13:50～14:30　Lecture 2

"Competition Policy in Network Industries"

Dr. Nicholas Economides, Professor of Economics, New York University

1. Lecture by Professor Economides

I am very glad to be here.　My name is Nicholas Economides.　I am from the Stern School of Business of New York University.　And I have created the web server http://www.stern.nyu.edu/networks which has an extensive bibliography on network economics.　I am also executive director of the NET Institute http://www.NETinst.org which is a focal point of research on issues that have to do with the networks but I don't have time to explain more now, you can go to the website and take a look.

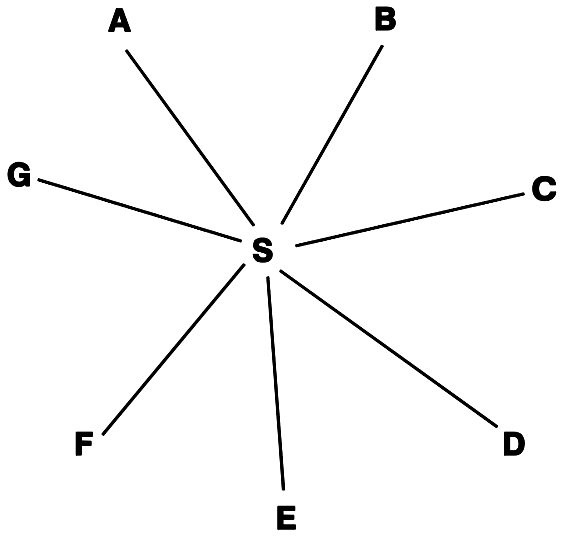
So, today I am talking about competition policy in network industries and as a matter of introduction, I would like to point out that network industries are a large part of the world economy and some are growing very fast (Page 2).　They include telecommunications, the world wide web, broadcasting, cable television, financial networks including credit card networks, ATM Networks, various payment systems networks, check clearing houses, traditional financial exchanges for equities, bonds, derivatives and so on, business to business and business to consumer exchanges, electricity, railroads, airlines, roads, as well as virtual networks where there is no particular network infrastructure but we have complimentary goods such as computer software and hardware and information servers such as yellow pages, Yahoo, Google and so on. So, they are a very big part of the economy.

Second issue is that networks many times offer necessities as in telecommunications and that should be possibly a particular concern to governments (Page 3).　So, the issue that I want to discuss is if there are special competition policy issues arising out of key features of network industries.　To understand this, I will assume the following (Page 4) and hopefully you will agree with me that the logic of competition law is that antitrust is to guard against restrictions of competition that the allocative, productive and dynamic efficiency is a desired outcome of antitrust policy　Competition is the means to achieve efficiency and regulation should be used in special cases when it's clear that competition cannot be achieved through market forces or when there are clearly different social and private benefits or when society agrees that it is desirable to have some deviation from efficiency.

So, let's assume that this is true and now let's look especially the second part (Page 5). Are there special competition policy issues arising out of features of these industries? Is there a special case for or against antitrust scrutiny in network industries?

Okay, what are the special features of markets with network effects (Page 6)? It's what I would call increasing returns to scale in consumption. You are all familiar with increasing returns to scale in production in which average costs are going down; here I am talking increasing returns to scale in consumption or otherwise called network effects. So, a market exhibits network effects when the value to a buyer of an extra unit is higher when more units are sold, everything else being equal.

Okay, one way that we can see network effects is in a traditional telecommunications network (Page 7). Think of a telecom switch and A, B, C, D customers (See the picture below). As subscriber A is contemplating joining the network, he will get more value from the network if more subscribers are in the network, so, if the network includes subscriber G, A will be better off. And the network effect arises because of complementarities because a phone call is ASB and AS and SB are used together.



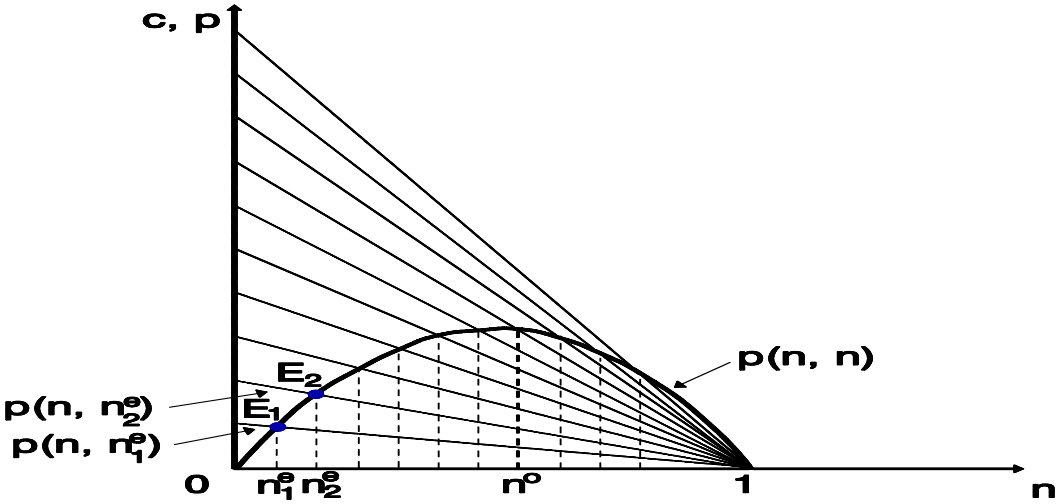
The other example, and it's more than those two but let me just confine myself for this talk to those two, is to have a virtual network; and for a virtual network we don't need any connection between the parts of the network but we need two classes of complimentary goods. For example, computer CPUs and computer monitors; all the As are computer CPUs all the B's are computer monitors and the more As we have, the more valuable the Bs are and vice versa. And we can also have some products that are

not Hi-Tech, like we can have wholesale services and retail services and we can still have a virtual network, and a network effect.

Now, what are the features of network industries (Page 8, 9)? First feature is obvious but it is important to say that firms can make money from either or both side of the network. For example, you are familiar with Adobe Acrobat Distiller and Adobe Acrobat Reader. Adobe has decided to collect money only from the Adobe Acrobat Distiller and not from the Reader, but it can make money from the server or the client. In telecommunications, a telecommunications company can make money by charging the caller or the receiver or both and there are various combinations of these in practice.

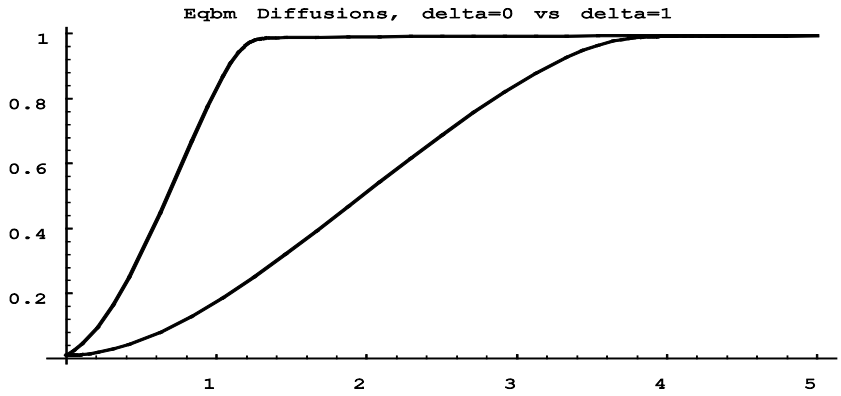
Now, this is important because it allows for sophisticated price discrimination schemes that combine both sides of the market which are not possible in non-network industries. Second point; many times the subscriber is not rewarded for the benefit that he brings to others by subscribing. So, I subscribe to my local telecommunications provider in New York, Verizon; they don't give me a discount because everybody likes to call me. So, I have externalities there for which I am not being rewarded; benefits are not fully intermediated by the market. So, this happens often in networks.

Next thing and that's more fundamental is that the law of demand, which means the demand goes down, can be reversed (Page 10); that is, a demand curve can slope upwards. (See the graph below)



Think of the straight lines here; here is cost and price and on this side is quantity. Think of all the straight lines as demand curves for a network good for different expectations of production and sales of that good. For example, think of the IBM PC, comes out in 1981, we don't know how much sales it is going to have, so we can have a low demand, a demand based on low expectations, a demand based on higher and higher and higher and higher expectations. So, each one of these demand curves is a function of the quantity that is being sold and a level of expectations. Now, suppose that expectations are fulfilled, that is, the actual sales are equal to expected sales. In that case, I pick up one point on each one of these demand curves in which the actual is the same as the expected in terms of sales. Now, if I look at the fulfilled expectations demand, this fulfilled expectations demand has potentially an upward sloping part. So, as I go from lower to higher quantities, people might be willing to pay more; and why are people willing to pay more, because now the good is more valuable. Why is the good more valuable, because it has more complimentary goods; for example, if it's the Windows Operating System, it has more applications, the more units of Windows sold.

Okay, so this is a strange thing; this doesn't happen in non-network industries. It only happens in network industries; the demand can go up, eventually it goes down. Now, that means, like if a new good is introduced, when cost comes down, nothing gets produced and then suddenly there is a big amount of production, a very quick expansion of a network. This is a feature that is important, characterizes networks ,that is the quick expansion (Page 11)(See the graph below). A way to see this quick expansion in terms of traditional diffusion curves, think of here as being time and here as cumulative adoption of the good.



For a non-network good, we typically observe an S shaped curve. For a network good such as the Internet, we will see a much faster adoption. So, that shows you that in network industries you will see much faster market penetration than in non-network industries.

Okay, the fourth thing I wanted to say about features of networks is for those cases, like the cases of Professor Tanaka was speaking about before, in which the firms can choose their own technical standards like if you think of Operating Systems, each firm can choose its own technical standard; Windows chooses its own, the Mac Operating System chooses its own and so on and so on. In those markets, we observe an extreme inequality in market shares and profits (Page 12), and let me explain what I mean by that. In those markets the market share of the largest firm can be a multiple of the share of the second largest firm and the second largest firm's market share can be a multiple of the third firm's market share and so on.

To give you an example, suppose that this factor across market shares is 3, then firm 1 has 66% market share, firm 2 has 22%, firm 3 has 7%, firm 4 has 2.5%, firm 5 has 1% and the rest of the firms are negligible. This geometric sequence means that as we go few positions down the scale, we have negligible market shares. So, even if you thought of operating systems had no fixed costs (and that's not really true because there are some fixed costs) but even if there were no fixed costs, very quickly you would end up with firms that are so small that they make no difference in the market structure and in the price level.

Now, where do we see such features? We see them in the PC operating systems market, in software applications markets and elsewhere. And you might ask why we have this inequality of market shares; the reason is very simple; it's because of network effects. A large market share means that there are a lot of complimentary goods for that particular specification, let's say Windows, and therefore the good is more valuable to consumers. A small market share conversely, like the one of Apple, means that there are fewer complimentary goods to that operating system, lower network effects and therefore lower value to consumers.

Now, one more thing; notice that I call this market structure "winner-take-most" not "winner-take-all". The market share of the largest firm is 66%, not 100%; it's a large market share, a dominant market share but not 100%. The reason why a firm might

not want to go from 66% to 100% is because it doesn't want to cut price which would be necessary to get to 100% market share. So, it keeps its price high and has a very big market share but not 100%. So, it's a "winner-take-most" market structure.

Okay, second issue that can arise is that (Page 13) in those industries with big network effects, under incompatibility; you can even have monopoly maximizing total surplus. Now, that's impossible under perfect competition under traditional models of industrial organization. So, the reason this could happen here is because a monopoly has standardization on the same platform and creates network effects among all participants who buy this product. While if it was broken up in incompatible pieces, then the network effects would be in each smaller group and in total the network effects would be smaller than the network effects of the larger compatible group of the monopolist. So, that means that *de facto* standardization is valuable even if done by a monopolist.

Now, what is the implication of this for antitrust (Page 14)? Suppose we are looking at the network industry, we see inequality, but the inequality is natural so we shouldn't be inferring from the existence of inequality the implication that there are anticompetitive actions because the equilibrium has a natural inequality. Here, it is not necessary to have anticompetitive actions to create inequality. So, in the traditional antitrust terminology, the "but-for" benchmark for which we should judge anticompetitive actions should not be perfect competition but should be an environment of significant inequality. That might sound a bit technical, but if we are going to apply this understanding of economics to antitrust, it is very important not to compare the real world with some anticompetitive actions to perfect competition, but to try to compare it to a world with significant inequality in market shares and profits.

Okay, second point as far as antitrust is concerned is that we may not be able to fix things so well in the markets with network effects than in markets without network effects (Page 15). For example, suppose we create free entry, we eliminate all barriers to entry. In this world with network effects, inequality will remain. See, the numbers that I showed you before, for example, 66% market share, 22%, and so on and so on, where this equilibrium exists without any anticompetitive effect. So, even though I can eliminate barriers to entry, have free entry, I will not necessarily go to perfect competition; in fact I know I will not. So, antitrust authorities may not be able to significantly affect market structure by eliminating barriers to entry. That doesn't mean that we shouldn't eliminate barriers to entry, but it means that we shouldn't expect

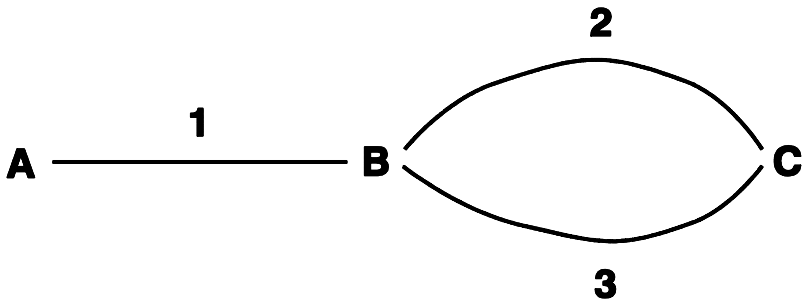
that eliminating barriers to entry is going to get us to an egalitarian distribution of market shares.

One more point on the aspects of competition, competition *for* the market in network industries takes precedence over competition *in* the market (Page 16); so, we can see very intense competition on which firm will create the top platform and reap most of the benefits rather than competition in the market. Actually there is a very nice example from recent experience of Schumpeterian races for market dominance among dotcoms in 1999-2000. The Internet created new markets, for example, for interactive advertising and many similar things. New firms came up, were created; they made their IPO's and they got money from the financial markets. Wall Street's perception was that the dominant firms would have much, much higher valuation than the non-dominant firms. That is predicted by the theory I was showing before but it is also what Wall Street believed. So, because of that, the firms understood that and spent all the money they had to achieve large market share and – I don't know if this happened and to what extend you observe it in Japan, but in the United States, they would bribe you, they would give you more than the value of the good to just buy one more unit so they have bigger market share and get more money from Wall Street.

One more aspect of network industries is path-dependence (Page 17). This is the dependence of decisions of today on past sales. For example, when somebody buys Windows today, he doesn't care so much about the number of Windows sold today or just the price, but he cares on the number of Windows that have been sold earlier, the installed base. Obviously, having an installed base favors the incumbent. On the other hand, if there is a significant innovation or a better pricing strategy, that can overcome the advantage of the installed base. An example was the battle between VHS and Beta video recorders in the United States. Sony made a mistake in disregarding network externalities and not licensing the Beta format. JVC had a widespread licensing of the VHS format and low-end cheap VHS players contributed significantly to network effects. Let's say here that a low price VHS player can contribute as much to a network effect as a high end price, high price beta player. So, here is a case in which essentially there is a mistake in the pricing strategy that allowed the second entrant/competitor to succeed.

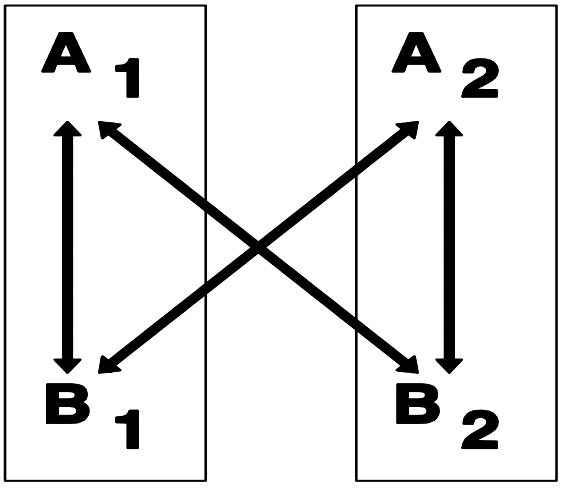
Let me talk next about some issues that are very particular to bottlenecks in networks (Page 18). One of them is a well understood case of a one-sided bottleneck. Think of

the following diagram, this part A-B monopolized; the monopolist in A-B also participates in the B-C part but then there is some competitor in the B-C part who does not own a network in the A-B part.



Example, think of AT&T around 1900; its patents had expired as far as local competition was concerned; so, a lot of local competitors had arisen in the United States in telecommunications. However, AT&T had patents at that point in time in long distance technologies. So, AT&T had a monopoly in long distance in the A-B part but faced a lot of competition in local telecommunications. What did AT&T do? It refused to interconnect. It refused to independent local guys to interconnect with its long distance network except if they were acquired, except if they became part of the Bell System which essentially meant if they were acquired. It was a very effective strategy which resulted in AT&T by 1935 reaching 89% market share which in fact was exactly the same market share that AT&T had in 1981, when it was broken by the consent degree in the antitrust case that the government of the United States had brought against it.

So here is a one-sided bottleneck in a way that AT&T was able to extend the monopoly power of this piece into that piece. Here is a more complicated case. This is a two-sided bottleneck (Page 19).



How is that? Think of local telecommunications competition. Here is a very big company, let's say Verizon in the United States; maybe I should say NTT in Japan, and here is my company in Greenwich Village New York, which I have the right to create and provide local telecommunication services. I have some subscribers, let's say 1000 and they have many millions. Calls are completed in network 1, in network 2, and across networks.

So, if calls go across networks, my network and Verizon's network need to pay each other some termination charge. If a call goes from my network to Verizon's network, I need to pay Verizon some amount of money to allow the call to be terminated to its customer. Similarly, if a Verizon call comes to my network, they pay me an amount of money to terminate in my network. Now, if Verizon can make this termination fee very high, then there are no calls from my network to the Verizon network; this A2 to B1 disappears. Now, think of the subscribers who might subscribe to me or to Verizon. Well, if there are no calls made across the networks and in my network only internal calls are made, the utility that people get from my network is very small. So, they will never subscribe to me. They will all subscribe to Verizon. So, here is a pricing mechanism that Verizon can implement to keep me out, to foreclose me.

And this is not just a theoretical issue. This is exactly what happened in New Zealand where a dominant telephone company was privatized. It used to be a state monopoly, was privatized, and set up the termination fees in such a way so that competitors were eliminated and in fact the competitors were eliminated, they went out of business. Now, in the United States, this problem is solved by setting the termination fees equal; a regulatory rule that is called reciprocity. But it is unsolved in unregulated networks such as automatic teller machine networks and credit card networks.

Let me also give you some more examples of leveraging market power across markets (Page 20). Typically this happens through various types of exclusionary arrangements and firms use technical standards, bundling and pricing strategies and non-price discrimination strategies such as raising rival's costs to implement such leveraging.

Let me give you an example (Page 21). You are familiar with Nintendo; in the middle 1980s, Nintendo had a dominant hardware platform for games but the software was provided by third parties. It imposed the following rule: it told software manufacturers that if they wrote a game for the Nintendo platform, they could not write a game for a

competing platform for two years. So, what was Nintendo trying to do, it was trying to use its present dominance in the hardware market to create a dominance in software and therefore perpetuate its dominance in hardware. Which was a very smart idea but unfortunately for Nintendo, it was stopped under threat from the Department of Justice.

There are also issues in aftermarkets when consumers are locked in, in a durable good or service (Page 22). Let me just mention that there were problems with a refusal of Kodak to supply repair companies, parts to repair Kodak photocopiers and there are issues of the lack of number portability in wireless in earlier times in the United States and presently also lack of email address portability for ISPs.

Now, let me go to a more sophisticated example from the computing industry (Page 23) and you can think of firm A and if you want we call firm A, Microsoft; but firm A has an operating system incompatible with others and subsidizes firms that produce complementary goods. What do I mean by "subsidizes"? How does the subsidization happen; operating systems have in them parts, that is routines and subroutines which are not useful directly to end users like you and me but they are useful to people who write application software. So, an operating system can provide a lot of these and therefore subsidize the firms that produce complimentary goods. Or, firm A, let's say, Microsoft produces MS Office and subsidizes from one division to the other.

As a result of this, the value of the operating system increases and simultaneously the entry hurdle for firm A's rivals also increases. So potentially, it creates market power through the strategy but this strategy at least has a pro-competitive justification and it will be hard to show it to be illegal. Now in that scheme, incompatibility was a necessary condition for the creation of market power (Page 24) and if we are trying to go instead to increasing social welfare, we might go to public standards and impose compatibility. Now, there are two issues regarding that: one is the reluctance of antitrust authorities to intervene and define standards; and the second problem which was mentioned also by Professor Tanaka was that imposing compatibility can reduce significantly the incentives to innovate.

Okay, I'll say this very quickly, other areas in which there could be anticompetitive problems are in B2B (business to business) exchanges (Page 25) which sometimes are set up by companies who are on one side of the market and try to squeeze the other one or people who want to, like Enron, who wanted to run the exchange and also do

transactions at the same time in the exchange. And there could be results like monopsony and you may be familiar with a traditional price fixing problem of NASDAQ.

Okay, so there might be problems with static efficiency lack in dynamic efficiency (Page 26), that is what I mean by that. You can have a technology which is optimally chosen in every period, given where we are but it would be sub-optimal if decisions were delayed and not taken all at once. And if you have a lock-in because of this race to produce a dominant network, you might end up with very inefficient decisions. One more thing that you will hear often in this area is about innovation (Page 27); the problem with innovation is that in economics there is no consensus that innovation is higher in perfect competition that in monopoly and therefore you cannot easily apply results to network industries.

Okay, so just to summarize what I was saying before, if we are going to intervene in network industries for anticompetitive actions (Page 28), it's important to have the right benchmark as the measure against which we can judge anticompetitive actions. It cannot be perfect competition. We should make sure that competitors' harm is not a sufficient reason for intervention. We have to be careful not to guess widely about what the world is going to be few years from now when we don't really know as an antitrust authority. We should also take into consideration the other issues that I already discussed, I won't go into detail.

I'll say a few more things about regulation (Page 29) because given all the problems that I have raised, some people might say that the only way to fix this problem is to have regulation, like we have regulation in telecommunications, for example, or in other utilities. The thing to remember about regulation is that it is best suited for industries that have well-defined and non-changing products and not in industries with rapid technological change. For example, regulation in the United States of AT&T started in 1930, that's over 35 years after the end of the original patent of AT&T. Second problem, regulation can be used by regulated companies to keep prices high and regulation has been used extensively in the United States by telecommunications companies to keep prices high so that consumers did not get the benefit of rapid technological change and cost reductions in telecommunications. And many times, the regulators are very close to the interest of the regulated parties rather to the interest of

public and they are also not very well informed about what the costs are. This refers to the American situation.

Regulators are also subject to pressure from the executive and the legislative branches of government (Page 30). For example, the Federal Communications Commission gets pressure from congressmen and senators and from the executive branch, from other parts of the government to be more favorable to some clients, to some people from the districts of the particular Congressman or Senator. And that's much more pressure than could be put on a Court or a Judge. So this is a problem: regulation always happens under some pressure from the executive and the legislative branch. There is also a tendency for regulation once it's established to reach further and further into new markets, even if it is inappropriate to do so. So, these drawbacks can create significant surplus losses because of the existence of regulation and therefore we have to be very careful in creating regulation.

So we covered a lot of distance here in terms of networks. I think what I want you to remember from this whole talk, it's the following two things: one, that there are significant inequalities in the market shares and profits when the goods are incompatible, and have network effects; and two, that traditional antitrust intervention such as eliminating barriers to entry will not be sufficient to fix the inequalities; it will not get us to perfect competition. So, antitrust authorities have limited capabilities in fixing markets with network effects and I hope we can have more elaborate discussion in the discussion period. Thank you very much.

2. Q & A

Questioner D:

Professor Economides, you talked about regulation. Are you talking about antitrust regulations or sector-specific regulation? And lastly, you have mentioned that the antitrust intervention is very limited; then the sector specific regulation is relatively more important. Is my understanding correct?

Professor Economides:

I used the word regulation to mean sector-specific regulation; in the last two slides, that's what it meant. And the drawbacks that I outlined were the drawbacks of sector-specific regulation. Now, I know that I also said that antitrust intervention has limited effects compared to other industries and I believe this to be true. On the other

hand, I do not have a magic solution, I'm just pointing out that we should be aware of the limited possibilities that we have as antitrust authority when it comes to defining market structure in network industries.

Questioner E:

An anticompetitive behavior among firms is not the actions only within the industry but we sometimes observe some big coalitions or big anticompetitive behavior at closed industries, such as between network industries and retailing industry or network industries between end manufacturers. But in that case, how can we or does FTC have any significant standard of efficiency measure or inequality measure? So, I would like to hear your opinion about the cases for across industry coalition behavior and anticompetitive behaviors.

Professor Nicholas Economides:

Well, that's a difficult question. There are a lot of complicated antitrust issues that essentially have aspects of vertical effects and sometimes, as you say correctly, on one side the industry might be a network industry and maybe on the other one, on the other side not, or maybe both. And these issues become more complicated, and one of the early slides I had was discussing complicated price discrimination issues and I can understand that they can also be exclusionary strategies and various other strategies that may have anticompetitive effects. Unfortunately, at the present stage of understanding and development of industrial organization theory, we don't have a clear bright line, a clear rule of thumb that we can apply and these cases on the left are anticompetitive and the ones to their right or not, we do not have such a situation. So, we have to understand each case and analyze each case on its own facts. I know this answer is not very satisfactory, but unfortunately that's the best answer given our present knowledge. So, I do not mean to exclude those from potential problems. I'm just saying that there is no easy solution as far as I understand the problem.

Professor Okada:

Well, then time is up. Let's move on to the next presentation. This is the last presentation for the first section. The speaker will be Professor Gilbert.