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**Lecture 22: Technology and the Economics of Ideas**

1. The Results Are In
   1. Economists have long agreed that the key driving force behind long run economic growth is improvements in technology.
   2. This is also reflected in the fact that new technology is an important way companies gain profits.
      1. Remember your introductory econ: it’s really hard to make higher than average profits.
      2. As economist Joseph Schumpeter pointed out, the only way for firms to make these profits is to innovate.
      3. This innovation includes not just advances in technology, but also a deli’s new sandwich, a hotel’s new logo, or an ad agency’s new location to place ads.
   3. Understanding the economics of ideas, especially technology, is critical in understand not just how societies grow wealthier but also how business functions.
2. Marginal Versus Average Costs
   1. Recall the marginal cost is the cost to produce an additional unit of a good. The average cost is the total cost per good produced. If your fixed costs are high and your marginal costs are low, your average and marginal costs will be very different.
      1. Ideas are one such example. They have a high fixed cost but a low (often zero) marginal cost.
   2. Everyone wants to be the “marginal cost consumer” or the consumer who pays at or near the cost to provide an additional good.
      1. Recall price discrimination for AIDS medication in Africa versus Europe. People in Africa pay close to the marginal cost. People in Europe pay close to the average cost.
   3. But when marginal and average costs are really different, we all can’t be the marginal cost consumer. Otherwise, we can’t cover our fixed costs.
      1. One of the reasons Netflix increased its prices in 2011 is because people started substituting streaming video (priced near marginal cost) for DVDs (priced at average total cost). Studios thus started demanding more money so they could cover their fixed costs.
   4. And yet, once created, economic pressure forces prices down to marginal cost. In some ways, this is very good: if the marginal cost of a good is zero, we want everyone to have it (assuming marginal benefit is never negative).
   5. But if the marginal cost is zero, we’re not covering our fixed costs. If firms can’t cover their fixed costs, then the good won’t exist in the first place. How do we solve this paradox?
3. Protecting Your Product
   1. The market has several legal and economic ways to cover the fixed costs of innovation. Notably, they all relate to constraining competition. In increasing order of security (and of cost) three big ones are:
      1. *First Mover Advantage*—Simply being the first to the market, even if you’re copied shortly thereafter, is a big advantage since you have a monopoly until the others reverse engineer your advantage. This is a lot like patents except the length of the monopoly is much shorter.
      2. *Trade Secret*—These are innovations and inventions which are kept secret by a company. They do not patent them (since that requires publicly detailing the idea) but instead rely on secrecy to protect the monopoly. Trade secrets are rarely used for products, since products can be reversed engineered. Production processes are often trade secrets, protected with employee nondisclosure forms.
      3. *Patents*—This is one of America’s oldest institutions. It is actually an explicit part of the U.S. Constitution.[[1]](#footnote-1) A patent grants a monopoly to the inventor, thus preventing prices to fall due to entry and competition. Example: drugs, which become cheaper when the patent runs out due to entry of generics
         1. A patent is different from a copyright: patents are harder to get and last less time, but cover a range of innovations rather than what’s *exactly* protected. I will focus on patents here but much of what’s discussed can also be applied to copyright.
   2. Different industries rely on these protections in different ways. Pharmaceutical and chemical companies heavily rely on the patent system while motor vehicles tend to rely on first mover advantage.
   3. **As it becomes easier to keep secret, the benefits of using trade secrets increases.** This is why information regarding manufacturing processes tends to be held as a trade secret.
      1. Trade secrets require a moderate amount of money to uphold, reflected as increased security, communication delays within the firm, and the danger the information might get out anyway.
   4. **As the “fashionability” of something increases, the benefit of using first mover advantage increases.** If the firm will only be able to enjoy the benefits of information for a short period, it is often not worth it to invest anything into holding onto the information. Clothing follows this rule—fashionable items are (almost) never put under any formal protection. To an extent, movies also pursue first mover advantage. While the characters and specific plot may be formally protected, the overall plot (alien invasion, earthquake disaster, super heroes) is not.
      1. The first mover advantage may seem costless but it’s not. To ensure you really take advantage of being first, you have to make the biggest “splash” possible. Advertising becomes a major expense.
   5. **As a firm becomes more technologically focused, the benefit of using patents increases.** This is largely because patents are often combined to make one product. Having a patent portfolio is preferred since you can not only protect your product, you can threaten to sue other firms for infringement thus ensuring they won’t do the same to you. When Google bought Motorola in 2011, they were largely after the firm’s patents as a way to protect their Android system.[[2]](#footnote-2)
      1. Of course, patents are very expensive and they only last a certain amount of time (maximum 20 years). Google paid $12.5 billion for Motorola’s 25,000 patents, or $500,000 per patent. (Of course, Google got other things besides Motorola’s patents.)
   6. **As the race to invent increases, the benefit of using trade secrets decreases.** If many firms are trying to invent the same thing, your secret won’t stay secret no matter how good your security. For most technology, an intense race will favor patenting though very short-lived products could favor first-mover advantage.
   7. **As the potential revenue increases, the benefit of using trade secrets decreases.** If the revenue from the technology is high, there’s a strong incentive to replicate or reverse engineer the technology once invented. Typically, larger markets favor patents but, as previously, it depends on the life-span of the product.
      1. Note how this is the inverse of the ease of keeping a product secret. It becomes harder to keep secret if more people are trying to figure it out.
   8. **As the cost to invent increases, the benefit of using patents increases.** The more a firm invested in a technology, the greater the danger if it lost its monopoly position. Patents are the only way to ensure it’s protected. Even a first-mover advantage isn’t a guarantee.
4. Patent buyouts
   1. The problem with patents is that they create deadweight loss. But they create the incentive to come up with new ideas. Is there a way we can have our cake and eat it too?
   2. Economist Michael Kremer argues that the government could buy patents and then release the patent into the public domain. Such a buyout could remove the price distortions and wasteful reverse engineering costs while maintaining the incentive to invent. It’s a strange idea, but not without precedent
      1. 1839—the French government purchased a patent for something called the “Daguerreotype process” after the inventor spent two years trying to sell it. Months later, there were instructions in dozens of languages: the industry of photography was born (the Daguerreotype process is an early version of how you develop pictures).
   3. The difficulty of patent buyouts is determine how much to pay for them. You obviously don’t want to overpay: not just because the government doesn’t want to spend too much money but also because you don’t want to over-incentivize. Of course, underpaying means you won’t get the interest in the technology you might like.
      1. Kremer solves this by letting people bid on the patent. Then, every once in a while, the government swoops in just before the sale is final and outbids the highest bidder.
      2. In essence, people who know the most about the industry does the research for the government to determine what the patent’s worth.
5. Technology prizes
   1. Technology prizes are like patents: you offer a lump sum to the first group who can accomplish some technological goal. The difference is you then release the patent into the public domain.
      1. Note how, if the government sponsors a prize, this is like a patent buyout.
   2. Technology prizes have a long history: canning, longitude, and the dome of the Cathedral of Florence all found their technical expertise in the prize system. Now there are technology prizes for space travel, longevity, recommendation algorithms, self-driving vehicles, and fuel efficient cars to name a few.
   3. A difficulty with technology prizes is, again, one of valuation. How do you determine the right size of the prize? And, if the government runs it, how do you avoid corruption?

1. See Article 1, Section 8: Congress shall have the power “To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;” [↑](#footnote-ref-1)
2. Google CEO Larry Page justified the acquisition as a way to “strengthe[n] Google’s patent portfolio, which will enable us to better protect Android from anti-competitive threats from Microsoft, Apple and other companies.” <http://www.huffingtonpost.com/2011/08/15/google-motorola-mobility_n_927670.html> [↑](#footnote-ref-2)