Sloan School of Management
Massachusetts Institute of Technology

15.013 – Industrial Economics for Strategic Decisions
Professor Robert S. Pindyck

Lecture Notes
on
Entry and Reaction to Entry

(Revised: July 2013)

In these notes we will examine some issues that can arise when a firm tries to enter a market. We will begin by considering some of the ways that uncertainty over future market conditions can affect an entry decision that involves a large sunk cost investment. As we will see, uncertainty creates an *opportunity cost* of investing now rather than waiting for new information. (In effect, the first section of these notes provides a very brief introduction to the theory of "real options.")

Next, we will focus on entry into a market that has been dominated by a monopolist or a near-monopolist. What kind of response should the entrant expect from the incumbent monopolist, and are there ways of affecting the likely response? We will consider the question of whether it might be advantageous to enter on a small scale. Might such entry lead the incumbent firm to respond in an accommodating way, so that the new entrant can survive and earn profits?

Next, we will consider the problem of entry in a market for an "experience" good. We will see how an incumbent firm in such a market can have an important first-mover advantage that can make entry by another firm difficult or impossible. We will also see how this first-mover advantage can help explain the success of Gillette with its Sensor and Mach 3 razors.

We will then turn to markets for "credence" goods, and see how the "credence" characteristic can induce producers to set high prices. Finally, we will see that in some markets — pharmaceuticals are a good example — it can be advantageous to be a second mover.

1 Entry Under Uncertainty

Often, entry into a market involves a large sunk cost, combined with uncertainty over future market conditions, and thus the eventual return on the investment. Sometimes by waiting the firm can learn more about market conditions and the amount of revenues it can expect to earn. This information can come from the market itself (for example, a firm deciding whether and when to develop a large oil reserve can simply observe the evolution of oil prices), or the information can come from observing the success or failure of other firms in the market. In either case, we can think of the entry (and investment) decision as analogous to the exercising of an option. We refer to such investments as "real options," and we use option valuation techniques developed in finance to determine when such investments should or should not be made.

The idea of a "real option" is fairly straightforward: A firm has an *option* to invest. It can exercise this option now, in the future, or never. The exercise price of the option is the cost of the investment. If the firm exercises its option and invests, it receives an asset, which could be a factory (or apartment building, or developed oil reserve, or patent, etc., etc.). The value of that asset will fluctuate unpredictably over time, just as the price of a stock fluctuates over time. Like many stocks, the asset yields a "dividend," which could be the net cash flows from the factory, net rental income from the apartment building, etc. Thus the decision to invest is much the same as the decision to exercise a call option on a dividend paying stock.

To explore this further, consider the decision to build a widget factory that will produce one widget per year forever. The price of a widget now is \$100, but as shown in the diagram below, next year it will go up or down by 50% (with equal probability), and then it will stay at its new higher or lower level. The cost of the factory is \$800, and it only takes a week to build. We'll assume that the correct discount rate is 10 percent. Is this a good investment? Should we invest now, or wait one year and see whether the price of widgets goes up or down?

$$
\begin{array}{lccccc}
\underline{t=0} & & \underline{t=1} & & \underline{t=2} & \cdots \\
 & & P_1 = \$150 & \rightarrow & P_2 = \$150 & \rightarrow \\
 & \overset{\frac{1}{2}}{\nearrow} & & & & \\
P_0 = \$100 & & & & & \\
 & \underset{\frac{1}{2}}{\searrow} & & & & \\
 & & P_1 = \$50 & \rightarrow & P_2 = \$50 & \rightarrow
\end{array}
$$

Suppose we invest now. Then the NPV of the investment is

$$\text{NPV} = -800 + \sum_{t=0}^{\infty} \frac{100}{(1.1)^t} = -800 + 1,100 = \$300$$

This is much greater than zero, so the simple NPV rule that you learned in your introductory finance course would tell you to go ahead and invest. But suppose that instead of investing now we wait a year. In that case we would only invest if the price of widgets goes up to \$150. (If the price drops to \$50 investing would then have a negative NPV.) Thus the NPV *as of today* if we wait a year is:

$$\text{NPV} = (.5)\left[-\frac{800}{1.1} + \sum_{t=1}^{\infty} \frac{150}{(1.1)^t}\right] = \frac{425}{1.1} = \$386$$

Clearly waiting is better than investing now. The value of being able to wait — i.e., the value of having the flexibility of being able to invest either now or later — is the difference in the NPVs: \$386 - \$300 = \$86.

What's wrong with the simple NPV rule that tells us to invest as long as the NPV of a project is greater than zero? After all, building the factory today still has a positive NPV. The problem is that when we calculated the NPV of investing today we ignored an important *opportunity cost*, namely the cost of "killing" our option to wait for more information. In Chapter 2 of Dixit and Pindyck, *Investment Under Uncertainty*, this simple investment problem is solved in a more circuituous but informative way — by using standard option pricing techiques. There we show that the *option to invest* is worth \$386, which is precisely the NPV that we just found for the optimal investment strategy of waiting a year before deciding whether to invest.

Another way to value flexibility is to ask how high an investment cost I would we accept to have a flexible investment opportunity rather than a "now or never" one? To answer this question, we find the investment cost $\overline{I}$ that makes the NPV of the project when we wait equal to the NPV when $I = \$800$ and we invest now, i.e., equal to \$300. Substituting $\overline{I}$ for the 800 and \$300 for the \$386 in equation for NPV above:

$$\text{NPV} = (.5)\left[\frac{-\overline{I}}{1.1} + \sum_{t=1}^{\infty} \frac{150}{(1.1)^t}\right] = \$300$$

Solving for $\overline{I}$ yields $\overline{I} = \$990$. Thus an opportunity to the build factory now *and only now* at a cost of \$800 has same value as an opportunity to build the factory now *or next year* at a cost of \$990.

Why use option-theoretic methods, which are generally more complicated than the simple NPV rule, to evaluate investment decisions? Here are a few reasons:

- With uncertainty and irreversibility, the NPV rule is often wrong — *very* wrong. Option theory gives better answers.

- We can value important "real options," such as value of land, offshore oil reserves, or a patent that provides an option to invest.

- We can determine the *value of flexibility*. For example, the flexibility from delaying electric power plant construction, or the flexibility from installing small turbine units instead of building a large coal-fired plant.

- Option theory emphasizes uncertainty and treats it correctly. (The use of the NPV rule often doesn't.) This in turn helps us to focus attention on the nature of uncertainty and its implications.

  - Managers often ask: "What will happen (to oil prices, to electricity demand, to interest rates,...)?" Usually, this is the wrong question. The right question is: "What *could* happen (to oil prices, to...), and what would it imply?"
  - Managers often underestimate or ignore the extent of uncertainty and its implications.

This is not a course in real options. However, you should be aware of the optionality involved in many of the strategic economic decisions facing a firm. We will revisit this issue from time to time throughout this course.

2 Rational and Irrational Responses to Entry

One of the difficulties the arise when deciding whether to enter a market is determining how the incumbent firm (or firms) is likely to respond. Will the incumbent firm accommodate you, perhaps lowering it price slightly, or even maintaining its high price in the hope that you will also set a high price? Or will it try to drastically undercut you in an effort to drive you out of the market (even though if it succeeds in driving you out, it might be subject to a predatory pricing antitrust case)? Often we address these questions by asking what a rational incumbent would do. Is drastically undercutting you in the incumbent's economic self-interest, or would it be better of by accommodating you? If the incumbent is rational, we can at least anticipate the kind of response we should expect.

Sometimes, however, the incumbent will not act rationally. Sometimes we can anticipate that the incumbent will not act rationally, but sometimes we can't, and then we might be unpleasantly surprised. A good example of this is the experience that Kodak had when it entered the market for instant photography in 1976 — a market that Polaroid, and in particular its founder Edwin Land, had "invented" many years earlier.

Prior the the 1970s, the market for instant photography was limited because the pictures were limited to black and white. That changed in 1971, when Polaroid introduced its SX-70 camera and film, which allowed people to take instant photos in vibrant color. (Polaroid used a two-part tariff to price the camera and film. The camera price was at or below its marginal production cost but the price of the film was much greater than marginal cost. Does this make sense?)

Kodak entered with its own version of a camera and color film, and it expected to share the market with Polaroid. Executives at Kodak (and management consultants) claimed that prices could remain high, so that entry would be profitable. The idea was that Kodak would

enter with high prices, and Polaroid would (rationally) keep its prices high. Given the size of Kodak, that scenario indeed made sense.

Edwin Land, however, was not "rational." For him, the entry of Kodak was a personal affront. After all, Land had invented instant photography, whereas Kodak was just a copy-cat follower. From Land's point of view, Kodak had no right to be in this market.

So what happened? Polaroid (i.e., Land) dropped the prices of its cameras in half, and also dropped its film prices. It did not matter at all that Kodak maintained high prices (at least for a while) in the hope of signaling that both firms could co-exist and make plenty of money. Although it was unlikely (given Kodak's size and deep pockets) that Polaroid could drive Kodak out of the market, Polaroid would make sure that Kodak lost plenty of money, even if it meant that Polaroid would also lose money. And indeed, both firms lost lots and lots of money in a war of attrition that never ended ... until:

Polaroid sued Kodak for patent infringement. This was a complex patent lawsuit that went on for several years. But Polaroid finally won in 1986. Kodak was forced to exit, after incurring huge losses.

Now here is a question for you to think about: *Was it rational for Kodak to have entered this market.* This carefully about this; the answer is not obvious.

3 Entry on a Small Scale

Suppose you are considering entering a market currently dominated by a monopolist.[1] Should you enter, and if you do, how will the monopolist respond? Might it be advantageous to enter in a very limited way (by installing only a small amount of production capacity) in the hope that the incumbent firm will then be more accommodating and not undercut your prices? As we will see, the reaction that we can expect to entry, and hence the desirability of entry itself, can depend crucially on the scale of entry.

Suppose a monopolist is currently selling in a market with demand curve $Q = 100 -$

[1]This discussion is based on J. Gelman and S. Salop, "Judo Economics: Capacity Limitation and Coupon Competition," *Bell Journal of Economics*, 1983.

P. Hence the monopolist's marginal revenue function is given by $\text{MR} = 100 - 2Q$. The monopolist has a constant marginal cost of \$20 per unit. By setting marginal revenue equal to marginal cost, you can check that the monopolist's profit-maximizing price and quantity are \$60 and 40 units, respectively, and its profit is $\pi_m = 40(60 - 20) = \$1600$.

Now suppose that you are considering entering this market. You have less experience than the monopolist, so your marginal cost is higher—\$30 per unit instead of \$20. Suppose you enter with enough production capacity to serve the entire market. What can you expect to happen?

We will assume that both you and the monopolist produce an identical product, so that if your prices are equal, consumers will, out of convenience, continue to buy from the monopolist. However, consumers will shift all of their sales if one firm has an even slightly lower price. In this case, you can only expect to make money by setting your price below the \$60 price that the monopolist had been charging earlier. But the incumbent must then match your price, or else it will lose everything. You can continue to lower your price all the way down to your marginal cost of \$30, but the incumbent will still undercut you. Even if you charge \$30 (and thus make no money), the incumbent will match you, getting all of the customers, and still making \$10 per unit. Thus you can feel certain that the incumbent will respond aggressively to your entry, and you will not make money. It looks as though entry is not a good idea.

But now let's try a different strategy. Suppose you enter the market with only a *limited amount of capacity*, e.g., a capacity of 10 units. (You build a plant that is only capable of producing 10 units per period.) The incumbent knows that you can sell no more than this. What will happen now?

The entrant will have to undercut the former monopolist's price in order to sell anything. Suppose the entrant does this, charging a price P_E which is less — but only *slightly* less — than the incumbent's price P_I. Consumers will all prefer to buy from the entrant, but the entrant does not have enough capacity to sell to everyone. We will assume that the entrant's output is "rationed" randomly among all consumers willing to pay. For example, if the total demand for the entrant's output is 70 units, each consumer has a $10/70 = 1/7$ chance of

purchasing from the entrant.

In this case, what is the *residual demand facing the incumbent* when the entrant undercuts ($P_E < P_I$)? Note that demand for the entrant's output will be $Q_E^D = 100 - P_E$, since with $P_E < P_I$ everyone would prefer to buy from the entrant. The entrant, however, can supply only 10 units. Assuming that these 10 units are rationed randomly, each consumer will have a $10/(100 - P_E)$ chance of being able to buy from the entrant. Thus the residual demand facing the incumbent is:

$$Q_I \;=\; \left[1 - \frac{10}{100 - P_E}\right](100 - P_I) \;=\; \left(\frac{90 - P_E}{100 - P_E}\right)(100 - P_I)$$

Hence the incumbent's demand (average revenue curve) is given by:

$$P_I = 100 - \left(\frac{100 - P_E}{90 - P_E}\right) Q_I$$

and its marginal revenue curve is given by:

$$\mathrm{MR}_I = 100 - 2\left(\frac{100 - P_E}{90 - P_E}\right) Q_I$$

Setting marginal revenue equal to the incumbent's marginal cost of \$20, we find that the incumbent's optimal quantity is now:

$$Q_I^* \;=\; 40\left(\frac{90 - P_E}{100 - P_E}\right)$$

and its optimal price is once again \$60.

Note that the incumbent no longer has an incentive to drop its price and thus undercut the entrant. The incumbent makes more money by maintaining its original monopoly price and accommodating the entrant, letting it sell its 10 units.

We have not specified what price the entrant should charge, but that is easy to determine. The entrant does best by just slightly undercutting the incumbent, e.g., charging a price of \$59. Then the entrant sells approximately 10 units (its capacity) and the incumbent sells 30 units. The incumbent therefore makes a profit of $(60 - 20) \times 30 = \$1200$. The entrant earns a profit of nearly \$300.

The incumbent is now earning a smaller profit (\$1200 vs. the \$1600 it earned as a monopolist), so why not just undercut the entrant and drive him out of the market? To do so would

mean charging a price of \$30. The incumbent's profits would then be $(30-20) \times 70 = \$700$. The incumbent is better off accommodating the entrant.

We have seen that an entrant that comes in on a small scale can rationally expect accommodating behavior from the incumbent firm. This is a rationale for the pattern of start-ups in the U.S. airline industry that we witnessed during the past twenty years. Small start-up airlines like Kiwi International and Reno Air have come in with just two or three leased planes, offering only a limited number of flights on several point-to-point routes. In the case of Kiwi (flying originally out of Newark and then later out of Boston), the reaction was indeed one of accommodation. (Kiwi nonetheless went bankrupt.) That was not the case, however, with Reno Air—Northwest Airlines attacked aggressively on its overlap routes.

4 Markets for Experience Goods

Now let us turn to a market for an "experience" good. Examples of experience goods include razor blades, underarm deodorant, and disposable diapers. An experience good has the following characteristics:

- First, an individual consumer can be expected to use at most one brand at any point in time. The consumer might use a Gillette razor or a Schick razor, but not both.

- Second, any particular brand either "works" or "doesn't work" for a particular consumer. In other words, either the brand "does the job" as the consumer expects, or it doesn't. A deodorant, for example, "works" if it prevents odor and doesn't cause a rash or other allergic reaction.

- Third, the only way that a consumer can resolve the uncertainty over whether the brand will work or won't work is by purchasing it and trying it. The fact that a particular razor or deodorant "works" for your friend does not necessarily mean that it will "work" for you.

Note that with an experience good, the consumer gets no value from variety. Unlike breakfast cereals and other food items, there is no benefit from using one brand of deodorant

or razor on Mondays, Wednesdays, and Fridays, and another brand on the other days. All that matters is whether the particular deodorant or razor does the job it is supposed to do.

4.1 Entry in the Market for an Experience Good.

Suppose that such a market is currently served by a monopolist.[2] It might have taken some time for this monopolist's product to diffuse through and eventually saturate the market. In any case, we will assume that enough time has gone by so that consumers have learned that the product "works" and will buy the product as long as the value to them is at least as great as the price that the monopolist charges. We will now consider what will happen if a second firm should try to enter this market with a similar product.

Suppose that the incumbent firm (the former monopolist) is charging a price P_I. To keep things simple, we will assume that the incumbent maintains this price after entry occurs, and that the entrant expects the incumbent to do this. (Of course, if the incumbent were to lower its price after entry occured, that would make success by the entrant even more unlikely.) The entrant must now consider how many consumers currently using the incumbent's brand are likely to switch to his brand.

Consider a consumer currently using the incumbent's brand. Suppose that consumer has a value v for the good and thus enjoys a consumer surplus of $v - P_I$. (See Figure 1.) Suppose the entrant charges a price P_E, and that this consumer (along with all other consumers) thinks that the probability that the entrant's brand will "work" is $(1 - \pi)$, so that the probability that it will *not* work is π. In this case, the consumer will try switching to the entrant's brand if the following condition holds:

$$\pi \left[-P_E + \frac{v - P_I}{r} \right] \; + \; (1 - \pi) \left[\frac{(v - P_E)(1 + r)}{r} \right] \; \geq \; \frac{(v - P_I)(1 + r)}{r}$$

Here, the first term in brackets on the left side of the equation is the loss to the consumer if the entrant's brand does not "work." That loss is the money spent (P_E), plus the present value of the surplus enjoyed from switching back to the incumbent's brand in the next period.

[2]The model described here is based on R. Schmalensee, "Product Differentiation Advantages of Pioneering Brands," *AmericanEconomicReview*, June 1982.

The second bracketed quantity in this equation is the present value of the flow of surplus to this consumer that results if the entrant's brand "works." Weighting by the appropriate probabilities gives the expected value of trying the entrant's brand; that must be at least as great as the present value of simply sticking with the incumbent's brand. With a little algebra, this equation can be rewritten as follows:

$$P_E \;\leq\; P_I \;-\; \frac{r\pi v}{1+r-\pi}$$

Note that if $\pi = 0$ (so that consumers are certain that the new brand will "work" just as the first brand did), then all the entrant needs to do to get consumers to switch is to price just under the incumbent's price. However, things become much more difficult for the entrant if consumers are not sure whether the new brand will "work." For example, suppose that $\pi = .50$, and the interest rate r is equal to 10 percent. Then the consumer will try the new brand only if:

$$P_E \;\leq\; P_I - 0.83v$$

In Figure 1, this is shown as the dashed line AB. In other words, consumer currently buying the incumbent's brand will switch only if the entrant's price is below this dashed line. Observe that the higher the consumer's valuation (i.e., the farther to the left we are along the demand curve), the lower the entrant's price must be to get the consumer to try its brand. The reason is that consumers with very high valuations have more to lose by trying the entrant's brand; part of what they lose if the entrant's brand does not work is the consumer surplus that they would have enjoyed in the first period from use of the incumbent's brand.

Of course, those consumers who have low valuation for the good will not be using the incumbent's brand, and they are also candidates for the entrant's brand. If the entrant's price is below the incumbent's price, and if they believe that the probability that *each* brand will not work is π, then they will try the entrant's brand as long as:

$$-\pi P_E + (1-\pi)\left[\frac{(v-P_E)(1+r)}{r}\right] \;\geq\; 0$$

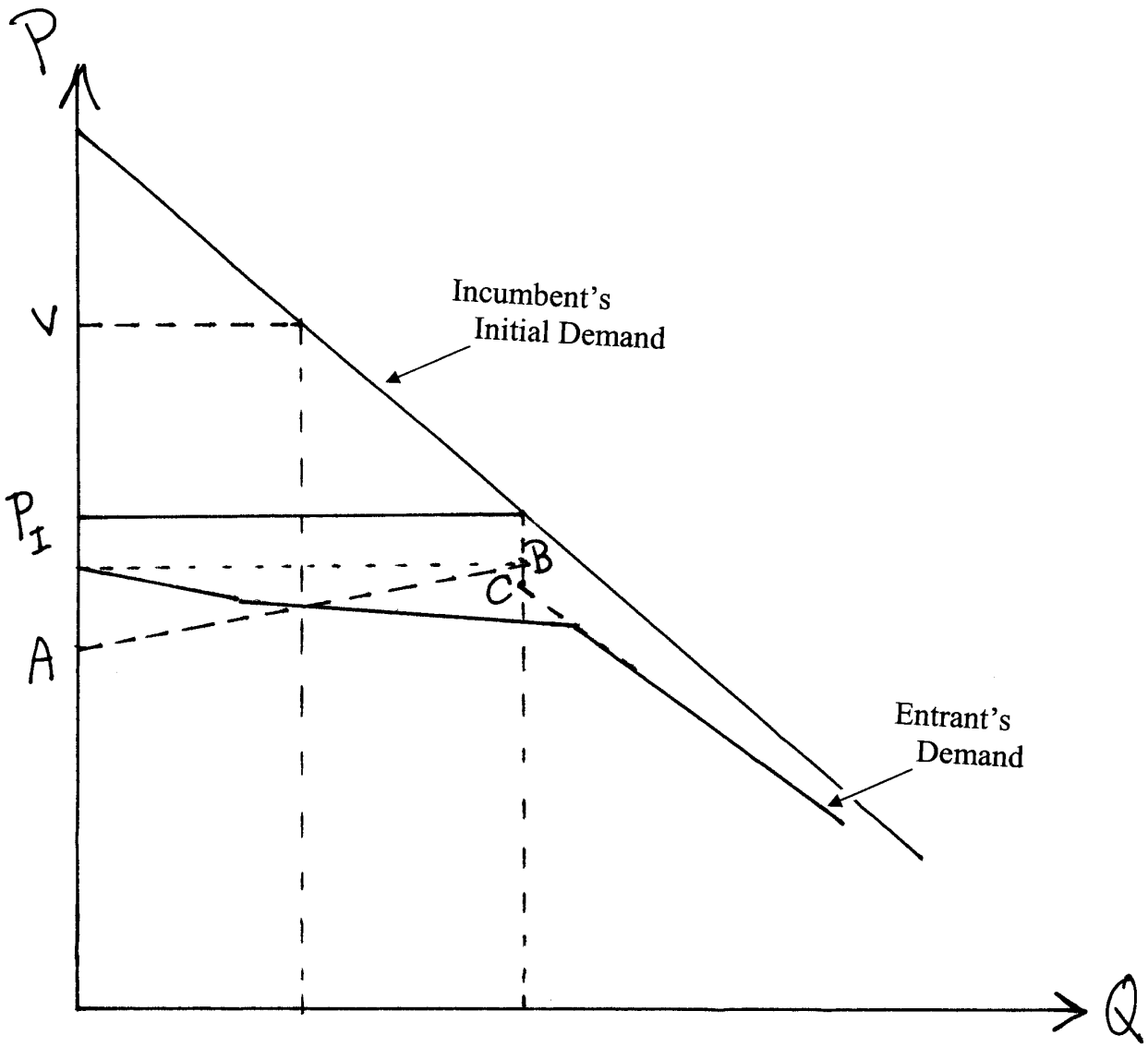

Figure 1: Entry in a Market for an Experience Good

This, in turn, can be rewritten as:

$$P_E \leq \frac{(1+r)(1-\pi)}{(1+r-\pi)}v$$

Continuing with our example, if $\pi = .5$ and $r = .1$, then the condition becomes that $P_E \leq .9v$. This condition is shown as a dashed line extending to the right from point C in Figure 1.

Figure 1 also shows the demand curve facing the entrant. The entrant must always price

below the incumbent, but initially can expect to attract some consumers who currently are not using the incumbent's brand. However, the entrant's price must fall considerably before he can expect to begin picking up consumers who currently use the incumbent's brand.

It should be clear from this analysis that uncertainty in the minds of consumers over whether a product will "work" for them gives an incumbent firm a considerable advantage. Likewise, it creates a strong incentive for a firm to be the "first mover." The advantage occurs because consumers already using the incumbent's brand have little to gain by switching to the entrant's brand. The only thing they can gain is the lower price, but that must be weighed against the possibility that the entrant's brand won't "work."

For many experience goods the obstacles to getting a consumer to switch are even greater than what has been portrayed here. Consider deodorants and disposable diapers. What happens when such a product "doesn't work"? It is not just that the consumer will not enjoy the benefit of the product; in addition, the consumer might have to bear the cost of an allergic reaction to the deodorant, or several sleepless nights taking care of a baby that has developed diaper rash.

4.2 The Market for Razors

Gillette's success with razors and razor blades illustrates the importance of first mover advantage in experience goods. During the 1980s, Gillette had about 60% of the U.S. market for razors, Schick had about 20%, and Bic, Wilkinson and others accounted for the remaining 20%. These shares were stable, and – as we would expect with an experience good – there was very little brand switching by consumers.

In 1989, Gillette introduced its new Sensor razor, and it did so in a very aggressive way. It built two plants simultaneously (in Boston and Berlin), with plans to produce at full capacity immediately. It also launched a $100 million advertising blitz, which was unprecedented for a product of this kind. Gillette knew that the Sensor would cannibalize sales of its old Trac II razor, but it planned to sell the Sensor at a high price, and it also thought it could take market share from its competitors.

The Sensor was an immediate and enormous success. But why? Why didn't consumers

stick with the razors (whether Schick's or the Gillette Trac II) that they were already using, and that "worked" for them? Does the success of the Sensor imply that the first mover advantage associated with experience goods is not as important as our analysis suggests? What do you think?

In the late 1990's, Gillette and Schick were again racing to introduce a new razor. Both companies introduced their new razors in early 1998. Both companies knew that Gillette gained an enormous advantage from its pioneering introduction of the Sensor, and both companies knew that a similar advantage would likely go to the company that was first to gain a significant share of the market for the next generation of razor. Gillette introduced its new razor – the Mach 3 – in July 1998, and Schick followed with its new razor a few months later. Once again, Gillette embarked on a $100 million advertising campaign. Like the Sensor, the Mach 3 was a great success. (In 2004, Gillette's market share exceeded 70%.)

If three blades is better than two, think how much better still five blades must be. That's how many blades Gillette's new Fusion razor has. Gillette has been hoping that five blades is at least better than the four blades on Shick's Quattro razor, which was introduced in 2003. But not surprisingly, some market analysts were skeptical. As one Business Week article suggested, "They have pushed the model to its limit."

The attached articles describe the Mach 3 and its introduction, as well as Gillette's more recent experience with the Fusion razor.

5 Markets for Credence Goods

We saw that the consumer of an experience good learns whether or not it "works" by using it. A credence good is quite different: *the consumer can never really determine its true value*. A bottle of multi-vitamins is an example. Will those vitamins really give you a health benefit? And is the $20 bottle of 100 vitamins likely to be twice as "effective" as the $10 bottle?

Other examples of credence goods range from management consulting services to automobile tune-ups to the services of a "nanny" to (for some people) wine. In each case it is

difficult or impossible to determine the quality of the good you are paying for, even after you have consumed the good. Was that expensive auto tune-up that the Toyota dealer recommended really necessary, and did it improve the performance and extend the life of your car? Hard to tell. Is that expensive blue-chip consulting firm providing better advice than what you could get from a less expensive firm? Again, hard to tell.

So what is a consumer to do when purchasing a credence good? In many cases, *price becomes the signal of quality.* For example:

- You hire the expensive blue-chip consulting firm because it is expensive, and therefore (you think) the advice it provides must be the best available. Of course you have no way to really assess that advice relative to the advice of another, less expensive consulting firm. But going with the expensive firm seems safer.

- You've been invited to a dinner party, so you pick up a $50 bottle of wine, because (you think) if it costs $50 it must be much better than the $10 bottle (even though if you were given a blind taste test, you couldn't tell which one costs $50). Nonetheless, the $50 bottle seems like a "safer" choice.

- You and your spouse live in New York and need a nanny to help care for your young child. You want the best for your child, so you pay $180,000 a year (plus a generous Christmas bonus) to a 20-year old with no particular skills or education. (That's a data point — I didn't make it up!)

Is a high price in fact a good signal of quality? Sometimes yes and sometimes no. Recall that a credible signal of quality has to be more expensive for the low-quality firm to send than it is for the high-quality firm. (If you can't recall this, go back and read Section 17.2 of Pindyck and Rubinfeld, *Microeconomics*.) What about the consulting firms? Suppose some indeed give high-quality advice and some give low-quality advice. The cost of setting a high price for both types is reduced business. (The demand curve for consulting services is downward sloping, like other demand curves.) But a high price is also likely to induce more monitoring and exchange of information by customers. Thus the low-quality firm might have

more to lose by setting a high price.

On the other hand, it may simply be impossible to assess the quality of advice from the expensive blue-chip consulting firm *or* from the less expensive firm. What will often drive customers in that case is simply the desire to play it safe. Thus customers choose the high-priced option, even though the high price is in fact a poor signal of quality.

Now, what should you do if you are the producer of a credence good? In many cases, it is best to charge a high price. Suppose you are a consultant (working in a firm or on your own). Business is slow. You heard that demand curves slope downwards, so you think that perhaps you should cut your rate in half in order to drum up more business. Yes? Probably not, because it will send the wrong signal. On the contrary, you might even *raise* your rate so that potential clients will understand that you are one of the very best consultants in the industry.

Finally, if the job market this spring is slow, consider moving to New York and working as a nanny. Starting salaries are amazing!

6 First-Mover vs. Second Mover-Advantage

We saw that in markets for experience goods, there is a strong first-mover advantage. First-mover advantage is also important in markets with strong positive network externalities. But in some cases, there can be a second-mover advantage that dominates, even when there are network externalities. Pharmaceutical markets are an example.

In pharmaceutical markets, network externalities can be of two types. First, there is a network externality associated with a *therapeutic category*, i.e., type of drug. Examples of therapeutic categories include SSRI antidepressants and anticholesterol drugs. For any particular therapeutic category, both doctors and patients will be more willing to prescribe and take a drug in the category if lots of other patients have taken or are taking a drug in that category. In other words, the perceived value of a particular type of drug (measured in terms of efficacy, safety, and side effects) is greater if that type of drug has been "accepted," and "acceptance" is best measured by the number of other people that have taken or are

taking a drug in that therapeutic category.

Pharmaceutical companies are also concerned with the possibility of a second network externality, which is associated with the *brand* of drug within the therapeutic category. If this network externality is important, it means that doctors and patients would be more willing, for example, to use Nexium (as opposed to Prevacid or Prilosec) the greater the market share of Nexium. This is an important issue for pharmaceutical companies, because if the brand-specific network externality is large, it means that the owner of a dominant brand will have market power, and can afford to raise prices above those for brands with smaller shares. It would also mean that the reward for being first in the market is large, so that it is worthwhile for a company to spend a good deal of money to accelerate the development of a new drug.

Pharmaceutical companies devote considerable effort to assess the relative strength of product-specific versus brand-specific network externalities. (They have found that the answer varies enormously across different kinds of disease categories.) If the brand-specific externality is weak but the product-specific externality is strong, there could be a second-mover advantage. Let the first mover take the risk regarding market acceptance of the new type of drug and spend the money necessary to educate doctors about the benefits of the new drug.