Journal of Industrial Organization Education

Volume 1, Issue 1

2006

Article 1

Entry Deterrence Strategies

Valerie Y. Suslow, *University of Michigan, Ross School of
Business*

Recommended Citation:

Suslow, Valerie Y. (2006) "Entry Deterrence Strategies," *Journal of Industrial Organization Education*: Vol. 1: Iss. 1, Article 1.

DOI: 10.2202/1935-5041.1000

Entry Deterrence Strategies

Valerie Y. Suslow

Abstract

This lecture on entry is a transcript of a second-year MBA class at the Stephen M. Ross School of Business, University of Michigan. At various points, student comments and comments by Francine Lafontaine, the co-teacher of this course, appear. Accompanying this lecture are the PowerPoint slides and various film clips from the lecture.

This lecture provides an overview for MBA students of several entry deterrence strategies and their treatment under United States antitrust laws. The lecture begins with an examination of predatory pricing and an introduction to sequential games. This is followed by brief discussions of several other strategies (including limit pricing and raising rivals' costs), with business applications. The lecture concludes with a discussion of how dominant firms can legally compete, both in the U.S. and in Europe.

KEYWORDS: economics, entry, game theory, antitrust

Slide #1

Thank you all for coming. I have handouts that I have passed around. Today we're going to talk about entry deterrence strategies. I'm going to give you an overview of entry deterrence strategies, but I need to begin with a caveat before we get going. Since this is a lecture series and not a regular class, you are saved from the painful exercise of developing an analytical framework for non-cooperative oligopoly. There are models that we would normally take time to cover and we don't have time for that. Instead, I'll be telling stories about different strategies and how companies have used them, and we'll be applying our economic intuition to try and think through some of the issues. But if you are serious about any of these topics I would encourage you to go back to your micro textbook and read about non-cooperative oligopoly. Or, there are other more advanced textbooks that I can recommend.

Slide #2

We will start with predatory pricing, since I assume this is something that is familiar to most of you. Then we are going to go through a variety of other long run strategies, such as excess capacity, limit pricing, and raising rivals' costs (which some people refer to as non-price predation). I'm not sure we will get to the last item on the "agenda" slide relating to how dominant firms compete, but the slides are self-explanatory. If we don't get to it you can read through them and there are readings posted on the lecture series website that you can look at [Slide #3](#). Also, Professor Lafontaine will pick up a couple of topics from these cases when she does her lecture on vertical restraints in March. And as before, if you weren't here in January when we did the first lecture, Professor Lafontaine will interrupt on occasion and add things to the discussion so we can have a good conversation about entry deterrence.

Slide #4

The first thing to note is that there are a lot of different strategies that firms can potentially use to deter or slow down entry. We are going to be focusing on the single-element strategies because this is the best way to introduce the topic. Pricing strategies such as experience curve pricing – that you are familiar with that – predatory pricing, and limit pricing (which I'll explain in a little bit). But you can see that there are a lot of other strategies, for example, brand proliferation is one where you can think of it as "filling the shelf." You can read more about these if you are interested in the article that I have posted on the website.

Slide #5

There are two different categories of strategies (slide #5). Some strategies increase the expected entry cost, so for example, if you advertise and establish a

brand name, you are doing that in order to increase demand for your product and create a more inelastic demand, but you are also doing it because you hope that the second and third movers will have to advertise even more in order to both establish their brand. There are other strategies, though, such as investments in excess capacity, which can be characterized differently. Having excess capacity does not increase demand for your product. There's no particular reason to do it (unless we are talking about a cyclical or seasonal industry), other than perhaps trying to send a signal that if you enter, I can easily increase production, drive down the price and that is going to make the post-entry intensity of competition relatively fierce. You are certainly thinking ahead when you advertise and invest in R&D, but this is a different type of strategy. Building a reputation for toughness and predatory pricing also fall under this category – strategies that can increase the expected intensity of post-entry competition.

Slide #6

A good question to ask before we start is which of these entry deterrence strategies are used most often? There was a terrific survey that was done in 1988 of product managers, where the researcher asked the product managers both for existing products (more mature) and for new ones, which strategies they used. The number one favorite was to try to hide the fact that you are making a lot of money on a particular product line. When you report, you can report by division – baking goods for example – and you don't have to say which individual product is actually the one with the highest margins. That was the best (or at least most popular) entry deterrence strategy.

The next most popular strategy was filling all the product niches. We don't have time to talk about this in detail, but how does that work as an entry deterrence strategy? Suppose you are a breakfast cereal company. How might that work as an entry deterrence strategy?

Student Answer: The company is trying to meet a variety of different needs.

So if somebody is entering they are looking for a profit opportunity where the needs are not being met, but if you already have met all those needs it is hard for others to profitably enter. The other thing to think about is whether there is a substantial minimum efficient scale, relative to the size of the market. If you need a certain critical mass of demand to cover your costs (particularly fixed costs) and the incumbents have carved the market into lots of little bits, it's going to be harder for you to cover your those costs. Other strategies on the list are advertising, R&D, reputation, limit pricing, and excess capacity. You may not have heard of limit pricing before. Limit pricing is charging a price that is less than the short run profit-maximizing price (less than the monopoly price, even though you

could). If you charge a lower price you earn a little bit less in the short run but hopefully you deter or slow down entry, and you earn more in the long run. This is a rank ordering: maintaining excess capacity as an entry deterrence strategy is often something that is fun to talk about in class, but it is a very expensive strategy and, in fact, it is used very little.

Slide #7

The other thing I'd like to mention before we move on is that all these strategies have risks and they have costs associated with them. We're going to talk today about how these strategies might work. But you have to be careful because it requires a full assessment of costs and demand and so on, in order to figure out if as a company you want to invest in one of these strategies. The other cautionary note concerns market dominance: if you are a dominant firm and you are playing rather tough in the market, there are antitrust laws in the U.S. and elsewhere in the world that will come into play. You have to be careful not to abuse a dominant position in the market. It is not generally illegal simply to have a large market share, but once you achieve that large market share you have to be very careful how you use it.

Slide #8

Courts in the U.S. look at a variety of factors in monopoly cases, but the first thing they look at is whether the firm has monopoly power. That goes back to our discussion in the first lecture on market definition, market share, and so on. Next, courts look at the level of exclusion or foreclosure as a result of the conduct. What was your intent, what is the business justification? Suppose you are a computer hardware company, for example, and you are constantly changing the product interface so it makes it hard for the peripheral manufacturers to plug in. That is a strategy that has been used. You could be doing that because it is good for the consumer: you could argue that you are innovating and improving product features. You need a valid business justification. The court worries a lot about the effects of their decision on innovation because society wants firms to think they can win the game, or at least gain some competitive advantage, through innovation. The types of practices that are worrisome for the courts are predatory pricing, refusal to deal, exclusive territories, exclusive dealing, and tying. Some of these Professor Lafontaine will talk about later in March.

Slide #9

My final comment before we get started with entry deterrence is that there are many situations where it does not pay to try and deter entry because there are low barriers to entry. In those cases it would be foolish to charge a low price and take a cut on your profits with the goal of maximizing long-term profits. If barriers to

entry are low, competitors are likely to enter anyway, even if you don't charge the monopoly price. Instead, you are better off charging a high price and getting the short term-gains. Here's a quick story about the early days of the ballpoint pen market that illustrates the situation. We'll ignore the patent disputes that were going on at the time and start in the middle of the story, where in 1945 Reynolds International Pen Company was selling pens at \$12.50 each that cost \$0.80 to produce. They made a great deal of money and within six years or so they were out of the business. They were not the highest quality manufacturer. Others were slower to enter because they were working on producing a higher quality pen. (Consumers returned a lot of Reynolds' pens, actually.) But still, with an investment of about \$26,000, Reynolds made millions. If they had tried to deter entry it is not clear that it would have worked.

Slide #10

So, let's talk a little bit about predatory pricing. This is a highly aggressive pricing strategy and the goals can be several. One is to drive a rival out of business by pricing below your own cost. This is not about pricing below somebody else's cost by being more efficient, lowering price, and driving them out of the market. This strategy entails pricing below your own cost.

But it can also be used to discipline firms. Suppose a rival is undercutting you – you can react by lowering your price, and then a month later or two weeks later, it depends what the business is, you raise the price and see if you can get them to follow you back up. Here you are trying to establish more cooperative behavior. If your rival does not raise the price and follow your lead, you lower the price again and then see if they follow you back up the next time. Or, this strategy can also be used to establish a reputation of being very aggressive in response to entry. This might scare off potential entrants or it can be used in order to help you buy them at a lower price.

Regardless of the specific motive, during the low price phase of predatory pricing you lose money because you are pricing below your own cost (I'll be specific a little bit later about what that cost is). Then once you kick them out of the market or they start behaving you raise the price again to make that money back. If we had more time today we could talk about when this is wise and when it is unwise. There are numerous factors involved – I have listed the most important one on the slide – clearly this is foolish if there are low barrier to entry. You lower the price, you lose money, and you kick somebody out of the market. You raise the price to recoup the losses, and then somebody else comes into your market. This is not the strategy to use. And there are other strategies you can use, as well, other than predatory pricing.

Slide #11

Let's take a look at predatory pricing using a sequential game. How many of you are familiar with game tree like this, more or less? Almost everybody. Good. We have an entrant in this game that gets to move first and is choosing whether to enter or stay out of the market. There is a convention in these games that we follow: the profits of the company that is moving first are listed first. For example, on the lower branch of the tree, if the entrant stays out they are going to earn a competitive rate of return in some other market and the incumbent will earn \$500.

On the upper branch, if they enter you are then going to decide whether to accommodate their entry (behave passively and share the market, with the result that you will each get \$200) or you will react aggressively and engage in predation and they will lose \$100 and you will earn \$300. I'll change these payoffs in a second, but the way that I have them now tells a story where it works out, for whatever reason, that predation is actually more profitable than accommodating. It is important in these types of sequential games where somebody really does get to move first, that you think ahead and put yourself in the place of your rival. Think first about what they are going to do and then work backwards to what you are going to do.

Student Question: Are the payoffs short-run or long run?

Slide #12

This is a good question: these are present discounted values over a long period of time. In order to call it predation you actually have to be pricing below your own variable cost and then later it works out that you can raise the price and more than make the money back. If you are the entrant and you are trying to decide whether to enter or stay out, when you think ahead you are thinking first about what the incumbent is going to do. As I've already said, if you enter and the incumbent accommodates they will earn \$200 and if you enter and they predate they will earn \$300. In this case, the incumbent is going to engage in predatory pricing which means you cross out that branch of the tree. In other words, if they threaten this strategy in this case it is not a bluff.

So what does that mean for you, the entrant? That means that you have now two choices. You can stay out and earn nothing or you can enter and get into a costly price war. Given that those are your two choices (given how I wrote the payoffs here), this is not a good market for you to enter into. You stay out and you earn zero. In this case is the threat to engage in predatory pricing credible? Yes, it is in fact, in present value terms, the more profitable strategy for the incumbent to take if the entrant actually enters. But notice that if it is credible you never have to get into the price war because you deter entry to begin with. In order for a threat to be credible, when push comes to shove, it has to be your best

response, otherwise it will turn out that it is more profitable for you to back off and accommodate, which is easy to do if I switch the payoffs.

Slide #13

Now let's just suppose that if you get into a price war, you lose \$150, and if you accommodate, you earn \$200. This simple change in the payoffs for the incumbent reflects one of the reasons why predatory pricing is often considered to be not the smartest of strategies. We always implicitly have a story in mind where you're the big company and you're trying to kick out a small or medium-sized company. If you are larger, when you start a price war, what happens to demand? It's going to increase, right? And if you don't satisfy that demand then the low price won't stick. Therefore, as the large company, you must have the capacity to fulfill demand at that low price, and you are going to be losing proportionately more than the company that you are trying to kick out. It is very expensive. So it could easily happen that accommodating is the more profitable strategy. Suppose you, as the incumbent, you let it be known that if entry occurs you will react – you say “we're not going to lose market share, we will lower our prices,” etc. But the entrant doesn't need to know that your payoffs are +\$200 and -\$150; they just need to think that it is a bluff and that accommodating is going to be more profitable for you than entering into an expensive price war. As long as they think that you won't predate, they are looking at a payoff of \$200 versus zero. So they are going to, in fact, enter in that case.

Student Question: How do you know how to calculate the payoffs of the incumbent?

The entrant needs to make a very good educated guess. You are trying to forecast whether or not it is a bluff. The incumbent by definition has been in business for a long time, so you can look at their history of how they have reacted to entry in other markets, in other product lines, or other geographic areas. You can have an idea perhaps, although how precise it is depends on information in the industry about whether the incumbent is a high cost or low cost producer. Also, you know what price you are thinking of entering at, right? How aggressive are you, as the entrant, going to be? Are you going to trigger an aggressive response on the part of the incumbent? You can see that there are other strategies too, if you think that you might trigger an aggressive response there are ways of entering off on the side or more slowly so that you don't attract the incumbent's attention.

Prof. Francine Lafontaine: This question raises the issue of how precise these numbers have to be. They don't really need to be precise. We use numbers at the end of these branches because it makes it easier to explain

what the concept is. But really all you need to have is a ranking as to what you think will be better for them. You don't need any numbers, you just need to think that accommodating will be more profitable for them, or less profitable. That is really important when you think about game theory generally as a tool. All you need is a sense of where things stand and not the actual numbers.

Student Question: What about using profits from another product to sustain the price war?

It is true, as you say, that you can use profits in one market to subsidize losses in another market, but there are other effects as well. In the airline industry, for example, let's say you enter into one market and you challenge American Airlines by cutting price. Since American operates in multiple markets, they also have a choice. They don't necessarily have to punish you in that market. They can punish you in another geographic market where it will hurt you more. So there are a number of factors that arise if the incumbents that were thinking about operate in multiple markets. It opens up opportunities for them, as well.

Student Question: You said that it has to be pricing below your variable cost. Is there a rule courts always use for defining variable and fixed costs in these cases?

It is marginal cost or average variable cost – but the incumbent on trial has a lot more knowledge of what their costs are and what they choose to present as variable versus fixed. Normally everybody knows that variable means – cost varies based on output – but I would hesitate to say that there is a particular rule that will always apply in all court cases.

Prof. Francine Lafontaine: Let's put it this way: it is going to be the court's best guess as to what the variable costs of the incumbent really are. In these predatory pricing cases, a lot of time and energy is spent, in fact, trying to identify which costs are variable and which costs are fixed.

Student Question: What about marginal costs for software companies?

Let me give you an example again from the airline industry, but it has spillovers and implications for Microsoft and other technology firms. The antitrust officials in the U.S. brought a predatory pricing suit against American Airlines and they tried to use a different cost argument so that they could prove that American was pricing below their marginal cost in response to entry in a particular market. But the judge took the traditional definition of marginal cost: if the plane is going to

fly anyway what is the marginal cost? It is another bag of peanuts, a little bit more fuel etc., etc. and that is extraordinarily low. But American Airlines was not charging near zero, so the judge said they were not guilty of predatory pricing. The decision was appealed, but the government lost.

That was a U.S. case. Other countries might take a different view of this, so you have to be careful. The American Airlines case has implications for companies like Microsoft where the marginal cost, once you have invested in R&D and so on, is just burning another disk. In the U.S. we allow, generally speaking, very aggressive pricing. However, that doesn't mean that your competitors can't hassle you and sue you if you price aggressively and kick them out – they can turn around and sue and tie you up in court. But the federal government doesn't bring firms to court very often.

Prof. Francine Lafontaine: The European Union is much more aggressive in this area. But there are no private suits, so there is no opportunity for competitors to complain about an incumbent's behavior using the court system. So it is only if some government agency chooses to go after you. Here in the U.S., your competitors can file private lawsuits. It doesn't mean that they will win, though. Most of the time they will not win.

Student Question: What if you are pricing below what your costs are now, but you expect costs to fall?

I can't really say offhand whether that would be legal or illegal – you would have to argue the case and convince the court. For example, suppose there is a learning curve and you are pricing below your current costs, but costs will fall quickly with cumulative output. Within a relatively short time-period you will be pricing above cost. It sounds like that is a reasonable economic justification for your current low prices. However, some years ago in the semi-conductor industry, Japanese companies were doing exactly that and they lost that argument. However, that was a dumping case and not a predatory pricing case. They were charged with selling chips in the U.S. at very low prices and they tried to say these prices will cover our costs in the long run. That didn't work. Dumping cases, though, don't go through the court system and they are treated very differently from predatory pricing cases

Student Question: So the court worries about possible high prices in the long run?

That's right – in the long run. This is the issue that the court struggles with. In the U.S. they try to take the side of what is best for the consumer. In the short

run, predatory pricing, price wars, tend to be very good for consumers as long as we don't have product quality problems as a result. In the long run, though, perhaps a company might be able to kick a rival out of the market, or perhaps three or four years from now they will raise the price up to monopoly price. This means that maybe consumers will be hurt in the long run. But these long-term effects are very uncertain. That is why, in the U.S., in general, courts have decided that aggressive pricing is good because it is good for consumers.

Student Question: What about agricultural subsidies?

The World Trade Organization has rules about what kinds of agricultural subsidies are okay and which ones aren't, and there can be disputes among countries about this. For example, we had tariffs put on for steel a couple years ago and other countries complained, so we basically took them off. That is a different set of rules – it is a very different category from predatory pricing.

Slide #14

Before we move on, I want to mention an article that I posted on the web site. I would recommend this article if you are interested in how to fight a price war started by a competitor. In one part of the article, they talk about how many unprofitable price wars happen because a company sees an opportunity, they want to increase their market share through lower prices, and they forget about the fact that their rivals will respond. So, very quickly, let me ask you: if you are in an industry where somebody else has started a price war, do you have to match them head-to-head, or are there ways you can soften the results or deflect attention from the price war? What are some things you can do?

Student Answer: Compete on quality.

Student Answer: Raise your price and they will follow.

Let's think about that – your suggestion is to price somewhat above them and hope they rise to meet your level. The problem with that is that they are the ones that started the price war, so they clearly have a strategy of pricing low. It's going to be tough for you to lead them to a higher price when they clearly have the opposite strategy.

Student Answer: Bundled pricing.

Yes, another thing that you can do that the article talks about is bundle products so that it is difficult for the consumers to do a direct price comparison. There is a

story in the article about what happened back in the 1980s in the fast-food market. Taco Bell reduced the price of its tacos. McDonald's could have responded by reducing the price of its hamburgers, but what they did instead was create the "value meal." They bundled together burger, fries, and a drink and then it was difficult for the consumers to do an exact price comparison. The price war did not spiral out of control. So there are counter-strategies that a rival can adopt.

Slide #15

This has already come up in our discussion, but let me very quickly say that predatory pricing is charging a price that is below average variable cost or marginal cost. Marginal cost can be difficult to measure (by courts or by companies), so sometimes we use average variable cost. Courts also look for specific intent to drive the rival out, and whether this is a rational strategy. Could you think that you have the possibility of recouping these losses? Also, if you are losing money and you think you have the likelihood of recouping the losses it must be that the price cut is temporary. That is an important part of predatory pricing as well. Each of these elements will be looked at in court cases.

Slide #16

Okay, let's talk first about promotional pricing. Suppose you promote a product by reducing the price. That's temporary. It's a low price. You might be pricing below cost, and you might even be giving it away for free. Is that the same thing as predatory pricing? Does that satisfy all the elements for the court?

Student Question: Is this in the U.S. or in other countries?

It depends on the country, so let's stick with the U.S. for now. In Germany, for example (although they have changed the law recently), they did not allow companies to have sales (above-cost sales). They thought it was confusing for consumers. Germany is different. So, is promotional pricing the same thing as predatory pricing according to U.S. courts?

Student Answer: Usually promotional coupons will have an expiration date.

Yes, one of the things that characterizes promotional pricing is that the promotion is on for three months or three weeks and you tell consumers ahead of time – buy the product now or redeem this coupon now because it expires in such and such a time. You don't do that when your strategy is predatory pricing. Promotional pricing is normally considered fine.

What about a loss-leader strategy: Is that different from predatory pricing? In certain cases it is possible that it could be, but there are many other cases where

it is clearly different. We often talk about milk being a loss leader at a grocery store. Or, as another example, think about purchasing a cell phone service plan: the cell phone might be in some cases given to you (or sold to you for a steep discount) and that might be a permanent state of affairs for the company. They will always do that because that is how they bring people in and then they make the money on the complementary product. It is not designed as a strategy where later on they are going to increase the price of milk or cell phones. So a loss leader strategy can be very different from predatory pricing in that it is immediately profitable. You are not losing money temporarily. It is immediately profitable. Generally, you won't see cases like this in federal court, but in certain states you will see cases. There was a case several years ago in California that was a cell phone case where there was a company that was giving away cell phones (or close to it), but also selling customers the monthly service plans. Then there was a company that only made cell phones. There was no way for the stand-alone cell phone company to compete and so they sued. So, generally speaking, it is not a problem, but you have to be aware of the law.

Professor Lafontaine: Let me add, that there have been state-level cases against Wal-Mart. In Arkansas, for example there was a suit against Wal-Mart by small pharmacies. The mom-and-pop pharmacies were saying that Wal-Mart was using all pharmaceutical products as loss leaders. I'm using Arkansas as an example and Professor Suslow talked about California. Within the United States, in addition to federal law, each individual state has its own antitrust laws. In Arkansas the law was a little bit more ambiguous on predatory pricing and the pharmacies won the first round against Wal-Mart. Then at a higher level, on appeal, it got reversed. So Wal-Mart has been charged with predatory pricing. But fundamentally, when it can be assessed that it is a loss-leader strategy it is not wrong for Wal-Mart to be doing that because on the bundle of products they sell, they are not selling below cost. That's going to be the test – on the typical customer's bundle of goods, is that price below cost? If the answer is no, then the fact that one product is below cost, that's just a loss leader and that's okay.

Slide #17

Let's switch topics now, and let me give you a survey of some other possible entry deterrence strategies. I'm going to speak only briefly about excess capacity and we'll spend a bit more time on the others. Here, I'll just tell you a story about Archer Daniels Midland and the lysine market. Lysine is an essential amino acid. It's an important component of animal feed. In the 1990s there were a handful of companies globally that made lysine. Ajinomoto in Japan had 60% of the world market share in 1991. Archer Daniels Midland decided to enter and this was

basically what happened. (There have been books written about this and I give you additional references if you are interested.)

I should mention by the way, before I go into this, that for each of these mini-cases we are going to talk about, it would be very rare for the companies to pursue one of these strategies in isolation. It is more likely that the firm would combine pricing, capacity, R&D strategies, and so on. Today I'm just taking a slice and telling a little bit for each company, but there is a lot more involved.

Okay, here's part of the ADM story. ADM decided to enter into the lysine business and they built a plant that was going to end up, once they got it to full capacity, as the largest in the world and almost three times the size of the largest plant. They aggressively publicized their investment so that everybody knew what they were doing. It actually took quite a while for the plant to get up to full capacity. I have here that it didn't get to full capacity until 1995, but in 1991 or so was when they started telling everybody what they were going to do. (By the way, there are also strategies for publicizing what you are doing as a way to try and influence other people's investments, but on the other hand there are also times when you want to keep it very quiet. So that is a decision for companies to think about.)

Slide #18

ADM was very open about this and once the plant came online they produced as much as they could and drove the price down, which hurt the others in the market. The other firms actually tried to raise the price several times but that wasn't what ADM wanted, so ADM didn't follow and the price went back down. Then ADM took the rather rare step of inviting the engineers from the other companies to come and tour their plant. Why is that? Why should you allow them in?

Student Answer: It makes it a credible threat.

Yes, to make the threat credible, but how? What is it you are trying to show? We really are the most efficient plant. The others doubted that ADM could actually survive at the low prices that they were forcing on the market. As I mentioned before, there were multiple elements to their strategy, but the most important element was the plant they were building. I have to be careful here because you can also argue – and this always comes up in these “building excess capacity cases” – that ADM just was simply anticipating demand. They were building five years ahead of demand and that was rational for them to do, so there is an innocent explanation to their strategy as well.

ADM achieved their goal of 30% global market share (and eventually their market share went even higher). Now, the next set of actions was illegal, so I'm not recommending them to you. At that point, ADM flew over to meet with

their competitors and they said this low price is painful, isn't it? And their competitors said yes. How about if we start a cartel and it will all be very peaceful? They were eventually caught and were fined in multiple countries, and some executives went to jail. Their customers also sued them.

Slide #19

Now let's talk about another strategy called limit pricing. I'm going to pick on DuPont for the next two cases. DuPont combined limit pricing, excess capacity, and a learning curve, but I'm going to focus on the limit pricing element. I'll tell you the story in a second but, let's first define the strategy. Limit pricing is a strategy where you could charge the short-run profit maximum monopoly price, but if you do that will create enough of a gap or price umbrella so that others, even if they are not as efficient as you, could enter and survive. So, instead, you set a price that is lower than the monopoly price and you produce more in order to hopefully make profit opportunities in this industry less attractive. This might allow you to either deter entry, or slow it down, or slow down the rate of expansion by your competitors. It is a difficult strategy as many of these are for a number of reasons. One of the things, in case I forget to say it later, is that you have to be fairly sure about your competitor's cost structure. If you lower price in order to deter entry, it is because you are hoping that although your price is above your cost, it is below your competitor's cost. If your competitors are more efficient than you think, it's not going to hurt them. They can still come in and expand and you will have cut your profits.

Slide #20

This case is about the titanium dioxide market – it is a pigment that is used for many things but one of its main uses is for paint. To make a long story short, as this market was developing the producers had the opportunity to invest in two different types of processes to make titanium dioxide. Also, there were different grade ores that could be used for the chloride process, either low or high grade and DuPont invested in both. The competitors invested in the high-grade ore process. When DuPont was making these investment they weren't sure about what was going to happen, but they developed a proprietary process for the low-grade ore and it was a very steep learning curve. You had to learn at full scale. You couldn't learn by building a small-scale plant.

Then several things happened in the 1970s that were not within DuPont's control and suddenly they had an enormous cost advantage. The price of the high-grade ore skyrocketed. The Environmental Protection Agency was getting after people for the other low-grade ore process. These changes gave DuPont a cost advantage, but DuPont recognized that it was temporary: if DuPont could learn, then the other companies could also learn. It is just that it would take them

time. So DuPont formed a task force – you could be on such a task force someday – and they said how are we going to turn this advantage to our benefit long term?

Slide #21

Initially the management in DuPont was saying let's just maintain our price, maintain our market share and keep with the status quo. Our market share will increase from about 30% now in the 1970s to maybe 37% in 1985. But the task force looked at the situation and recommended something very different. They said let's forecast about nine years out or so and let's charge a low price now because now we have the cost advantage. They thought very specifically about the price to charge now. It had to be high enough that DuPont was making money and could continue to expand capacity and invest in the industry, but low enough to deter expansion and entry by rivals. That is a very fine-tuned price. Eventually others will exit because it is not profitable. At that point we can raise the price, about 2 to 4 cents above the "maintain" strategy, and we will also be increasing our market share because others will have exited by then.

The task force was targeting a 65 percent market share and they calculated that this growth strategy would be more profitable overall. There were really three elements to this strategy. One was the pricing strategy, high enough for investment for DuPont, low enough to deter others. The other was investing in excess capacity or building capacity ahead of demand (there was a lot of debate about this in the court case). The third part was DuPont's choice not to license their new process for titanium dioxide. Each of these elements fed back into the other and gave DuPont a more sustainable advantage.

Slide #22

What happened was, basically, it worked. Although you can argue about the individual components of the strategy, it worked. There was exit. DuPont's market share went up to maybe 60% or so. The Federal Trade Commission charged them with illegally monopolizing the market. It is very important, at least again confining ourselves to the U.S., that DuPont won this case. This gets back to the idea that in the short run this was good for consumers and in the long run it is very speculative as to whether DuPont would raise the price that high again. The conclusion was that there was no unfair conduct. It was limit pricing, but it was not predatory pricing. DuPont was not losing money. DuPont tried to say as companies often say that the task force was just a few rogue employees. Don't use the rogue employees argument, okay? It doesn't work. They had to admit they did have a conscious strategy, but they argued that there was a legitimate business justification. They were a low-cost competitor, they were innovative, and prices were low. That is all good for consumers. They used their superior skill and

foresight – those words came up in a classic monopoly case. It has to be okay to be good at what you do and to be smart. If that is how you achieve a large market share, we think that's okay.

Student Question: Is it okay if as a dominant firm you pursue an aggressive strategy that causes your rivals to lose market share, but doesn't put them out of business?

It certainly is safer, but there is no guarantee. As we've been talking about, it's not the government who will file a case against you, but your competitor who is losing market share. Even if you haven't kicked them out of the market, they can still turn around and sue. For example, there is a case that we probably won't get to (but Professor Lafontaine will mention in March) against 3M for Scotch tape where a private label manufacturer came in. 3M introduced a fighting brand – that's another way to deflect a price war, so that you don't lower the price for Scotch brand tape. They introduced Highland brand (similar to their introduction of Highland brand disks when competition in that market intensified). 3M then launched a program with bundled rebates. LePage's was the other company, the private label company. They lost market share but they didn't exit. LePage's turned around and sued and they won. It was appealed to the Supreme Court, but they chose not to hear the case. So, 3M has lost that case. This is a troublesome case for many large companies particularly because 3M's argument was that they never charged a price that was below their cost. LePage's never fought that: it wasn't a predatory pricing case. 3M tried to argue that it has to be legal for a large firm to compete, as long as they were not predatory pricing, but 3M lost the case.

Prof. Francine Lafontaine: When you look at the facts in the 3M case, to most people in Business School this seems totally logical. There's nothing nasty about this. It is part of competing. But there are people trained in law schools that think that this is bad. Connected to this "rogue employee" argument – I agree, don't ever use that argument – when you are on a task force, recognize that some of the language that you use could end up in court. The last thing you want to have in any kind of memo, is "we're going to do this to kill our competition." Don't ever put words like that in any memo or document, ever in your life.

In case she's not clear, don't ever put those types of statements in memos or emails. DuPont did it, and it caused problems. 3M had a memo like that – the reason for introducing Highland and the rebates is to kill the private label competition – and it caused problems for them, too.

Slide #23

Our last topic is raising rivals' costs. I'll start off with a couple examples and then we'll get back to a sequential game treatment of this strategy. I'm going to pick on DuPont again. This wasn't an antitrust case; this is just an example involving the use of chlorofluorocarbons or CFCs, which are used in refrigerators and refrigerants in the insulation. These CFCs harm the ozone layer and so governments worked together internationally to regulate the CFCs and slowly phase them out. They were phased out of aerosol hair spray earlier than this and now they were really trying to get them completely out, meaning that the companies had to switch over to substitutes. The story here is that DuPont innovated and developed patented substitutes, and consciously managed the regulatory process so that the regulators were steered towards requiring DuPont's new substitutes. These substitutes were higher cost, which made it difficult for their competitors. DuPont was able to maintain its market share if not increase it through this process.

There are other strategies that come under this heading of raising rivals' costs (and it can mean raising your own cost as well). One that I mentioned at the beginning is changing product design and interfaces frequently. Another is "jamming the signal," for example, when a rival company is doing a product entry study in a particular geographic market. You are the incumbent firm, you notice what they are doing, you have a sale that week or you put out ads and coupons and you confuse the market or make the market test noisy. I'm not saying that will prevent a firm from entering, but there are cases where it has slowed them down a bit. These strategies also come up in auctions. Does anybody know, what sort of signal jamming you might use if you were bidding in an auction? Think of a case where there are companies that are bidding for multiple items or in multiple geographic areas.

Student Answer: You could try making a low bid and then other companies will think it isn't a valuable market.

Yes, you could bid low to try and signal that the value in this market is low, particularly if you are an established firm and others look to you to form their bidding strategies. Any other ways you can create a little bit of noise in auctions (and again these can be risky strategies)? You do the opposite as well, you drive up the price, or you bid a lot in one market making people think that that is the market you really want and then in the end you come over here and take a different market. You have to be careful because sometimes the others will drop out and you will win the market that you don't want. That has happened to companies before. But some of it isn't just creating noise. There have been cases in the

spectrum auctions where companies try to bid up a price to make a smaller competitor use up their limited budget.

Another strategy within the standard setting context is what is known as the “patent ambush.” You have to be very careful about this legally. Standard setting is very important in a lot of goods, computers for example, and there are some companies that wait until the standard is set then reveal that they have a patent and then they go to everybody and ask for royalties. Consult your lawyer. Sometimes it is legal, depending on the disclosure rules when firms are trying to agree on standards, and sometimes it is illegal.

Slide #24

So, let's take a look at raising rivals' costs – the question is whether it is possible to do it in such a way to increase your own profits. It is certainly not always doable, feasible, or wise, but it can be. The one thing I want to get you thinking about, and this is much more general than just raising rivals' costs, is that when you decide to pursue a certain strategy there's a direct effect and a strategic effect. Suppose you are going to raise everybody's costs including your own. There are various ways of raising the cost of competing, as we talked about earlier: advertising, intensive R&D, very quick turnaround in terms of new models and new products, and so on. The direct effect on your own profits is negative because you are investing in something that is very costly. But if that investment signals to your competitors that this is not a market that they want to be in, then the strategic effect is that you might be able to deter or slow down entry and in the long run your profits will be higher. This is something to think about in many other different contexts: what is the direct effect, and what is the strategic effect?

Slide #25

Let's look at a simple numerical example. There's a monopolist and there's a firm that wants to enter. As a monopoly you earn \$100. If another firm comes in and you compete, you both earn \$40. Imbedded in this is the idea that if another firm comes in and you both compete you are not going to make it to \$100 any more; you split slightly lower profits and each get \$40. The entrant is willing to pay to enter and you are willing to pay to keep them out. The question is – will raising everybody's cost, including your own, by \$50 work as a strategy to deter entry?

Slide #26

Here is the sequential game, but it is different than the first one we considered. Remember in the predatory pricing game the entrant came in and then the incumbent decided, do I accommodate them or start a price war? Here the incumbent is making the first move in order to change the nature of the game. Their first move

is to decide whether to do nothing – don't raise cost – or make this investment that raises costs by \$50. Then the entrant decides what to do. That is why I list the incumbent's profits first, because they move first, and then the entrant is the second mover and their profits are listed second.

Slide #27

Again, we're going to look ahead. Think of yourself as the incumbent now, but first put yourself in the mind of the entrant and ask what they will do. Notice here that if we do nothing the entrant has two choices: if they don't enter this market they will earn a competitive rate of return in another market, but if they do enter this market they earn \$40. Since \$40 is better than \$0, they will enter this market. If we do raise cost, the entrant again has two choices: if they don't enter they get economic profit of zero, but if they enter and there are now two companies each earning \$40, but we've raised cost by \$50, so we're each going to get -\$10. The important thing to keep in mind for situations like this is the following: if the incumbent does nothing that does not mean maintaining status quo. Doing nothing means your profits are going to fall from \$100 to \$40. So when you think about your alternative strategies, doing nothing does not mean you get to keep the profits that you have. What is going to happen here? If the entrant is going to choose enter if I do nothing, and if they are going to stay out if I raise cost, then \$100 isn't an option for me anymore: my choice is \$40 or \$50. Since \$50 is better, the incumbent should make the investment to raise costs. This shows you that there are situations where this can work.

Prof. Francine Lafontaine: So getting back to the environmental example: one of the ways you can do cost raising that is pretty well recognized is lobbying for environmental rules. You go to the government and say this industry really shouldn't be polluting so much and there is a technology that is available that we can use. There are firms that have done that in a strategic context, because they knew either that it would hurt their competitors more than it would hurt them, or they knew it would deter other firms from entering because of the higher costs. So, environmental policies can actually play into this type of strategy.

Slide #28

Yes, a lot of times the more expensive technology, even though it pollutes more, will be grandfathered in so you can get higher standards for new competitors. So, back to our example: this is a situation where raising rivals' costs could work. The other thing that is interesting to think about is that there is a potential asymmetry between the incumbent and the entrant. The maximum amount the incum-

bent is willing to pay is \$60 and the maximum amount the entry is willing to pay is \$40.

Student Question: Is this example assuming perfect information?

It is assuming very good information, but this goes back to the comment I made earlier. I don't need to know that it is -10, 40, 50, and 100. I just need to know that this is the ranking. I need to be able to predict what I think the company will do and which is their better choice. But I don't have to know exactly what their profits are. It is certainly true that sometimes even just trying to predict what the other company will do is really tough. But it is deceiving that we have such a precise game here. We only have numbers here so that we can be specific in our discussion, but I don't really need to know the exact numbers. This could be 40 and 0 or 4 million and 3 million, it doesn't matter. But if I'm the incumbent and I'm thinking about this decision, what I do need to be able to predict is whether they will enter if I do nothing. That is what I need to know. You are right that you need to have some information, but it can be very imperfect. It is still true, though, that there are a lot of risks associated with this strategy and so you if you are pursuing a strategy of raising everyone's costs, including your own, you better have a good idea about how much those costs are going to go up for you. Does that get to your question in terms of the perfect information?

Let me give you a completely different illustration, not in the context of pricing. Suppose you work at a Wal-Mart and you're thinking of unionizing. What do you think Wal-Mart is going to do? How are they going to react?

Student Answer: They are going to close the store.

That's possible, yes – they might to close the store. There's a situation right now in Canada. You don't need to know how much money Wal-Mart is making or losing at that store. In your judgment, if you try to unionize, they will close the store. You can make a pretty good guess about what Wal-Mart is going to do in that context and you don't need to know any specific figures. But it is an educated guess based on their history of how they handled this at other stores in other locations and their reputation with attempts to unionize. It is the same thing here. In some cases and in some markets it is going to be easy to guess because the path of the incumbent is very clear. In other cases it's going to be quite difficult, so I acknowledge your point. Think about airlines again. In the airline industry you can bet that if you are an upstart airline and you charge a very low price on a route that is valuable to the dominant firm, they will fight you. If you charge a low price on some other route leaving from some other small city airport, it is likely that they won't fight. So you can make some of these broad predictions.

Prof. Francine Lafontaine: Having said that, it is true that companies will make mistakes. Setting things up like this also forces you to think through what it is that might happen if ever a decision is wrong. And that is a useful thing to do as well.

Okay, we are out of time. We made a promise to end at 11:30, we'll end the presentation here, and people can leave if they want to. We will stick around and continue the conversation if you want to until noon. Thank you all very much. Let's take a couple minutes break and then we'll answer questions.

References

- Balto, David (2003). "LePage's v. 3M," *The National Law Journal*, August 11.
- Dobson, Douglas C., William G. Shepherd, and Robert D. Stoner (1994). "Strategic Capacity Preemption: DuPont (Titanium Dioxide)," in *The Antitrust Revolution* (2nd ed.), John Kwoka and Lawrence White, eds., New York: HarperCollinsCollegePublishers, 157-186.
- Gruca, Thomas S. and D. Sudharshan, (1995). "A Framework for Entry Deterrence Strategy," *Journal of Marketing*, 59: 44-55.
- Meller, Paul (2004). "Coke and Europeans Settle Antitrust Case," *New York Times*, Oct. 20, pg. W.1.
- Meyer, David (2003). "LePage's II: The En Banc Third Circuit Revisits 3M's Bundled Discounts and Sees Unlawful "Exclusion" Instead of Above-Cost Pricing," *The Antitrust Source*, July: 1-14.
- Rao, Akshay R., Mark E. Bergen, and Scott Davis (2000). "How to Fight a Price War," *Harvard Business Review*, March-April: 107-116.
- Reinhardt, Forest (1999). "Market Failure and the Environmental Policies of Firms," *Journal of Industrial Ecology*, 3: 9-21.
- Smiley, Robert (1988). "Empirical Evidence on Strategic Entry Deterrence," *International Journal of Industrial Organization*, 6: 167-180.