FEDERAL TRADE COMMISSION

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In the Public Hearing on )
COMPETITION AND INTELLECTUAL )
PROPERTY LAW AND POLICY IN )
THE KNOWLEDGE-BASED ECONOMY. )
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February 20, 2002

Room 432
Federal Trade Commission
6th Street and Pennsylvania Ave., NW

The above-entitled matter came on for hearing, pursuant to notice at 9:00 a.m.

SPEAKERS:

James Langenfeld, Director, LECG, LLC
Professor Wesley M. Cohen
Professor Robert E. Evenson
Professor Edmund W. Kitch
Professor Maureen O'Rourke

SPEAKERS (Continued):

Philip Nelson, Economists Incorporated

Professor Shane Greenstein

Professor Josh Lerner

Professor Janusz Ordover

Professor Lawrence White

Margaret E. Guerin-Calvert, Economists Inc.

Professor Stanley Liebowitz

P R O C E E D I N G S

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MR. COHEN: Good morning. My name is William Cohen. I am Assistant General Counsel here at the FTC and I want to welcome you to this morning's session in our hearings on the intersection of antitrust and intellectual property.

We have now moved through our keynote speakers and through a set of panels that discussed some of the nuts and bolts of both the antitrust and patent law, and we are now in our third day of these hearings and we are ready to move into some of the analysis. We felt that the way to start would be to bring together a number of outstanding panelists who can help us bring to bear some of the best economic thinking on some of the key issues.

This afternoon we are going to have a panel that will deal with economic perspectives on the relationship between competition and innovation.

This morning we will be doing sort of a flip side of that. We'll be looking at economic perspectives on the relationship between intellectual property and innovation.

What we will plan to do is divide our session in half. We will have three panelists make presentations, have some discussion, take a break, come back for our

final two panelists to make presentations, and wrap up with what I hope should be a very good discussion.

During the first half, we're going to try to cover some of the core issues in economics and the economics of intellectual property. And in the second half of this morning's session, we will give particular emphasis to problems raised by innovation's nature as a continuous process.

We have some terrific panelists. Before I begin to introduce them, though, I'd like to introduce the others who will be participating from the United States Government. We have, also from the Federal Trade Commission, joining me is Hillary Greene. From the Department of Justice we have Sue Majewski. And from the Patent and Trademark Office, we have Ed Polk and I welcome all of them.

Turning now to our first speaker, our first speaker will be James Langenfeld from -- he's a director at the Law and Economics Consulting Group, with extensive experience in antitrust, intellectual property, and strategic consulting.

His work includes, I guess, 11 years at the Federal Trade Commission. During the last six of those years, he served as Director for Antitrust in our Bureau of Economics. And it is really my pleasure to turn the

lectern over to Jim Langenfeld to start us off.

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MR. LANGENFELD: Thank you, Bill. Thanks, everyone.

I was very pleased to be invited to be a part of this particular panel because of research that I've done and some articles I've written and cases I've been involved in, both in terms of patent protection and competition, and the intersection between the two.

What I was asked to do today was to provide a framework, an economic-style framework, to consider what the impact of intellectual property and innovation might be. And I'm going to talk a little bit -- I'm going to eke over a little bit into this afternoon's session because I'm also going to talk about some of the tradeoffs with competition, and to provide just the framework to begin to think about what the key issues should be here.

My experience, and with all respect to my former employer, although I really only worked for the FTC for ten years, so -- but my --

MR. COHEN: But it seemed like 11.

MR. LANGENFELD: Yes. It was that enjoyable and fulfilling, yes.

So one of the things that -- from my experience, looking at both competition and innovation issues, one of the -- what I consider to be the key fallacies in doing

these type of -- in weighing what intellectual property does for innovation and what competition does for innovation is that from the antitrust side, at least, what you have is a feeling that innovation or intellectual property should be treated just the same way as tangible -- tangible goods. Tangible property.

If you look at the intellectual property guidelines that the two agencies have developed, although they -- they make some mention it might be a little different, but by and large they are going to treat it just the same. I think that actually sets back the analysis for understanding what type -- what the intellectual property does to stimulate innovation, and on the other hand what competition does to stimulate innovation.

And let's think about some of the basic differences and some of these I discuss in an article, which some reprints are outside.

But first of all, intellectual property can create certain social benefits because -- and an inventor will generally not get all of the returns from an invention. So there tends to be, unlike building a factory, there can be an externality -- economists call it an externality through the economy by people building off of certain developments.

Also intellectual property by itself just doesn't do anything usually. I mean, there has to be -- if we're talking about a patent, you're talking about something that has to be applied to factories. It has to be implemented somehow. And that's not necessarily true for, you know, a stand-alone factory. You have to embody the ideas in a patent, be it a process patent or a product patent. So that's a little different from most forms of property.

Also the obvious problem of free riding. If you build a factory, you own it, it's there. It's yours. But if you have an idea and you can't protect it adequately, other people will steal it and use it and that, obviously, deters your incentive to develop those ideas yourself.

And also research and development by itself can be inherently risky. I wouldn't say it's completely different than other forms of oil exploration and things like that. But it is inherently risky in the sense that there are going to be just a lot of dry holes out there before you actually get something useful. Not necessarily the case, or less likely to be the case, with tangible property.

On the other hand, there are other issues about intellectual property that I think make it quite

different. One is that the exclusions are very broad. A patent means that you can actually prevent other people from having that idea or implementing that idea, that product, or that process, whether they are in competition with you or not. They may even be in a completely different industry, unlike tangible goods where, basically, you own the property, but somebody else can reproduce the factory or a factory similar to that, subject to trade secrets and those things. So if you get patent protection, you're talking about a very sweeping -- a very sweeping intellectual property potentially across the economy.

Also the length of exclusion. Most firms that build something tangible, somebody else can come in in a year or two, or depending on if you look at the merger guidelines, two years or less, more -- whatever you want to say -- that actually embodies a lot of the reality of the economy, which is that somebody else will eventually come in and compete away whatever -- compete for whatever product you're selling.

With patent protection, you're talking 20 years. That's a long time to eliminate someone else from competing with that specific product. It is quite different than typical intellectual property -- typical tangible property.

Also there is a risk for follow-on innovators. If patent protection is as broad as it can be interpreted and sometimes the Federal Circuits are going to -- are pretty broad, pretty broad areas of defense, there is a risk to follow-on innovators. That is to say, you have the initial idea. Someone else may come up with an idea to make it better. And intellectual property patents can prevent that from happening, depending on how much protection is associated with that patent.

Now I'll talk about what the tradeoff of that is in a second. So there's a tradeoff here, depending on how strong the intellectual property protection is. Let's think about what that is just to an economist.

If you have very strong intellectual property protection, you have the ability to basically kill other innovations. That is to say, follow-on or developmental innovations. So if you take a very strong stance, you could actually -- you have a tradeoff. You're not necessarily going to maximize innovation.

Clearly you're going to have less price competition. There is no question about that, if you're preventing someone else from producing the same product, or close to it, or using the same process. And in some sense, if it's strong enough, you could have fewer benefits, fewer externalities to society because it's

possible that the innovator could end up taking, literally, all of the surplus, no consumer surplus, no -- no net benefit to other people.

If you have weak IP protection, you've got a tradeoff on the other side. You will encourage a free-rider problems, which will kill the incentive to, at least initially, innovate.

You will have more price competition, which can benefit consumers, at least in the short run. But you also have fewer externalities for society, fewer benefits, because fewer initial patents will come out. People won't receive the benefits from them.

So there is a tradeoff here for these two types of intellectual property. And the way the economist thinks about it, and this is hugely simplifying it, but -- these points were made -- this sort of sums up the literature here, but you might think about it this way. You have abstracting to give a -- in a sense so that patent protection can be seen as a degree of protection on the horizontal axis here.

And on the left we'll say it's complete patent protection. You have an idea. It's automatically patented. It's yours. You don't have to share it with anybody else.

On the other end, there is no patent protection.

You come up with an idea, somebody else can just copy it. And I'm going to -- as an economist, because I can do these things, I'm going to say that there is a continuum here. And some of the other speakers are going to talk about different ways, even more specific items within this continuum, the different ways to try to move the continuum back and forth. But for my purposes, I'm just going to assume that the continuum exists. What does that mean?

Well if you have complete patent protection, you're still going to have an effect on -- on developing a certain number of innovations. And that's what's over on the left. That's the blue line there. And you'll still get some. There will be some innovation. But because you have prevented developmental or follow-on innovations, if you have complete patent protection, you're not even going to maximize the number of innovations. It's not going to happen.

As you move to the right along here, where you get more of a balance, where you don't give people complete rights, the number of innovations will go up, as I stylized, put it here, to some -- as economists always like to find -- some optimum level of innovations.

And then, as you further weaken patent innovation, where people can copy, and you're not going

to get -- and inventors are not going to get the full returns on their investments, then you're going to see the number of innovations fall off.

The interesting thing from an economist's point of view is what would be the optimum, though. The second line here is basically total surplus -- is what I've said it is. Total welfare, which is the sum of what consumers get, consumer welfare, and what producers get, profits.

Assuming away for the moment the FTC standard, which is typically a consumer welfare only standard, which even Chairman Muris in an article last year mentioned this, the typical standard, and looking at it from more of an economist's point of view, we look at total welfare, what you can see here is that total welfare is going to be optimized in a similar pattern, but it's only going to be optimized with less intellectual property protection than the maximum number of innovations.

Now why? The reason is because you're going to get more competition, more price competition. And if you get more price competition than the consumer welfare portion of total welfare will go up, even though the profits, the producer welfare portion, is going to go down.

And so typically what you will find is, you

don't want to -- if you're trying to maximize society's welfare, you don't want to maximize the number of innovations, necessarily. What you do want to do is, you want to have standards where you are maximizing consumer welfare and that's not going to be designing things so you get the maximum number of innovations, because there are these other gains that society can get with lower pricing and more competition.

I just want to talk briefly about this. This is important and I'm not an attorney, and I don't plan on being one, but as economists we look at some of the -- some of the court decisions and try to tease out what the economics is. And one of the problems that I think that the Department of Justice, and the FTC, and the courts face, and business face right now, is there's a lot of uncertainty as to exactly what the tradeoff between competition -- that is to say antitrust laws -- and intellectual property -- patent laws, copyrights -- what that tradeoff exactly is.

Now these are patent cases, not that long ago, and depending on which case you read, it's unclear what a firm can do in terms of protecting its intellectual property.

Certainly with the Federal Circuit, since 1998, taking responsibility for all of the cases that have a

patent kicker in them, and offering dictum copyrighting, they have really made themselves the focal point for at least unilateral actions to enforce patents. And competition cases that involve patent allegations, that involve patent --

And if you look here, you look at the Ninth Circuit's decision in Kodak. That was a case where antitrust won over, at least asserted intellectual property rights, at least asserted patents and copyrights.

And the older -- well not that much older, but older FTC Intel consents were once again one where the antitrust agency said, look if you have -- you cannot just use your intellectual property, your patents to -- to prevent unilateral behavior that we believe it is anti-competitive.

On the other hand, though, if you look at the Xerox case and the Intergraph case, in the Federal Circuit, pretty much unless it falls into a tie -- a tying claim, a sham litigation, or a fraud on the Patent Office, and it's not clear how broadly any of those will be read, the Federal Circuit has said antitrust competition doesn't have -- intellectual property is the key.

Now whether that's going to stimulate innovation

or not, we can look back and think, well, it will help stimulate innovation, depending on how strongly that is read.

And then there are other cases like Nobelpharma which is -- which is a Walker Process case, fraud on the patent -- and Bard, which is a predatory design case. So looking at those cases where actually antitrust or competition issues were upheld, even though patents were at issue, looking at those two cases -- and I won't talk about them in detail, but looking at those two cases, it's unclear where -- whether those cases in the future would end up being -- whether antitrust violations would be found in the future, given a similar set of facts by the Federal Circuit.

So what I see here, in my opinion, is the way the laws -- at least the laws involving unilateral actions by patent holders are going, there is an increasing amount of protection that is being given to patent holders. And I'm not sure that it's actually balancing one way or the other correctly, given the tradeoffs that exist.

The last thing I want to mention is and why we have someone from the Patent and Trademark Office -- is enforcing this. Now if -- there's always an issue, if the courts are going to give so much deference to a

patent, an ex parte patent that's been put out, then obviously -- and say that there is not going to be any antitrust or any competition issues here because this is -- this is the patent law, and these are the patents, and people can do whatever they want with them. The problem here is that that means that that really puts the Patent and Trademark Office on the spot because, gosh, you'd better be getting those patents right. You better be sure that the -- bar is incorrect. You better be sure that -- you know, that obviousness has been dealt with. You better make sure that the information you're getting from the firm that wants to have the patent is accurate.

And as you can see here, what we have, since 1996, is over a 50 percent increase in patent applications being put at the Patent and Trademark Office. That's a lot of work. By my count, that's about 1,000 patents per working day that are submitted each day. And you have a beautiful building over in Rosslyn. You have a lot of people working hard. But, you know, if the courts are going to assume that you've pretty much gotten it right in most instances, save for the lengthy litigation that could take place over the existence of a patent, you guys have to have enough bodies and enough people to do this accurately. And that's not -- and that's something you can talk to. I can't.

But I just know that that type of increase, and given the increasing importance of what the Patent and Trademark Office allows, because you all allow about 75 percent of the patents to go through, patent applications to be approved, that -- that puts you really on a spot, especially when we think about these business methods application patents that you are just starting to pick up in '99 and 2000, because these, I think, are distinctly different types of patents. These are ones on -- enclave bordering, things like that, that can completely cut across the entire economy. These can be extremely broad.

I've actually worked for General Motors and, gosh, you know, it certainly would be nice to have -- I'm not sure General Motors has any that they've submitted, but these can be an amazing tool for knocking out competitors across the board. And I know that the Patent and Trademark Office has been looking more carefully at them recently. But these have a huge potential for eliminating any tradeoff, in terms of follow-on patents, and in terms of follow-on innovations, and in terms of price competition. And that potentially could be a pretty scary area here, in terms of giving intellectual property too much sway, because it's not clear that that's necessarily going to stimulate more innovations.

So, in summary, I think there are a few points

you should take away. First of all, it's necessary to recognize and study the implications of the differences between intellectual property and tangible property, certainly from the antitrust point of view. You've got to think about this differently. You just can't put them in the same box. That doesn't mean, though, that you should get a get-out-of-jail-free card every time you wave the patent defense.

So you need to -- I think it's very important to encourage innovation, to balance intellectual property protection and antitrust analysis.

And then last, once again, we need to recognize the limits of the patent and trademark process, in terms of how much -- you know, how broadly intellectual property can be asserted. And I think that's probably enough. I think I'm about on time.

So I will turn over -- Bill, do you want to introduce the next speaker?

MR. COHEN: Yes.

(Time Noted: 9:54 a.m.)

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MR. COHEN: Our second speaker this morning will be Wesley Cohen. He is a Professor of Economics and Social Science at Carnegie Mellon University. He is published widely on the economics of technological change and he is currently engaged in NSF-funded research on the effect of patenting on innovation. I turn it over to Wes Cohen.

PROFESSOR COHEN: I would like to begin first by thanking the Federal Trade Commission and Department of Justice for holding these hearings on what I think is an extremely important topic, which should be apparent -- at least my views should be apparent, given that I've spent years working on them.

Today I really want to report on essentially a series of papers that I've written over the past few years and I want to highlight that this has been done collaboratively with a number of folks -- Ashish Arora, a colleague at CMU; Marco Ceccagnoli, Akira Goto, and Akiya Nagata, both in Japan; Dick Nelson, who many of you know; and John Walsh at University of Illinois, Chicago. And this work has been supported by many sources, but the major ones are Sloan, NSF, and the Center for Global Partnership of the U.S./Japan Foundation, at least the comparative dimension of the work.

I think you should all be fairly familiar with

the background to the subject, that over the past 20 years we have witnessed a strengthening and broadening of patent protection in the United States. And, in fact, we are witnessing the same with a bit of a lag in Europe and now in Japan as well.

In the U.S. the most visible kickoff event to that process was the '82 creation of the Court of Appeals for the Federal Circuit. We've seen pro-patent trends as well in court decisions.

We've also seen the expansion in '81 of what can be patented, notably life forms, software, both in key decisions at that time. And then, more recently, as Jim referred to, business methods as well in the late '90s. And even an expansion of who can patent, in the form of, particularly, of Bayh-Dole and related legislation that permitted essentially universities and even government labs and other thoroughly sponsored institutions to go out -- to patent their inventions.

We've also seen a significant change in private practices, reflected particularly in a dramatic growth in corporate patenting over the past two decades. Jim showed some recent data, but patent rates have almost tripled in a period of about 20 years.

Okay. There is, however, cause for questioning both the public policies and private policies. There, in

fact, exists in economics, largely, though not exclusively, based on survey research, a 40-year empirical legacy, starting from say the work of Mike Scherer in '59 and extending through the work of Ed Mansfield and particularly a precursor study to my own, the work of Rick Levin and his colleagues at Yale, Vaborik, Nelson, and Winter, that suggest that patents are, in fact, not central to the protection of inventions in most industries.

And though there are important exceptions -- I use the word "most industries." The drug industry is reliably and robustly an exception to that -- to that trend. We've even had recent theoretical work that suggested that the effects of particularly broader patents on R&D is unclear, especially in industries where innovation is cumulative. That is, innovation builds on -- importantly, on prior innovations.

The work -- particularly the empirical work, but also the work in theory, casts some doubt on the presumed role of patents in stimulating invention in most industries. And so what I want to talk about today is patents, their effectiveness and role in the manufacturing sector of the U.S., with some reference to experience, particularly in Japan.

So the overview of what I'm talking about, I'll

provide a brief, brief review of survey based evidence on the effectiveness of patents in protecting inventions in the manufacturing sector; the uses of patents; how are they used across different industries in the manufacturing sectors; what I call the quid pro quo. That is, in exchange for the legal ability to exclude others from using, commercializing, et cetera, an invention that is receiving a patent, patent holders are supposed to disclose the technical information standing behind that invention.

Then I will end up by talking about, in the context of some recent work, the impact of patenting on R&D incentives in the U.S. manufacturing sector.

The data -- I'll do this fast. Survey data from the mid '90s. We collected almost 1,500 observations from the U.S. manufacturing sector. The sample is quite broadly representative of the firm size distribution in the manufacturing sector. And I'll also be reporting on some results from a comparable -- and I mean truly comparable -- Japanese survey where we had well over 600 observations.

I want to provide some context here, which is -- and this builds -- does build directly on the contributions of Levin and his colleagues -- that, in fact, there are a variety of mechanisms, okay, or ways

for protecting firms' inventions. Patents are obviously one.

Firms also, though, use secrecy, lead-time. They will also exploit complementary sales and service capabilities or complementary manufacturing capabilities. Okay.

It's in that context that my colleagues and I evaluated the effectiveness of patents across the manufacturing sector. And specifically we asked respondents -- and this is important. Our respondents were actually R&D lab managers. They weren't the patent attorneys. We didn't go into the IP departments for these responses. They were directors of R&D labs, R&D units, in manufacturing firms.

We asked the respondents to report on the percentage of their firm's innovations for which a mechanism -- secrecy, patents, lead-time, et cetera -- was effective in protecting the competitive advantage from that innovation.

Briefly, what did we learn? Well before I tell you what we learned, let's be careful what we mean by this term "effectiveness" and the response scale.

Mind you, the use of these mechanisms are not mutually exclusive. Indeed, many of them are often used together. You will use even secrecy and patenting

together, though not at the same time. At least, I'm putting it a bit simply.

So given that, I would suggest the way to interpret effectiveness of a mechanism and notions that one mechanism or means is more effective than another, not that that's used and the other isn't, were really a judgment on the part of firms of which of these means of protection are more central to firms' strategies in protecting their inventions.

With that said -- and we do this separately for product and process innovations, but I'll -- for brevity, I'll focus largely on product. The top mechanisms overall were secrecy and lead time. Which was, actually, a bit of a change from when Levin and his colleagues did their survey. Secrecy was not nearly as important in the early mid '80s as it apparently is -- is in the mid '90s. That, in fact, patents were the least effective overall which, in fact, though, obscures a lot of cross-industry variation. And particularly we found patents to be relatively effective, as compared, again, to these other means in a small number of industries, particularly drugs, again, but also medical equipment, and I'd be happy to go into more detail. And detail -- industry level detail is provided in the papers that we've done. And we find patents to be a relatively less effective or,

again, less essential to the appropriability strategies of firms in other high-tech industries, like semiconductors and communications equipment.

I want to pull us back for a moment, having said that. Do not conclude from that observation that patents, therefore, do not stimulate invention, do not stimulate R&D broadly, and do not stimulate R&D or invention, even in those industries that say that patents are not as central or as effective as lead-time, secrecy, and so on. Do not conclude that. And, in fact, we will return to that question at the end of my talk, reflecting some analysis and work that we've done recently. I'm happy to give numbers and so on during the discussion period. I want to move quickly, though.

The question is, well why do firms say that patents are relatively ineffective? We asked our respondents why did you apply for a patent on your most recent invention.

Demonstration of novelty. That's really an issue of patentability.

More interesting for our purposes, 24 percent of the respondents said, well, information disclosure, ease of -- again, these responses were not mutually -- not mutually exclusive. Though disclosure and inventing around were the two most important reasons cited.

I want to highlight, though, at the bottom of the slide an interesting observation that might be of interest, particularly concerns over competition. What we observed is negative within industry correlations between firm size and, other reason, defense costs, okay, regarding reasons for not applying for a patent. In other words, your smaller defense cost looms larger.

That's interesting because what we also found is that larger firms reported -- again, within industries -- reported patents to be more effective. And I would suggest that those two facts are related. That, in fact, the access to legal resources on the part of larger firms lead them to suggest that patents are more effective, which is consistent with the initial negative correlation.

Well, listen. How are patents used? In fact, the way patents are used depart a lot from the way I think we conventionally think about them. And we need to consider how patents are used across industries and the difference in those uses to help understand how they affect innovation and, possibly, competition.

These are our aggregate results. These are actually simple averages. We have patent weighted averages, as well, that I can talk about.

A little clarification. These are the different

reasons that we inquired about. They, again, are not mutually exclusive. We asked our respondents to -- to tell us why they patented their most recent innovation that they patented. Again, product and process separately. Which of these reasons motivated that decision to apply.

Prevent copying. Well that's sort of like mother and apple pie.

Patent blocking. What's patent blocking? Precisely we asked was there reasons to prevent other firms from patenting, not the same, obviously, but related inventions. That's what we referred to as patent blocking.

Prevention of suits, also looms pretty importantly.

Use in negotiations. I'll be talking about particularly blocking and use in negotiations in a few moments. But, again, we see that -- what you might call defensive patenting to be rather pervasive throughout the industry. Indeed, if you patent weight that, that figure for products, the figure actually comes out to be 74 percent, meaning those firms that patent most intensively are particularly concerned with the defensive use of patents.

I want to now talk about industry differences in

the reasons to patent, because I think this gets a little interesting. It builds on a key observation, an observation that came out of interviews.

By the way, these data, this study, was supplemented by quite a few interviews in the U.S. as well. I found that very, very helpful.

The key point is to think about what's the implications of the number of patents that it takes to protect a commercializable innovation, a product. Forget this one patent/one product relationship. Even in the simplest of worlds where that mapping is pretty direct, that often doesn't apply. Even in industries like drugs and chemicals, it often doesn't apply. Sometimes it does.

But in other industries -- electronics particularly, telecomm, computers, et cetera -- what I'll be calling complex product industry, it can take hundreds -- hundreds, sometimes over 1,000 patents, are associated with a commercialized product. What's the implications of that? And that's what's interesting.

When that number of patents per commercializable innovation are great, it's unlikely that any one firm will hold all the necessary rights, essentially fostering a condition of mutual dependence across firm's patent holdings. What does that lead to? It leads to a lot of

things, but quite notably and importantly it leads to often pervasive cross-licensing negotiations, which is not bad at all, but that's what that reflects.

Now here are my definitions of what I call complex versus discrete product industries. It's very simple. Very simple. Complex product industry is where a product is protected by relatively numerous patents -- computers, communications. Discrete product industries, relatively few.

Now I want to distinguish then the uses of patents by industry type. In our empirical work, we provide the details. We distinguish across industries in a very coarse way, because we don't have direct measures on the number of patents per commercializable product. We used the SIC Code, basically, their guide to distinction.

And what we are suggesting is that in complex product industries, that patents are often used to block the use of complementary technologies that are essential to the -- essentially to the working of a patent, to the commercial introduction of a new -- of a new product. And, in fact, by blocking the use by rivals in other firms of such complements, what you're really doing is you're saying, hey, you've got to deal with me. You are essentially forcing them into a cross-licensing

negotiation.

For example, essentially in what we call a player strategy, because what it does is, it makes -- by having a strong portfolio, you assure yourself of inclusion -- you're not excluded, but you're actually ensuring your own inclusion in such negotiations and interactions of an industry. And that permits you, actually, to gain access to rivals' technology and vis versa, in this condition of mutual dependence.

In contrast, for the more typical story, though even here there is a departure, in discrete product industries, patents are often used to block substitutes, as you tend to think of the -- more conventionally of patents, by often creating patent fences. That is to say, even in discrete product industries, it's often fairly easy to invent around. It's easy to come up with substitutes. So what firms do is patent substitutes of surrounding some core invention that they're hoping to commercialize, building what we call a patent fence. They are not -- so they used the block, but the purpose of that blocking, unlike the prior case, is not to compel cross-licensing.

What do we find? What we used are responses to our questions about the use of the patents to say, is this conjecture right, using this kind of coarse

distinction between SIC industries that I talked about before. Does it map true responses?

Well we, in fact, find negotiations to be much more prevalent in what we called -- the patenting -- applying for patents for their use in negotiations to be much more prevalent in complex product industries than discrete product industries, much more prevalent for cross-licensing, in complex versus discrete. You see the numbers.

And, similarly, when we say well, when you answer to say that "I am patenting to prevent other firms from patenting a related invention," do you also check off the answer "and for use in negotiations"? And we call that a player strategy. You're blocking and you're using it for negotiating. Again, much more prevalent in complex than discrete product industries.

Well what about a fence strategy? You're patenting to prevent -- you're patenting to prevent rivals from patenting related inventions but, no, you're not interested in negotiations. You're building a fence. Well, again, per our expectation, we indeed find in discrete product industries a fence strategy to be much more prevalent.

Again, this is a very coarse distinction. This is a first step at really teasing apart and understanding

the uses of patents, the motives behind patenting. Clearly, there are some industries which are much more heterogeneous, even within this -- the set of industries that we -- that we look at.

For example, medical equipment, as an example, is fairly heterogeneous. It would be hard to map it into one clear set of strategies versus another.

What are some of the policy implications of this finding? Reflecting my own work and the work of others, notable a nice study done by Hall -- actually, that should be Hall and Ziedonis -- that appeared in the 2001 Rand Journal, that mutual -- Ham and Ziedonis are the same person; she got married -- that the mutual dependence and associated player strategies spawn patent portfolio races in those industries, generating what might be thought of, metaphorically, as a rather costly arms race. Indeed, in these industries, the term mutually-assured destruction is often used.

People -- these firms, whether it's semiconductor firms, computer manufacturers, telecomm -- amass just enormous patent portfolios and then they -- they often trade, through cross-licensing and a blow to you who launches the first -- first missile in that kind of setting. But, actually, in the setting it works well in one sense.

Now that kind of behavior might yield patent harvesting. Why? Well let's say what harvesting is. It's essentially where firms are patenting innovations that they would have generated anyway. And why does that occur? Essentially it's a -- game. You know, like a prisoner's-dilemma-like game, where everybody is trying to match, build, to come to the table from a -- and negotiate from a position of strength.

Okay. Now what that -- the possibility of patent harvesting suggests is that perhaps in such settings, patents are not having as much incentive effect on R&D as we might like. Now that's -- we don't know that. And I will try to address that portion a little later on.

Why else might we be concerned in these settings? Portfolio races and the pervasive cross-licensing of large portfolios, et cetera, in these industries may also deter entry and associated innovations. Do we know if that's actually happening? No. Is it a concern? Sure.

Hey, not so fast, though. Is it all bad news, the use of patents in these settings? No. Because there is some up sides to extensive cross-licensing. It promotes information sharing and we'll talk about the benefits of that in a few minutes. It also can avert

license stacking and the possible breakdowns in negotiations over rights due to large numbers of claimants.

How does it avert that? Well it keeps the number of claimants pretty small by deterring entry.

I want now to shift gears a little bit and focus on the quid pro quo of patenting. That is, the information that patent disclosures are supposed to provide and that tends not to merit a lot of -- or it hasn't received a lot of attention. It merits more attention in the U.S. And patents are supposed to promote innovation in two ways -- appropriability, and we've been talking about that. The appropriation of profits due to invention. But then also via the disclosure function. Diffusion of information.

The question is, is that trivial? Is that something we really don't have to worry about? Can such disclosures importantly affect innovation? And to consider this, we compared patenting and related information flows in the U.S. and Japan.

Just a -- wait a minute. Why do we worry about R&D related information flows across rivals? Jim talked a bit about that before. Number of reasons.

Saves on duplicative R&D. There can be complementary -- complementarity effects, improving R&D

productivity of firms in the industry, incentive. It may promote entry.

But, again, watch out because it can also diminish appropriability and associated R&D incentive due to appropriability.

I don't have a lot of time. I'll make this brief. What we observed, using a variety of measures, is that information -- R&D information flows across rivals. It's clearly greater in Japan. A lot greater in Japan. Okay. I can talk about the precise measures.

Then you would think, well, if there is more information flow, you would think that there is less appropriability. Indeed, there is. Using what we might call imitation labs, in fact, we find clearly, and other measures, that appropriability of profits due to invention is much less in Japan than in the U.S.

Now the question is why. We are going to suggest that patents may be key. I don't want to go into a lot of detail here, but at the time of the survey -- there are still policy differences and these policy differences were even greater in the mid '90s. Key policy differences include priority to first-to-file in Japan from receiving a patent, versus first-to-invent in the U.S. That basically means that firms have an incentive to patent earlier in the innovation process.

There is also automatic disclosure of patents after 18 months in Japan. That was not the case in the U.S. in the mid '90s. It is now the case for -- except, for firms that patent only domestically.

Moreover, there was an opposition process in Japan and back then it was pre-grant. Now it's post-grant since '96. But what that means is that Japan, you have the opportunity, prior to the issue of the patent, to oppose it, for anybody to come up, a rival say, "Hey, this is not valid." But you only have a limited window to do that. Several months.

What did that mean? That meant that rivals had a lot of incentive to look very closely at those patents early on because that's where patents were challenged in Japan, typically not so much in the courts.

Another reason for more disclosure via patents in Japan. Compared to the U.S., in essence, there are more patents per commercializable product. Why? There are fewer claims per patent and the claims are interpreted more narrowly. Consequently, more claims -- I'm sorry -- more patents per product.

What does that do? That implies that mutual dependence across firms' patent holdings, that we talked about in the context of complex product industries in Japan -- or in the U.S., are more pervasive in Japan.

And in that regard, chemicals and semiconductors may not be all that different.

What do we find, looking at the same reasons to patent that we did before? In summary way, negotiations. In Japan, using the same distinction across industries, essentially no difference between discrete and complex product industries in Japan.

The player strategy, no difference between discrete and complex product industries in Japan.

And the fences strategy, little difference, but even more interesting is that what we see is that patents are rarely used for exclusion in Japan. Again, they are used as a part of this player strategy to make sure that everybody can, you know, participate at the table.

So what we find is that -- then this different role of patents. But wait a minute. So why do we think that patents are a more greater source of R&D-related information across rivals?

We do a comparison of different channels of and sources of information across rivals in Japan. And just to get to the bottom line, patents stand out as being much more important in Japan than in the U.S. And, indeed, it is the most important vehicle through which rivals learn about one another's R&D in Japan, according to our survey results, which we were -- that result

astounded us. But that is the result that we -- we found.

Implications. The Japanese experience suggests that patent policy may, indeed, significantly increase R&D spillovers.

Also, you'll say, well, hey, watch out. That means R&D incentives may be diminished as well. Again, not so fast. Indeed, average R&D intensity in Japan is greater than in the U.S., particularly in the less R&D intensive, more mature industries, which was interesting.

So the suggestion here is that patent reform efforts more generally in the U.S. should give, we would suggest, at least equal time to their disclosure function.

Let's get back to the question that I deferred before then, reflecting on a recent paper that is nearing its end stage now, but this is a work, nonetheless, in progress on presenting, with a little trepidation, some preliminary results. But I think they've been -- let's put it this way. They've been robust -- they're getting banged around a lot for about a year now.

In light of the finding that R&D is relatively unimportant in protecting inventions across most U.S. industries, does patenting stimulate R&D, even in such industries?

In this recent study with Arora and Ceccagnoli, we look at this question. We evaluate the impact of patenting on R&D in U.S. manufacturing, using our survey data, exploiting a number of the unique data elements there, particularly our questions of patent effectiveness and particularly the percentage of innovations that firms patent, which we call patent propensity, which is a little different from the conventional notion of that.

And in the paper we do two things. We estimate what we call a patent premium, which is the proportional increment to the value of inventions realized by patenting. So a patent premium of greater than one means you're getting a return to patenting. If it's less than one, you're losing by virtue of patenting, perhaps to the disclosure effects of patenting, because -- and because a patent perhaps can be easily invented around.

Then we look at the impact of that patent premium on R&D itself. What did we find? Let me whiz by that. Our estimates of what we call the ex ante patent premium, okay, is that for all inventions across our wholesale -- across the manufacturing sector, for all inventions, indeed, the patent premium is less than one, about .6, which simply means that most inventions in the manufacturing sector broadly are not worth patenting. Again, there is inventing around. There is disclosure,

et cetera.

But then I wanted to highlight the results for a couple of our sample industries -- semiconductors and biotech -- where you can indeed find similar results for semiconductors, really quite -- clearly the minority of inventions are worth patenting there. But in biotech, as in drugs and medical equipment, that is greater than one.

But then let's look at the right-hand column. What's the premium if you patent? The premium is strongly positive, conditional on patenting. And what's interesting is that the return to patenting seems to be fairly comparable across industries, once that decision to patent is made, though I would suggest, again, for different reasons because patents are used in different ways.

Then what's the effect of the patent premium on R&D? Sort of the bottom line issue. What this table presents is the percentage increase in R&D on the one hand and patenting on the other in response to a simulated doubling of the patent premium. So we use our our empirical estimates to generate these results. What we find is that across the whole sample, if you doubled the patent premium, and we can talk about what that -- that might mean concretely, R&D spending would increase by 33 percent.

So there is a stimulative effect of increasing the patent premium, of increasing, if you will, patent effectiveness across -- for the whole manufacturing sector, and 28 percent in semiconductors. So even where patents are least effective, among high-tech industries, relative to other mechanisms, even there we find a stimulative effect. Unsurprisingly, in biotech, much higher than semiconductors, 48 percent increase in response through a doubling.

Now what's the effect of increasing the premium on patenting itself. And there we measured patents per million dollars of R&D. Unsurprisingly, how much you patent increases more than proportionately than any increase realized in R&D itself. So patents per million dollars of R&D increased 59 percent overall. Semiconductors, a lot. R&D increases there, you know, in response to an increased premium, but patenting increases more than proportionately.

Biotech, that relationship is actually reversed. R&D will increase more than proportionately than will -- well, no, that's not reversed, because it's already normalizing for R&D. You get the same relationship in biotech, that patenting increases a bit more than proportionately than R&D, but certainly nothing like it does in semiconductors.

Implications. So we find a positive effect of patenting on R&D overall, even in semiconductors where patents are much less effective than other mechanisms. Though we find some degree of -- again, I referred to this before -- of harvesting. That is, the patenting of inventions that would have been generated anyway -- in all industries, but especially where the patent premium is lowest.

Overall conclusions. There are many ways to protect inventions. While patents are not as featured as other mechanisms, they do stimulate R&D broadly, though more in some industries than others, unsurprisingly.

Moreover, patent disclosures can contribute very importantly to R&D information flows, to R&D spillovers, okay.

Where I would highlight a policy concern, but there are a lot of open questions here, is the pervasive player strategy raises issues of cost, and issues concerning entry. Those are open questions requiring more -- more study, though. We really don't know.

Moreover, reflecting the point that I made earlier on, that we should be concerned about the possibility -- and this is suggested by other -- work by Lerner and others, that litigation costs, as well, may particularly disadvantage small firms.

Thank you, very much.

(Applause.)

(Time Noted: 10:32 a.m.)

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MR. COHEN: Our third speaker this morning will be Robert Evenson. He is a Professor of Economics at Yale and he has done significant research in the area of

technology and productivity, especially in agricultural markets.

PROFESSOR EVENSON: Thank you for the invitation to appear and summarize some of the studies that we've done. I come from the same tradition that Wes Cohen comes from, the Yale incubator for studies of invention and growth. But I am tackling an international dimension.

And the international dimension is important, even for -- for a lot of reasons, but even within the United States, simply because we have -- we are part of an international set of intellectual property rights with the -- and particularly with the TRIPs negotiations and with world trade organizations, firms in the United States are very much looking into international markets. And the size of the markets that they're looking for in their technology is -- is much greater than it would be -- than is the case if you sort of -- is only marketing their buying and selling technology in the U.S.

What I'm going to do is, I'm going to make a few comments about growth convergence. Then I'm going to look at some invention patterns between developing and developed countries.

And my main concern here is to report the results of two studies. One is an international study of

R&D investment and intellectual property, and the strength of intellectual property rights.

And the second is a study of the R&D productivity which asks the question as to whether the productivity of R&D, in terms of the inventions produced by R&D, is itself a function of the recognition of foreign intellectual property rights and essentially the experience with foreign -- with foreign inventions in your country.

And I'll say a few -- I'll come back at the end to say a few more words about the intellectual property rights.

What do I mean by convergence? I'll just make a quick note. I want to come back to this at the end. But, basically, among all of the OECD countries, we essentially observe, over long periods of time and also over -- since 1960 -- this one actually happens to be over a longer period of time -- we've observed that if, for example, if you take the per capita income in the beginning of the period and compare it to the growth rates over the period, we get this kind of a relationship. The highest per capita income at the beginning of the period grow slowest, and the lowest per capita income at the beginning of the period grow fastest.

Now this is a pattern that holds remarkably strongly for all OECD countries, but it doesn't hold for Socialist countries and it doesn't hold for developing countries. So it holds only in a subset of the world's economies, the OECD market economies. And I'm going to come back and try to say that that has something to do with the -- with intellectual property and with the technology markets.

Now I'm going to show you some invention patterns to begin with here. And for simplicity, I've reduced these and we have a lot of data on these. But, basically, this is essentially the invention patterns from OECD countries, and in this case I've just got the U.S., all the European economies, and Japan. And the -- so that the U.S. -- U.S. indicates that in 1990 there were 59,000 U.S. origin patents. Of those, 12,000 were patented in Europe and 14,000 in Japan. And across all of the developing countries, we also see a steady flow of -- or essentially a fair amount of U.S. inventors obtaining protection in these developing countries.

So that we get a steady flow of selling technology from the high-income countries into the developing countries, as well as a tremendous amount of selling technology between the high-income countries.

Now when we look at that same figure for the

inventions that originate in the low-income countries, we find that -- we find quite a different pattern and I'll just summarize it briefly. We find that Korea, in 1990, was already able to export inventions into the U.S. economy, and into Europe, and into Japan. But almost all of the other countries have very limited exports of patents or of their inventions, in a sense, obtaining protection, even though it's easy to get protection in other countries, and for the countries, they do quite a bit of invention, but almost all of it is domestic invention only.

Now I'm going to come back and argue that this -- and there isn't much cascading. In other words, the high-income countries don't modify any technology that originates in -- or the middle-income countries don't modify the technology that originates in the high-income, and then modify it and sell it in the low-income countries. There is virtually no exchange of intellectual property assessment between the developing countries.

Okay. Now let me turn to my two studies. And I'm going to try to put a technology market focus on this. Intellectual property should do three things for a country. It should increase and stimulate domestic R&D. And Wes Cohen has given us some insights into the way

this is happening and the degree to which it is happening in the United States over recent years.

It should also facilitate the purchase and sale of technology by making it clearer and by providing licensing components and so forth.

And it should have disclosure effects. And, in particular, the availability of technology produced outside your country ought to have an effect on the productivity of R&D in your country.

So I'm going to do two studies to look at these and I'll just -- I'll summarize them fairly quickly. But they do represent international ways of looking at the question of does intellectual property actually stimulate R&D.

That's a question that can be asked internationally because in many ways it's very hard to tell in a country that has had strong intellectual property rights for a number of years whether you're actually -- it's very hard to tell within a country whether you're actually stimulating R&D. And it's -- Wes Cohen's work is quite ingenious, using this patent premium methodology.

But in this case we're looking at several components and, basically, I'm simply trying to look at -- my variable is R&D as a percent of the GDP in

different countries. The data are for a 18 -- 1980 and 1985, and 1990. I've got a sample of 30 some countries. And I'm looking at determinants, and I've got some measures of GDP, growth in GDP, and a number of other things. But the key variable is intellectual property protection.

Now there are two indexes internationally that are widely used for intellectual property protection. There is a -- Roziak measure, which essentially is based on the actual loss, and there is the Park and Ginarte measure, which is based on the actual implementation of the loss.

And Park and Ginarte -- and this Park measure -- incidentally, Park is also part of our Yale group. And this measure is a much more realistic measure of the actual effectiveness of intellectual property. And by that measure, we get countries varying quite a bit.

And I'm sorry, incidentally, these -- I can make these slides available. I did have a Power Point presentation, but decided I wanted to incorporate some of these materials that I didn't have in the Power Point presentation.

But, basically, we see that countries with the strongest intellectual property are the USA, and Netherlands, and Austria, and other countries have

somewhat less. Surprisingly, Canada does not have a very strong intellectual property protection by this measure.

But the question is, are we -- can we get any predictive power from this measure by looking at comparison over time. And what we're doing here is we're using what's called a random effects model, which is kind of a mixture of a fixed effects, which takes out -- which essentially looks at only the within country effects and so forth, and there are some econometric issues associated with that.

But, basically, what this study is showing is that intellectual property indicators have a strong -- that's the IP number -- have a strong impact, increasing R&D investment. And we've got four different specifications here in the paper. We have another several more -- dropping some countries and so forth. And that result is robust.

In other words -- now there is still -- there's a little bit of an issue here in terms of the simultaneity of R&D investment and of the intellectual property investment, but we've tried to take out most of that and we have tried to address it in many ways. But this study essentially says that when you look at international data, our intellectual property -- stronger intellectual property, much of it coming through the

administration of intellectual property and the effectiveness of courts in enforcing it -- does stimulate R&D.

Now we have tested this a little bit with -- by dropping some countries and including different countries, and so forth, and it seems to hold -- it's a pretty robust result.

So the second study is the one that -- once again, I'll just summarize it here. The second study is a study of -- more or less from the same countries, slightly different period, but essentially 1980, '85, '90. And this study essentially asks the question, does the -- does a country -- or does the foreign patent recognition of a country actually make your own domestic R&D more effective, in terms of domestic inventions.

So the -- variables, domestic inventions -- this is modeled on -- there are some modeling issues associated with this. But basically the story here is that the elasticity, which is -- which is, essentially the -- if you were to increase your R&D by ten percent, you would get about six percent more inventions.

If you increase your foreign R&D, even your foreign payments of royalties, you will get -- because it complements your domestic R&D, you get another four percent, or five percent more R&D. And this is what

essentially enables countries to double their R&D and get double their inventions.

It is the foreign -- it is this foreign germ plasma and that's mostly -- it's mostly disclosure effects. Disclosure effects internationally, but they are -- they are a different type of disclosure than some of the -- than some of the national things.

Let me just say a couple words on invention in developing countries. And, basically -- and then I'll try to wrap up here. But, as we know, developing countries have resisted intellectual property protection. They have -- and if we can go back to those -- to those figures that I showed you earlier, we essentially can see where some of that resistance comes from. It comes from the fact that developing countries are buyers of technology, but they are not sellers.

You have to get quite advanced before you can sell technology in the big markets. All of the OECD countries, of course, sell and buy, but developing countries are mostly just buyers. And when you're only a buyer, you want to -- you're seduced into thinking that you don't really need R&D and you don't need intellectual property because all you'll do is commit yourself to paying the drug firms for very costly AIDS drugs, which is, of course, is at issue in developing countries right

now, particularly in Africa, and that's a whole episode where the -- okay.

But the methods of convergence says that many -- many times it is said, why should developing countries do any R&D at all. Maybe they can simply mimic. And if you really just mimic or copy, why should you put yourself in a position of having to pay the U.S. and European intellectual property holders for the protection.

Well you might not do this if, in fact, you've got a lot of location specificity, and there are a lot of other issues, as I've noted. If you look at developing countries, by and large, you'll find that the bulk of them have very weak intellectual property rights, and they don't give much invention. They don't have much in domestic invention either, but we saw some of it, some of the data.

Well the people who have studied the convergence looked at several mechanisms here. One mechanism is a paper by Coe and Helpman, which essentially says that imported capital goods convey a huge amount of the intellectual property or the invention spillovers and disclosures that essentially affect these markets and contribute to that foreign invention story.

There is some alternative work that Wolfgang Keller and others have done, which essentially points to

more inventions, direct licensing of inventions.

And there is now increasing recognition that the foreign direct investment in developing countries is a huge contributor to the technology flows and to the technology market that is being realized in these countries.

Now just briefly, location specificity. When it comes to agriculture, and soil, and climates, and so forth, the story is pretty simple. No region in the world that has not got an R&D capability suited, producing crop varieties for that region, no region in the world has had any success in producing or copying inventions at all. It is so location specific that, literally, you can just say that if you don't have R&D, you don't have anything. You don't have productivity and you are part of the world's poorest economies.

For the industrial technology, there still is a great concern that you don't really need the R&D, but the evidence just points all against it. Even the World Bank does not push R&D for developing countries very heavily. As I say, they do it for agriculture because it's so obvious there that there is no spillovers into regions that -- unless they have their own capacity. Once they have the capacity, you bring in spillovers and it's that same spillover mechanism that we saw in the production.

There is a concern that institutions, corruption, transaction costs, and associated with imperfect markets is a big barrier to these international flows of technology and there have been studies of that and so forth.

And there is something called tacit knowledge and I'll end my comments here, which essentially indicates that there is simply no way that developing countries or developed countries can acquire technology by reading the blueprint. It is true that anyone can read a blueprint. It is not true that that means that you have mastered the technology associated with it. You have to have tacit, hands-on experience with the technology to benefit. And that almost always means that you have to have some form of R&D. You can have blue-collar R&D. Many developing countries have a lot of blue-collar R&D. That is, as opposed to white-collar R&D.

Product improvers, modifying and making a lot of things. Incidentally, there is an intellectual property right, a utility model, which is a petit patent, a weak intellectual patent that has never been used in the United States, but it's been used incredibly in Japan, where twice as many utility models as patents are granted.

And so the studies that we're looking at here do point to the importance of the institutions of this tacit knowledge, and to the importance of intellectual property in not only stimulating R&D, but in facilitating the exchange and making it feasible and possible for countries who do R&D to have more productive R&D.

Now a certain amount of this is based on comparisons between developing countries and developed countries. But if we go back to the OECD countries, we don't always appreciate the fact that several countries in the OECD, notably Spain, Portugal, Italy, Ireland, are countries that have had extraordinarily good economic performances, much better performances than France and Germany, or the U.S., in terms of their rates of growth over the last 40 years. And much of that is due to the fact that they have been able to bring themselves into the OECD technology market -- buy and sell technology, recognize the property rights of others, and that hasn't happened with -- with all -- with many developing countries yet. It's beginning to happen. We're seeing it happen in China. We're seeing it happen in India, and certainly Korea, and the best performing countries.

Well I'll stop there and we can consider some of these items later.

Thank you.

(Applause.)

(Time Noted: 10:54 a.m.)

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MR. COHEN: Thank you. Well I think we have at least a few minutes available for discussion here. And I thought one item we could begin with derives from Jim Langenfeld's graphs where he showed a distinction between the level of protection where you might maximize innovations, and level of protection where you might maximize total welfare. In part I know this is derived from considerations of competition and the -- the price effects there.

I'm wondering if embedded in this is some form of assumption that the intellectual property at issue is creating market power, and whether that is the normal -- should be our default assumption, or whether we should -- I think Professor Kitch, at times, has written on the idea that a better default assumption would be that the -- in the instance of market power stemming from intellectual property is more rare.

Perhaps Jim and Professor Kitch might want to both comment on this.

MR. LANGENFELD: Why don't I just start. At least in my opinion, I think it's generally reflected in the economics literature. I mean, if you have, by definition, a unique product as a result of a patent, a defended patent, and it's actually differentiated from other products offered in the market, even in direct

competition, what you're going to find, typically, is that, whether you call it a market power or a monopoly -- that you're typically going to find some type of power. You've identified, even for the broader market, a niche that's yours.

And, by definition, if someone else can completely duplicate that, it will go head-to-head, even in a broader market context and prices will fall. That will generate additional consumer surplus, at least in the short run, abstracting away from the reduced incentives to innovate.

So, yeah, there is an assumption built in there that I think is a reasonable assumption, and I don't think that's that an unusual perception in the economics profession. That's not to say, though, that by having a patent, that gives you necessarily anything along the lines of monopoly power that would allow you to do -- you know, to do anticompetitive tying arrangements or anything along those lines.

It is going to eliminate direct price competition for comparable products, otherwise the patent is truly not --

PROFESSOR KITCH: Well it depends. Sort of the important case in what class -- if you define patents in the way you're defining them, then it's true by

definition.

The only point I make is that if you're trying to evaluate the social impact of the very large number of patents that are issued and enforced in the United States, then you have to look at the characteristics of all of the patents that are issued and outstanding. And I -- we know, for instance, that most patents that are issued and outstanding have no commercial -- have no capital value.

There are thousands and thousands of patents which have no market position, whatsoever, which then leads to a second kind of interesting question as to why firms even pay the cost of applying for and obtaining them.

But you also have to understand that the patent world -- patents are defined -- the scope of a patent is defined in terms of the claims. And the claim is not on a product in a market -- in an economist sense of a product market.

And I think economists have always tended to think of inventions being an invention of a product, something like a car, or a copying machine, a radio. Invention, as it's used in the patent system, is something that can be claimed, and it's usually a very small part of the -- sort of an applied technology.

And by itself -- and I think several speakers in their work quite clearly have picked this up -- they -- they don't correspond with a product, to a competitive offering. And one or more, as was said, in many cases thousands of patents' rights are involved before you get to the stage of actually having a competitive product on the marketplace, like a PC.

So you really can't analyze these rights by using the kind of standard classification and conceptional system that commonly is used to talk about "products." And of the thousands, and thousands, and thousands of patents outstanding, my judgment is that a very small number of them, in fact, infer a market power position in a traditional sense. Some do, but in a traditional sense that economists think of that -- that concept.

If the objective is to talk about the social effects of the patent system as a whole, then it seems to me, given this large number of patents, predominant number mind you, that don't have this characteristic, then it seems to me that that dominant number ought to be the focus of your attention. Then you can deal with the outliers. I think to look at it the other way is to turn -- to really turn it around unrealistically.

PROFESSOR COHEN: On the question of -- agreeing

with Ed Kitch, few patents confer product market power in a product -- in a market. Again, drugs are an exception. Often economists -- conventionally, when they thought of patents, have thought of drugs as being representative of the way patents work. They are absolutely off the scale, an exception, in the way that patents work. There are some industries that approach it, but again they are very different.

Number two, let me make a broader suggestion. If you think that actually some of these industries -- semiconductors, telecomm, et cetera -- amass enormous patent portfolios and, indeed, they -- that improves the ability to cross-license, and often really the freedom, essentially, to design and freedom to operate without worrying about getting sued. Why? Because the other guy knows that you're going to sue them and everybody is going to lose in the process.

Now given the way that patents are used in that -- that setting, what are patents doing? How are they generating rent? Are they generating rents -- is a patent generating the rent on the invented invention, of the invented item, per se, or is it rather becoming a vehicle for sharing oligopoly rents?

Now clearly there is a return to the patent because at the margin it -- it increments your portfolio.

But in the main, are you really deriving the profits from the patented product. In fact, when you have these cross-licensing deals, there are firms, as we've heard in the past from Paul Ziedonis, firms will have a lot of these patents that they have acquired the rights to from other firms, they don't touch them. They don't work.

Okay. So, in other words, they can become vehicles for simply R&D sharing in industry, as opposed to protecting the rights to a specific invention.

MR. LANGENFELD: If I can continue. Okay. If there are a lot of patents out there, which there are, that aren't used and they are used in a way that Wes is suggesting, then the graph is still accurate.

PROFESSOR COHEN: I wouldn't disagree with that.

MR. LANGENFELD: It is still perfectly accurate because what you're saying is they are used to prevent competition from other people coming into the market, if Wes' findings are correct, which we have no reason to doubt them. So the -- the key point of that graph is, one, that maximizing the number of innovations, whether they are used or not, is not necessarily, from an economist's point of view, the optimum.

Now you can argue and maybe this is where some of the -- some of the disagreements with the FTC and some firms out -- and their policies in the economy, is if the

-- the interesting graph that's not up there, the one that I thought, is -- okay, let's -- for the moment let's say we're trying to maximize total welfare, returns on -- to the patent for the innovator -- patent over to the innovator and returns to consumers. If the FTC takes the position or the Department of Justice takes the position that they only care about consumer surplus, they don't care about any producer surplus, they have to be taking an extremely long-running view because if -- because that graph would mean, to take it to the next level, if you're only concerned about consumer surplus, you will -- it would put further space between what is the optimum, the maximum number of patents, the optimum for society, and then the optimum for consumer surplus in the short run, because you're going to be subtracting out the gains to the innovators.

So that graph actually would be heightened if you were taking a pure consumer protection point of view, consumer surplus point of view, which the FTC often has.

MR. COHEN: You're saying the peak would be moved farther to the right on that graph?

MR. LANGENFELD: Yes. So there -- I mean, you can justify it in terms of if the FTC takes a sufficiently long-run view, then -- and supply curves are perfectly flat, I mean, eventually they will -- you

should eventually curve them back to consumers.

But if the FTC takes the short-run point of view, then the logical result of that policy is that you're going to -- you're not going to maximize the number of innovations. You're going to come far short of that in determining the amount of intellectual property protection you're going to tolerate.

PROFESSOR KITCH: I have another problem with that graph. In its own terms, I don't have any problem. I agree with the basic proposition that, in theory, there is going to be some optimum level of innovative activity and you can have too much innovation, where the cost of it will exceed the benefits to society. And you can have too little, and then the same way that there's -- I agree there is some relationship between the patent system and the amount of innovation and, indeed -- and that can work both ways.

But my problem is with the definition of the bottom dimension. That is, you talked about something on the horizontal dimension of the graph as being stronger and weaker patent protection. And the problem is, to implement the conceptual structure in actual policy terms, it's necessary to understand how -- what stronger and weaker translates to, in terms of actual rules, conditions, and provisions of the patent system and

antitrust rules. And unless you can define what is stronger and weaker and explain the connection between the graph and the strengthening or weakening of that particular provision, then there is no -- there is no sort of implementable policy bite in the insight. It's kind of -- it's a nice heuristic and it sets up kind of a general conception, but it doesn't help us answer questions like should the time bar be three years or one years, or zero.

What should be the scope of patent clients?

How much should the Patent Office invest in patent examination?

What procedures should the courts be using in the enforcement of patent rights?

Should the antitrust laws follow Kodak or Xerox?

I assume you're assuming, but not arguing, that Kodak is in the weaker direction and Xerox is in the stronger direction. I assume you have some view about where the American patent system was on that graph 20 years ago and they view that it has moved to the right in, say, the last 20 years. But you're really not -- not sort of arguing the institutional details to show that that's true.

Much is made of the fact that the Federal Circuit has strengthened the presumption of validity and

has seemed to soften the non-obviousness test, and that is argued to be generally, you can just say, a move in the direction of strengthening the patent system.

For some reason, little is made of the fact that the Federal Circuit has quite strenuously pushed in the direction of narrowing patent claims, the scope of patent clients, and has had a lot of trouble with the doctrine of equivalants and other doctrines which broaden the effective scope of claims in particular patents.

Well if you put the two together -- that is, you -- and you assess all other changes that the Federal Circuit has made, has the U.S. patent system gotten stronger or weaker over the past 20 years, or do we know?

MS. GREENE: And the answer to that is? Because I'm curious as to how taking your own standard that you were applying, in terms of taking the -- what is the empirical analysis on that? If you look at those two main factors, non-obviousness and claim construction? What is the impact?

PROFESSOR COHEN: I certainly think it could --

MS. GREENE: Is it stronger or weaker?

PROFESSOR COHEN: I guess my own judgment, and again I don't really have an analytic structure that sort of leads from this notion of strong and weak to particular answers about the institutional structure. I

think in the -- from a larger perspective, I don't think we have moved very much in the last 20 years. We've probably moved a little. But we're still sort of in the same ball park.

Now that still begs the question as to whether we were in the right place 20 years ago. And I don't think the economic analysis at least provides a clear answer to that question.

MR. LANGENFELD: Well I think it's -- it is true, as I said, I simplified the analysis in trying to -- actually, I used -- I used part of that from some research done by Landes and Posner. I thought that was an appropriate assumption for the copyright analysis.

I think it's a useful tool. I agree that it's multi-dimensional, but most things in the world are. And I do think that you need to look at all those dimensions, like in the hedonic type of analysis, to find out whether it was actually, you know, stronger or weaker.

My sense of the areas that I have looked at is that I think it is that intellectual property -- and I think that was Wes' point, too -- has gotten stronger, or the protection has gotten stronger within the United States over time. But can I show you a quantitative analysis of that? I'm looking at the cases, because I think the cases are very clear.

But, you know, you're right. There is an offset, if the claims are being read more narrowly. I don't think anyone has done that type of quantitative analysis. You know, we're all looking at it qualitatively. And that's one of the reasons why the work, such as the work that is being done by -- by the other academics on the panel here, is quite helpful, because they are providing some quantitative insights to what's going on here, and I think that's really an area that -- that we should all be exploring.

MR. POLK: Can I jump in?

MR. COHEN: Go ahead.

MR. POLK: Clearly there has been a strengthening in the sense of the expansion of patentable subject matter over a couple of decades. You're saying no. Life forms, biotech, software -- you're not going to find that -- okay.

PROFESSOR COHEN: However, I think the general point that you make, which is right, which is often discussions are cast, you know, just for purposes -- purposes of simplicity, in terms of strength of patents, that that can sometimes obscure some key issues. So one needs to be mindful, when you talk about strength, what you mean. You mean, presumably, enforcement. You might mean, presumably, scope. You mean life. That is, the

duration of the patent life.

And then, when you push that, you say well does an expansion of scope really advance innovation. The literature suggests maybe not, even in a very simple way, that if -- if the scope of claims is in some sense broadened, what that means then, for example, is that there is some expectation that if your rival gets to an invention, your domain, before you, that actually restricts your rights and might, in fact, dampen your incentives to do -- to invent.

So what I want to suggest is that, albeit the utility and simplicity in talking about strength of patenting, you really should talk -- you do, when it comes to policy discussions, probably break it down into fairly concrete dimensions.

MR. COHEN: Go ahead, Ed.

MR. POLK: I tend to agree with what he is saying here, as far as the terms of strengthening and broadening patent protection being thrown around without, necessarily, a good firm basis of what exactly that means.

Now as far as the comments that the non-obviousness standard is somehow being lessened, I think that's wrong. The non-obviousness standard was set forth in 1960, Graham v. -- in the '60s, Graham v. John Deere,

and that standard has not changed. Now maybe the Federal Circuit has made it more uniform, so you can't go around and -- shop, and in the Ninth Circuit you have one standard of interpreting obviousness, and in the Second Circuit, a different standard. Maybe if they were more uniform -- but I don't necessarily say making them more uniform, is somehow making it stronger or broader using the patents claims. Coming from the standpoint of a former litigator before I came over to the Patent Office, I don't think they're going into a courtroom and being interpreted in a manner that may have been -- may be is suggested here. I mean, I think courts are still -- are not just looking at it and giving the patentee, you know, what everybody they want when they get in the courtroom.

I think the bigger problem, and something you have to address here, maybe is the doctrine of equivalence, the way that is being used right now. I, wholeheartedly, agree that that is a problem right now. And the case of Festo right now is before the Supreme Court, and maybe the Supremes will finally, at this point, come in and put a little more clarity into the scope of patent claims under the doctrine of equivalence. But I think a lot of that has somehow been shifted to the PTO that we're doing wrong, and we don't have anything to do with the doctrine of equivalence. That's purely a

court-made doctrine and we don't have any way to rein that in.

And as far as the Patent Office, when we are issuing patents, and the company thought is now that we're just issuing these broad patents, and we get -- we do have the examiners there who have to look at the doctrines. And the Federal Circuit has been just as hard on us in denying patents to applicants and saying, you know, that we're -- just for instance, there is a case that just came up a few months ago that said that the Patent Office can't rely on their common knowledge to reject something. There may be element of a plain language that any examiner would look at and say, "Yeah, this is obvious to me. I may have done this in -- you know, in industry, yeah."

But the Federal Circuit is saying, no. We need a textual basis. Go find this reference that says that. And the examiner, for whatever reason, it may be some of the most obvious stuff, just can't find something that says it. And we are not allowed to reject something if we don't have a textual basis, something to show the Federal Circuit, here.

I mean, and that's part of what my job in my office is, what we do. We represent the Patent Office at the Federal Circuit. And we get slapped down quite a bit

because the court is saying the board is not making a proper factual finding. You know, you can't just rely on your own common knowledge. You know, and that's an issue that I don't think anyone has really taken to heart here.

MR. COHEN: We have a little bit of the advantage of not having a Federal Circuit reviewing our morning record right here. And let me just tell you a little bit more about, you know, how -- what economics tells us is to an optimal approach. I'd like to just stay a little bit more with some of the issues as to the patentability standards that are likely to be optimal.

Does your work that distinguishes settings where patents are used for direct appropriation from settings where patents are being used as negotiating chips, suggest that -- suggest any differences in the way optimal standards might be set for patentability in the two settings?

PROFESSOR COHEN: Well you want to walk onto a very slippery surface there.

MR. COHEN: I want to push you onto the slippery surface.

PROFESSOR COHEN: No. I'm not about to suggest that the standards for patentability should, in fact, differ across industries. One can make an argument that perhaps in -- yes, there might be virtues, but that's a

pretty tough thing to do. Where there has been sui generis protection, for example, outside of issues of patents, like design registration and semiconductors, that's really not been that -- that productive.

But that sort of sidesteps your direct question, which is -- I think what you're -- the issue isn't so much should the standards differ, but how difficult is it to apply the standards to different settings. And there there are remarkable differences and, indeed, you know, business methods, which is perhaps the most challenging -- or one of the most challenging domains right now, although even in biotech, you know, it's often -- it can be pretty tough, so even in a domain where patents clearly are having a very strong and critical incentive effect as well as effects on the viability of what Bob called technology markets.

So I think I did not answer your question. Maybe someone would like to step into --

PROFESSOR EVENSON: Let me just make a comment that Japan is always -- for a long time Japan had a restriction of single claim in their patents. They've changed that now but -- and that was designed in part to provide a weaker -- a weaker level of protection but, in fact, it wasn't very effective in doing so because, as far as I understand, the U. S. and European inventors

wanting to obtain protection in Japan were able to, pretty effectively, get around that single plain limitation by getting several patents and so forth. And the reverse was also the case that Japanese patents were condensed when protected in the United States.

So that was not -- that does not seem to have been a very effective mechanism for playing with this optimal degree of protection.

MS. GREENE: What empirical evidence would it be helpful for you all -- you all, the economists -- to have to get at that question better? And what, if anything, can the federal government do, in terms of assisting in the process of gathering the data and understanding it?

PROFESSOR COHEN: Can I take a shot at that? Some years ago, I, unhappily, moved upstream into data collection. It's always nicer to be able to use other people's data. Okay. Because it's really a lot of work to collect it yourself, without that much of a return, in case of a very long run.

But I had specific suggestions. First of all, the R&D data for starters collected in this country is terrible. Okay. It is way, way too aggregate. Okay. In fact, the best -- the best data on R&D ever gathered in this country was collected by the Federal Trade Commission through what's called their Line of Business

Program and that data exists for 1974 through '77. In fact, my early work, early in my career, relied very heavily on those data. And you could see things and do analyses using that -- those data that cannot be done with R&D data that's subject, for example, to primary industry assignment or the -- almost sometimes the whimsical responses of firms to the still too aggregate NSF product field data requests, via census on -- you know, please break up your R&D, if you so choose.

Then, of course, you need to complement that with other data on -- again, broken down clearly by line of business, but data which can correspond to your R&D data on things like, you know, sales and margins, et cetera.

I would then -- I would suggest that the Federal Trade Commission go back and look at some of the work that you folks have done years ago. Okay. And I think Mike Scherer was at the origin of a good part of that program.

Then you have other data, which is not the R&D data, not the nuts and bolts data, but the -- some of the data that are collected and that I did through my survey. Would it be useful to collect it and revisit it? Sure. Not every year. But -- rateables would be very useful.

And my feeling is that data -- the R&D data,

even data of the sort that I just talked about, and not just on patents but broadly -- once you're in that business, be careful. Because you don't just collect data on patents or patent effectiveness at R&D because to understand the effect of patents, to understand incentive effects, et cetera, you have to then be able to control for a bus load of other things. Okay. So it is also a slippery slope and a very ambitious undertaking, so let's not trivialize the cost.

Also, let's not trivialize respondent burden. Okay. It is hard for these guys to respond and they didn't like it back then. In fact, waged a battle that went right up through the Supreme Court back then, around the FTC's Line of Business Program, particularly their right to make the data available to non-FTC employees, in a formal setting.

So is it worthwhile? I think so. Is it easy? By no means.

MR. COHEN: I think this is probably an excellent time to take a break. We should try to reassemble here in ten minutes and we'll try to start promptly at the deadline point.

(Whereupon, there was a brief recess taken.)

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MR. COHEN: The next speaker is going to be Professor Edmund Kitch, who teaches law at the University of Virginia. He is currently visiting at Georgetown. He is the author of a seminal 1977 article entitled The Nature and Function of the Patent System and he is just the ideal person to give us additional background in this area. Professor Kitch.

PROFESSOR KITCH: Well thank you for inviting me to participate today. I've been asked to give an overview of that 1977 article, which offered a way of thinking about -- trying to think about these policy questions in connection with the patent system.

I should explain that I am, by background, a lawyer and I have come at the patent system as the result of an effort to teach it and to explain its features to students. In the process of doing that, I have benefited enormously from reading the work of economists on the subject of innovation and on the subject of the patent system.

But as I proceeded in that enterprise, I came to notice what I thought were features that the patent system actually had that I had trouble squaring with or understanding in terms of the description and explanation that the economists had to offer. And this -- so this perspective came out of that -- that inconsistency or

lack of fit and with some effort to try and take into account the actual features of the patent system and then try to relate them back to how one would understand the economics.

Now the basic insight is simply a positive observation about the structure rights conferred by the patent system and that is that the rights conferred by the patent system are -- have important forward-looking elements.

The traditional discussion by economists have focused on patents as rewards for inventions made and completed and now the patent enabled the inventor to exploit that invention in his marketplace.

My observation was that an important dimension of the rights conferred by the patents, in fact, affect future inventions and future developments in technology.

And in the article, trying to explain my unfamiliar ideas to my audience, I used a kind of tag line. I described this aspect of the rights as "prospects." Now, what are examples of these prospect rights? Well the generic proposition is a claim with a few limitations will cover improvements or changes that include additional elements.

Specific examples. You can patent a specific compound, a chemical compound, based on a single utility,

and the claim will then, for the life of the patent, cover all subsequently discovered uses of the compound. But the fact that the next inventor has found a new use and additional element will entitle that inventor to get a patent. But that patent will also fall within the claims of the first patent, even though those uses were not limitations or not disclosed in the initial patent claim.

Or a process claim will cover a process, even if a new inventor has come along and added additional steps or features to the process and even if those additional steps and features are the key to the actual commercial value of the process.

In the same way a claim that covers a machine will cover the machine, even though it has new or additional features, and again even if those new and additional features are what add the marketplace value, the commercial value to the invention.

So I found it difficult to explain, under the traditional reward approach that the economy theory had taken, to explain why the patent claims cover -- in fact, cover more than the inventor has actually achieved, and why patents are regularly awarded on inventions with no commercially practicable utility. And so that was the motivation for trying to think about a new approach to

analyzing the impacts of the patent system.

In addition, I noticed that the rules in the patent system actually force applicants to apply quite early in the innovation process. That is, an inventor cannot, without risk under the patent system rules, sit around and wait until the invention is perfected and complete it. This is because of the priority rules, which give a benefit to early filing, and because of the time bar rules. That meant that applicants come into the Patent Office when really they have the first glimmer of a significant finding, which can be long before a commercially useful product has been developed.

And, indeed, I took a look at some information on this question and was able to demonstrate that many important patents, in fact, have issued, historically, long before the technology was commercially important. There are many striking examples of that, but it is -- it is not uncommon to see that the really commercial important introduction of the invention may occur at the very end or after the patent term has expired, which again is hard to explain, in terms of reward theory, because by the time something of real value appears in the marketplace, the patent is gone.

I also noticed the patent is awarded to a single applicant without any effort to gauge the quality of the

applicant's contribution, and even if there were others who had a near miss, and indeed you can lose a priority contest by even days, even though your science was superior, your investment greater, and when you lose, you lose all of the rights. You don't get some share of the resulting patent rights.

Then to try and make this idea more familiar to my readers, I offered an analogy to the mineral claim system, where -- behind schedule, due to computer problems and other things, and so I'll just skip over that. But, again, my use of the term "prospect" -- it fit the idea of prospector and the rules governing mineral claims on the federal public domain in the West.

I then asked what -- what could be the possible benefits of these features in a patent system if they are -- if they are not explained by a reward or incentive to make investment type theory. And I -- I identified the following benefits.

One was that once a prospect is created by an issued patent, it makes it possible to have centralized management of the flow of investment into the exploitation of the prospect. That is, investment in its improvement and perfection and, hopefully, the production -- eventual production of a commercial product.

Second, better appropriability of the

implementation investments required to bring the invention to market.

A reduction in transaction costs. And I think this is probably the most important insight. I compared a world with these prospect patents to a world in which only trade secrecy was available, and pointed out that it is extremely difficult for firms to engage in transactions which -- with each other, conveying information held in the form of trade secrets, and argued that since trade secrets are not going away -- that is, secrecy will be something that the system has to live with, that patents improve the ability of firms to contract and transfer information between themselves. And I think some of the earlier presentations this morning, the empirical presentations, demonstrated the very important flow of transactions between firms holding patents, in forms of cross-licensing and licensing, and so on and so forth, in order to bring the invention into use.

Again, I proceeded to speculate -- or attempt to speculate about a possible on the ground policy implications from this view. And I argued first that there were some possible implications for the test of invention, and argued that a substantial novelty approach under this approach could make sense, as compared to a

cost focused approach. I had actually argued for a cost focused approach in a 1966 article on Graham v. John Deere and in the -- this article I decided that -- or announced the position that my 1966 position really was not workable and substantial novelty could make more sense. I just read a law review article published in 2001 which said I had it right in 1966 and should have stuck with that.

This approach has varied implications for the importance of coordination among firms through licensing. It is important to understand that the issuance of patents to particular holders will have a large element of randomness and arbitrariness about it. Competing firms working in related fields of technology will quite easily end up with parts of -- patents on parts of the technology, whose exploitation may -- may fundamentally require that those technologies be combined for their efficient exploitation. Yet one firm because maybe it was three months late, or its application was not timely filed, or some lawyer in the patent department was sick, or because the firm wasted two months pursuing what proved to be an unprofitable line, all really just accidents, some other firm gets a particular patent, but the existing technology base of the firm is really not worth something unless it also has access to that patent,

that the ability of firms to license and exchange and rearrange these rights among themselves is extremely important. And this, of course, relates to my transaction cost point. The existence of patents makes this process less costly.

This is the -- I think the implication with the strongest implications for antitrust policy, and the implication is basically this. Whatever the welfare effects of the patent system as a whole -- and we talked about some of the difficulties of understanding exactly where we are and what the applied policy implications are for that question earlier -- once you have a patent system, interventions which increase the cost of licensing, increase the cost of transactions between firms with different patent positions, is very likely -- is probably going to work to, indeed, to increase the social cost and the social cost of the patent system that you have. It's very important, if you have a patent system that the holders of the patents then be able to transact about the patent rights between themselves after the patents and even before the patents issues.

And so I'm a great fan of the 1995 intellectual property guidelines. I think they do start off in the right place. I think it is important that when antitrust comes to intellectual property, it brings the same tools

and methods of analysis to intellectual property that it brings to other forms of property. And I disagree that you can make kind of a sharp distinction between intellectual property rights and rights in what is sometimes called tangible property.

Another implication I said was, in terms of government patent policy -- this is before Bayh-Dole and the issue, however, was alive -- as to whether recipients of government research subsidy should themselves be able to obtain patents on inventions resulting from the subsidized research work. And from the reward perspective, of course, this makes absolutely no sense. You've already been paid to do the research. Why in the world should you have a patent as well.

If, however, you are looking forward to the process by which inventions are further developed and exploited, then I argued that in order to provide for the orderly and efficient further development of those inventions, it would make sense to permit such entities to obtain patents. And of course that has been a clear change in U. S. law and practice.

So the bottom line is a -- of this prospect approach, the bottom line is the contrast with the reward approach. The reward approach conceives of the innovation process as a single cycle. You have

investment, invention, patent, and then exploitation, and not a continuous process in which each innovation is an input to successive innovations. That is a multi-generational approach, an approach which does, I must admit, make the analysis far more complicated, multi-variate and difficult to follow and even to trace empirically.

The reward conception looks backward. The prospect consumption -- conception looks forward. I think you can see this contrast in things like the important Levin, et al. study, the survey of managers about the importance of patents. The central question asked there was are patents important in terms of obtaining financial reward and appropriability of research results. That is a question that is consistent with the traditional economic approach to the patent system. The question did not ask the managers and did not focus on the role of patents in the subsequent management of the invention process, and in the contracting process that goes on between firms working in the same or related area of technology. And that's the overview.

(Applause.)

(Time Noted: 12:04 p.m.)

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MR. COHEN: Our final speaker this morning will be Maureen O'Rourke who teaches intellectual property and other courses at Boston University. She is now researching the antitrust implications of patent settlement agreements. She brings some real world science and real world experience to the table to us. She received a Bachelor of Science in Accounting and Computer Science and she spent three years working at IBM, dealing primarily with software licensing issues. So we will turn this over to Maureen O'Rourke.

PROFESSOR O'ROURKE: Well, first I want to thank the staff for inviting me here today and for the opportunity to speak to and also listen to my fellow panelists.

The theme that I want to talk about is really reflected in this whole series of hearings, which is that we tend to think of intellectual property law and antitrust law as discrete bodies of law, but rather as part of an overall system that includes all the sets of legal and extra-legal tools that we use to try to achieve the optimal level and insight to innovate, which unfortunately we can't define.

But generally I would say that we, in the U. S., have always believed that the optimal level is one where we've got some balance between the exclusive rights of

the inventor and those of the public, where the public would also include second-generation creators. So I guess in my conception I would say I kind of envision the exclusive rights as still leaving something meaningful unprotected.

So I think antitrusts are a part of that system that includes other things like contract and extra -- devices like technology protection measures that regulate access and copying. And so when we think about that system, we need to think about whether it has any gaps in it. Are our bodies of law doctrinally equipped to achieve their goals, or are there some improvements that we can make that would be cost effective?

And so I'm going to talk today about providing patent law with an additional doctrinal tool that I think would help it achieve its goals, help it fit within this broader system that I spoke about, and particularly maybe make its fit with antitrust law an easier one. And so I'll talk a little bit about the idea, followed by an explanation of how I got to it, and mix in some talk of pros and cons and some alternatives, and what more we need to know.

I should say at the outset that this idea is widely reviled, so I guess the only point there would be to say, while your initial reaction might be one of

revilement, if that's a word, maybe on further reflection it won't seem quite so odd.

All right. In a nutshell, my idea is that patent law may lack the doctrinal tools, at least as they are currently interpreted, to excuse certain literal infringements that are socially beneficial and wouldn't adversely impact the patentee's incentives. And one way to remedy that gap would be to adopt some variant of copyright law's fair use doctrine.

Now why would you want to do that? I mean, patent law has never had a fair use doctrine, so what's different now? Well to a certain extent, nothing is different and yet everything is.

We've always had this fundamental assumption and a number of the speakers today have referred to it, which is that patentees would efficiently license their inventions. They are not going to use them to suppress innovation or to leverage whatever power the grant would happen to give them into another market. And if they did, antitrust law could deal with that. So there is really no need for a doctrine like fair use that in copyright law, at least in some commentators' views, exists at least in part to correct market defects that lead to licensing failures.

And also, to the extent that copyright failures

deals with First Amendment type issues, it's not a doctrine we need in patent law, where those issues are generally absent. So why would a doctrine like that make sense in patent law?

I thought it would be helpful if I sort of gave you an explanation of how I got to it, which means we start with a narrow, but economically important, context and then kind of broaden the view and raise some of the pros and cons here. And that narrow context is really one that came out of my experience with IBM, which is the evolution of IP protection for the connectivity components of operating systems software, application programming interfaces, or APIs for short.

Originally we thought these connectivity components were copyrighted. But then in 1992, it became clear, at least in the Ninth Circuit, in the cases on video games, that they were not copyrightable subject matter. And, in effect, the courts turned them over to patent law and, indeed, the major video game manufacturers have patented their APIs and so certainly have the major computing software manufacturers, including Microsoft.

Now why would the courts have done this, basically sort of take something out of copyright protection that formerly was there. Well it seemed like

part of what they were saying is that the market for operating systems exhibits network effects. And you have some feeling that these manufacturers were leveraging small bits of code into a much larger market. And so we thought it would be a good idea to kind of open up the standard for connectivity to give consumers more choice.

So we turned APIs over to patent law and I would just note that that seemed to be in accord with economists' recommendations. And just briefly the argument is that network markets make a case for weaker IP rights because of their externalities. An IP right allows price of marginal cost, with a network effect. A person's failure to join a network, because the price is too high, imposes negative externalities on those already in the network, which seems to translate into a policy recommendation that weaker IP rights might make sense.

And as we've seen -- really I think Microsoft is probably an example -- IP rights can be especially powerful in network industries. The problem is, though, at the same time you know there is probably some incentive required to produce APIs, but at the same time we know that strong IP protection may produce a regime where you have one dominant player and then less than optimal innovation, again, if we could define it, after the standard is set.

So patent law would make sense because its threshold requirements are higher than those of copyright. So it would make sure that only those APIs that represented a technological advance would receive protection and possibly weed out those whose success stems not so much because of their technology, but because consumers happen to adopt the particular operating system.

So rather than weaken the right directly, what the law really did was achieve basically the same effect by raising the bar for protection. My problem is, though, that a patented interface can become a standard, as much as a copyrighted one, and strong patent protection may frustrate efforts for compatibility at a point when we think that would be desirable.

For example, you can't offer a competing operating system that implements the same patented APIs. Depending on how the claims are written, an application developer won't be able to write to the API. They're going to have to reverse engineer to get at the API.

Patent law scope-limiting doctrines generally don't allow much literal infringement. You might be able to contort some of them, but it would be a real stretch. I think it's pretty clear current law wouldn't allow this.

I don't think we'd care that much if we thought patentees had an incentive to license. The problem is that in network markets, bargaining may break down if you want to try to control additional markets or if the potential licensee can't pay the price because they can't capture the externality of making the network more attractive to consumers who are already on it.

What's the point? The point is that addressing situations like this is in part one of the reasons why copyright fair use arose, so why not patent fair use?

Well, you know, there are plenty of reasons to why not. It would be expensive. It would be error-prone. It would increase the cost of litigation. And the real concern would be that it would achieve exactly the opposite of what it's intended to do. In my vision, what it is intended to do is really to provide -- not to be used so much to excuse infringement, but to provide an incentive for licensing. The problem is, if fair use works, you complicate valuation questions so much it might actually not realize that goal.

So here is what I know are a couple of alternatives. You know, one defense that I always make to saying that this is a very odd idea, is that a couple other people sort of came up with the same idea with different twists on it at the same time. Professors

Julie Cohen and Mark Lemley came up with the idea that patent law codify a right to reverse engineer software for research purposes. Now that's a narrower solution -- it's an industry specific solution -- than mine.

What it won't do, though, from what I can figure out from what they said, is it won't protect a new product that literally infringes. So you'd never have the chance to actually offer a competitive operating system that implemented the same APIs.

Additionally it's not clear to me again -- it depends on how the claims are written, but if it's a process of using the API, it's also not going to shelter the application. So that's one alternative. And, you know, my argument is that sometimes exactly what we should do is permit some amount of literal infringement in the end product.

Now Professor Merges has a different view or a different suggestion, which is that patent law should adopt a doctrine of technological genericide. And he bases this idea on an analogy to trademark law and don't laugh. And the basic idea is this, when a patented invention becomes a standard, basically you lose your patent rights then, just like a trademark owner loses its rights in the market when it becomes generic.

Now that idea is both narrower and broader than

mine. It's broader because you could lose all your property rights. It's narrower because, again, from what I can understand, it ostensibly applies only to standards in network markets.

Under a fair use type doctrine, at least as I would propose it, the court could hold an infringement to be fair, but require the infringer to pay for its continued use, which, in effect, would be like a compulsory license.

The problem with a fair use type approach is, even if we could agree that network markets make a case for "weaker" patent protection, and we can argue about what that means, would that one context justify a new doctrine in patent law. And I think the answer is probably no, that you have to have a broader justification for adopting a patent fair use doctrine.

And so the question is, are there other contexts in which we might view some amount of literal infringement as socially beneficial, but bargaining for a license will break down. And that's, I think, where I need to do some further work.

Certainly others have talked about this for a long time. In the biotechnology industry, we worry a little bit because the rights are so splintered that its difficult to amass all the licensing required to produce

a product. And Professor Rebecca Eisenberg for a long time has argued that researchers who infringe a patent in the course of verifying the functionality of the patented invention should be exempt from infringement liability. And she also argues that a patentee should not be granted an injunction against a research use that leads to improvements or alternatives to the invention. And she goes through a number of economic reasons -- high transaction cost, difficulties of valuation, and some desire to maintain whatever market power you have -- that may prevent a license. And she also makes the point that sometimes a licensee -- a potential licensee can't pay the cost because they can't capture the diffuse social benefit of moving clients forward.

Generally, you know, we might have a use for a doctrine like fair use in any industry where some broad basic patent threatens follow-on research. And this is where I refer you to the work of Rob Merges and Dick Nelson, where they go through a number of different industries and they talk about how even a modest threat that an infringer will be excused from liability has a salutary effect on pioneer improver bargaining.

The point really is that there seem to be some recurring themes. You know, one could adopt piecemeal industry specific legislation, like a reverse engineering

exception for software, but there seems to be a common core of issues that tends to recur across industries. And sometimes they evidence motives that really don't have anything to do with advancing the patent system, like moving your power into another market, like not letting a researcher verify the functionality of your invention.

The question is whether there are enough contexts to really justify a fair use doctrine, or are these just some high profile cases and someone importing this new doctrine would just mess up the whole system without any corresponding benefit to justify its cost. And so there I think we need some empirical work on, for example, do patents really frustrate researchers and actually Scott Keith at Washington University in St. Louis is doing that work right now. And so that might be useful information to have.

I think we need some additional studies along the line of Merges and Nelson's which came out in 1990, and I think the work that Wes is doing is great and that will help us answer some of the questions here.

You know, I think that at the end of the day we might find that fair use judiciously applied can act as something of a safety valve against over-protection and plug the gaps of existing doctrine, which may actually

excuse too few infringements. And it would eliminate the need for some of the more amorphous patent doctrines, like the reverse doctrine of equivalence.

Finally, and I'm going to throw out another idea that also will be widely reviled, which is I think that if we had some way of excusing some literal infringement in patent law, like fair use, it would ease some tension between patent law and antitrust law, particularly with respect to the unilateral refusal to license a patent. You know, it's not -- I'm not sure that the Federal Circuit is necessarily right that a unilateral refusal to license a patent can never be an antitrust violation. You know, we know it can't be patent misuse but, you know, do patent misuse and antitrust have to be co-extensive.

And I guess the point here is this, if the invention -- if the patent is an essential facility, antitrust law, it seems to me, could impose a duty to license. And it's here, you know, I would part company with Ed, if I haven't already irretrievably done so, by saying that I think there is a difference between tangible and intangible property, in the sense that our intellectual property protection proceeds from a very clear constitutional ground, authority to promote the progress of science and the useful arts. And it seems to

me that there is actually sort of perversely more reason to require the license of a patent under something like an essential facilities theory, than to order access to other tangible property, because intellectual property isn't viewed with the public interest that tangible property is.

And so, I think that fair use, but permitting certain unlicensed uses, could help to head off that conflict and so there would be less need for antitrust law to intervene, and I think people worry when it does that it will sort of stomp on patent laws values.

So I guess I'll stop there. I'm sorry. I sort of messed up my timing and so I have to leave pretty much on time to catch my flight. But I guess I would just say that my point -- I have two points. One is that we have to think of this as a system that works together, not as mutually exclusive sets of doctrine.

And my second point is that within patent law, we might want to think about whether we have the doctrinal tools, sufficient to allow literal infringement that might actually be socially beneficial without undercutting the patentee's licensees. Fair use is just one potential approach. It may not be the one you'd like to adopt or the best one, but I think the point is to get people thinking about that idea and about how that might

help patent law fit with antitrust.

Thank you.

(Applause.)

(Time Noted: 1:21 p.m.)

MS. GREENE: The value of certainty to patent right is often viewed as a value in and of itself. What are the ramifications of the fair use doctrine, as you propose it, for certainty?

PROFESSOR O'ROURKE: I guess I would say two things. One is, yeah, fair use would certainly inject a level of uncertainty but like in copyright law, I think after you get through the first few cases, then it becomes relatively clear how it will be construed. It won't cause increased costs tremendously. And I think there will be benefit from the Federal Circuit because it would unify the doctrine and so I think actually it could become a reasonably clear doctrine.

On the other hand -- actually, there is this other work which is in the Michigan Law Review, an article by -- and Clepper and it is quite difficult to understand. But their basic point is that uncertainty can sometimes be a good thing, because -- let me see if I got it right -- because the last bit of monopoly pricing by a patentee gives a patentee not so much, but exacts very large social costs -- actually costs society quite a

bit. And so increasing uncertainty would not necessarily be a bad thing. They proposed to do it through a system of probablistic patents and that's where my understanding broke down.

But -- and so the idea was just that this uncertainty would constrain sort of the power of the patent, whatever amount of power that is, and also encourage licensing. And to go back to sort of the real question is -- you know, as Ed quite correctly points out -- most patents don't give you market power. And so the real question is whether sort of adding a new doctrine that would do this is worth it for the number of patents that it would affect.

MR. COHEN: One question which I think I'd like to take up with you, since this is very much a foundational data, is one concept that I think was lurking in what you were talking about, you talked a little bit about -- it was suggested the idea of the blocking patent doctrine. And maybe if you could just, you know, explain that briefly and then try to amplify a little bit as to why you felt that that fair use would help some industries move toward licensing solutions.

PROFESSOR O'ROURKE: Sure. The blocking patent doctrine is generally the idea that if I have a patented invention and someone invents an improvement to it, they

can get a patent on their improvement, but they can't practice my invention, nor can I practice their improvement. And so there is an incentive for the two of us to license because, as the original inventor, I can't use this hopefully better enhancing improvement, and if I'm the improver, I can't use the underlying invention. And so we both have a mutual interest in licensing.

Interestingly, it's not clear whether this doctrine actually results in a lot of licensing. Because it seems -- it apparently seems that there is a lot of valuation problems, that the original inventor tends to over-value its contribution, and the improver likewise, which actually can make bargaining somewhat difficult.

I'm not sure that I would say, sort of, you know, in every context that the patented improvement should necessarily have a sort of fair use right to the underlying patent. The threat of fair use might make it easier to overcome the bargaining impasse, whatever bargaining impasse you achieve or you're at. You know, I'm just kind of thinking out loud here.

It does seem to me that that would be a case. If one were to sort of look at it and, you know -- if one were to go through and see a case for fair use, it does strike me that that would be one in which you would want to have the improver pay the fee for use of the

underlying patent. You know, copyright has traditionally viewed fair use as basically a compulsory license with a royalty of zero. And there is no necessary reason why it has to be that way.

I mean, I think actually Judge Kozynski said, "You know what we should do? We should never grant an injunction. We should just always basically assess continuing royalties for infringement in the copyright context." And so one could do that in patents. I don't think you want to do it as a matter of course, but I think as early as in the '60s and even before the Scherers' work, they did conclude that compulsory licensing would, you know, sort at the margins, not have an adverse effect on innovation.

The question is whether you can reliably identify situations where that would be appropriate and, you know, uphold the defense of fair use, or whether the cost of errors offset the benefits that that would bring.

MR. COHEN: I would like to weave our prospect theory into the discussion. How would your theory deal with blocking as an issue? How would it deal with some of the concerns that have been raised about the fair use suggestions?

PROFESSOR KITCH: Well, I think this is a useful enterprise. I have long been troubled by the apparently

narrow scope of the experimental use exception in patent law. And it seems to me that the structure of the statute suggests that you at least ought to be able to fully investigate your competitor's patented technology, which requires that you engage in infringement of a patent and that clearly ought to be all right.

There is no reason why the infringement doctrines have to be as clear edged as they are and why you wouldn't invite the courts to consider more factors.

It does relate to a general problem, which goes far beyond antitrust and patent law, which is the nature of U. S. judicial procedures and the costs of litigating in the courts, which affects the costs of enforcing patents, the costs of defending patents, the costs of arguing invalidity to courts. I am of the view that our general procedures allow kind of far too much unfocused open discovery and various side paths into irrelevant issues and there isn't enough control.

If that's the procedure you're going to have, then getting -- adding this new whole range of subjects seems to be more costly, but I could imagine a procedural system where the -- probably a procedural system I would prefer myself.

I didn't understand the point about the essential facilities doctrine. I assume the essential

facilities doctrine applies to patents, as to any tangible property, and that they should be treated the same. Antitrust itself does have a problem exactly classifying what is an essential facility and it would have that problem in the case of patents. But I assume the doctrine is fully applicable, not because IP is different, but because IP is the same. So I don't understand why that illustration requires that we view IP differently.

But there is certainly no reason that the patent law has to have exactly the same form tomorrow that it has today. And questions about fine tuning the doctrine and so on seem to me should be welcomed by everyone, including patent lawyers, who, of course, want to make the system more socially useful.

MR. COHEN: I know Professor O'Rourke has to leave. Do you have any final --

PROFESSOR O'ROURKE: No. I was just going to say that what brought the essential facilities doctrine to mind I think was the Intergraph/Intel opinion of the Federal Circuit where, you know, they rejected just the essential facilities generally because they weren't in competition. Intergraph and Intel weren't in competition. I think that was the reason for it.

But there was this dicta I think where they said

that basically -- what I thought they said was that you couldn't require -- exercising your patent rights could not be an antitrust violation, and so that's where I picked it up from.

And what brought it to mind was with the whole software API thing, it just struck me a long time ago that one of the ways to treat those would have been under an essential facilities doctrine, because that's sort of what they are. They are the gateway to the second market. So that opens up a whole another set of problems because the Microsoft problems, to the extent you think it's a problem, wouldn't be solved, actually, by patent fair use. It would have to be solved more along an antitrust line because the system specifications for connectivity are so complicated, and there are so many of them. There are like 50,000 API calls in Windows. There is just no way that you could rely on anything other than Microsoft's help to clone a system or to --

MR. COHEN: Turning a little bit to the prospect theory, I know one -- one issue that you -- is that -- this sounds fine in theory, but there are a lot of practical impediments to somebody being able to develop prospects early on. There are difficulties in identifying the right -- the right firms to license to, and to turn development over to. There are a lot of

transaction costs. There may be differences in valuing the yet-to-be-developed subsequent innovations. And all of this can stand in the way of successful prospect development. Would you like to comment on that?

PROFESSOR KITCH: Yes, indeed. There are transaction costs and -- for instance, to give the example of blocking patents. Yes. Patent owners are not always going to be able to agree.

Licensing is a costly process. But the fact that there are some cases of failure doesn't tell you how well the whole process works over all and its approach, as compared to some other approach.

And my basic argument was that you're going to have a world of licensing with trade secrets and no patents, and you're going to have a world of licensing with trade secrets, patents and licensing and that's what you have to compare. You're not going to get rid of the ability of firms to appropriate the value of technology through keeping information internally. And it is and remains an important way in which firms exploit the value of their technology.

If you have a trade-secrets-only regime, it makes it, I argue, much more difficult to enter into these transactions with patents. I agree there are difficulties with patents, but the choices that are

actually on the table are to either have these institutions or not. I mean, you have to look at the other alternatives on the table.

I mean, if you're conceiving of some central management of allocation of technology rights by a centralized regulatory agency, you can put that proposal on the table and then we can discuss the ability of the centralized system to work.

Some type of very strong industry trade associations. I mean, where are we going -- where are we going to go?

Now I was interested in the results of -- comparing Japan and the United States, suggesting that there was a lot more communication between Japanese firms about their technologies than among firms in the United States. And one question that occurs to me is, to what extent is that a consequence of a much different attitude towards antitrust enforcement in the United States and Japan. We lawyers have worked very hard to educate all of our clients that basically don't talk to your competitors. It just leads to trouble. And it's the beginning of a price fixing suit, and so certainly the general counsel's office has tried to very much monitor and control the amount of communication going on between firms in the United States.

Well, I think one of the consequences of creating an environment of uneasy communication is on-the-ground executives get the message that -- just to avoid that trouble. Don't do it. And some -- it's actually social -- socially useful communication may be lost.

PROFESSOR O'ROURKE: May I just ask a question?

MR. COHEN: Go ahead.

PROFESSOR O'ROURKE: Thank you. My question was, does the prospect area work better for some industries than others? Because I'm thinking of the ones where there are -- cross-licensing arrangements are sort of standard in the industry. Because I know at IBM, and this may be -- it may not be, actually true. But the story always was that IBM was first to patent the risk technology. And they sat on it and they sat on it because they wanted to protect the high-end mainframes where they were making all their money. And apparently somebody forgot that they had these cross-licensing arrangements with the entire industry and so HP -- or I guess Sun came out with a risk machine before IBM.

So I guess my question would be, it seems like prospect works well where there is a lot of cross-licensing in the industry. But when there isn't, you sort of run the risk that the firm actually -- they can

block rivals and also they can -- they're inactive themselves on developing the technology.

PROFESSOR KITCH: Well I don't know what works, but it certainly -- you seem to be able to come up with pertinent on-the-ground examples of this process as being more central in some industries than others. But the legal system faces a very basic choice as to whether to try to create a framework which is not industry-specific and is not technology-specific, or whether you try to go through and create a kind of industry-by-industry, technology-by-technology set of rules.

And I would argue that one of the great successes of the patent system has been to choose generalized principles over context specific rules. And the great advantage of it is that, one, it reduces kind of industry specific lobbying, rent seeking, by trying to get -- I want better rules for pharmaceuticals because that's human health and that's important, than they get over there in electronics, because that's just tools, or -- I mean, it can go on endlessly.

And really more important is that the framework doesn't have to anticipate shifts in the technological opportunities, and changes in sort of the technological possibilities in the future. So the outsider who shows up with an idea contrary to conventional wisdom and

understanding can get a hearing in the patent system based on the general principles, without having to fit into sort of -- sort of industry-specific tailored rules.

So, although I think for purposes of economic understanding, it's probably -- it's quite useful to sort of get down at the industry level and try to understand the range of variations, I think it would be a major shift in historic practice to try and start taking it at the -- at the structure level, an industry-by-industry approach and it has a lot of obvious negative problems as you go down the road.

Now we see a little of it. There is that exception for surgical/medical techniques that has gotten into the patent statute. And the drug industry has gotten these special extension procedures for their patent terms. And it could be the way the patent system would go in the next 100 years. I tend to think that that's not a road to go down.

PROFESSOR COHEN: Regarding just a couple of small points. One, we actually have data on, if you will, the informal communication across firms in Japan and the U.S. They're not that different, in fact, notwithstanding a stronger emphasis on antitrust for the U.S. In fact, Eric Von Hipple, some years ago, carefully documented how much informal know-how trading goes on

under the radar of top management, and attorneys, and so on, and -- quite consistent with his earlier findings.

Number two, I want to -- on that broader point, economists have long been concerned with the expected -- the anti-market power due to -- hence, not just the fact of a reward for invention. In fact, you cite Levin. Well distinguish -- and the survey distinguished between the need for a measurement that reflects on past effectiveness and experience, and you have to do that. You need something that happened as the subject of measurement, versus the more theoretical conception and, indeed Levit, and I, and folks well before that are in print talking about the importance of patents as conferring "X" anti-market power that is before the fact of innovation, and as an inducement to the future innovation. That's absolutely essential to the way economists have thought about it. And like you, I think that's very important and that's where really patents have their force.

MR. COHEN: Okay. We've run a little bit over. I'd like to get just one more question out. It takes us all the way back to our very first slide. We've been talking a little bit about the overlap between a first generation and a second generation of innovation. The first slide, I think, suggested something that there

could be some overlaps in innovation between industries. I think Jim talked a little bit about the -- the flow of social benefits from one industry to another. And I wondered if that leads you to make any comments about the way we've dealt with some antitrust principles at times, when we've tended to look at both harms and benefits only within a single market.

MR. LANGENFELD: Yes. I have strong views about this and I had strong views back when I was at the FTC. I can't say the FTC always agreed with me, but I always was willing to share those --

I think one example to keep this focused, the FTC has expressed interest in taking consents in certain drug cases recently, between agreements, for example, on where one firm has the intellectual property right and there is a disagreement. Commissioner Leary and I were on a panel awhile ago where we had some discussions about this.

I think one thing that's a problem with antitrust that handicaps -- that creates a real problem here in the area where intellectual property patents are an issue, if you think about it in terms of an agreement between a generic and a branded firm, making agreement to perhaps keep the branded firm off a branded firm's product, the generic firm's products off the market for a

period of time -- litigation be resolved. And obviously there has been a lot of -- a lot of investigation of that still at the FTC.

If you take a very narrow view about what the dynamics of competition are, you might just look at that single product and do a completely short-run -- a short-run analysis. The longer -- the longer damage to competition, and I think that Ed and I would actually probably agree with this -- on this point, is that -- is that you're reducing the incentive of firms to come up with new innovations that are patented, particularly in the drug industry.

And if you're thinking in terms of what is the tradeoff, what are the efficiencies from trying to negotiate these type of -- these type or any type of agreement where there is a patent litigation pending, you really have to think in terms of going beyond that one product, whatever that -- whatever that market definition is, because the benefits of that type of negotiation, whether it's a license or whether it goes to the type of deals that the FTC is investigating, the real benefits to society is from the longer run competition, coming out with the next new product.

If it turns out that there are restrictions that are placed on firms either cross-licensing or doing any

other type of agreement while there is a patent dispute going on, without taking into account the long-run benefits that settling that might mean for the next generation of products that are coming out, that may not even -- it may not even be with the relevant market, I think you're taking way too narrow -- way too narrow a view.

And so that's another way in which I believe very firmly that -- that looking at some of the typical antitrust analyses, dealing with tangible property, with tangible businesses, really to the extent that makes sense and it may or may not make sense, but to the extent that makes sense in the -- in the tangible markets, it really doesn't make any sense to have a narrow focus or an efficiency defense limited to the specific set of antitrust -- to a specific antitrust market. You're just always going to get more.

MR. COHEN: Okay. I'd like to thank our panelists. They did just an outstanding job. You've laid some important foundations, I think, in this session and many of the topics which have come up are going to be topics which will be explored in greater depth as we go forward with the hearings. But I think we've made, you know, an excellent start this morning.

Thank you.

(Applause.)

(Time Noted: 12:45 p.m.)

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A F T E R N O O N  S E S S I O N

(2:02 p.m.)

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MS. DESANTI: I think we saw this morning that that's a pretty tough goal to meet and it's really hard for people to resist getting into the nitty-gritty of these difficult and fascinating issues and making it all too abstract. I think you'll see some of that same phenomenon this afternoon when we're asking about the relationship between competition and innovation.

Early work in this area asked some fundamental questions about whether innovation is more likely in the presence of monopoly or competition. However, as our speakers are going to quickly make apparent, the issues are much more complex than that simple question suggests and they are prepared to educate us about some of the complexities at hand.

We're going to have basically two groupings this afternoon. We'll begin with presentations and a discussion panel that focuses on the relationship between competition and innovation, but that also brings in how intellectual property, patents in particular, can affect competitive dynamics and, thereby, innovative competition.

We'll have a short break after that. Then we

will broaden the discussion with presentations on the role of networks and network competition, and the particular issues for innovation and intellectual property that may arise in a network setting, including the particular issues that patents may pose. And we have different perspectives represented, so we can expect a lively discussion there.

I'm going to warn you ahead of time that despite the note that this panel is supposed to end at 4:30, I have some sense that it may go over some. So feel free, if your schedule requires you to leave earlier -- and I know Janusz Ordover is going to have to leave us early. But don't be surprised if it goes somewhat longer.

We're going to begin with a presentation by Phil Nelson. He is a principal at Economists Inc. He, too, has been a public servant, as some of our panelists this morning. He was Assistant Director for Competition Analysis here at the FTC. Now in the private sector, he examines, among other things, the competitiveness of the conduct of intellectual property holders.

Phil.

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MR. NELSON: Well I was asked to get the ball rolling by doing sort of a quick overview of the economics literature that relates to market structure and innovation. And a good starting place is to talk a little bit about Joseph Schumpeter. Talking about these relationships without, at least, mentioning him a little bit is -- he says in his book, actually in a different context, it would be a little bit like talking about Hamlet without mentioning the Danish Prince.

And so to come -- to give you a little sort of graphical view of some of Schumpeter's ideas, I concocted a simple numerical example of a market which has sales of about $1 million and hypothesized that there is a five percent static loss, so that you can see the red line or pinkish line at $50,000. The monopolist takes over. There's a static loss of $50,000 a year.

But because the monopolist might be more dynamically efficient, passing on cost savings at the tune of one percent a year, but that compounds because it is really a growth rate, so the first year the monopoly contributes $10,000 in savings, because one percent of $1 million is $10,000. And then if he continues to shed costs at one percent a year, I take one percent of $990,000 the next year and so on. You then get a -- the line that is the yellow line.

And then if you adjust for the static loss, you get sort of the greenish line that is below the yellow line. And parallel, and you can see it about the 2004, on an annual basis, the dynamic growth has gotten such that you're better off with a monopolist in that year, but on a cumulative basis, you get the sort of curved line that crosses at about 2000 -- 2009.

And so it shows that, you know, a one percent dynamic cost saving could, you know, catch up with an -- then from 2009 on, be a substantially preferable world than one that is competitive and doesn't have that dynamic growth or cost saving aspect.

And that is, to some extent, the heart of what some people call the Schumpeterian Hypothesis, that you're better off in a world of creative destruction, where you have dynamic large firms. And he went through various arguments to explain why large firms might, in fact, be better platforms for innovation and dynamic change.

But that's not the only relationship. We're going to talk about that in a second. Other relationships I'm going to talk about is obviously innovation itself is going to feedback and affect market structure. And then near the end I will talk about a -- what I sometimes call the Yale literature and I coded

this blue to continue the Yale discussion from the morning session, since I was a student of Nelson Winter and Rick Levin.

But to talk about there might be underlying characteristics in market, like innovative opportunities and the appropriability of innovations that might simultaneously affect concentration and that characteristic of the market, as well as shaping how much innovation you observe. And that is where we are going to progress.

But I thought at the start we would talk a little bit about the Schumpeterian Hypothesis and the support for it. I have two slides on the theory and these are basically pulled out of various literature. You'll see a lot of it going, you know, back in F. M. Scherer and Ross' revision of the original Scherer textbook. But some of those points are there, but they are scattered throughout the literature. And they point out that there is some, at least, theoretical reasons for believing that large firms might be better platforms for innovative activity.

First, the larger scale firm will benefit more, so there is more -- you know, if you're going to spend some money in R&D, if you're going to get more gains, the thought was the large firms, since they have a larger

output and if you, for example, have a -- the R&D is going to lower your production costs by some fixed percentage, you're going to capture more total gains and thus it might be worth more to you to undertake the R&D.

Richard Nelson and also Arrow, actually, in '62 talked about the second one, which is, if you have a diversified business that might be in multiple markets, since research and development is somewhat random, you may have a better chance of gaining from your research and development effort if you have this diversified portfolio of business activities, which larger firms are more likely to have.

Third, large firms might be able to support a bigger portfolio of research and development efforts, meaning that they may take two or three tacks at solving a given problem and because they have the funding and the wherewithal to do that, their research effort might be less risky and they might have a bigger payoff as a result.

Another -- another thought that has been out there is large firms have scale advantages in the R&D process. For certain types of research and development efforts at least, you would like to have a big, you know, research lab, and that's a fixed cost and a large firm may be in a better position to -- to fund and support

that type of fixed cost.

Larger -- another point is that larger firms may be in a better position to finance large-scale R&D efforts. That was actually in Schumpeter's original book, but it has triggered a stream of research that tries to really profitability to research and development efforts and look at lag structures and you see some -- some support for that, with small lag structures, but other people have come up with contrary results.

Then you also have the fact that -- you know, you come up with the innovation, but you've got to get it to market to get some money. And so there was some people that were suggesting large firms were better positioned to do research and development because when they came up with something, they were better -- in a better position to market it. And so there -- there is a thought like that.

And one of the connections that some of these later panels may be talking about are network effects and first-mover advantages, and we'll talk about that. But if you can market your innovation quickly, take advantage of the first-mover effect, and then get yourself to be the accepted network, you may be in a better position and if large firms could do that, they might have an incentive -- stronger incentive to innovate.

But the -- in addition to these sort of theoretical points and many of them are contested and people will say, their markets work. You can license your technology to others. But to the extent there are market imperfections, some of these theories, you know, are based on, I guess, an implicit assumption of market imperfections.

But there is also theoretical research that goes contrary to the Schumpeterian Hypothesis and I think you're going to hear some people talking a little bit about that. But early theoretical models by Arrow and then later ones that use Corno or Bertran, more formal game theories show that, at least in some market environments, a competitive firm, an entrant is more likely to have an incentive to innovate than a monopolist.

So the theoretical work that you've got is cutting both ways, even before you get to sort of more behavioral economic theories, which the last bullet on this page is trying to capture, which is the notion that large firms may be more bureaucratic and it may be harder for them to manage an innovative research lab. Or, alternatively, there is literature that's out there that suggest monopoly power makes monopolists lazy and they may take some of their monopoly rents through not being

as aggressive competitors. But even before you get to that, you have somewhat more formal models.

And so what does the empirical data say, given that you have these cross currents in the theoretical literature. There were some early studies that were looking at measures like concentration in Herfindahl industries, for firm concentration ratios, and research and development often proxied by things like R&D to sales ratios, inputs into the R&D process. Other ones started to try to use sort of -- some sort of measure of patents, or some sort of measure of output of the R&D process. But, you know, measuring those things, some of them looked at the size of the firm, as opposed to concentration.

And if you look at the literature reviews that are out there and, again, the Scherer textbook, while it is dated, has a fair amount of this early literature in it, you see that there is -- they were finding that higher concentrated markets tended to have more research and development to sales or some measure of innovative activity. But there are contrary studies even to that. And then it was a little bit less consistent with respect to firm size, but again some people found that relationship and other people didn't.

Now Scherer sort of started to argue that there

might be a non-linear relationship, that a little bit of concentration would lead to more research and development, or more innovative activity, but at some point the monopoly power element would take over, and then you'd start to see a decline in innovative efforts. So he had sort of a curved upside down "U" as sort of what he was expecting. And there is, again, some empirical literature supporting that perspective which, again, would be contrary to at least the simplistic version of Schumpeter, although Schumpeter was in quotes earlier and is even here in quotes, because he means different things to different people and you've sort of got to control for that.

But these early studies did not have particularly great data sets. They didn't use particularly sophisticated modeling. And there are many ways that a modern economitrician might go after them. And so -- so I'm not sure that one wants to take many of them to the bank.

And interesting enough, there were a series of case studies. One of the most famous sort of sets is by Jewks, Sawyers and Stillerman. That's an older one, but they -- they were looking at sort of specific innovations and they were observing that large numbers of significant innovations came from small firms, which would be, again,

contrary to Schumpeter.

One thing I thought would be helpful is to go to some of the data out there to see where -- you know, where the funding is coming from for R&D, and the previous edition of the economic report of the President -- a new one should be out momentarily -- but had this chart that I borrowed from it. It's based on NSF data. But you can see that the largest firms in the blue do do a fair chunk of it, but -- this is in terms of employees. But you can see, and this is the point the economic report was trying to use with this chart, is you can see the smaller guys, and especially the ones in the green, are growing within -- in this period.

Now one of the things that others may want to talk about is whether this is an anomaly of the last several years, where you -- you had particular types of, you know, dot-coms and other small companies that were really starting up, and whether this was, you know, just a peculiarity of this five-year period, or whether it is longer term. But in any case you can see, at least during some periods of time, the small guys were growing and doing more of the research and development.

But the other sort of line of empirical work that we're going to come to and talk about a little bit later that uses more of modern data sets, and you see the

name Levin there, and he -- Levin offers us some of this data that Yale got, and then they also used a lot of business data and marry the two together. They start to try to build simultaneous equation models, do sophisticated modern econometrics. And they start to come up with a notion that is the prelude to where we are actually going to end up that, well, Schumpeter had many insights, but you've really got to think about this as a complicated set of simultaneous equations and think about whether there are -- are root structural characteristics of markets, like the technical opportunities and appropriability conditions that are driving simultaneously the evolution of the market towards a given -- let's say Herfindahl level of concentration, and then also driving the market's innovative activity, and then there can be interactions between those. And they do a yeoman's effort to try to estimate it, although they, I'm sure, would recognize, as everybody else, that while they have better data than their predecessors, the data still leaves something to be desired.

So the -- but, nonetheless, Symeonidis, who in '96 did a sort of literature review, came to the conclusion that recent empirical work is moving you in this direction. But what I'm telling you is at least it's not sort of a slam-dunk conclusion in terms of, you

know, the -- that the results are absolutely definitive.

Now turning quickly to innovation can effect market structure, I mean, this is what you've been hearing about. You've got the patent protection and trade secrets. You know, innovators can be insulated. That will obviously affect concentration.

What a lot of the other people are going to be talking about is -- and you heard a little bit from Wes Cohen and the others this morning, about other aspects of industries insulating people with intellectual property rights. And so people like Rick Levin were saying -- have done studies that show that even if it's an unpatented item, there are going to be some substantial costs for people coming in and replicating it. And so even without a patent system, there could be some protection there that would give a first-mover an advantage.

Now innovation may also reduce concentration. That is probably self-explanatory, particularly to the antitrusters in the group. Because, you know, when you -- innovation can help support entry and there have been economic studies that have shown how when there are new products that are being introduced in particular, you get more entry than you get exit, and it has a deconcentrating effect. Nothing that's too surprising.

And so you -- and you have studies that sort of follow up on that.

But the -- I talked about this a second ago. You've got this market concentration and innovation may be simultaneously shaped by fundamental market characteristics. And it was even creeping into the literature, you know, five - ten years ago, but it's -- it's out there and you can see major inter-industry differences, as we were hearing this morning, between, you know, the characteristics of the industry. So finding one very simple Schumpeterian relationship or something like that would be quite surprising.

And so one of the things I thought I would spend a little time is just giving you a little flavor of this variation. Historically, a lot of the R&D expenditures have been in the manufacturing sector, but I think that it may have shifted downward, looking at some of the time series -- but it's still substantial. Within the manufacturing sector, it breaks out.

Now one thing that you'll see is pharmaceuticals -- everybody thinks of them as being a lot of research and development and they are non-trivial, but there is a lot over in the computers, which are -- that sector is going to include all sorts of, you know, chips and things like that. You get a more -- and this is just a

percentage of all R&D dollars that are in these different sectors.

If you divide things by their sales, you get more what you expect. You can see pharmaceuticals, as was sort of alluded to this morning as very different, a lot more, you know, of your relationship to your sales level, a lot more R&D dollars are going into pharmaceuticals, but again you can see quite a bit of variation.

The economic literature that's sort of been built up has come to sort of some ideas of what -- what these variations are, and what variations might be significant. And very quickly, you know, R&D is not a homogeneous good. There are different types. People talk about product innovation versus process innovation. Process is lowering the cost of production, something of that type of change. Product is coming up with a new product.

But you also have basic innovation versus applied, you know, R&D expenditures. I mean, that's another big difference. And you see funding differences and sources of where these things are coming through that vary quite a bit across the type of R&D and they are going to vary across industry, too.

The cost of R&D is going to vary. In some

industries you need that big lab; other industries, you don't. I mean, so that the -- the structure of the cost and how much it costs to do it is going to vary.

Funding sources vary. In some sectors, the government is important, not just as far as, say, like in military R&D they're bigger. In other sectors and in most sectors, though, it's private funding.

The risk is going to vary from sector to sector, but it's also going to vary over the innovation cycle. As you get further along, things become clearer, perhaps, and so different types of firms are going to be better positioned to handle the innovative activity at different stages of the innovation process.

You've got technical opportunity varies. What's gone before, what's passed is prologue in the world of innovation. So that you can have the ability to make a breakthrough, depending on what point in time you're talking, but that's also going to vary across industries just because of the nature of the technologies and what people have been doing in the different industries.

Complementary technologies vary. We were hearing a little bit of this this morning about needing a whole set of maybe thousands of patents to really get to market. So in some markets, that's going to be important. In other markets, you're going to have the

ability to go forward maybe with your one innovation.

Industry interfaces are going to vary. In a lot of industries, the innovation is done by some vertically removed level, an input supplier, who then is supplying to somebody that supplies the consumer product or is downstream, and you need to have coordination with that downstream supplier to get your innovation to market, and that's going to vary from industry to industry.

The technical challenges are going to differ. And they are, again, going to vary over the life of the innovation.

And then appropriability conditions are going to vary because of the first-mover advantages or other things that are characterizing the industry.

And so, given all these, you know, work that's been done, you know, it's clear that it's a really complicated problem because there are all sorts of endogenous variables that are related. You're going to need to control for exogenous changes in demand over time if you're doing time series data. So you have one set of problems if you're trying to go cross-sectionally, across industries. You have a whole set of different challenges if you're going across time, which makes it very hard to do. And while it is easy to criticize what's gone before, you know, there has been much to learn -- that

has been learned as sort of those -- and ideas of what's important.

And so, you know, the conclusion of where we are today I would say is that there is no simple relationship, despite those early efforts to track down the Schumpeterian Hypothesis. But, nonetheless, you know, we know a fair amount about the fundamental economic relationships that underlie innovation.

So I'll turn it over to the next speaker.

MS. DESANTI: Thank you, very much, Phil. That was a sufficiently daunting introduction to this.

(Time Noted: 2:27 p.m.)

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MS. DESANTI: Our next speaker is Shane Greenstein. He's a professor at the Kellogg School of Management in Northwestern University. His research focuses on the economics of high technology, and this year he co-edited a book entitled Communications Policy in Transition: The Internet and Beyond.

Shane.

PROFESSOR GREENSTEIN: First of all, I want to thank the FTC for giving me the opportunity to speak. And before we start, I need to say I don't have any financial interest in any present or pending antitrust case, nor any recent ones, either.

I have written remarks, if somebody would like a copy with the footnotes and so on.

So a central question motivates the literature I'll discuss now. Do large firms with market power deserve special scrutiny in markets characterized by robust innovative activity?

This question motivates a lot of recent thinking, as well as very -- very old thinking about the relationship between market structure and innovative activity. And I was asked to provide a brief synopsis of the recent literature in particular and how it relates to the traditional literature, and so that's what I'm going to do.

Let me foreshadow my main message. Public policy should distinguish between environments where an intellectual property is effective and where it is not. And particularly where it is not, competition policy has to be concerned when a dominant firm uses non-innovative tactics to move the locus of competitive behavior away from innovative activity.

Okay. So what's the setting? Well, first of all, the economic benefits from commercializing technology are essential for modern economic growth. And successful commercial innovation enhances welfare, especially when it leads to lower prices and new services, even when both threaten the established order of business.

In these kinds of markets, they are characterized by a great deal of uncertainty, both in the business environment and in the technical environment. And as a consequence, most experts will have differing market forecasts and views about the best commercial options. Hence, it's difficult to evaluate competitive behavior and especially in a market structure that's potentially ephemeral.

Altogether, it's a pretty cautious setting for competition policy. The topic is important to be sure, but you have to begin from a relatively humble position.

And to be sure it's not the same as forbearance, but that's -- when you start from that position, at the end of the day there is one minimal principle that arises, and that is competition policy can seek robust commercial experimentation and encourage multiple commercial visions, even for innovations with modest probabilities of succeeding.

That conclusion arises because in these sorts of markets even failures are useful. One innovation might fail, but in failing they teach others who are working on their own innovations. If eventually the original failure leads to commercial success, then the benefits from an informative failure can easily exceed the foregone spent resources and often by orders of magnitude.

Hence, commercial failures should not be thought of as an obvious waste of resources, the recent experience with dot-bombs notwithstanding. Still that doesn't get us very far, I'm told. There have been a lot of studies of the key question.

There is a traditional approach to the central question and it concludes that monopolies deserve special scrutiny. There is a lot of literature here. Let me just be very brief.

The concern arises because monopolies may have

low incentives to innovate, and the intuition behind this concern arises if you compare an inventor selling an invention to a monopolist and you compare that with an inventor selling into an industry with competitive supply, where otherwise things are equal.

The monopolist will be concerned about the cannibalization of monopoly rents he enjoys today, whereas the competitive firms will not be. And according to this argument, firms with market power do not spend as much on innovative activity. And in line with extension, some arguments in the same spirit, you can also show monopolists do not commercialize innovations as quickly.

A contrasting and I would call a traditional approach focuses on monopolists' use of innovative activity to preserve their present position. In this view, a forward-looking monopolist, identifying a threat from an entrant, who can credibly buy the invention, will, in fact, innovate robustly, or theoretically.

In general, an incumbent monopolist has more to lose from falling from a position of monopoly than any new entrant will have to gain from entering, and so monopolist incentives are actually higher in that vision.

Many researchers have held up these two views as directly contradictory. And I think -- first of all, let me venture an opinion. I think, actually, it's more

insightful to characterize a lot of these differences as different hypothetical scenarios. To see this, consider melding together the two contrasting views, in something of a semantic shift. So consider a vertically differentiated product market and let an inventor sell a qualitatively better product into one of three market structures -- one where you have a protected monopolist, who has sole control over the output market, another where you have a threatened monopolist who anticipates entry, and another where you have competitive industry.

In that setting, the protected monopolist obviously has lower incentives to innovate due to cannibalization concerns by the traditional argument. Then the interesting question is, what about the incentives for the threatened monopolist and the inventor in the competitive market. Well, it's a long argument so I'm not going to do it here, but I can give you citations if you'd like.

The general answer is it turns out the incentives don't differ much between the two -- the threatened monopolist and the competitive market.

Now that gets you somewhere, but overall I don't think these insights lead to very satisfactory guidance for competition policy. On the one hand, they suggest that competition policy should prevent firms from -- with

market power from protecting themselves from threats. While this insight is in line with some of the spirit of antitrust law, it's also impractical in practice. Policy makers are required by this sort of line of thinking to find information about, (a) the presence of monopoly, (b) the potential for another entrant, (c) the incumbent's calculations about the threat from an innovative entrant. And these are just -- you know, when you put them into practice, they are just awkward and it's actually quite difficult to do.

Okay. Now recent thinking in this line has begun to reframe the central question, particularly as it applies to large firms and that's where I'm going to spend most of my time now.

But the foundations for the recent thinking presumes we live in a world of widely-distributed technical knowledge, where many small firms have access to some, if not all, of the technical assets necessary for inventive activities.

In addition, commercializing those inventions involves use of real assets from both disinterested parties, such as venture capitalists, and deeply interested parties, such as incumbent firms. Entrants must incur entry costs to compete with entrants or, alternatively, make deals with them.

The crucial point in the new thinking is that each of these choices requires distinctly different investments. And actually, in practice, most small firms, if you talk to them, will tell you that they will treat these as mutually exclusive decisions.

This approach to thinking about innovation leads you to two questions right away. First, if the two parties cooperate, do the incumbents have assets that significantly raise the value of the invention in its commercial form?

Second -- oh, sorry. And as it turns out, I should say, policy arises in markets where incumbents' assets are typically valuable, which is to say, most innovative markets.

Second, and then the especially crucial, if two parties compete, can entrants effectively exclude the incumbent from imitating their invention? Most markets lie between two extreme situations, those where entrants can exclude imitation by an incumbent or somebody else, and those where they can't. Now, to be sure, the effectiveness of intellectual property in a particular patent law plays a key role in which situation arises, and so that's going to be an important insight we'll come back to.

When an inventor can exclude imitation, then

markets for tradeable technologies arise. And this is one of the biggest developments in this literature in the last ten years. The plain fact is, there is an actually rather enormous market for licensing joint ventures and inventors tend to cooperate with incumbents holding valuable assets. Sometimes these deals raise value for everyone and sometimes these deals are exclusive. You know, in general, it's just hard to say.

The large point in the investigation so far is to recognize that inventors tend to act as a source of ideas, but they don't tend to overturn market leadership. So, for example, if you look at the biotechnology pharmaceutical industry today, this is what tends to happen, and also, as a matter of fact, in many chemical markets.

Now, in contrast, consider a situation where entrants cannot exclude imitation, particularly by incumbents. In those environments, incumbent strategies towards bartering with inventors for deals for technology turn out to strongly shape the incentives to innovate in the first place, by both the incumbent and the entrant.

Now, knowing this, what happens is large incumbent firms can and do use their bargaining process to change the incentives of the small. Incumbents can and do take actions designed to increase or diminish an

entrant's incentive to compete, build their own business, or choose among those options.

Now it's important to understand that the literature has pointed out there is a wide range of economic behavior that arises during bargaining and so I'm not going to pick on anyone in particular in this case. I just want to give you illustrative examples.

So, on the one hand, some large firms have developed a reputation for not walking away from potential deals with proprietary information. So for some years now, Cisco maintains strict policies. So, for example, Cisco has maintained strict policies about when it would buy a firm and for how much. Such predictability had a large influence on venture capitalists and small inventive firms that viewed Cisco as a potential partner. And Cisco's policies certainly altered inventor entrant incentives to develop products, even when Cisco was the target buyer.

Now, to be sure, the late '90s would have witnessed much innovation in communication equipment markets under any scenario. But I don't think anyone doubts that Cisco's actions induced a lot of small firm entry on the margin, much of it favorable to Cisco, I might add.

Now on the other hand, negotiations can also be

confrontational and certainly that matters also. So, as an example, it is well known that in the Spring of 1995 Microsoft threatened to withdraw API support from Netscape, if Netscape refused their cooperative deal. Now even though API information was readily given to others, it was well understood by all parties that this was one of several carrots and sticks for eliciting cooperation. And Microsoft typically offered such carrots and sticks to small firms.

It was also understood by everyone that withdrawing API support would slow down the pace of innovative activity in Netscape temporarily and delay the introduction of new features to Netscape's products.

Now notice what the recent thinking is doing. It's widening the scope of the analysis. At the same time, it's providing a lot more nuance about innovative behavior.

Okay. Well let me cut to the chase. There is a lot of literature here that I'm summarizing quickly and I can give you references if you like. But, you know, what are the implications that are coming out of the recent thinking?

First of all, recent thinking is focusing competition policy questions in a particular direction. For policy purposes, this view requires information about

both structure and conduct. It first asks whether conditions exist so that a smoothly-operating market for technology can arise easily.

If not, it then asks whether incumbents have access to a wide arsenal of strategic tactics during bargaining and whether these tactics have consequences for innovation. This view suggests that policy should encourage the use of intellectual property in the service of making technology markets work smoothly, particularly when incumbent assets are valuable. That raises welfare for all parties involved.

At the same time, it also raises questions about the competitive tactics of powerful firms in particular environments where intellectual property is weak. And, finally -- and notice it suggests that the two situations are closely linked.

Okay. So now back to the main question. Does this recent thinking suggest that incumbent firms deserve special scrutiny? And the answer, I think so far, is yes. But to be fair, the thinking is not fully worked out.

So let me illustrate with a modest proposal motivated by recent thinking and then we'll take it from there. Recent thinking would suggest a three-part test for one kind of action.

First, does the incumbent firm possess market power and use it when bargaining with entrants?

Second, are the scrutinized tactics closely affiliated with non-innovative behavior?

And, third, is there a rational -- a rationale, excuse me -- under which this action is in users' interests?

So let me illustrate the test with an example and this time I really am going to pick on Microsoft, just to get the point across. The point, however, is broader than this particular example and you should take it as a broad point, not a specific one.

So in the PC industry in 1995, the OEM -- the original equipment manufacturers -- in this case, Dell, Compaq, Gateway, and so on -- they served as both the assembler and distributor for many users. The dominant upstream supplier of operating systems insisted on restrictions in its contracts with the OEMs that, in effect, foreclosed placing logos on the desktop from other applications which were visible when users opened the box.

These so-called first screen restrictions on the out-of-the-box experience were in Microsoft's interest, to be sure. However, by the three-part test, they look like anti-competitive actions. The market power test was

satisfied. If there had been effective competitive alternatives for PC operating systems, then exclusivity like this would not have been at all worrisome. The end users, hypothetically, alter their purchasing decisions regarding OEMs, if they cared to. However, in this case there was no serious alternative competitive choice to mitigate the -- and Apple's recent comeback notwithstanding.

The test about non-innovative tactics was also satisfied. The contract clause had little consequence for innovation at Microsoft. Notice that if it had, then one might be concerned about trading off different innovation incentives and I'll get to that point more deeply in a moment.

That said, this clause certainly did have consequence for other firms' innovative behavior by raising distribution costs to application firms. It also became the source of considerable ire at OEMs because it prevented them from developing OEM-specific help screens and tools for reducing after-sale service expenses.

Finally, the user's interest -- user interest test was satisfied because the contracting costs encumbered user choice without any large gain. Indeed, I'd go even further and say it violated that minimum principle of fostering robust commercial experimentation.

Okay. So according to this test then, these contract restrictions were anti-competitive in the sense that non-innovative tactics diminished innovative behavior. And more to the point, it suggested that only minimal contracting restrictions were appropriate in the setting, the idea being that once the product leaves Redmond, it's actually in society's interest to make sure that Redmond cannot protect itself from the harsh reality of user choice. That's what gives them the incentives to innovate in the first place.

I might add as an aside these restrictions also include some negotiations with Microsoft by making competing firms -- or firms who -- application firms who were thinking of competing with them, think twice about doing so.

Now this is an illustration of a broader principle. Competition policy can encourage dominant firms to compete by innovating. It can do this by discouraging powerful incumbents from using non-innovative tactics, discourage innovation of other firms.

The open question then is how far does this principle extend. For example, should public policy -- antitrust policy selectively intervene to discourage powerful incumbents from using innovative tactics, such as patent suits and patent blocking, to discourage

innovation at other firms. And I think the honest answer is the recent literature has not wrestled enough with this question to give a general answer, nor to provide a complete dichotomy of the tradeoffs.

So what was the main message here? The main message: These issues that I'm describing here arise and I believe will continue to arise. Information technology markets, in which I do most of my work, endemically produce firms with bottom line positions over key assets, not just the one I was talking about today. It's more general than that. And these are worlds with widely-distributed technical capabilities. Hence, it is inevitable that new inventors compete and cooperate with incumbent firms who control existing assets. It just happens all the time.

Traditional analysis has tended to narrowly frame the policy issues for the setting and it's -- I believe it is more fruitful to think about how competition policy works through two mechanisms -- by altering entry conditions and by altering the terms of bargaining between powerful incumbents and innovative entrants.

In addition, I think policy can discourage dominant firms from using non-innovative tactics that hurt both downstream users and innovative competitors.

And the closer that this gets society to innovative competition, the better.

MS. DESANTI: Thank you, very much, Shane. And I think we'll stipulate that Shane not only has no financial interests in any pending or recent cases, but that Shane speaks only for himself --

PROFESSOR GREENSTEIN: Absolutely.

MS. DESANTI: -- and none of his views should be imputed to anyone else sitting around the table today, especially since we have no respondents from Microsoft or Cisco and the Department of Justice, which is here, already has some issues that are in -- still in litigation. So we'll stipulate that for the record.

(Time Noted: 2:46 p.m.)

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MS. DESANTI: I think we are going to have to move at a faster pace and I'm really sorry to say that. But I would like to introduce our next speaker, Josh Lerner. He is a professor at Harvard Business School. He brings a scientific background to the table. He graduated from Yale with a major in physics and history of technology. His research examines how intellectual property protection, especially patents, affect high technology industries.

PROFESSOR LERNER: Okay. Let me just find the -- so I was asked to basically try to essentially bring -- go from the focus of the first two talks, which is really on competition issues and innovation more generally and sort of really relate it to some of the issues that we were talking about in the morning session, namely about intellectual property issues, and particularly sort of touch on some of the issues related to the inter-relationship between patent policy on the one hand and competition and innovation on the other.

And essentially what I'll just highlight is some of the -- some of the consequences, in terms of some of the changes that have taken place in the intellectual property system, particularly the patent system in the United States. In particular, I'll just sort of highlight that it seems that the policy shifts that have

taken place appear to have yet a pretty significant effect in terms of the nature of competition in various innovative markets. And I'll try to highlight some of those -- some of those implications here.

Clearly we don't have a lot of time to do it. These are complicated and interesting issues. But hopefully this will at least be suggestive of some of the issues that we explore -- explore later on.

First of all, just to emphasize the backdrop, though this has been highlighted in the talks -- talks before, and particularly the economists have done this whole body of work on what might be called technology races or patent races, where we see competition between firms in high-technology industries, and highlighted how intensely this competition can translate into even small advantages leading to firms emerging with very dominant -- very dominant positions.

And, clearly, this is saying that it's not only true in theory, but also very much in practice. And one can sort of point to many situations where venture capitalists have been floated perhaps a dozen business plans, all working within closely-related areas, and where it's clear that only one or two of those are really going to emerge as dominant -- as dominant firms.

I mean -- sort of thinks, whether one thinks

about corporations or venture capitalists, trying to choose through these -- these competing proposals, what one often sees is that really, ultimately is very critical in the decision making process is the intellectual property holdings -- the intellectual property holdings is absolutely -- is absolutely critical.

Now the -- having established this sort of backdrop of very intense competition in numerous high-tech industries, I'm going to turn and sort of talk about some of the changes in patent policy, including -- this is issues which are very familiar to many of you -- many of you here.

Clearly and, you know, the sort of real sea change that took place in American patent policy was less a sort of outright legislative change of policies, but rather something that was presented at its time as being, you know, merely a procedural -- procedural shift. And in particular, as many of you know, prior to 1982, we had a situation where the patent cases were held -- treated like any other and essentially what -- because of the Supreme Court, which is very unwilling to handle patent cases, you ended up with a situation where there was a great deal of disparity between the treatment of the case -- of patent cases in various districts.

For instance, when you look at the win rate of patentees, it was -- it differed by a factor of two across various -- various districts. And there was a sense that this was sort of quite an unappealing state of affairs, and that the way to address this was to sort of create this unified appellate court that would hear all patent -- patent cases.

But, you know, as many people have discussed, and certainly Rob Merges is one of most articulate -- you know, the most clearest articulations of this point, well it was presented in a purely procedural kind of way. It was at least anticipated by some that this was also lead to a change in patent policy. And in particular, you know, the -- Rob's accounts and others have suggested that the staffing of the CAFC was, you know, by and large with judges who were very familiar with and sympathetic to patent policies.

When one looks across a variety of different metrics, such as, for instance, the number of cases in which appeals of -- appeals of findings of infringement were brought up, what one sees is there was a very rapid shift in terms of cases. Basically it went from somewhere around 60 percent of the cases the patentee appellant or the patentee -- the pro-patent ruling was upheld, to somewhere where around 90 percent cases

shortly thereafter.

And similarly, one saw not only simply a greater willingness to uphold patentee rights, but simply -- but also the extension of patent coverage in different areas, a sort of greater latitude in terms of calculating damages, willingness to have preliminary -- preliminary injunctions and a whole variety of other -- a whole variety of other shifts.

Now this is, of course, a very rich topic of its own, but what I'm going to focus on is, instead, the consequences and, in particular, the consequences in terms of competition and innovative in high-technology industries.

In particular, what one sees is a whole set of consequences taking place -- taking place here. The most obvious, of course, is just simply the resources that have gone into patenting. As Sam Kortum and I highlighted, the U.S. -- U.S. corporations roughly doubled their patent filings in the last -- in the last dozen years. And while we've argued that to a certain extent this reflects the rate of acceleration and the rate of technological change, it also appears to reflect the fact that, again, holdings are more -- more valuable.

Similarly, we have seen quite a dramatic increase in terms of litigation surrounding --

surrounding patents. And based on some of the field work and other -- you know, other clinical research we've got, it seems that there has been a lot of -- also a very substantial increase in terms of the internal resources that a lot of corporations are devoting, not only to filing patents, but also to managing their patents through licensing and other kinds of activities.

I think that it's fair to say that there are sort of two -- sort of points to that, but it sort of really begs the question as to why do we want to worry about this, or what are really the consequences in terms of innovation and competition. And I think there are really two reasons why we want to -- or two pathologies which might lead us to be quite worried about these kinds of -- these kinds of situations. And what I'll do is, I'll simply just point out two classes of -- two classes of problems that can emerge.

The first is a situation where one sees the sort of growth of -- the growth in terms of litigation between established firms on the one hand and new firms on the other. And in particular one sees -- you know, one sees certainly many examples of firms which are sort of very established, in many cases not necessarily that innovative today, but where they have substantial portfolios of patents that they developed in the 1970s

and 1980s. And where they have established groups, often under the aegis of their general counsel, which have gone out and very aggressively litigated against -- against smaller firms.

And certainly, when one looks at some of these examples, you really have to be concerned, saying, you know, isn't this really in some sense innovation tax, where we have some of the youngest, most promising companies being basically -- being basically, in many cases it seems, being -- you know, almost sort of forced to -- forced to make these payments. Because certainly when one talks to many of the younger and smaller firms, the argument that one hears is that, you know, essentially the cost of uncertainty around litigation, the threat of -- threat of litigation, can be one that is sort of sufficiently onerous that -- that it sort of can have -- can be, you know, sort of profoundly -- profoundly worrisome and that it's often far simpler to -- far simpler to settle. And certainly one can make the argument that if some cases may effect, you know, firms' choices, in terms of whether to settle or not.

I think in terms of the industries where this has been a problem, I think there is probably several examples. I've done research highlighting some of these issues from the biotech industry and particularly around

the way in which some of the largest and most established biotech companies have apparently used their patent portfolios -- Bronwyn Hall and Rose Marie Ziedonis have done work in the semiconductor industry and, again, sort of highlighted how a few well-established, but not particularly -- particularly well-established semiconductor firms, but whose innovation seems to have dramatically fallen off, have basically been able to succeed in, it seems very much, in a sort of holdup strategy, extracting a lot of rents from smaller firms within the industry.

The sort of second consequence I want to highlight is really on the other side of the coin, which has less to do with, you know, sort of an established, perhaps less -- you know, on this sort of downward glide path -- a firm, you know, essentially extracting rents from smaller, newer competitors, but rather with the sort of growth of individual inventors who have essentially tried to take somewhat of a holdup -- holdup strategy. In many cases they've been able to exploit the fact that while, for instance, one competitor would be reluctant to threaten another one with a preliminary injunction, lest they also have that threat turned on themselves, here they can essentially, you know, sort of perhaps unilaterally engage in scorched earth kind of litigation

tactics, simply because they don't have much to lose themselves.

And certainly again one can point to many examples where large firms have decided that, given the sort of uncertainty of litigation, particularly an environment where, you know, highly complex commercial disputes are often being tried, you know, in front of juries and one simply doesn't know what's going to happen, that it is sort of an economically rational response simply to settle in those cases.

I think you know, this is clearly an issue in many industries. I think it is particular severe, both these problems, in emerging industries.

When one thinks about what are some of the problems and some of the issues that are running around here, clearly in these emerging industries, given the sort of relatively limited resource, as the Patent Office has, because in many cases the resources have been removed to fund the rest of the federal government, one has a situation where there is, you know, sort of recruiting examiners in these sort of new emerging areas can be enormously challenging.

Similarly, the problems in terms of retaining the people who have these skill sets, when industry is simply offering compensation that is, you know, often

several times higher than that, that the Patent Office can -- Patent Office can retain.

It also seems the Patent Office has a lot of difficulties in situations when one has a lot of prior -- art there that isn't patented, and where it is sort of searching for it and hunting it down is particularly difficult.

I'll just talk very briefly about one example and then I'll wrap up within my allotted 15 minutes. And simply I'll just highlight, you know -- we have pointed out many examples of problematic -- you know, this sort of way in which the lack of experience on the part of patent examiners is sort of translated into, you know, sort of distorting competitive effects. I'll simply point to this -- one example of financial patents. And this is a Daughtery patent, which has to deal with option pricing, which -- which is really the first in a series of three patents that have issued to date dealing with pricing of options.

Essentially what this is is a process for executing an expirationless option transaction. I'm pretty clear the argument is that they essentially value price options but actually sort of figure -- you know, figure out -- not only describe how options work, but also how to value these -- value these options.

And, essentially, it is quite interesting to look at the sort of description of the prior art here. Because what they argue is that even though there have been -- that there have been options that have been covering -- you know, essentially, finite-lifed options -- in particular, the work of Myron Schultz, and Fisher Black, and Bob Merton, which got a -- which was in the early 1970s, and was honored with the Nobel Prize a few years ago, is, you know, sort of work that looked at finite-lifed options. They say that basically when you look at infinitely-lifed options, there has been no work done in this area.

And similarly, they sort of -- you know, and when one looks at the examination file, the examiner sort of dutifully typed in the word "expirationless option" and couldn't really find anything there, and basically sort of signed off on the thing.

Now it turns out, though, that there is this whole body of work on something called perpetual options, which are basically the same thing as expirationless options. It's just simply a different name for this thing. And it turns out that not only was this -- it turns out there's actually an easier problem, looking at an option which has an infinite life and a finite life, and basically people solved this problem in the 1960s.

Paul Samuelson and my colleague, Bob Merton, among others, did a whole series of papers that basically figured out how these things work. And now we suddenly see someone emerging with a whole series of patents on these things and they are basically now -- Mr. Daughtery, who is an individual inventor down in Americus, Georgia, has basically set up a little company and he's basically been knocking on various doors of Wall Street saying, "I'm going to sue you because I've got this infinite option pricing thing here."

And once again, it seems clear that it's not in any sense malfeasance on the part of the Patent Office, but simply just that the examiner didn't have the kind of experience of knowing where to look in these kinds of situations. It sort of introduced all these kinds of competitive distortions.

Clearly, this is a hard area to shift policy in. And I think we could talk -- there's far too much here and we could probably talk about some of the barriers, in terms of shifting patent policy. I think I'll hold off until the question and answers in terms of talking about these issues.

I think that if we were to say, what -- how can these barriers to change be addressed, I think, you know, certainly one of the sort of biggest steps is something

that's really taking place here as part of these hearings. Particularly, I think that when we look to the patent arena, it seems that there has often been lawyers talking to lawyers and economists talking to economists, and we really haven't had a chance to have much dialogue between us. So I sort of see this very much as sort of an important first step.

But, nonetheless, I think it is a challenging process. And in particular, the fact that in some sense patents have harmful effects to very many people, but in many cases it's sort of scattered around these industries. Clearly patents also have helpful effects, but the harmful effects, which are there are sort of very much dispersed and scattered. Clearly, you know, there may be a relatively small number of people who gain a lot from the litigation.

If I were to sort of recommend a first step as we start thinking about policy issues and areas to address, I think this whole question -- you know, clearly patents pose many complex questions in terms of how they impact competition policy. But certainly addressing some of the questions around patent quality I think is a very important first step.

With that I will just sort of wrap it up and head back to my chair.

MS. DESANTI: Thank you, very much, Josh. We certainly will want to talk with you and with Shane, as well, about additional research that you both have done in this area.

(Time Noted: 3:01 p.m.)

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MS. DESANTI: Our next panelist, of the first four that we're going to have -- we'll finish up with Janusz, then we'll have a discussion, and then take a break.

Janusz Ordover is an economics professor at New York University and a former Deputy Assistant Attorney General for Economics at the Department of Justice, Antitrust Division. He is published widely on the intersection of antitrust and intellectual property, to say the least, and we are delighted to have him here.

PROFESSOR ORDOVER: Thank you, very much. I have to apologize for being low-tech, but my dog ate my Power Point presentation.

PANELISTS: Yeah.

PROFESSOR ORDOVER: I don't even have a dog.

I was asked to speak on a question that I think is on everybody's mind, which is to say whether or not conventional antitrust policy is capable of meeting the challenges of the new economy. This is a very old question. I think probably many of us spoke about it over the years. And the usual answer that is given is, "Yes, but."

So what I'd like to do today is to just point out a couple of these "buts" that I think are interesting, at least given the kind of interest that I

have, and the work that I have done over the years.

The "but" part comes from the fact that we all recognize that some features of the new economy require policy makers and the economists, who work with the policy makers, or who toil in their ivory towers, to adjust their conceptual models how actually competition works, and how it should work.

It is also the case that administration of antitrust may possibly adjust to the reality of the new information rich economy, but I will not talk about that issue in light of very interesting remarks by Judge Posner in the Antitrust Law Journal.

I will, however, start my presentation by going quickly through the list of the properties of the new economy that Judge Posner proposed, and show how these features of the new economy bear on the application of certain antitrust policy problems.

First of all, let me go through this with them and then come back -- go back and forth. The first point that Posner makes is that, as far as the new products are concerned in this new economy, we are observing falling average costs over the ranges of output which are large, relative to the scale of demand. And I think that's a very important point to realize. One has to always quantify over what range these average costs fall because

just merely falling average costs is not enough to lead to the feared outcomes which may include a very small number of active participants or even some sort of monopoly marketplace.

Posner also speaks of modest capital requirements. I'm not certain whether or not this is true. In particular, I doubt that it's true actually in the hardware sector of the new economy. And, moreover, I am also doubtful whether it is going to be so easy going down the pike for the upstarts to raise sufficient amounts of capital in light of the dot com bubble that burst, as well as the fact that most of the telecommunications sector is pretty much bankrupt at this very moment.

We already noted that the new technology -- the new economy is characterized by high rates of innovation, and some very fascinating talks were given as to the sources of -- and the drivers of the innovation rate, including perhaps availability of more complete and effective intellectual property protection.

Posner also identifies quick and frequent entry and exit. And that's something that may or may not be true. I don't know whether the empirical evidence would actually bear out that characterization. I think what it would bear out is probably substantial variance in terms

of entry and exit across the range of industries that are normally characterized as being the new economy industry.

The point about which Margaret Guerin-Calvert will speak extensively and I will address also, but briefly is the fact that the new industries are apparently characterized by network externalities, and I hope that we can actually have some discussion as to whether or not these are critical to our understanding of how these various sectors do develop or not. And I think even at this table, there is a great deal of differentiated views on whether these network externalities are something that economists cooked up in order to raise their consulting fees, or whether or not this is, in fact, something that is real and the policy makers ought to address in the assessment of how -- how enforcement should imply this.

Nonetheless, given the network externalities and, therefore, potential for monopoly, there is also another side of the coin, which is standards, designed in some way to overcome the problems of incompatibilities that may arise in network -- in network industries. But standards themselves create some interesting public policy questions, such as what are the limits to which the firms can go in the process of standard setting. Can the process itself be perverted for the purposes of

perhaps enhancing or prolonging the existing market power of the group of standard setters, or whether it can be hijacked by a single firm for the purposes of extending and prolonging its market power.

Posner finally identifies a feature that is not only -- that's important, I guess, in the high-tech -- this new economy and many others, and that is the extent of vertical integration, as well as substantial incidents of transactions between firms which are both competitors and cooperators. And I think there is a nice book by, I think Barry -- Dick Sid called Co-option that tries to meld these two concepts together where firms both cooperate and compete, and how the role of co-option affects the way the market dynamics evolved.

Let me say a word or two about the point number one, which is these falling average costs and what does that mean for antitrust policy, as I see it.

The obvious fact that needs to be borne out and I think that all of you know about it is that in such industries with a falling average cost, equilibrium market structure is likely to contain new firms and the survivors should be likely pricing above some version of marginal cost.

In other words, in such industries with falling average costs, the standard benchmark for what

constitutes competitive price is no longer sustainable. Marginal cost is not the right benchmark and not the right floor and, therefore, the question becomes, well, what is it.

There are several possibilities that can be suggested, but one issue that I find more interesting than that is whether or not the new econometrics of market power that is being practiced here, as well as through the Justice Department and on the pages of the Rand Journal, in which an econometrician tries to estimate some version of the elasticity adjusted Lerner Index, i.e., the negation of price above marginal cost, is the kind of econometrics that's all interesting.

Let's say we identify a situation in which there is such a high deviation, and what do we make out of this. Does it mean that we have identified an industry or a firm -- a market power industry that behaves in a way that is somehow away from the competitive ideal. Well the answer may be yes, or it may be no. It's probably true, when we're talking about such things as steel. On the other hand, is it true when we're talking about such things as -- content or content industries.

So I would like to throw on the table or to this audience, who is adept at the econometrics much more than I do, probably, a challenge to see whether or not we need

to revise the way we do the market power econometrics to meet the -- the challenges of the new economy.

Moreover, when it comes to the more mundane issue that does not require such heavy -- heavy-duty mathematics and tools, if marginal cost pricing is not the correct standard, then there is also the case that unsophisticated pricing, pricing which charges a customer ten cents per widget, is not likely to emerge in such a marketplace. What is likely to emerge is what I call sophisticated pricing, which will involve all kinds of pricing arrangements, starting from the most simple quantity discounts, to bundling, to tying, to various ways of dealing with the fact that the firm confronted with the falling average cost and needing to recover substantial up-front investments will have to implement pricing principles that deviate from the standard price equals marginal cost precepts.

Well that's all fine and dandy, but for the simple fact that antitrust historically has taken a tough look at these kinds of sophisticated pricing strategies. Now I don't even want to refer to the Robinson-Patman Act because my throat constricts when I hear those two words -- or three. But obviously it is a problem and it could be an issue even more so as we begin to realize that the firms do have to, in fact, deviate from the standard

textbook pricing principles.

Moreover, when pricing is sophisticated, it could be the case that the perception of such pricing may lead the antitrust enforcer to infer market power. We heard many times over from such luminaries as Mike Scherer that the evidence of price discrimination of sophisticated pricing could be the unit and index of market power. And I think that it is, of course, possible to perhaps infer such, but whether that's the proper inference in the industries under consideration here, I think is not the case.

In fact, we already know from the new literature that has really emerged over the last few years, that even in highly competitive marketplaces, sophisticated pricing, price discrimination can be practiced as, in fact, an equilibrium pricing strategy. And I refer you to the latest piece by Armstrong and Vickers in the Rand Journal that actually models that fairly generally, as well as provides a fairly extensive bibliography of the subject.

So when it comes to average cost falling, the question then is were we going to develop pricing, and I suggested that sophisticated pricing is likely to be the norm, that pricing may be used by virtue of the way that incentives are built into these pricing schedules, to

lock in the customers, to create an immoveable installed base.

It's also the case, as Professor Lessig pointed out in some of his writings, in the new economy the pricing that can be used to extract value from consumers is likely to be enhanced by virtue of being able to control -- to monitor usage much more so than in the traditional economy. So that when the consumer tries to, for example, listen to music over the Internet, or when the consumer tries to read a book over the Internet, all kinds of new pricing paradigms can be implemented, which may or may not go beyond what has been intended in the intellectual property law as to the rights of the -- of the owner of the copyright, for example.

Let me quickly move on to the -- some other features that we have already identified. And, in particular, the interaction between falling average cost and network externalities. I won't say too much about it, but I must, by virtue of the fact that this subject matter came up in this very room some 20 odd years ago, and I always have to return to my youth, given my advanced age.

The issue is, in fact, of how one looks at predation, how one looks at these practices that may appear to be anti-competitive in a world in which the

apparent battle is for the market position, for the market, so the -- battle to be a market leader.

Some years ago Bobby Willig and I tried to model such a scenario and not necessarily successfully, in part because we really didn't quite understand how one deals with the issue of intertemporal scale and scope economies, which is something that, of course, is the key driver of the network effects, wherein the value of the network is profoundly related to the number of people that subscribe to the network.

In such a setting it appears that the incumbent firm or the -- the two firms that can try to fight for the market, has a very strong incentive to price actively and aggressively in the first period. Willig and I suggested that the one way to gauge whether that kind of aggressive pricing goes beyond the pale of what's permissible, is to ask whether or not a firm that where confronted with a viable survivor -- surviving competitor would, indeed, be willing to engage in that kind of aggressive pricing -- i.e., subject to a competitively viable rival, would pricing of that sort be, in fact, profitable.

And it's easy to calculate whether it would be or would not be. In the event in which the rival's ability to constrain, hypothetically even, to constrain

the entrant or the incumbent firm -- the incumbent firm, sorry -- is independent of the actions in the first period. You can hypothesize that a firm can always come back, as the Chicago school hypothesizes, at the same marginal cost or same cost level as it did prior to its demise.

But, in fact, in the case of network economies, a situation of that kind of network externalities, this is no longer the case. While, indeed, it's true that perhaps firms' costs do not change, the equality or the attractiveness of its product changes significantly. If the firm won no customers during the first period, then you will have to be extremely aggressive in order to capture the new cohort of customers to its offering.

And, in fact, the predatory pricing is not designed as much to raise the rival's costs, but rather to lower the perception of the quality of its product by really denying to it the customer base. And there are actually some ways of handling that problem by recognizing that the firm in the first period should be permitted to aggressively bid for the role of the market survivor, but at the same time it should not bid in such a way as to reflect in the prices that it's willing to charge the harm that it thereby inflicts on the rival firm.

Now it's easier said than done. What it exactly means in practice, perhaps what it means in practice is that pricing ought to be constrained in some way, but the recognition that when the second round of competition does arise, hypothetical entrant would be there still at the level of cost or quality of product that it would have had it actually won the first round of competition.

I have no idea whether this prescription actually generally conduces to higher social welfare than some other prescription, but it's not different from the proposal that is due to Gilbert and Newberry in their work on the incentives of the monopolies to preemptively bid for valuable intellectual property. So there is a link between that work -- it goes back, I think, a decade or two, and the modern set of issues that arise from battles for the market.

As I said, I believe that this particular proposal I think is consistent, both with the work that Willig and I did some years ago, but it actually tries to capture the issue of -- of the fact that the rivals may be disadvantaged merely by the fact that they cannot compete in the second period on the same footing.

Let me say one -- two words about two other things. One, because of the issues of vertical -- vertical -- and vertical integration, as well as the

frequent transactions between buyers and competitors, and collaborators, the issue of access to the competitors or to the incumbent's assets becomes critical, from my perspective.

The fact that there is extensive vertical integration suggests that the -- one of the firms may have, in fact, control over scarce assets. Whether they rise to the level of bottleneck or somewhere below that is subject to debate in any particular case. But it's quite clear that access to the assets of the firm is absolutely essential, in some circumstances, in order to enable competition to move forward.

In such a situation, one can argue that some kind of open access may be the appropriate policy. Now this is a fool's errand because to use the word "open access" opens up more problems than it closes.

In particular, it is very hard to tell what exactly the open access means. It could mean a lot of different things, which may turn on the quality of the access being provided, the timing of the access that is being provided, the ability of the firm that controls these scarce assets to actually define what it is that the firm seeking access will be able to do with the -- with the assets at issue.

Secondly, when one talks about open access, one

has to immediately address the question at what price. Just because access is open, doesn't mean that it's free. Open and free I don't think are equivalent words in the English language.

Once you start on the slippery slope of pricing, you are already in the world of telecommunications and the experience that many of us had in trying to understand exactly what it means under the Telecommunications Act to require that incumbent local exchange companies should be selling or leasing access to unbundled network elements, which are pieces of the network that the entrants would like to have.

Well it's now, I think, six years since the Act was promulgated and we still don't know what exactly that means, or what is the right pricing principle to use in order to determine what the price ought to be for such -- for such access.

So, moreover, when we talk about the issue of the open access, we also have to factor the fact that with open access the incentives to engage in these kinds of competitive investments in development of scarce assets of intellectual property and so on, could be undermined, in part because the innovator may not know at some future date at what rate the access to his assets may be deemed required, and that's the additional

component of risk is introduced.

Finally, we have started by saying that in the new economy is the competition for being the leader in the market. This ex ante competition is so critical. Well that is true and I believe that the main role of the enforcers of antitrust in the new economy ought to be, in fact, to ensure that such competition for the next rounds of technology is fostered, facilitated, as opposed to distorted through the conduct of both the incumbent firms, as well as potential entrants.

Thank you, very much, and I look forward to the discussion.

MS. DESANTI: Thank you, very much, Janusz.

(Time Noted: 3:23 p.m.)

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MS. DESANTI: Now we'd like to turn to a discussion for a few minutes, bringing in Ray Chen from the PTO, and Sue Majewski from DOJ, and Hillary Greene, also from the FTC.

And I will use the moderator's prerogative to start out with a question. We have gone a long way in this discussion. We have covered a huge amount of territory, starting with early research on competition and innovation, and ending up with new models of competition and what does competition mean, and injecting some intellectual property concepts along the way.

I'd like to go back to Phil Nelson and ask you a question about some of the research that you were reporting on. Is it correct to say that R&D expenditures are used in that research as a proxy for innovation? And what is your sense of the extent to which that's a viable proxy for innovation?

MR. NELSON: The answer is yes. In the early literature R&D to sales was used as a proxy for innovation. There is substantial discussion and literature whether that's a wise thing to do because you really are more interested in sort of the outputs of the innovative process, rather than the inputs, and observing the inputs doesn't necessarily track the outputs, because people might be inefficient innovators.

And so it's a matter of trying to use the available data, rather than using the data that is necessarily the best to use.

MS. DESANTI: So it's imperfect, as with everything else. Okay.

MR. NELSON: I think it's fair to point out that people have tried to use patents and a whole variety of other indicators to try to get at some of these --

PROFESSOR GREENSTEIN: Oh, yes. In fact, I mentioned that patents were one of the variables to use. But how do you weight a patent, because -- and as we were hearing, the Japanese allow you, at least back a number of years ago, to kind of -- have a patent for one application and then they might have multiple patents so that they cover multiple applications, so the number of Japanese patents might not -- you know, ten of them might equal one U.S. patent. And some fields are less patentable
-- financial services, as Josh has pointed out, has a dearth of patenting, as compared to -- and still a very high apparent rate of innovation, but you won't find it by counting patents.

MR. NELSON: And the other thing that I really should have pointed out directly to your answer was that we argue the sales ratio comes from accounting reports.

Smaller firms may not have formalized books and records that record an R&D expenditure column in quite the way bigger firms do, so you might even have an inherent bias in your data set that would understate the amount of R&D expenditures by smaller firms, and some people talk about that in the literature.

MS. DESANTI: And I'd like to follow up also, Shane and Josh, there's at least a superficial tension in your presentations in that -- and correct me where I go wrong here -- but, Shane, I read your presentation to seem to argue that strong intellectual property rights can assist new entrants and, thereby, encourage competition because the new entrant can use its intellectual property right as a bargaining chip, that may be allowed to cross-license or joint venture with others.

And, Josh, I thought that your presentation was raising some problems that you thought that strong intellectual property protection had created deleterious effects on innovation and competition. And I thought if you two could do some compare and contrast of the similarities, the dissimilarities, that would help clarify exactly --

PROFESSOR LERNER: Do you want to start?

PROFESSOR GREENSTEIN: Well, first of all, you

did hear me correctly on the first principle. This is an observation about a phenomenon, rather than a model. That is, a lot of firms use their intellectual property for purposes of licensing or in the process of a joint venture, or in the process of a merger discussion, and it is valuable in that context.

I absolutely agree small firms use that in order to prevent firms from -- information and using it and to guard against a whole series of other -- other potential pathologies. It's not the only thing firms use. I should be honest. You know, there's lots of other things firms do, but this is one thing.

Second, it's not inconsistent with what I heard Josh say about incumbent use of patents in bargaining to holdup entrants, or to threaten them with litigation as a way to -- to get them to cooperate with them in certain ways.

I hadn't -- I don't really have an opinion on -- I have said, it's one of the things I deliberately tried to punt on when I discussed. I don't know, to be fully honest, what sort of behavior incumbents tend to exhibit when they are holding patents and how they use them in the bargaining process with entrants. I've got to be honest with you. I don't know and I don't know what the full range of behavior is until -- so it's not

inconsistent with what Josh was describing. It seemed to me it wasn't.

PROFESSOR LERNER: I'll answer it somewhat along the same tone as Shane's comments, which is I think it's certainly clear -- and I didn't want to leave the impression that, you know, sort of the -- that patents only have a dark side. In the sense that it's clear that patents allow many cases -- you know, things could happen that might not happen otherwise. I think we need to look no further than the biotechnology industry as an example of where we have seen many entrants not only being able to be successful in terms of accessing venture capital financing, but also in terms of being able to enter into alliances with much larger firms and with the pharmaceutical companies, and where they were very much facilitated in doing so by having intellectual property holdings.

But I think the point to make -- simply that I was trying to make is that there certainly are not only anecdotal examples of abuses, you know, and we can certainly point to things that we know, written case studies about -- or else where there have been investigations in terms of people of established firms using -- using patent portfolios in a variety -- a variety of deleterious kinds of ways. But also there's

again, some -- you know, some empirical evidence, at least from biotechs and semiconductors that suggests some real concerns about some of the very largest and most -- you know, most aggressive patentees and what some of implications have been for innovation in those industries by newer and smaller firms.

MS. DESANTI: Can you speak more to that? And in particular I'm wondering if you could add something on the research I know you've done on competition for venture capital.

PROFESSOR LERNER: Well maybe I'll take a stab at that. First of all we can certainly see many examples where when you see a new emerging -- new emerging industries and where essentially there's been an effort on the part of established players to do a bit of a sort of land grab into that territory in the way of, you know, trying to assert property rights.

I mean, for instance, we did a case study a number of years ago, if anyone is interested in it, on essentially Unisys and their strategy regarding the Internet, in particular, you know, sort of taking an old set of patents, in terms of various kinds of compression algorithms and asserting it regarding the GIF format, and essentially -- you know, their sort of strategy is to try to use that as a sort of way to go after a whole variety

of smaller, less established Internet content developers and so forth.

More generally, I think that when we start to look at high-technology industries, what we see is that the fear of -- I mean, as organizations look for venture capital financing, venture capitalists are in a role of doing an enormous amount of screening. Typically we see ratios of somewhere on the order of 100-to-one in terms of the number of -- number of business plans reviewed, to the number of actual ones funded.

And while it's certainly not the case that -- that, you know, that small firms do not violate intellectual property and do not need to -- and, you know, do not deserve to get sued in some cases, in other instances it really seems to be the case that the threat of litigation, even though it's perhaps not that well thought through, or in many cases where the patent which the threat is being based on does not seem to be that sound, often can have a very profound effect on the smaller firm, in terms of their ability to access -- to access financing.

So, again, when essentially you're sort of reviewing 100 business plans and you're only going to find one, all it takes is perhaps a cloud or a threat of a cloud over it, and particularly many venture

capitalists being pressed for time, they're not even going to -- you know, the presumption is, when there is smoke, there must be fire there, or at least there's enough -- enough to sort of scare me away from even looking at and considering this company more seriously.

PROFESSOR ORDOVER: One comment or question, really. I'm perplexed by what I just heard. In view of the fact that -- it's my understanding if I have a patent I have the right to exclude those who likely infringe from enjoying the fruits of my innovation.

So when we talk about the -- when we talk about the effects of these concerns about litigation, do we have -- do you think that it's possible to formulate a rule or something that would say you can assert this particular piece of intellectual property in that way, but not in some other way?

What is it -- what is it that we can accomplish or are those adverse effects essentially built into the concept of intellectual property rights, as a right, or is it something that goes beyond the right and now assumes there is abuse of that right in a way that can be identified, that can be prevented, that the FTC can step in and say, "You can't do that"? I was trying to see if we could get some --

PROFESSOR LERNER: Can I answer that question?

I think it's an excellent question. And I guess, to a certain extent, you know, the sort of difficulties of really trying to police the litigation process is somewhat what I sort of went for in terms of emphasizing the -- the importance of trying to get patents right at the time that they are actually being issued. In the sense that if they can be -- you know, essentially, greater clarity and greater quality, in terms of patents being -- at the time that they are being issued, I think would forestall a lot of these problems.

Just -- if I can just go on for one more second. You know, I think back to an example of -- the example of a roundtable we had perhaps a couple of years ago on business method patents at the Patent Office, where Commissioner Dickinson at the time was sort of talking and saying, "Well my major goal, in terms of business method patents is going to increase the time that the average examiner spends in terms of examining them from" -- I forgot the precise numbers, but basically from around 11 hours per patent to 12 hours per patent.

And when one thinks about, you know, the sort of challenges that an examiner has, in terms of going to this very complex area and having, you know, sort of very tight time frame to really learn about it and really understand what's going on, it's just there's something

fundamentally problematic about the -- about the system. And I guess I've been much more supportive of efforts to try to bring in, you know, sort of much more of -- sort of information from third parties, in terms of through publication of the applications, as getting sort of third parties to make inputs, and sort of really opening up the review process. Because I think that even if you were to give an examiner 20 hours, their ability to really be able to, you know, assess what the quality of the patent is, is going to be -- is going to be quite limited.

MS. DESANTI: Stan.

PROFESSOR LIEBOWITZ: Yes. My question was actually related, but it wasn't clear to me, when you were talking about the deleterious effects of these patent pools that the older firms have, if you're saying that essentially they are bringing frivolous suits because they are big and the other guys are small, and they have bigger legal staffs and the other guys don't, and this is just a way to get them in court and make them spend money, and there is really nothing behind it, which I can see easily agreeing, yeah, that's definitely detrimental.

The reverse is the case that if it's really a legitimate claim, then we're just either saying that there is something wrong with the contracting going on,

where they can't seem to reach a reasonable agreement, or that we're just looking at the back side of a balance that we have sort of drawn, which is that you give people a restriction on use, which is a monopoly, and we hope that that provides more of the activity in the first place. And by focusing only on the restriction, you say it's deleterious, but we can't really do that when there is presumably a balance there and you have to look at the whole thing.

So is it the first one, that it's -- they are being used frivolously or is it something else?

PROFESSOR LERNER: I think there's two -- two problems, one of which is, in many cases the patents which are being granted are in some sense -- you know, in many cases, overly broad or covering stuff which was actually -- where there is prior art that actually exists.

And then, secondly, that in some cases they're being -- even cases where the patents themselves may be used, they're being enforced in a very aggressive way that often, you know, sort of extends beyond the -- beyond the individual claims of the patents -- the patents themselves.

So I think that really it's much more in sort of the spirit of the first comment, which is that the

quality of many cases, the patents themselves, as well as the sort of aggressiveness of many of these firms, in terms of seeing intellectual property as a business unit and essentially litigation as a business unit, is the real concern.

PROFESSOR LIEBOWITZ: So would you think something like having the loser pay and maybe -- you know, treble damages is something that might be a way around that?

PROFESSOR LERNER: Well I think there has been a big law and economics literature on this and it hasn't really come up with -- you know, it certainly doesn't imply that that's some sort of -- you know, sort of magic bullet that's going to solve problems of litigation. In fact, in some of the models, I think when you have this sort of English rule kind of litigation, you actually get more litigation, rather than -- rather than less litigation.

MS. DESANTI: Okay. Ray?

PROFESSOR ORDOVER: Much depends on the relative risk aversions of the parties.

PROFESSOR LERNER: Sure.

MR. CHEN: There's a lot of things that have been going on that have prompted me in my thinking to answer this question about nuisance suits or frivolous

lawsuits that are really an abuse of the patent by a patent owner. I'm pretty sure there is a line of case law by the Federal Circuit where a patent owner would be punished for engaging in that kind of unlawful conduct, under -- I believe in some type of unfair competition theory. So that certainly exists within the Federal Circuit.

Actually, there's a lot of points that I would like to bring up, but first of all, let me reassure the panel and the audience that an examiner doesn't spend only 11 or 12 hours in examining a patent application. I understand that it's not a lot of hours that they do, in terms of an exhaustive search, where they have perfect information of the prior art, but it's not -- it's certainly not that limited number of hours.

As to Professor Lerner's finance patent example, first of all, we would always, at the PTO, as I'm sure the professor did, first warn people that you need to look at the claims of the patent first and not just the overall specification, which can be much more broad than the claims itself, which often times the patent owner is forced by the examiner, through the examination process, to add several more elements and limitations into the claims.

But I was also wondering how the professor felt

about the re-examination procedures we have in the PTO, where this is basically a mechanism where, after a patent issues, the patent can be hauled back into the PTO, based on new prior art, that hadn't been considered by the examiner in the first instance. And this is something that really any party can do and it seems like it's a relatively cheap and quick administrative way to review a patent and at the same time avoid the burdensome costs of litigation.

PROFESSOR LERNER: I'm just going to -- I mean, think that -- you know, first of all, I should have admitted this far along -- far from now. I'm not a lawyer and, as such, certainly can't claim to have, you know, the -- a profound understanding of, you know, the sort of legal -- legal nuances of this.

But certainly in terms of the conversations that I've had with practitioners around this question, in terms of lawyers in practice, whether in private practice or in corporate practice, there has been, you know, sort of some real reluctance expressed about going in to do re-examinations today under the current system.

In particular, you know, there's a sense that in many cases the same people are doing the re-examination who made the initial decision to file the patent. So in some sense, that there is, you know, sort of concern

expressed about whether one is really going to be able to get a fresh -- fresh glance at some of these issues.

And I think really the other concern that has been expressed is that if one has the re-examination which goes unsuccessfully, it weakens one's position in the litigation going forward. So at least when it's been described to me, many people have indicated that they've been -- that they are unwilling to sort of incur the -- you know, the sort of potential damage to litigation for something that doesn't seem to be in the sort of current system necessarily that much of -- that much of a remedy.

But anyway -- I'm sorry. Yes.

MS. DESANTI: I thought we would take a break soon.

PROFESSOR LERNER: Okay.

MS. DESANTI: So you can go ahead with more, if you have more right now, or we can take a break.

PROFESSOR LERNER: Oh, well I have more, but we can do it right now or we can --

MS. DESANTI: Why don't we take a break now because we've --

PROFESSOR LERNER: That's fine.

MS. DESANTI: -- been going for awhile.

PROFESSOR LERNER: Right.

MS. DESANTI: And let's come back about 12

minutes before four, to be precise.

(Whereupon, there was a brief recess.)

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MS. DESANTI: Professor Larry White will speak to us some more on network effects and competition.

Professor White is an economics professor at New York University's Stern School of Business. He is a former Director of the Economic Policy Office of the Antitrust Division of the Department of Justice, and he has published most recently on antitrust economics, competition, and policy.

PROFESSOR WHITE: I'm a low-tech guy. I'm the wrong guy -- save the situation, please. This is the time I should have brought my overhead transparencies. I knew it.

MS. DESANTI: While we are waiting for this to come up, Ray, did you want to raise a couple of other issues?

MR. CHEN: Oh.

MS. DESANTI: We'll interrupt you. We'll interrupt you when this comes up.

MR. CHEN: I'll be very brief for purposes of the time. I know that, you know, Professor Lerner brought up the concern about emerging technologies and whether -- and how the PTO can be equipped to handle examining such technologies and all I can say is, although the perception is we're a slow moving dinosaur, there is something called the Business Methods Patent

Initiative that in 2000 Former Commissioner Todd Dickinson instituted, where there has been a lot more of an outreach within the industry for seeking out all forms of non-patent prior art literature, that examiners are required to review before they issue a patent in that category of applications.

MS. DESANTI: I'm sorry to interrupt. And I just will flag for the audience, we are going to have some remarks about that initiative next Wednesday, when we have sessions out in Berkeley, so we're looking forward to learning more about that.

Professor White.

PROFESSOR WHITE: Thank you. I'm Larry White. I'm very pleased to be here this afternoon and I was asked to talk about network industries and innovation and I will try to tie it into the intellectual property theme, as well. The hour is late and so I'm going to try to just move things along as quickly as I can.

First, what do we mean by networks? Well it's nodes connected by links. That doesn't convey a whole heck of a lot, so let me try to give you some more concrete examples.

And here is a stylized link. It's a very -- a stylized network. It's a very simple star network, but I -- when I start thinking about networks, this is one of

the things I instinctively think about. And if you look at some of the -- some of the simpler airlines that have cropped up in the last two decades, post deregulation, a lot of them don't look all that different from this, as well as a local telephone network, a local package delivery network. In its early days, this is the way FedEx looked. Everything went through Memphis.

I labeled this "S," that central switch, "S" for "switch." That's going to be a crucial thing and I'll be coming back to it.

All right. But there are other kinds of networks. Here is a simple ring network. Those of you who live in this city would certainly recognize this as a real phenomenon. To get from one side of the Beltway to the other, very few people try to thread their way through the city streets. They go around the Beltway. Some computer linkage systems have worked like this. A Christmas tree light system, if it's in a series, would work like this.

Here is an all-points connected network. An urban street system, a CB band -- citizens bank radio system, where you don't have a central point. You don't have a ring. Everybody can connect to everyone else directly, and that's very different from that star.

Last and perhaps most important, two star

networks connected by a trunk line, and this can describe a telephone system, two local exchanges connected by a long distance line; a railroad system, two local marshalling yards, where the freight is collected and then disbursed, and the long distance trunk line in between; airlines with hubs -- two hubs and you collect traffic at a hub and send it to another hub, and then disburse it. Electricity, as well. You could think of one of the clusters as a set of generating units and the other as a set of users, and you've got a coordinating mechanism, the high voltage transmission lines, the step down, and the -- and the distribution. And again, here you have two central switches. I've labeled them "S1" and "S2." Remember them.

All right. Now network industries are different. The number of the speakers in the previous hour and a half talked about network externalities. And going back to one of those stars, the more users you have connected to the network, the more value there is for everyone. Think of a telephone network. Think of a fax network. Think of airlines, railroads. Any of those I would describe as a two-way network in the sense that any of the external nodes can send or receive. And in that kind of network, the network of value, the extra value for an extra user is direct. When another user joins the

network, he or she is doing it for his or her own value, but his or her presence also adds value for the others. And so this is a direct network externality. It adds value, up to the point where congestion through, say, that central switch may start decreasing value because the congestion slows down everybody else, or otherwise decreases the value for others.

There are other kinds of networks, besides those two ways -- describe something like an electricity network, or broadcasting, or cable, or the worldwide web, a credit care network, as a one-way network, because -- let me go back to this. Again, if you think of this as electricity generating and this as users, basically the interesting flows are going only in one direction. And when we get an extra user attached to this cluster here, the other users don't get any direct benefits. I don't really care if the neighbor down the street is or is not connected to the electricity grid, unless either the neighbor is causing congestion problems, or interference problems, or somehow diminishing my value, or because the extra user adds to the potential economies of scale, or the extra user allows for more entities over here, which gives me more choice, which is the kind of thing that shows up, say, in a credit care network or an ATM network, where more users over here mean more suppliers

over here, which adds to the value over here. But that's an indirect value, indirect effect, rather than the direct effect that occurs through those two-way networks.

And, finally, a lot of discussion of networks has gone into discussion of things that don't really fit the standard notion of what a network is, the nodes connected by links. There is nothing physical and so they've been described as virtual or metaphorical networks, but hardware and software, operating system, applications software, connections, which will have these same kinds of properties as a one-way network. That the more users there are, the more value there is to other users. And the -- the extra value happens because the extra users encourage more providers, which gives greater variety, greater choice.

Other characteristics. High fixed costs, low marginal costs, economies of scale, advantages up to the point where congestion may be a problem.

Compatibility standards are important. And these compatibility issues can arise because of technological phenomenon, because of just pure physical phenomenon. Sometimes through pricing practices, through refusals to deal can create a de facto incompatibility.

When I think about issues of compatibility standards, one of the things I love to think about is

railroads. They are a network industry. They are a 19th century network industry. But the issue of rail gauge, how far apart were the rails, was an important compatibility issue in the 19th century. Up until 1861 -- as late as 1861, almost half of the U.S. rail network was of a different gauge than the other half, which had serious implications, which I will talk about in just a minute.

So these issues of compatibility are important. Standards are important. And at least one version of the compatibility standards issue is related to intellectual property, since certainly in a lot of the new economy type industries, those standards are technological, are based on the intellectual -- intellectual property.

All right. Now consequences. What we often see are winner take most outcomes. That's been mentioned a couple of times earlier today, and one gets a competition for dominance. And as Josh mentioned before, sort of making sure that that process is a relatively open process is important.

Issue of path dependence. This is a controversial one, but I think if you -- if you run through the logic of the standards and compatibility issue, the possibility of a wrong path, of a different track gauge arising, and possibly a wrong gauge. As it

turns out, the non-standard gauge was in the South and it was not compatible with the North.

Those of you who travel in Europe, if you take a train from Northern Europe and head towards Spain, you can't get past Barcelona. You have to change trains. Why? Because the Spanish rail gauge is different from the rest of Europe.

If you take a train and go east, you can't get past Poland without changing trains, because the Russian rail gauge is different from the rest of European gauge.

Another nice example of this compatibility standards thing, and in a sense, the path dependence, is electricity. And some countries have 60 cycles, 110 voltage, like we have. Others have 50 cycles. Others have 220 voltage. We have incompatibilities, and I worry and ask the question, gee, did some of us go down the wrong path in terms of what would, with 20/20 hindsight, be a more efficient electricity set of standards.

All right. And now we get to the third point, potential losses from incompatibilities, from abandoned technologies, and the -- in the American rail case, we had freight being slowed down, off-loaded, reloaded, because the system was not -- was not compatible. And then in -- between 1861 and 1886, there were changes in rail gauges, literally tens of thousands of burly

individuals going out, lifting up rail, moving it slightly to make it compatible with the standard gauge, the 4' 8 1/2" gauge. Other burly individuals, with the help of a little bit of steam power, raising freight cars and moving the wheels around to make them compatible. Substantial costs because of this standards and compatibility issue.

And then, finally, remember that network, that star network with the central switch, the issue of bottlenecks being an important one. Janusz mentioned it earlier, a central facility, a bottleneck. Sometimes it's a proprietary technology, and again that brings in the IP issue. Sometimes it's just a physical switch, and so access becomes an important one. And, again, it can be a physical issue. It can be a pricing or a business practices issue.

All of us today fly on airlines and we now have a set of incompatible airlines. Rarely do we switch planes in a particular traffic movement, in a particular -- on a particular origin and destination trip. Twenty-five years ago, in the bad old days of regulation of airlines, and they were the bad old days, we had a set of compatible airline systems. People didn't think twice about flying from here to Chicago on one airline and then flying from Chicago to Des Moines on a different airline.

And things were compatible then. They are now basically -- for better or for worse, they are incompatible.

Consequences number two. Entry is more difficult. Sampling is harder. Larger scale entry is required.

Now what about innovations, since that's the major topic here? It's complex, unfortunately. Now innovation within the existing technological standard can often happen readily, unless the dominant firm feels threatened and if the dominant firm sees the innovation as a threat to its core activity. That's the way I understand the Microsoft case. That's the way I understand the major legal decisions in the Microsoft case.

Or the dominant firm may see the innovation as undermining its ability to price discriminate. And we all know the welfare consequences of price discrimination are ambiguous, so who knows quite what to do with that, but it can be a damper on innovation.

And, once again, innovation outside the standard is harder. It requires larger scale effort and sampling is difficult. And the issue here -- again, take my railroad example. If you've got a freight car that fits the 4' 8 1/2" gauge, then you can do modifications on the rail car and everything is fine. But if you have this

great, wonderful rail car that requires a five-foot gauge, you're out of luck. And you can't get people to sample it because they're going to say there is no five-foot track around. You have to build a whole new five-foot railroad in order to do this. Now this is just of the nature of what we're talking about.

Contrast that with apples. Somebody comes up with a new apple and they say, "Try it" and you can sample it. If it's a good apple, people buy more.

Innovation in the women's clothing industry. You come up with a new design. You can try it. If people like it, you can -- you can produce more. It doesn't have this kind of innovation within the standard/outside of the standard type of dichotomy.

Policy implications. Well, first, you've got to be wary. There are problems of dominant firms making life excessively difficult for entrants and innovators. But on the other hand, you've got to be careful. Over-reaction may improperly penalize winners and reward losers. Over-reaction is anticompetitive.

The bottleneck problems are real. Standards issues are thorny. Again, this got brought up earlier and Chairman Muris has been mentioning this in some of his speeches. On the one hand, if you've got sole ownership, you may -- that by itself may create dominance

in market power. Again, that's an IP issue. But you get joint agreements. They may turn out to be unduly exclusionary, exclude, freeze out mavericks who threaten the incumbent firms.

If there is something called an essential facilities doctrine, if any, it would be useful to clarify it.

Last. Conclusion. There are no easy answers, unfortunately, and good policy requires good judgments, requires a long-run perspective. And that's true generally in the IP area. A number of times that's been brought up. The issues on IP, over and over again, are short run versus long run. Short run it always looks like, gee, we can get benefits by restricting the granting of intellectual property rights, or stuff would get into the public domain and we'd have more competition. Isn't that great? But over the long run, what does that do for the development of intellectual property, the incentives to invent, the incentives to create? And so, over and over again, we find the short-run/long-run conflict. And taking, I believe, the long-run perspective is the right one. It does require good judgment and that's why government employees are paid such handsome salaries.

On that note, let me turn the podium over to the

next speaker.

MS. DESANTI: Thank you, very much, Larry, for that exploration of the alternate universe in which government employees are paid extravagant salaries. I'd like to visit sometime.

(Time Noted: 4:15 p.m.)

MS. DESANTI: We'll next hear from Meg Guerin-Calvert, who is a principal at Economists Inc. She was Assistant Chief of the Economic Regulatory Section at the Antitrust Division at Justice -- at the Justice Department. And she has also served as an economist at the Federal Reserve Board. Now she's in the private sector, and has been for sometime, and she specializes in health care, and financial, and network industries.

MS. GUERIN-CALVERT: Thank you, Susan. I would particularly like to thank Susan, and Hillary, and Gail, and others from Susan's office, as well as particularly the Commission for the invitation to appear. I have to start out with a disclaimer. As you can see from this, I do like blue. I do -- have tolerated really bad football teams, but I did not go to Yale, nor was I a cheerleader in high school, either, though.

But having said that, it's a great pleasure to be here today. What I thought I would do is really build on what Larry did and I will skip over some areas where his and my talk are largely complementary.

The first thing that I wanted to say as an outset and what this is going to be is a review of the economic literature in the network industry, particularly looking at two issues. What are the implications of it for IP issues and, alternatively, what are the really

thorny IP issues that are particularly relevant in network industries?

The first thing is, and this is kind of based on a general review, one of the things that I was surprised, as I went back to prepare for this session, is that the 1995 IP guidelines really do not expressly have examples or applications in the network industries. A lot of the issues that are there, such as standard setting, cross-licensing, exclusivity, are all greatly relevant to the network context, both in the development of networks, and in competitive issues. But there really are no network applications.

Despite that, if you look at the history of major IP antitrust enforcement action by the federal agencies in particular, but also in terms of private litigation, between 1995 and today, there are a large number of them and the substantial number occur in the network industries. So we all have had a great deal of experience dealing with this overlap between standard settings in joint venture network context, exclusionary practices in cross-licensing and patent pools in network context. Almost anything that -- and as Larry mentioned, that is a virtual network, where installed base of users are relevant, as in computers, is really looking at a network issue. And I'll come back to that at the very

end.

The main thing I want to say and I did a sample bibliography that you can find outside, is there is a vast literature on network effects and it would include both economic literature that deals with general principles that apply in any kind of network context, and help us distinguish among networks, but also in terms of a lot of applications.

If you think back on Larry's presentation, the sets of industries that he talks about, there are substantial industry reviews in each of those areas, particularly looking at antitrust and competition issues, case studies of those industries, and in many cases, already dealing with IP issues.

What does that literature tell us? I won't repeat this here. This is basically what Larry has mentioned, that there are various types of networks. One thing I want to point out in transition that is a useful distinction is a lot of the literature looks at the network as a system, as a whole package of the transmission, plus the distribution, plus the end-users. Others of them, as in the financial network area, look at the network as a means of delivering a product -- the ability to get cash from an ATM. And that can be an important distinction for standard setting and which IP

issues are more relevant. So I wanted to flag it to your attention. When you go through that literature, you'll see that distinction drawn.

Again, just emphasizing what Larry said, largely if -- what I'm going to be talking about is that it's important, in terms of thinking about networks, and which issues are relevant to your inquiry, which things do you care about, when is something more likely to be anticompetitive, as opposed to more likely to be defensible, it's useful to kind of separate out mentally what a lot of us don't do, which is the demand side externalities, the things which make the value of the network increase as it is larger, which deals with critical mass issues, as opposed to supply side externalities, which are somewhat more standard vanilla, decreasing average costs over some range of production.

And, again, to be thinking about or having in mind that the nature and extent of these externalities is going to vary, depending perhaps on the industry context, or the technology that's being applied in a given industry. So just as Larry was mentioning, if you look at airlines at one point in time, and then revisit it at another point in time, you can't necessarily assume that the same phenomena that are driving network effects are in existence because the technologies may have changed.

Briefly, what I'd like to be talking about is, obviously, that network entry and competition analysis which is fully developed gives a lot of perspective as to which kinds of IP issues we should care about in a network context.

The second point is that if you look at networks, the elements and the attributes of the network largely determine what outcomes in the marketplace are. Different network attributes depending on which ones are more important, are more heavily weighted, is going to determine whether the result is a single network with a dominant firm, or whether it's a kind of structure that with open competition will allow multiple networks to flourish. And these outcomes determine whether we should be focused on the process of getting to the network as the key focus of concern, what Janusz called the ex ante competition, as opposed to the ex post competition, either within the network or among networks for competition.

And, again, in the interest of time, I just want to focus on, not surprising, if you're looking at what makes for a successful entry, it is how do you go about achieving demand and supply side externality. Do you have issues or do you not requiring coordination standards and compatibility? It's not the case in every

network that these are big stumbling blocks, although in some it is.

And there are two stylized fact patterns that we can focus on that have very different implications. One is the one that Larry mentioned. It's the competition to be the monopolist. It's to be the winner or to replace the incumbent monopolist.

The second is an outcome where you can have multiple networks and where competition really is inter-network to get the volumes, to get the users.

And in terms of looking at network entry, let me just pose this as a framework, that when you are thinking about the importance of intellectual property assisting network development, or intellectual property assisting network development or intellectual property impeding network development and innovation, the things to look at is look at your particular circumstance and try to identify what are the issues for this particular industry that are required to achieve the demand and supply side externalities.

What are the issues? Are there any about compatibility? Are there issues of switching costs or are there not? Not all networks have high switching costs. Most of us, I would suspect, have multiple credit cards, even multiple ATM cards, and can switch them on

networks. Probably not the case that we have multiple fax machines, but there is a common standard.

An important point, and this, again is for predation, what Janusz mentioned, is how important is it as to the perceptions of people as to what will happen in the marketplace.

And then, lastly, how -- what is the likely total size of the market and how big will you, as the innovator, be? This is the issue in terms of the railroad gauge example. It may be in railroads' interests to have a common set of gauges, or a common standard, because the total pie, the total demand for cross-country railroad traffic will be higher, although your slice of the pie will not be 100 percent. So that the pie may be bigger with common standards. Your slice is smaller, as compared to a circumstance where you have 100 percent of a little tiny pie.

In terms of going to the main point, let me jump to some of the key policy conclusions, so there will be time for discussion. One of the things that comes up in network industries is the process of innovation. And this is work that's been very well developed by Carl Shapiro and Hal Varian, and also by David Teece. There's a number of sites in the bibliography, focusing on two kinds of innovation.

One is the incremental or evolutionary. That is taking the product as it is currently, making sufficient changes or improvements to it that you have a new, better, more attractive product, or network to offer to people, but it's sufficiently incremental that those users on the first network are not having to make a quantum change, are all the more likely to try your network for a period of time, and you, as a result, may find it easier with that kind of compatibility or common assets to evolve and grow.

The prospect for making a really big splash, gaining a really, really big share, may be more limited in this context, but we'd all say it has a higher certainty.

In contrast, in terms of if you look at radical or revolutionary, you have the problem that you potentially have very incompatible products. People have to make quantum leaps. There are substantial switching costs. However, there's a greater prospect perhaps of winner-take-all.

And so in terms of thinking about how you get all of those aids and what are the issues, let me jump right ahead to -- this is one of the problems that intellectual property or patents can raise in that context on innovation. If you have, by the incumbents,

substantial patents or, alternatively, as you get this new product together, you really need to have complex cross-licensing arrangements, or develop additional standards, it may be less feasible and less attractive to take the incremental approach. You may arguably be forced into the high-risk approach.

In the high-risk approach, you have the prospect of perhaps having a stranded product that you spent all the money on developing and then nobody is willing to switch, and no one is willing to experiment. So I just raise that as one of the issues in network industries where the gains, the likelihood of success are achieving relative to the incumbents huge demand side externalities and huge supply side externalities, and the presence of certain arrangements can make it more difficult to pursue the safer and easier strategies.

To go back up just for a moment, in terms of what network issues are relevant to intellectual property, the main one I'd say is -- what I had mentioned is, it's really worthwhile to look at the specific network you're dealing with, understand its attributes, its type, all of its properties, what's required for entry and expansion. This will inform you as to where the tensions are, particularly in terms of how important it is for there to be a standard setting, for there to be

common ownership of assets, or deployment of complementary assets, and where there is a real risk that without certain kinds of intellectual property protection, you just won't have the practice over the product.

Let me end, though, with a -- the other side of the coin is in circumstances where you have business practices that we also see in the merger and joint venture rule, which end up being exclusionary. On the one hand, putting in place exclusive practices for exclusivity could promote the incumbent network in a positive way. It may be necessary for success.

Alternatively, it could be entry deterring or foreclosing. And I think if you look at a number of the recent enforcement actions dating back to the Mac case and the ATM industry, to the early 1990s, they were focused on denial of access, in essence, or inability of members or users of a network to join other networks and to switch at relatively low cost.

Let me jump to the straight conclusion then. What we have is there is available to you a huge and extensive literature that deals with all of these issues in substantial detail. What is most relevant for the IP area, from the network context, is a lot of the thorny issues on coordination, standard setting, exclusivity,

other related -- have already been dealt with.

Similarly, in terms of the network issues, the IP issues that are relevant for networks, it really does come down to whether or not you can facilitate coordination and sufficient standards to allow certain kinds of networks to develop.

Thank you.

(Time Noted: 4:30 p.m.)

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MS. DESANTI: And now we will move quickly and test all of your patience. And we especially appreciate the patience of Professor Stan Liebowitz, who teaches Economics at the School of Management at the University of Texas at Dallas. He is published widely, and I'm sure most of you in the audience are familiar with his work. And his work is particularly focused on how new technologies affect copyright owners, and on network effects.

PROFESSOR LIEBOWITZ: Okay. While it is loading, it's really a very short presentation. It's just the way I created it, it was made from an old presentation, which was very long, so it probably has like 25 slides, but I'm only planning to go through four.

Let's see. Oh, yeah. First thing. Let me put a little advertisement in. It's getting late and a lot of the material I was going to talk about has already been covered, so there is no real harm. I have a book coming out this summer which talks about some of these things. I have another book that talked about it in the past, which was Winners, Losers, and Microsoft. This one, if you want to see how it is that -- a belief in winner -- first mover wins, which I -- sort of comes from the network effect literature, why it led to the Internet meltdown. That's the first three chapters in this book

and then it talks about other things on the Internet, as well. So that's my little blurb.

First of all, let me say that the term "network effect" versus "network externality," there is a serious difference and it's not always taken into account.

So that I guess it's a point that I've made in the past and I want to make it again. And network effect is defined here as when a product becomes more valuable, the more consumers there are that use it. That doesn't mean there is any sort of externality going on. Externalities are normally bad things. Externalities normally in markets don't work, particularly if they are technological externalities and not pecuniary externalities, another distinction that I'm not going to go into.

But a lot of things that are referring to as externalities may or may not be externalities, and we should be careful when we use the terms.

Okay. You've already seen networks, fax machines, telephones -- those are very clear. All right. The number of other people with those machines are going to be the keys, the whole ball of wax, so to speak. If there is nobody else on the other end of the line, your telephone is not really worth anything to you. And so it's obvious that in those industries, networks effects

will be very important.

Other networks industries, what we might call virtual networks, things like software, it's less clear. Now Margaret made the point and it's true, there is very large literature out here on network effects. But my reading of it is that it's to a very large extent theoretical. There is very little empirical work examining very simple things like how strong are network effects, and where exactly do we find them, and are they really in software, and if they are, how important is the network effect.

There are, to my knowledge, only a handful of papers, out of the hundreds that are available in the literature, that actually take a serious look to try to measure how strong the network effects are.

Now in the case of telephones and fax machines, we really don't have to there. It's pretty obvious that they are the basic element.

In the literal networks, where we have a lot of more interesting issues, because historically there was literature in the 1970s that took a look at telephone networks and had network effects, but that's before the modern literature, which started in 1985 came along. And in 1950 there was a paper on bandwagons, which was also about network effects.

The next literature in 1985, what makes it different, is that it talks about possibly getting stuck with the wrong network. And that's really what has been so interesting about it. And you don't really need network effects to tell that story to begin with. Any natural monopoly can lead you to the issue of do we get the wrong natural monopoly. It's just not a question that economists thought about all that much until 1985.

And at that time it was the network effect set of papers, particularly, you know, Katz, and Shapiro, Fowler -- and then a little literature with Brian Arthur and Paul David, and what not, that brought to the focus maybe we have the wrong network. But it could have easily just -- just as well been done with just old-fashioned economies of scale. Network effects are another way of getting to economies of scale.

I think the concept is overused. I was reading -- I talk about it in the book. There's this -- something you may have read the first year -- first day of 2000. The Wall Street Journal ran a special section on what the economy is going to look like. And there was a paper called "Supply and Demand is Dead, Live With It," or something like that. And in that article, he talked about various things, including network effects. And one of them he was talking about examples of network effects.

He said television networks are obviously network effects.

Well it's hard to really find very many network effects in television broadcasting. It may be a network, but there really are no effects. Viewers don't care how many other people are watching their program. It doesn't affect their utility directly.

Anything that has the word "network" in it doesn't mean that there are network effects, to say nothing of externalities.

The few attempts to examine network effects have looked at things such as -- and it's a reasonable investigation. If you have spreadsheets, what's the network effect? The network effect would be that you want to be able to use other people's spreadsheets, their data. And so, if you have Lotus 1-2-3, you want someone else who can read Lotus 1-2-3, if you're going to send them your data. And so the tests that were done were to look at things like whether or not spreadsheets set higher prices, if they could transform Lotus 1-2-3 data, if they could read it.

And, of course, they came to the conclusion -- many of you may know this literature -- that, in fact, that there were network effects. The problem is that, in fact, they don't show that there are network effects,

because if you had previously a Lotus 1-2-3 spreadsheet and you're buying a new spreadsheet, an upgrade either of Lotus or some other brand, you want to be able to read Lotus 1-2-3 spreadsheets, too, because you want to be able to read your old spreadsheets. And there is no network effect there. And, therefore, the only way to have tested it would have been to take a look at people buying spreadsheets for the first time, where there is no problems with compatibility with their old selves and their old software. And no one did that.

So, in fact, there is virtually -- I can say, to my knowledge, zero empirical evidence of how strong network effects are in any of these literal networks. Now I'm not saying that they don't exist. And I'm not saying that they're not strong. But I am saying that we don't know and we have a very, very, very large literature that's based on something that we presume exists and is powerful, that we have almost no interest, apparently in testing whether or not it really does exist in these literal networks. So a minor criticism of the profession, if you will, and I'm not as popular as I might be.

We know that if there were network effects, it gives us an economy of scale on the demand side, if you will. And that that might lead to winner-takes-all. But

network effects by themselves can't generate that result. Economy of scale of production, without network effects, can, but if you have just economies of scale in production and you haven't had network effects, no guarantee that we're going to have winner take all. It depends on which one is stronger.

And my gut presumption, since all we're doing is dealing with presumptions here, since no one is testing these things, is that in most cases that people talk about the new information economy, what's really going on is that we have very strong economies of scale in production, and minor network effects that play a trivial role in a lot of these industries. Now it's not clear that that changes much, okay, but still it's a different story.

All right. Whether we're talking about network effects or economies of scale, however, they both lead to the conclusion that we may have a just single winner or a small number of winners in the market. This has been talked about before, competition for the market or in the market. Who knows?

Is it harmful to have a single winner? Well it could be. And, as everyone has said, it's a difficult issue. I'm one of the few people that have taken a look with my co-author on much of this work, Steve Margolis,

and at particular industry, and whether or not it appeared to be the case that we were getting wrong winners, and whether or not the winners were getting stuck, and that they couldn't -- they were entrenched and were unable to be challenged by superior new firms. That was the software market that we looked at.

And what we discovered when we looked at those markets is that there was no evidence of entrenchment. There was evidence for winner-take-all. But there was no evidence of a lot of other aspects, such as tipping, a term you hear all the time. Try to go get an explanation or a definition of exactly what tipping is and it won't be that easy. But what it would seem to be is that two firms compete and then at some magic moment, one of them gets a large enough market share that the network effects take over, and it then becomes the winner very quickly. There was no evidence for a tipping point in terms of market share.

There was no evidence for lock-in. And what we found were very rapid changes in market share that went to the firm that was getting the better product review. Now this is for a single industry which is software, over a single period of time, which was like, essentially, 1985 to 1995 - '96. It was an unusual time in the history of that industry. It was still very young.

Whether you can generalize those results to later periods of time when the industry is more mature, we don't know. But at least we did look at that industry.

And something that I haven't seen much of, among people who, in talking about lock-in -- now there has been a lock-in literature. Railroad gauges, by the way, as you know, were talked about and so was AC/DC current. But it wasn't whether we had the right DC, whether it was 50 or 60. It was whether we had AC or DC. And we did get AC and AC is considered to be the better of the technologies, and there was a paper on that by either Paul David or one of his students, saying "We almost made a mistake. We almost got DC, but we were lucky. We just avoided, on the brink, getting the wrong product."

The typewriter keyboard, which is what I'm probably best known for with Margolis, that was another story that turns out to be totally fictional of how you get stuck with a terrible product. Everyone likes to make the claim that it was created to slow down typing, with apparently no evidence, whatsoever, behind that claim except the nice assertion that gets repeated over and over again. What we discovered was that there was no real evidence that the -- keyboard was any worse than basically -- for any other keyboard out there, that they were basically the same.

Similar stories for Betamax versus VHS. And so this idea of getting entrenched, getting locked in, it's a nice story and it certainly plays a large role in a lot of people's thinking, but it's still a story that -- now I should be a little more careful here. If Carl Shapiro were here, he'd say, "Well my book -- Information Rules," because he did this once before at a conference several years ago. He was just -- he had an advertisement for his book at that time. That was several years ago.

He said, "My book has hundreds of examples." But the difference was, his examples were examples where the incumbent has an advantage over the challenger because there's a cost in people switching and it may not be efficient for them to switch.

The lock-in that I'm talking about here is a strong form of lock-in, which the -- would be a story of that. It would pay for you to switch. All right. The advantages are greater than the cost of switching and you still don't switch. That's a strong form of lock-in and I don't know that there are any examples of that. And if there were at this point, after 15 years of examination -- by the way, Paul David now says he doesn't have to have any evidence that there are cases of lock-in, that he would like us to prove that there are no cases of lock-in, which is sort of an interesting position to

take. And I presume you could take it either way, but my answer is that if you follow this literature and all this, well what were you doing for the last 15 years with your students? Why were you bothering coming up with these examples if you didn't need to in the first place?

But at any rate, let's see. That's the story on lock-in. So I don't know that it exists. So what does that tell us about antitrust?

Well, first of all, when we were talking about network effects, which I'm not denying exist, and in some instances might be important, or economies of scale, which I think are probably quite important in the new economy, we're going to have a different type of competition. What we do need to know is not whether it's an economy of scale, not whether it's a winner-take-all, that's not so important. What we really need to know is whether or not once you've won, that somehow there is going to be less competition in the future, that you're not going to be vulnerable to competition. That's the real danger.

And of that we have no evidence that I'm aware of to say that we should be worried. Now perhaps we will get some and maybe we should be worried. I think it's premature to start putting forward rules based on theories when, even though it may be a very large

literature, it doesn't have any support for the idea that we have incumbents who are getting locked in, who really should have been replaced by challengers. All right. So that's one thing that I think we should be very careful and avoid putting in into the current thinking until we know more.

And the government goes around and asks people to do studies. NSF does this all the time. That would be very useful, I think, for the NSF to go out and ask people to actually try to measure how strong network effects are and whether or not we really do get stuck with the wrong products.

Okay. The other thing is that it does seem to me that there is potentially a place for intellectual property to talk -- to play some role in this literature, or this literature to play some role in intellectual property. And that is, if we do have a fight between two competing standards, it is fairly important in most cases that either they both be owned or not owned, and that if they are both owned, you would expect the market to work better than if only one is owned. And that's a rationale for ownership here of a standard. That's quite different than the normal patent for -- ownership. It has nothing to do with trying to provide a reward for the inventive activity. It's ownership in the same way that we would

want fisheries to be owned, if we want efficient use of the fish, and we don't want them to be over-fished.

And so, there is a potential use for intellectual property in a completely different way, if we believe that there are these networks where there may be real externalities, and where there may not be an owner who puts the proper resources into fighting the other network. And so that's something that somebody might want to think about and some government agency might want to look at. And how that would work, as opposed to the old-fashioned intellectual property, I'm not entirely sure, but it is something different and it is something that arises here. But I don't know that it's due to network effects. It's due to any network where you're going to have a winner-take-all result, which just may be a network where you have economies of scale.

That's my four slides.

MS. DESANTI: Thank you, very much, Stan. We appreciate it.

(Time Noted: 4:50 p.m.)

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MS. DESANTI: Well the hour is very late, but I'm sure there are some people who want to have comments made. Did you want --

MS. GUERIN-CALVERT: I just want to make a couple of quick comments. One is that I did, for a little bit, Stan, get a view as to the empirical literature that is out there on network effects. I think a little bit of it is it depends on how one is valuing or measuring.

For example, I would point to there is quite an array of studies in the airline industry, dating back to the immediate post-deregulation era, that look at the value of adding hubs and spokes by airlines, as opposed to single line traffic, in terms not just of economies of scale and scope on the supply side, but the ability by being able to offer seamless travel, common baggage handling, coordinated schedules, to get to a lot of places, that there are measurable increases in the volume of passengers of the airlines who have those, as opposed to not.

And similarly, on the ATM industry side, there are a lot of studies that have been done, both by network owners and also by economists, looking at, again, the idea that you can have these large inter-connections. You can induce and have a greater value, larger network

than you otherwise could, and that, in fact, drove the need for proprietary networks to share.

But I think you raise an interesting issue that I think is very pertinent in terms of the lock-in issue. It is, because I think that my view of the whole vein of literature looking at network effects, is that there are certain circumstances in which the best outcome for society is to have a single firm, and that acting competitively -- or a single standard. That is what is going to happen. That we are better off, ultimately, with competition, but who is going to be the standard, and VHS might be better than Beta. And that then, as long as there is the prospect and no significant anticompetitive behavior that would keep DVD's from coming up and delivering fundamentally the same product, in a completely different technology, you can have the leapfrogging that doesn't happen in every industry.

But it's the anticompetitive lock-in, as opposed to the existence of lock-in, that is a problem. So it is an industry that otherwise would have gone to two or more competing products, that ended up with one because of the fact that anticompetitive games were played.

The last thing is, I think you're right in terms of ownership of standards is an issue. One of the things that's most intriguing in a lot of industries, we've

ended up with common standards, where there are massive network effects, such as fax, phone, and I would argue, rail gauge, and where the nature of the competition is multiple firms competing for the volumes, and that that's where the gains are.

So I think it's important to distinguish between outcomes that could get to that multiple approach, but I think you're right that where ownership rights are not clear, it may well be the case for the product to even exist you need more tolerance toward joint ventures, more tolerance toward standard setting bodies looking at trying to come up with the common or best standard, so that then expost there can be competition.

MS. DESANTI: Phil and then Stan.

MR. NELSON: Yeah. This is actually just to let you do a two-fer and get economies of scale. This one is actually just a clarification.

I think Europe is on direct current. U.S. in on alternating current. No? Never mind.

PROFESSOR LIEBOWITZ: Yeah. I guess on the first thing, as far as the literature, I know of some of the literature on ATMs, but my knowledge of the literature is flawed and I can go through that with you as well, but not -- I don't know the whole literature. I know a couple pieces. I guess Eleanor Sheppard and maybe

a few others. I can say lots of things about it. It's hard to --

The other thing is that on the airlines, I'm not sure what it is that is the network effect that makes that an industry that we would talk about to have network effects in the first place. I don't even know whether we're talking about hubs or spokes. Yeah, it's network in the sense that it has hubs and spokes, but is there -- what is the network effect where somehow the more uses there are, your utility goes up or down? Are we just talking about prices changing?

MS. GUERIN-CALVERT: I guess I would have a couple of responses. One is, it's a physical network and that in terms of getting greater volumes of users that demand the product, and find it more convenient and, hence, offer greater quality of service, would be what the value is.

And, again, I think it goes back to Larry's diagram and he can probably say it more articulately than I can, it's the idea of you do not necessarily have to have the value as in the phone system, where I need to be connected to you for the value to occur, but that the presence of a substantial additional volume of passengers makes more service possible than could be sustained if there were not such a comprehensive network.

PROFESSOR LIEBOWITZ: Yeah. Well to some extent we may be relabeling things. Any industry that's not a constant cost industry is going to have an impact where as more users or less users are in the industry, other consumers are going to have either higher prices or lower prices, and we can get concerned about how all these networks may be out of kilter.

I'm not sure it does us a whole lot of good to start referring to that as a network effect, when I think the original idea of network effects was sort of more specialized, some more -- a case where you really were getting value because more people were using it, which would be something that would be involved, say, with the information and information economy makes more sense. And also those are all very pecuniary externalities. If they are externalities, you don't want to internalize them because if they were internalized, all we'd have would be monopolies.

And because if one -- and takes consumers away from another, they're causing negative impacts and those are -- refer to those as network effects, if you will, and gee, do we want to stop that because it's causing negative impact. And the answer would be no, because that's a pecuniary externality. We don't want to internalize them.

So I think that that's sort of the first case you gave of all the empirical work. It is empirical work that doesn't have anything to do with network effects, which doesn't do anything too much to reject my claim that there isn't much of a literature there.

MS. GUERIN-CALVERT: Yes. We can agree to disagree. Now the one thing that I would say is -- and I think you raised an important point. Whether or not you end up with a single firm supplier depends substantially on the scope of the overall marketplace. One of the things that has happened in the airline industry, for example, particularly if you look at transcontinental travel, is you have competing networks.

And so, you know, I think it again, looking at the big picture issues, in some industries you'll end up with one. In others, you could end up with multiple. And those, I think are the key issues.

PROFESSOR LIEBOWITZ: We do agree on that.

MS. DESANTI: We have time for one last comment and, Shane, you're it.

PROFESSOR GREENSTEIN: All right. I was going to say something provocative to try to generate discussion, but maybe -- I'll generate thought as you go home. And this is sort of two comments and it's for all three of you who talked about networks.

First of all, I would like to offer the opinion, I don't find it at all useful and I don't think competition policy would at all find it useful to focus antitrust policy on avoiding inappropriate designs or directing industry to avoid inappropriate technological designs. I think that is a waste of government policy and time and effort.

And that raises the question, what should governments be worried about and what should we focus on in environments where there allegedly are networks? And I took from your three talks that design alone is not what we should be focusing on, that when Larry puts up his little diagram, it's not -- it's not the physical connections alone that are the focus of our attention. You know, when you put up a little hub and spoke diagram, it's not the physical connections alone that you worry about, it's about the economic relationships that are repeated over and over again between a whole series of actors who otherwise are not -- you know, otherwise are in different entities, and what that can do is entrench some firm in a position of power. And what we worry about in innovative industries is whether the firms at the center of those network of economic relationships, whether the firms at the center of them can or cannot use the innovative process to -- and distort it in some way.

And I think the central question that we should be asking is if you see a firm at the center of one of those networks, the question you have to ask, okay, a lot of innovation is going to be to their benefit. That seems to be fine. Most of the time we actually think that's just fine. So then, is there -- you know, is there a competition policy question there? And I think the answer has to be it depends on the actions they take and what effect it has on the incentives of other firms, either within that network of economic relationships or not. That's the central question.

I really just don't give a damn whether, you know, we get the wrong outcome or not, because I don't think I know. I don't have enough information to know. But I do really, really care, you know, what the firms at the center of these economic relationships do when talking to other firms, and what sort of deals they are trying to cut, and what effect that has on incentives. To me, that's where we ought to place our focus.

MS. DESANTI: Thank you. Thank you all, very much, for your patience. Could you please join me in giving a round of applause to our speakers.

(Applause.)

(Time Noted: 5:00 p.m.)

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C E R T I F I C A T I O N  O F  R E P O R T E R

CASE TITLE: HEARINGS ON COMPETITION AND INTELLECTUAL PROPERTY LAW AND POLICY IN THE KNOWLEDGE-BASED ECONOMY

HEARING DATE: FEBRUARY 20, 2002

I HEREBY CERTIFY that the transcript contained herein is a full and accurate transcript of the notes taken by me at the hearing on the above cause before the FEDERAL TRADE COMMISSION to the best of my knowledge and belief.

DANIEL WILSON