Some are corporate like Papad. It is very fragmented because it is a corporative sector kind of a thing.

Professor M Suresh Babu: Generally, food products are all like that. So, this is one kind of an inference that we can draw using firm level data to have an insight on the industry structure.

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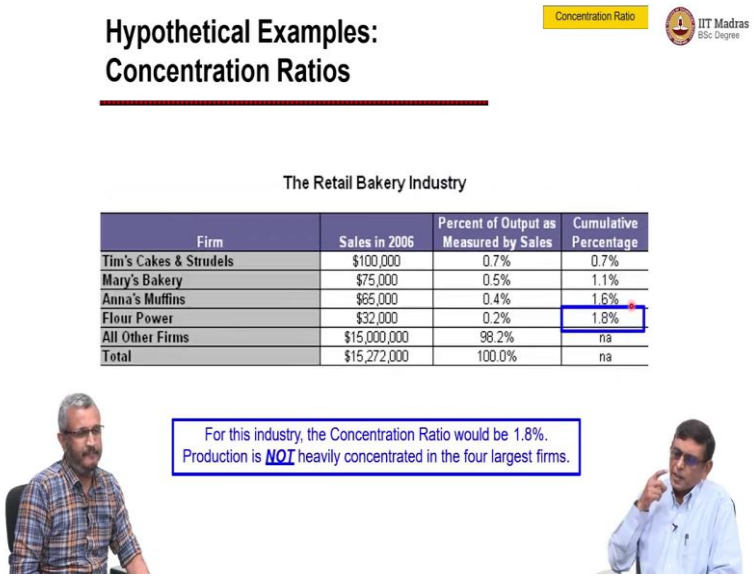

Here is another example, the retail bakery, where we have, different players, and I am putting 4 big ones, but their percentage shares are very low. 4 are having a cumulative percentage of only 1.8 percentage, which means that concentration ratio is only 1.8 and production is not heavily concentrated in the hands of the 4 largest.

So, these are two different industries where concentration ratios are wildly different. Both are food related, one dog food, and other is a bakery. We find that one is highly concentrated, and the other has no concentration. Bakery is a very interesting kind of an example. We have this all kind of shops, small-small bakeries. And also, concentration is very difficult to measure in that, as there are so many places.

Professor G Venkatesh: So, you call this fragmented?

Professor M Suresh Babu: Highly fragmented. So, two extremes we saw here

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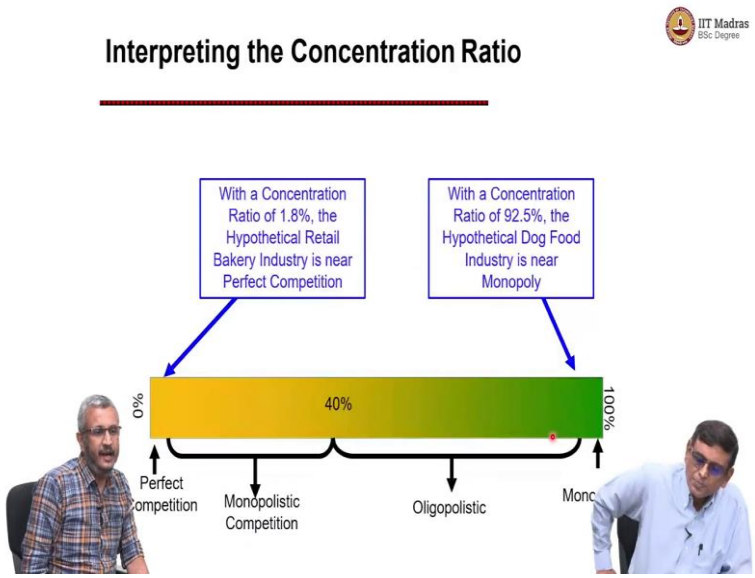

Now, how do we use this? Well, we know that if there is only one firm, it is monopolistic. If there are few firms, it is oligopolistic. Well, if there are more firms, but some firms are dominant, then it is monopolistic competition. And in case there are many firms it will be a perfect competition. So, we find that with a concentration ratio of 1.8 for bakery is near perfect competition.

Now, we were using the word near, because in reality, there is nothing called perfect competition kind of thing. It is a textbook kind of a construct. But in reality, it is nearer to that, not perfect.

Whereas here, it is closer to a monopoly situation because 4 firms are controlling the market. Now if these 4 firms collude among themselves, then they are monopolies. Collude in terms of price or quantity decision.

Professor G Venkatesh: Quantity decisions like OPEC curtail. Yes if they all say “let’s curtail”.

Professor M Suresh Babu: That is a curtail. It is a quantity curtail. You can have a price curtail also. So, we find that this analysis can be used to draw inference in terms of, where the industry is, in terms of…

Professor G Venkatesh: So, if it is a very fragmented industry, it is easier for me to enter presumably, but at the same time, I am not going to make anything because there is no control of price.

Professor M Suresh Babu: Yeah, so here at this point, entry is easy, but survival is difficult. At this point entry is difficult, very difficult, but survival will be easy. Once you are inside, then you might survive. So, that is why the entry decisions are aligned with this market structure.

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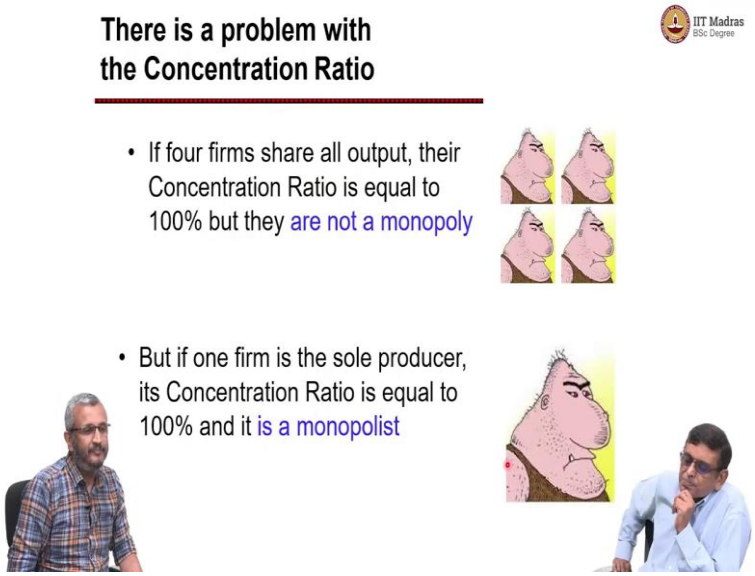

Now, but then concentration ratio has a problem. The problem is that if 4 firms share all output, their concentration ratio is 100 percent. But then they are not monopoly. But if it is one firm as a sole producer, then it is monopoly. So, the kind of inferences that we can draw looking at concentrations ratio is also limited because we are not taking into account the entire number of players in that industry.

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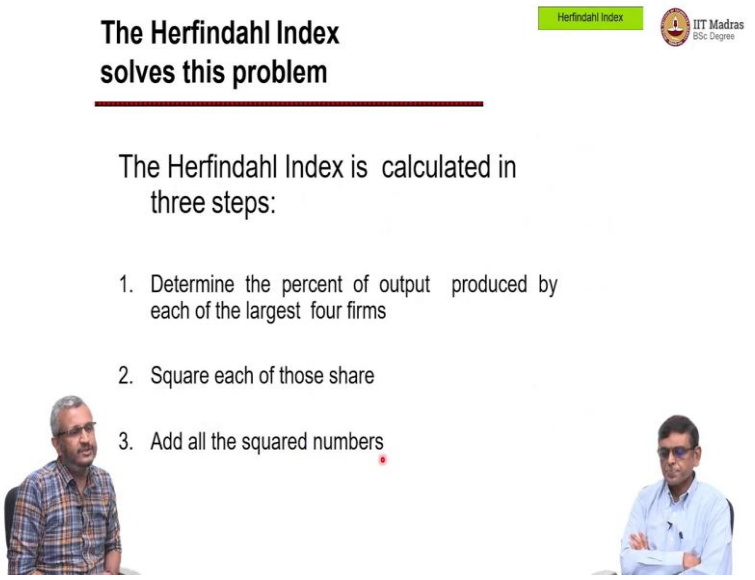

To take care of that we use Herfindahl index, which solves this problem. Our Herfindahl index is calculated in three steps.

Professor G Venkatesh: So, there is something called HHI. Is this the same thing?

Professor M Suresh Babu: This is the same thing Hirschman Herfindahl Index. So, in the first step, we determine the percentage of output produced by each of the largest 4 firms. Square each of those shares and add the squared numbers.

Professor G Venkatesh: So, it is like what statistics students has studied about first and second moment. Mean is sum, deviation or standard deviation is measured using squares. Here also the same, similar method? So, some variance type of measures?

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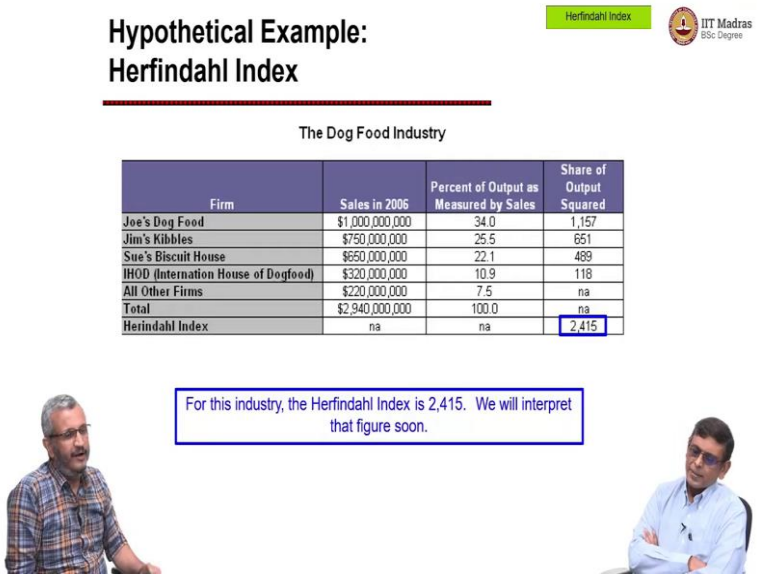

Professor M Suresh Babu: Yeah. Now, let me put an example of this same dog food industry. Now, you get the sales, percentage of output measured by sales. And then you get the share of output squared.

Professor G Venkatesh: Square the percentage. It is mini math actually.

Professor M Suresh Babu: Yeah, in a sense, but then…

Professor G Venkatesh: Yeah, index it is.

Professor M Suresh Babu: It is an index. We will interpret that, in a couple of minutes.

Professor G Venkatesh: So, we can get the maximum or what?

Professor M Suresh Babu: It depends on the total number of players in the industry. It depends on the distribution that you have…

Professor G Venkatesh: But maximum will be 10,000, I think?

Professor M Suresh Babu: Yeah, that this itself is an abnormally high number, 2,400 itself is an abnormally high number.

Professor G Venkatesh: But in case one guy is contributing 100 percent then it will be 10,000.

Professor M Suresh Babu: That is maximum possible which is also unlikely, as it is a monopoly situation…

Professor G Venkatesh: It can be close to 0, but that is also unlikely…

Professor M Suresh Babu: That is also unlikely, those are two extremes.

Professor G Venkatesh: So, the typical will be like 1000?

Professor M Suresh Babu: Around 100 or less than that.

Professor G Venkatesh: Less than that. So, 2000 which is already high…

Professor M Suresh Babu: It is highly concentrated; 92 percent we saw…

Professor G Venkatesh: We already saw it.

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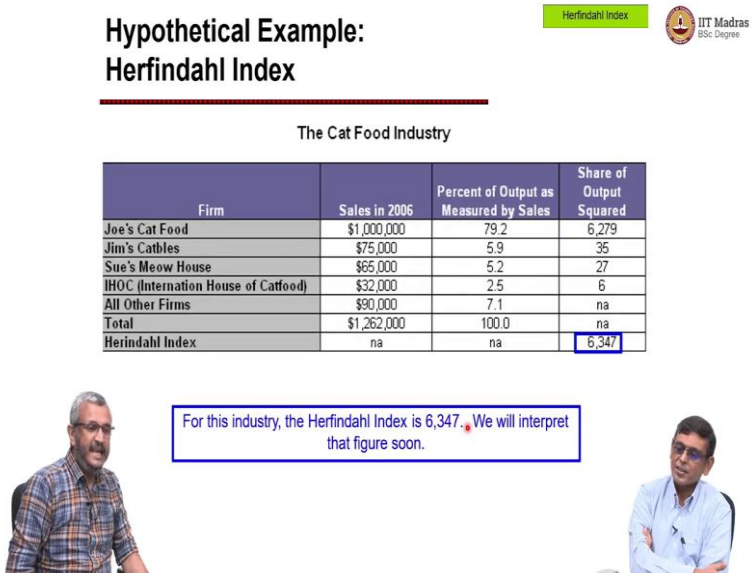

Professor M Suresh Babu: Now, we see the similar analysis for the cat food industry also. So, here we find that again, we square and for this the Herfindahl index is 6000.

Professor G Venkatesh: Oh, my goodness. Because it is one firm doing the most of the sales. It is monopoly. So, this tells you, when you get closer to 10000, you are getting monopoly.

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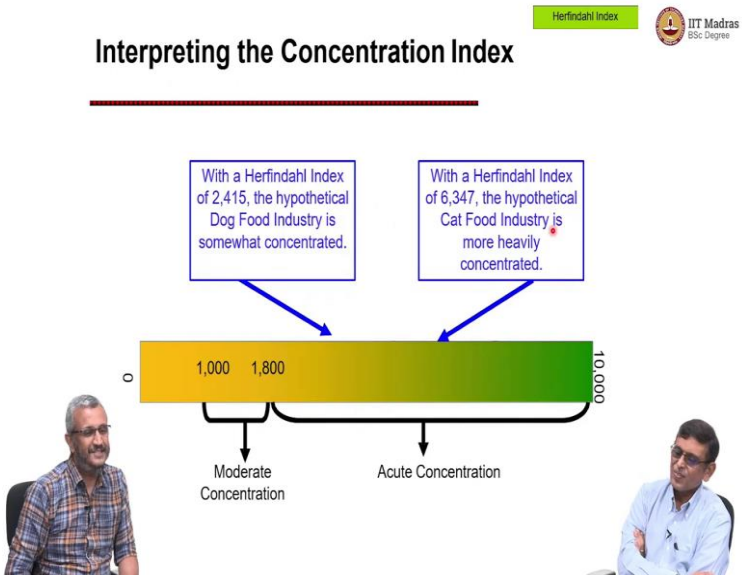

Professor M Suresh Babu: Now, we draw inferences from this. Dog food is somewhat concentrated. But this is heavily concentrated. So, you get an idea in terms of the relative levels of concentration.

Professor G Venkatesh: So that means 1000 to 1800 is moderate concentration, below 1000 is considered to be competitive.

Professor M Suresh Babu: And then there is acute concentration.

Professor G Venkatesh: So, 2400 is already acute concentration. 6000 is a hyper concentrated

Professor M Suresh Babu: And this is the upper limit that we are talking about. So, we can actually draw inferences in terms of…

Professor G Venkatesh: Where the industry is? You put it on the scale.

Professor M Suresh Babu: Yeah in terms of relative levels of concentration.

Professor G Venkatesh: Nice, so, one scale for the whole industry.

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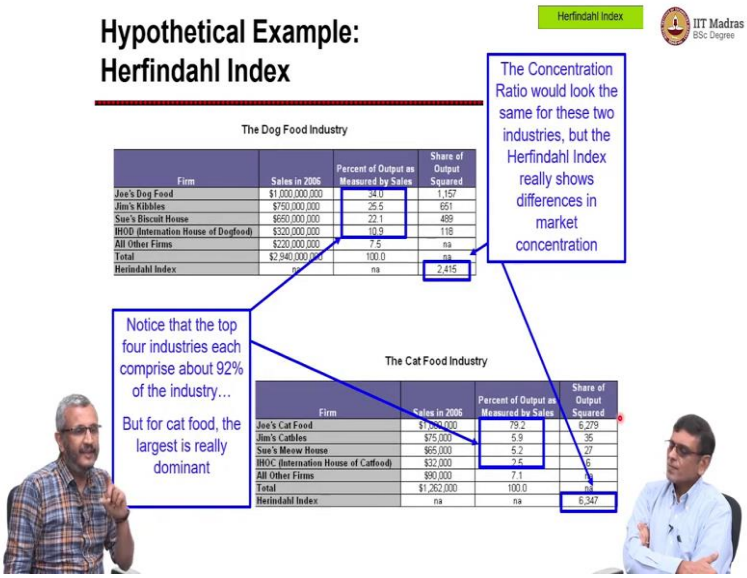

Professor M Suresh Babu: Yes. So, now, there is another example that I want to draw here. Now, you see, when we look at the Dog food industries, Herfindahl index is 2415 and for cat food industry, it is 6000. Now, the concentration ratio would look same for these two industries, but the Herfindahl index shows difference.

Professor G Venkatesh: Because, variance concept is involved.

Professor M Suresh Babu: Yeah, if you look at a concentration ratio…

Professor G Venkatesh: distribution is very different;

Professor M Suresh Babu: Yeah. So, why because the top four of each account for 92 percent. In this also 92 percent (referring slide), this also 92 percent (referring slide) but actually, the Herfindahl index gives us a different picture in terms of concentration. And that is why we consider Herfindahl index as a better measure compared a simple market share.

Now, so, this is a very useful kind of analysis in terms of understanding market structure, in terms of entry decisions, as well as in terms of exit decisions. Whether one should exit from an industry which is highly concentrated and about the threat of entry. Because in competitive markets, there is always the threat of entry.

Professor G Venkatesh: Sometimes industry itself undergoes diverse transformation. It may be very fragmented, then consolidation starts happening, firms merge with each other, one company acquires another company. Cement industry in India, for example, went through the phase. And then they suddenly found that the industry has become very concentrated. So, if

you happen to be in an industry, with some position, maybe with a small market share, but it is a consolidating industry and similarly you have access to capital; you could play this game.

Professor M Suresh Babu: And that is exactly where the antitrust policy comes into effect. In India, the Competition Commission…

Professor G Venkatesh: They will not allow you to consolidate.

Professor M Suresh Babu: They will allow you, provided, you are not exhibiting any anti-competitive behavior. See, when we look at merges and takeovers, there are different kinds of merges and takeovers, for example, one is a kind of a hostile takeover, I am aggressively buying you out. Then perhaps competition commission will pull you out. Because there is an intention that I want to block competition in this. That is why I am aggressively buying all.

Professor G Venkatesh: So, if one company has 40 percent market share, another company say it has 30 percent market share, together 70 percent. So, if the first company tries to acquire the second company, will probably be blocked?

Professor M Suresh Babu: They will be blocked.

Professor G Venkatesh: Because then together they have 70 percent and they control the market. So, that should not be allowed.

Professor M Suresh Babu: Yeah. Now, the way to get over that is then the 40 percent market share company will form a subsidiary. And they will actually slice it into two. And then you have two entities and one of those entity would acquire the 30 percent company. So again, that is a way to some corporate structure. They will acquire that through restructuring. So, merges and acquisitions that are very important in terms of analyzing this.

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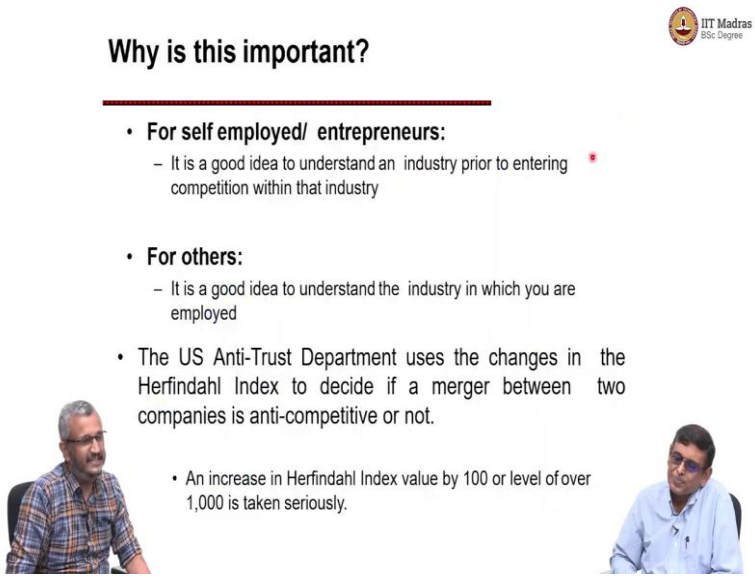

So, why is this important? This is important, because it gives us a good idea in terms of understanding an industry a priori before entering. Should we at all enter into an industry where it is competitive? And it is very important, especially for a startup, because we find that in the COVID times, a lot of startups came up for the retail space delivery, delivering to the door or house delivery kind of a thing for groceries, etc.

And it is a very competitive thing. There are so many agents now in that kind. So, should I at all enter into that as a startup or should I enter into another segment as a startup? Such decisions, it is important in terms of looking at this. Then it is also important in terms of looking at regulators, their point of view and antitrust. So, from a public policy point of view, examining concentration is extremely important.

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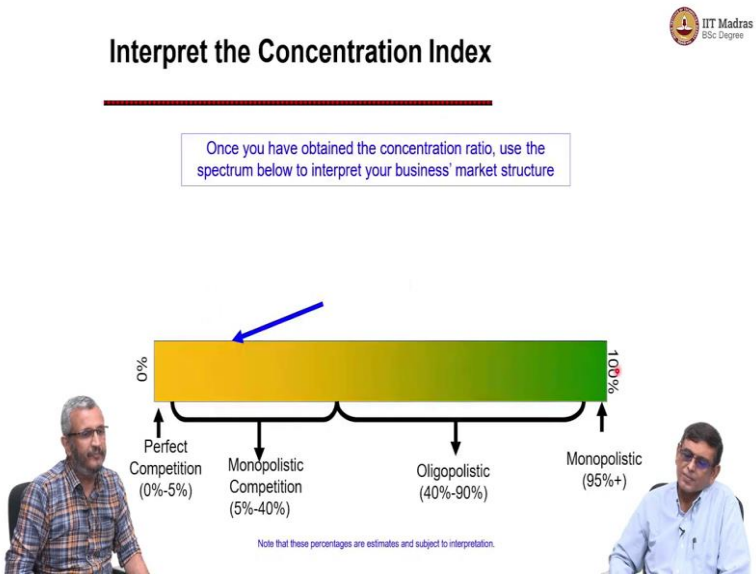

Now, how do we interpret it just to summarize our discussion. Well, once when we have obtained the concentration ratio, we use a spectrum like this, and then interpret our market structure. Where it is perfect competition, monopolistic competition, oligopolistic and highly monopolistic tendencies, and then you actually see whether you should enter or you should actually diversify or should even enter?

Now, this is also very important for a firm's decision to expand. Because if a firm decides to expand, then it should also escape the antitrust of regulator's eye, otherwise, they will be pulled up, you cannot expand. But unless a firm expands, it might not reap sometimes economies of scale. So, should I have another firm all together spun out of the main entity or should I have a subsidiary? Those kinds of corporate decisions can actually made using this data analysis.

Professor G Venkatesh: Also, firms basically can grow in two ways; one the industry itself is growing. So, it is growing. It is a great sector, so, industry is growing very fast. Like, so FMCG, for example, is Sunrise. Sunrise consumption in India is going to increase along with GDP increase. So, the industry itself grows every firm, like rising tide, lifts, all boats, etc. But the firm can also grow because they can eat the market share of another firm.

So, if I have 20 percent market share, and I see that you have 15 percent market share, I can have 25 and reduce you to 15. That is another way, because I have more competitive product, I have better price product, something like that. So, these are two ways to grow. Again, this picture tells you something, it tells if I know where I stand in the market share. I can say okay, the industry is growing, so I just retain my market share and grow with the industry, that is a

strategy. Or I can say, okay, maybe the industry is not growing that much. Let me see if I can eat somebody else's lunch.

Professor M Suresh Babu: Or I acquire another firm…

Professor G Venkatesh: Or acquire another firm, immediately I get the whole, I can have a bigger share, bigger chunk and reaps economies of scale. I have 10 percent, you have 5 percent, together we have 15 percent, we can cut some overheads and all and get economy of scale.

Professor M Suresh Babu: So, this we are highlighting as an example, where firm level data is combined with industry's level data to draw inferences at industry level. Very important, because it has also implications on firms or strategies. For example, growth, diversification, entering into new product space, etc.

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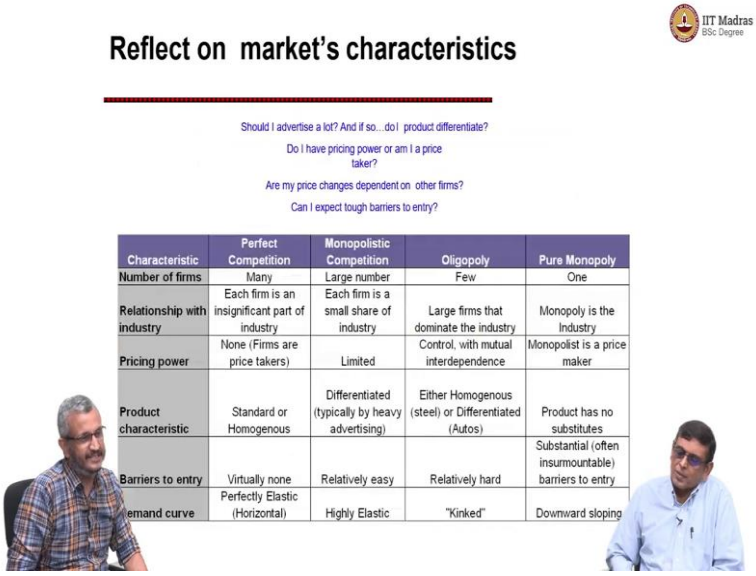

Now, this is just to summarize our market share analysis and market's analysis. And we know that there are four, two extremes of perfect competition and pure monopoly and within that monopolistic competition and oligopoly. And we classify it in terms of number of firms by the kind of power that each firm has in terms of price setting or quantity setting…

Professor G Venkatesh: So, telecom would be a classic example for oligopoly, right? Because there are a few you can go with like Reliance JIO, Airtel or Vodafone which is also struggling.

Professor M Suresh Babu: BSNL?

Professor G Venkatesh: BSNL, so there are 4, but there are only 4. So, that would be oligopoly, right?

Professor M Suresh Babu: It is a classic case of an oligopoly. But at some point, when the telecom sector opened up, we had a competitive space…

Professor G Venkatesh: We had many more, we had 10 or something…

Professor M Suresh Babu: Then there was a consolidation. Then there were also a series of merges and some exits, mergers and takeovers, consolidation phase. So, that is how an industry actually evolves over a period of time. And as famous economist John Robinson remarks, too much of competition ultimately might end up in monopoly also.

Professor G Venkatesh: Because lot of people die.

Professor M Suresh Babu: Lot of people die, it is controlled competitive and only few can survive, and telecom is a case in India where kind of it happened. So, this is the kind of an indicator or characteristic that we use to classify markets, product characteristic, pricing power, barriers to entry and demand. And then we classify markets into four broad heads. And then we can understand where, actually, a market is in terms of these four categories. And…

Professor G Venkatesh: (referring slide) So, this is interesting, watch this line. Even this pricing power is interesting. But about this product characteristics, you are saying basically, when there is perfect competition, you are trying to find a standardized product.

Professor M Suresh Babu: Yes, homogeneous.

Professor G Venkatesh: Homogeneous, like materials, the steel or something like? Steel is not perfect company, I think because it is monopolistic, because…

Professor M Suresh Babu: But highly capital intensive. Our earlier example bakery products, bakery bread, more or less…

Professor G Venkatesh: Not too much differentiation possible. So, it is standard, then there is a monopolist competition, you will find differentiation…

Professor M Suresh Babu: Because the market is driven by innovation and a lot of differentiation. Because I want to be a monopolist in this small mesh product category...

Professor G Venkatesh: Soap would be an example. So, heavy advertising clearly…

Professor M Suresh Babu: Because you want to give a signal that you are different.

Professor G Venkatesh: And then oligopoly again steel tend to be somewhat homogeneous but somewhat differentiated also. Because you have different categories of customers that try to

segment your customers. And then your structure is monopoly. So, whatever he provides you have to consume, only one.

Professor M Suresh Babu: Yeah, that was our earlier telecom company, BSNL.

Professor G Venkatesh: Power industry, today, is like that; you have to get it from only one provider.

Professor M Suresh Babu: Or earlier airline

Professor G Venkatesh: Or even gas. For example, cooking gas, you have to buy it from one person. Airline exactly, at one time, it was like that. And pricing also, in a perfect competition, all are price takers.

Professor M Suresh Babu: Yes, everybody, no single firm can influence.

Professor G Venkatesh: In a monopolistic competition, some…

Professor M Suresh Babu: Some are limited, they will try and…

Professor G Venkatesh: If there is one guy who has got a large share, then he can be a price setter

Professor M Suresh Babu: Yeah, they can lead or follow…

Professor G Venkatesh: They can lead or follow our model. In the oligopoly, they can curtail. That is how it is. They can set the price by curtailing.

Professor M Suresh Babu: Yeah, but then the problem with oligopoly is that everybody knows that coming together is better. But it is difficult to cooperate. And that is why we have this kind of, Game Theory model and all to analyze oligopoly. I know that it is beneficial for me to cooperate with you. But somehow, I will not cooperate because I think my selfish interests are somewhat more in that.

Professor G Venkatesh: In India Cement tends to be like that.

Professor M Suresh Babu: Curtail.

Professor G Venkatesh: Oil of course is curtailed and the price, diamonds…

Professor M Suresh Babu: Yeah, DBS or whatever…

Professor G Venkatesh: He sets the price, that is it.

Professor M Suresh Babu: (referring slides) And also, it is very important to see barriers to entry here, virtually none. We talked about that entry is easy, but survival is difficult there, it is relatively easy here, but in oligopoly it is very hard, because the existing players first reaction will be to block entry, I will not allow you to enter at all, by some pricing strategy. We talked about that when we looked at the pricing strategy. And here it is substantial and it is very difficult, it is often insurmountable barrier to entry. So, industry level data combining with firm level data can give you a lot of insights.

Professor G Venkatesh: (referring slides) Explain this Kinked. We talked about elastic and non-elastic and all that stuff, what is kinked?

Professor M Suresh Babu: Up to a point, demand will be elastic, and then thummmmm (showing expression using hands). It is just because there is a possibility that they could actually collude.

Professor G Venkatesh: yes, where collusion breaks down. For instance, oil prices. But with curtail, if they are not able to enforce production decisions, suddenly oil price will go up or down.

Professor M Suresh Babu: Yes, so that gets reflected…

Professor G Venkatesh: That is about Kinked.

Professor M Suresh Babu: And here of course, we know it is downward sloping demand… So, given these conditions, this industry analysis can be used for positioning in the market and developing strategies, firm level strategies. So, you can have industry level data, you can have firm level data. You analyze industry level data and firm level data and then you have strategies in terms of firms.