

### **Chapter 3: How Competition Works**

Property is a good thing. Ownership of houses, land, automobiles, potatoes and coffee contributes to our wealth and well-being. Property brings with it rights: you cannot take my property without my permission, but I may, if I wish, sell it to you. This provides incentives to produce, accumulate, and trade. In countries such as Zimbabwe where property can be arbitrarily taken away by government action and theft, there is little reason to produce or acquire valuable property, resulting in widespread poverty and even famine. Without the ability to sell our property, there is little reason to specialize in the production of goods and services, and no mutually beneficial trades are possible.

If property is good for automobiles and potatoes, should it not also be true, as Michael Novak argues, of ideas as well? Intellectual monopoly propagandists such as Novak have found it convenient to pretend that there is a connection between “intellectual property” as enshrined in copyright and patent law and property rights in the ordinary sense. Property in the ordinary sense is a good thing – and this is as true of ideas as of automobiles and potatoes. “Intellectual property,” however, is the “right” to monopolize an idea by telling other people how they may, or more often, may not, use it. In all of thriving innovative industries we looked at in the previous chapter, it was the right to buy, sell and improve on copies of ideas, not the prohibition against using them, that lead to innovation and prosperity.

Competition is a good thing. That is why the NBA and the Tour de France are so popular, and why we give our all at the annual interdepartmental basketball game. Competition is not just fun, it is also useful. History, practical experience, common sense and economic theory all agree: economic competition is probably one of the greatest ideas humans ever came up with. When a bunch of people compete to achieve the same goal, great things seem to happen that otherwise would not. Things get done faster, cheaper, and better; new methods for lifting a weight or quenching a thirst are invented; the average guy ends up with more of the stuff he likes at a lower price than before. That is why, in the end, socialism collapsed like a rotten wall: it did not allow its people to compete and, as a result, it not only made their economic life miserable, but strangled their hearts and souls.

A few enlightened economists, such as George Stigler, have argued that if competition is good for the production of cellular

phones and bananas, it should be equally good for the production of ideas and of their copies. We agree with George Stigler: indeed, it is. In this chapter we explain how competition works in the market for ideas, and why it is beneficial. We will try to stick to English and not use the mathematics so favored by economists. The brave and the curious can find all the mathematics they want in the references listed in the final notes.

We are going to imagine a world similar to that in Switzerland or in the Netherlands in the late 19<sup>th</sup> century, in which there are no patents and no copyrights. When an economically valuable idea comes to their mind, entrepreneurs can spare themselves an insane race to the patent office, profitably invest the money that would otherwise go to lawyers, and get down to the business of selling to consumers the new thing they just invented. We have amply seen in the previous chapter that, at least for ideas that are now commonly copyrighted, a state of affairs in which copyright is absent does not mean that innovation is a profitless enterprise conducted only by great altruists. In the next chapter we report about patentable ideas and find that the same is true: innovations have flourished and still flourish all around us in competitive industries where patents are either not used or are unenforceable. Here, we see why this ought to be so even according to economic theory.

### ***The Fruits of the Idea Tree***

When an innovator comes up with an idea for a new product he makes copies of it to sell, and those copies are his property in the same way his socks are. The sale of ideas is all about copies – it is only copies of ideas that can be sold. I can no more sell “my idea” than I can sell myself. I either sell objects containing copies of my idea – books, CDs, how-to-do-it manuals, trousers with a low cut, multi-purpose gadgets, or you name it – or teach my idea to other people directly, and charge for that. Either way, I am selling copies of my idea. In the first case the copies are contained in the objects, in the second case the copies are contained in the minds of the people I have taught. When I write a book and publish one hundred thousand copies, it is one hundred thousand copies of my idea that I am trying to sell.

Once I willingly sell a copy of my idea to you, for example a copy of this marvelous book, you become the owner of that copy and I retain my idea together with all the other copies of it I have printed and not yet sold. In the absence of “intellectual property” you can “do what you want” with your copy of my idea – the book

you purchased from me – in the same way you can do “what you want” with the ice grinder you bought yesterday from someone else. Without “intellectual property” there is something you can do that you cannot legally do in the world we currently live in: you can spend your time and your resources to make new copies of the book you purchased. If you were to change the title or the name of the author or engage in some other fraudulent deception, that would be plagiarism – which we are not in favor of. But if you change the cover, the quality of the paper, the fonts, the chain of distribution, or the media carrying the original text in an honest straightforward fashion – or even modify the text with a clear acknowledgement of the original contribution – in the absence of copyright, no property right would be violated. Obviously, if you elected to do so, your copies will compete with the copies I am trying to sell and, possibly, with the copies that other purchasers of the book may have decided to produce.

Do the innovators, lose because of this? Probably, although there are circumstances in which not even this is true; the good news is that, in most circumstances, everybody else gain a lot more than the innovators lose. Good economic laws and institutions are not designed to make a few lucky people super wealthy, but to make the average consumer better off. Three features of a world without “intellectual property” should be noted:

- The number of copies available to consumers is higher and the price is lower, thereby making consumers better off.
- The initial innovator still earns a substantial amount of money.
- The market functions whether there is one or many innovators – and socially beneficial simultaneous innovation is possible.

How can an innovator make a substantial amount of money in the face of competition from all of his customers? Take this book. We own our original manuscript, which was necessarily the source of all future copies. Our original manuscript is, therefore, like a capital good such as a shoe factory, and its competitive price reflects the future profits it will generate. When a publisher buys the book from us, the price it is willing to pay reflects the fact that it will be able to make copies and sell them to other people, who can make copies in turn. So, while it is true that competition between publishers will result in a lower market price, it is not true that they can profit at our expense or we at theirs. The same is true for any other purchaser of the book, should she decide to get into the business of making additional copies by using the copy she lawfully

bought. Whatever profit you could hope to earn from selling our book will be driven to zero as you and other purchasers compete with each other to pay us, the original writers, a price that reflects the market value of the book to you. Whether we make many copies of our manuscript and sell them directly to you, or whether we sell our manuscript to a publisher makes no economic difference, at least as long as the market for reproduction and distribution of books is more or less competitive. We own the manuscript and, under the standard definition of property – in the complete absence of copyright law – we can sell our manuscript at whatever price the market bears. If potential readers exist and reproducing and distributing copies of books is costly, our manuscript will fetch a positive price – in the same way that Wolfgang Amadeus Mozart’s or Ludwig van Beethoven’s uncopyrighted manuscripts fetched substantial amounts of money in the competitive markets for musical scripts of eighteenth and nineteenth century Europe.

Initial copies of an idea are owned by the innovators, and those initial copies are like roots of a tree from which all other copies will emerge as if they were branches. Hence, when private property and competition hold, and in the absence of “intellectual monopoly” competition lowers the price at which the idea will sell now and in the future, but since all competitors have to pay to obtain the idea directly or indirectly from the original innovator, the original innovator collects all profits from the reproduction of copies of his idea.

Economists refer to the net benefit to society from an exchange as “social surplus.” Without intellectual property the innovator collects a share of the social surplus she generates: this is the competitive value of an innovation. Such competitive value is likely to be more than enough to compensate the innovator for the cost of creation. If so, the allocation of resources is efficient, neither too few nor too many innovations are brought about, and social surplus is maximized.

Notice that we said “a share of the social surplus”, not the entire surplus. Contrary to what many confused pundits repeat over and over, there is nothing terrifying about this. Under competition, consumers or imitators, or both, receive a portion of the social surplus an innovation generates. Confused pundits use the jargon “uncompensated spillovers” to refer to the social surplus accruing to those besides the original innovator. There is nothing wrong with this, however. That competitive markets do allow for social surplus to accrue to people other than producers is, indeed, one of their most valuable features, at least from a social perspective; it is what makes

capitalism a good system also for the not-so-successful among us. The goal of economic efficiency is not that of making monopolists as rich as possible, in fact: it is almost the opposite. The goal of economic efficiency is that of making us all as well off as possible. To accomplish this producers must be compensated for their costs, thereby providing them with the economic incentive of doing what they are best at doing. But they do not need to be compensated more than this. If, by selling her original copy of the idea in a competitive market and thereby establishing the root of the tree from which copies will come, the innovator earns her opportunity cost, that is: she earns as much or more than she could have earned while doing the second best thing she knows how to do, then efficient innovation is achieved, and we should all be happy.

The Garden of Eden portrayed until now – we are theorists after all – follows from the fundamental principle that it is copies of ideas that have economic value, and that there can be many copies of the same abstract idea, your copy, my copy, my brother Jake’s copy, Wilson Pickett’s copy and so forth. Copies of ideas are always limited, and it is always costly to replicate them, this is why they are valuable and why they should enjoy the same protection afforded to all kinds of property. They should not be taken away without permission, and the owner should have the legal right to sell them. Copyrights and patents are not needed to afford this ordinary level of protection. Copyrights and patents are the additional – and unnecessary – right to tell other people what they cannot do with their copies. If ideas are afforded the ordinary protection of property, but not the extraordinary protection of “intellectual property,” would people still come up with valuable ideas and make copies of them to sell to other people? You bet they would! As we have just argued, people can make lots of money from selling copies of idea under this competitive property right regime. In fact, we have already seen that most markets have functioned and still function this way, and people operating in those markets have created new ideas at a breakneck pace, and profitably sold them for centuries.

The image of an idea as the roots of a tree is more than just a metaphor; markets for plants and animals have worked for centuries according to the principles described here. Competing breeders were able to sell the first exemplars of the new species at prices that were orders of magnitude higher than their cost because those exemplars were in very limited supply right after their introduction. By so doing, competing agricultural innovators captured the value of all future profits accruing to subsequent users of the new plant or

animal. Sometimes the new variety of grain turned out to be particularly prolific, hence the innovator would learn, ex post, that she sold it at a “discount” on the theoretical price. Some other times the new variety of tomatoes turned out to be not nearly as resistant to bugs as the breeder and her clients had expected, so that she sold at a “premium” over its theoretical price. Nevertheless, to the extent that entrance in the breeders’ market was not distorted, one would expect breeders to make an average profit in line with that of other, similarly risky, lines of business.

The “average profit” aspect of our argument is often missed by people not familiar with economic reasoning, leading to an understandable, but incorrect, criticism of the theory of competitive innovation. Here is an “offspring of the great stallion” version of it.

*The Boldrin-Levine paper makes a similar argument about copies of creative works. They suggest that because the first people to buy a creative work will capture value from copying that work, what they will pay for the first copy will be very high. Thus, copyright is not necessary. The owners of Seabiscuit did not need a copyright in order to capture the breeding value of their horse. If Seabiscuit, the horse, does not need a copyright, why do we need a copyright for Seabiscuit the book? My guess is that the publisher, Ballantine Books, could not be sure ahead of time whether Seabiscuit would be a winner or an also-ran. The book was available to be copied before this uncertainty was resolved. Without copy protection, another publisher could wait for Ballantine's full line-up of books to come out, observe how they sell, and then choose to copy only the popular titles. In contrast, the owner of the horse could wait until the quality of the horse was established before making the horse available to others to make copies. I can see how the Boldrin-Levine mechanism works for horses, but I have a hard time seeing it work for books.*

As we have observed in the last chapter, waiting until Ballantine has saturated the market with their copies of Seabiscuit the book before producing your own is a business strategy that will fill Ballantine’s coffers with money and not yours. We will discuss in greater detail “Ideas of Uncertain Value” later in this chapter. However, we observe that even the copyright protection that made him a multimillionaire seems unable to keep Mr. Kostner from also producing monumental flops every few years or so.

### ***Fixed Costs and Competition***

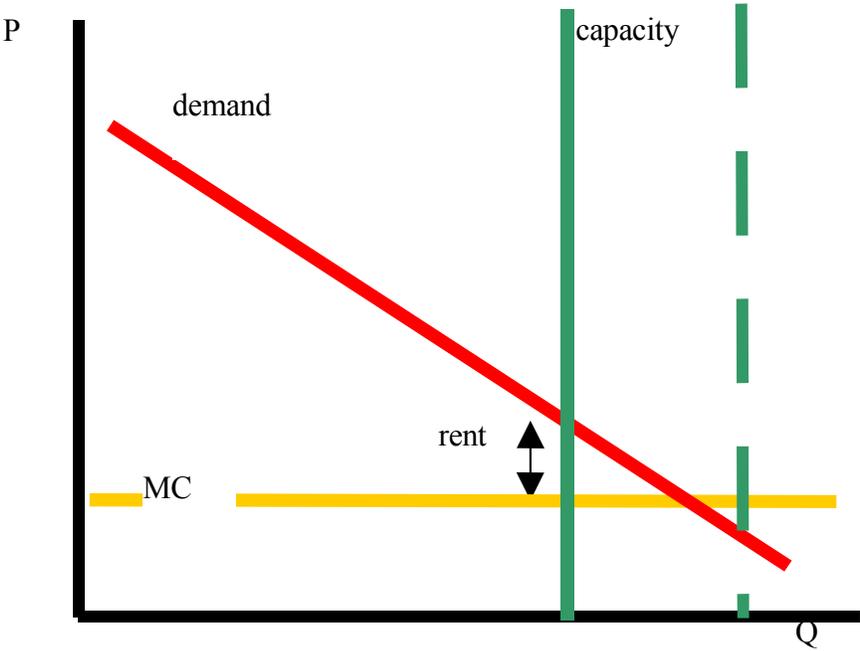
The mythical inventor spends lots of time and resources to come up with a new product, a different way of doing things, a novel organizational form, or what not. Once the invention is completed, reproducing copies of it is a routine task, which anybody can perform at low cost. Leave aside the fact that this mythical description probably applies to no more than a tiny fraction of innovations – that most of the useful things surrounding us are not the product of some great leap forward due to the imagination of a Promethean genius but are, instead, the outcome of a string of humble and mostly overlooked incremental improvements carried out by thousands of very normal human beings. In the mythical case, competition will force the invention to trade at the very small cost of reproduction, leaving the inventor with no compensation for the very large initial cost of invention. This has led many to think that innovations are unbefitting of trading in competitive markets.

This is a powerful argument, so powerful in fact that it ought to apply to all industries. Take for example the shoe industry. A factory that produces shoes is expensive. Once the factory is built, shoes can be produced cheaply at a relatively low cost for each pair. If two shoe factories are built, competition between them will drive price down to the cost of producing a pair of shoes, leaving the factory owners with nothing left over to pay for having built the shoe factories. Why, then, do we not consider shoes to be a special entity among economic goods, also unsuitable for competitive markets? Why not special shoe laws entitling the shoe manufacturer to special rights over the lives of shoe buyers and sellers? The same could be said of gasoline and many other industries: an oil refinery is most certainly a very expensive plant. Building a refinery costs orders of magnitudes more than producing a gallon of gasoline from that same refinery once it is in place, still we are not troubled by the idea that the oil and refinery industry should be ruled by open competition.

What is it that makes us so confident that competition in shoes and gasoline is an obvious and good thing to have? A factory cannot produce an unlimited number of shoes, and oil refineries have limited capacity. If the shoe factory is small enough, relative to the size of the market, it will produce only a modest number of shoes, and consumers will be willing to pay a premium over marginal cost for the limited number of shoes available.

We can illustrate our story about shoe production in a diagram of supply and demand much beloved by economists. On the horizontal axis, we show the quantity  $Q$  of the number of pairs of shoes that are sold. On the vertical axis, we show the price  $P$  and the cost of shoes. The height of the yellow line labeled MC is what economists call “marginal cost.” This is the cost of producing a pair of shoes after the shoe factory is built. But the factory can produce only so many pairs of shoes. This limited number is the capacity of the factory, which we represent by the solid and dashed green lines, representing a factory with low capacity and high capacity respectively. The willingness of consumers to pay for the shoes is their demand, represented by the red line. The more pairs of shoes they buy, the less consumers are willing to pay for additional shoes, so the demand curve slopes downwards. Take first the case of a high capacity factory – the dashed green line. Under competition, we have the famous result that competitors will produce shoes until the price of shoes – represented by demand – falls to marginal cost. In economics jargon, the competitive equilibrium is at the intersection of the yellow supply and red demand curves. Since each pair of shoes is sold for the marginal cost of producing a pair of shoes, the factory owner earns no profit – and so has nothing left over to pay for the factory.

*Diagrammatics of Capacity Constraints*



If shoe producers were foolish enough to build very large capacity factories, this would be the end of the story. But who would build a factory so large that they would lose money? Suppose instead that the factory is a low capacity factory, represented by the solid green line. It is no longer possible to supply enough shoes to drive price down to marginal cost. The competitive equilibrium is instead at the intersection of the green capacity line and the red demand curve. Price is more than marginal cost. The difference between the price and marginal cost is called “competitive rent.” This amount can be used by shoe producers to cover the cost of building their factories. And indeed, in the competition to build factories, shoe producers will build just enough capacity that their competitive rents cover the cost of building the factories. This is Adam Smith’s invisible hand – just the right number of factories are built, and social surplus is maximized.

What is true for shoes is also true for ideas. It is no more possible to flood the world instantaneously with copies of an idea than it is to produce an infinite number of shoes from a finite sized factory. Because copies of ideas are always limited, like shoes, they always command a positive price.

Nowhere is limited capacity more important than in a nascent industry. The first entrants earn large rents over and above the opportunity cost of capital for quite a while, until enough productive capacity is built up to push price down towards marginal cost. The presence of large initial rents are the carrots for which innovators innovate, while the threat and arrival of imitators is the stick forcing capacity to grow until the rents are almost completely dissipated. The newcomers will not only try to replicate the leader, they will probably try to go one better than him by cutting costs or improving the product, or both; and he will do the same to inhibit their arrival and keep his rents from falling. This is what, in everyday language, we call economic competition. It is this competitive process that rapidly improves new products and makes them cheaper, making all of us better off in the meanwhile.

Eventually the competitive process increases capacity and reduces competitive rents, but not to zero. This is true in both the shoe and the idea industries. To the extent that even the last entrant must build a costly plant, she will have to earn some rents on the price of shoes, to pay for the cost of the plant. Similarly for the entrepreneur who is trying to compete with an innovator: as long as imitating an idea and learning how to make copies of it involves some fixed cost, a positive distance will remain between the market price and the marginal cost of reproduction. Hence rents will be

earned for a long while, and the rents earned by the innovator are commonly much larger than those earned by its imitators: the market shares of Aspirin, Coca Cola, and Tide are still very large, indeed.

When the innovation is particularly good and making copies particularly easy, many people will imitate the innovator. We have seen this happening over and over again in new industries: too many people enter and too rapidly, too much capacity is built and some firms, usually the least efficient, earn “negative rents”, which in the real world are called losses, and exit. Economists call this stage in the development of an industry, the shakeout. Shakeouts happen in the market for shoes and in that for lollipops, so we expect them to happen in a competitive market for copies of ideas as well. You may recall when the last shakeout in a competitive market for ideas took place – it was the dot-com bust of 2000-2001. Using the Internet to do business, from selling airline tickets to manage your financial portfolio, was a great innovative idea that someone, perhaps Al Gore, had. Fortunately for us all, it was not yet patentable, and once the first dot-com business was created other entrepreneurs started to make copies of this idea, and other dot-com companies were created. This was the boom, to which the bust followed, and then the more stable but still fast growth we have witnessed during the last four years or so. We would have not had an efficient dot-com sector without a boom and the following shakeout, and we would not have had either if intellectual monopoly had its way here.

While entrepreneurs whose inefficient firms are forced to exit do not like to hear this, shakeouts are good and socially valuable events. It is a pity that all those ill conceived and inefficient companies are forced to shut down, but competition is not a gala dinner, and getting rid of inefficient firms while allowing efficient ones to blossom is exactly what competition is supposed to accomplish. We all agree this is good for the shoe industry. It is good also for the idea industry. We may have forgotten, but it was Xerox, not Microsoft or Apple that invented the GUI based on manipulating icons on a graphical screen. Still most of us would agree that it was socially beneficial that Microsoft imitated and outperformed the original innovators. Eventually, mature industries reach some kind of “long run equilibrium” where there is roughly the correct amount of productive capacity, the rents earned by the marginal firm are just enough to pay for its fixed costs, and what we call “competitive equilibrium” reigns. Until, of course, some other innovator comes along with a new kind of shoe and steps over the

placid equilibrium lake to create the socially beneficial waves of competitive innovation, which is the source of all progress.

### ***Indivisibility***

Our analogy between shoes and ideas has served us well so far, which is why it is the right time to drop it and examine the crucial difference between the economics of shoes and the economics of innovation. The fact that the innovator will earn a rent means that some ideas will be produced under conditions of competition. But it does not imply that every socially valuable idea will be produced.

Consider again the case of a shoe factory. The standard theory of competition, not only asserts that shoe factories will be built, but that the socially desirable number of shoe factories will be built. The reason for this is that shoe factories are fairly divisible: we may build smaller or larger shoe factories. The builder of the factory, when deciding how large a factory to build, will not build so large a factory that the rents from the fixed capacity of the factory will be less than the cost of building the factory. The builder (facing competition from other shoe factory builders) will wish to increase the size of the factory as long as the rents from a little more capacity exceed the cost of adding the capacity. This is exactly the condition for maximizing social surplus, and that is why economists do not argue that owners of shoe factories should be awarded government monopolies. This does not necessarily apply in the case of innovations.

By contrast with shoe factories, two first halves of a book are not terribly good substitutes for the first and second half together. At the same time, the initial book and the copies that can be made over a very short period of time may be so great as to essentially flood the market dropping price to near zero almost immediately. There is no way to offset this by producing a “smaller book” that is a good substitute for the larger book; this is something we can witness to. The presence of indivisibility in the innovation process and the fact that this indivisibility may be large relative to the size of the market is a key fact about innovation under competition.

Most ideas are not divisible, and there are cases in which the cost required to come up with the first prototype of an idea is quite large, compared to the size of the market for copies of that idea. Said differently: the capacity the innovator must install is so large, given the demand for the good, that one is not likely to earn any rent over marginal cost. In which case a rational innovator understands

she cannot recover the initial fixed cost, and does not even get started. When these two anomalies – large minimum capacity and small demand – meet, competitive markets do not function properly. This is the heart of the economic argument for intellectual monopoly: that the additional profit achieved by a monopolist may, some of the time, lead to socially desirable innovations that would not be produced with unfettered competition.

Is indivisibility a relevant practical problem? As we shall see, available evidence suggests it is not. Notice also that as the economy expands in size, the economic relevance of indivisibility is progressively reduced. So, too, as people become richer over time. Hence, economic progress makes competitive innovations easier and easier, and the economic justification for intellectual monopoly diminishes as time passes.

### ***The Collaborative Advantage***

Large advances are generally built out of many small innovations. The process of innovation is greatly enhanced when innovators share information, enabling other innovators to bootstrap off of their advances. Because under competition all competitors can imitate and so benefit from the innovation of everyone else, the incentive to share information is strong. By sharing information, the innovator increases the chances that his competitors will make further innovations – and under competition the original innovator expects to benefit from the innovation he induces from his colleagues.

The incentive to share information is especially strong in the early stages of an industry, when innovation is fast and furious. In these early stages, capacity constraints are binding, so cost reductions of competitors do not lower industry price, as the latter is completely determined by the willingness of consumers to pay for a novel and scarce good. So the innovator correctly figures that by sharing his innovation he loses nothing, but may benefit from one of his competitors leapfrogging his technology and lowering his own cost. The economic gains from lowering own cost, or improving own product, when capacity constraints are binding, are so large that they easily dwarf the gains from monopoly pricing. It is only when an industry is mature, cost-reducing or quality-improving innovations are harder to come around, and productive capacity is no longer a constraint on demand that monopoly profits become relevant. In a nutshell, this is why firms in young, creative, and dynamic industries seldom rely on patents and copyrights, while

those belonging to stagnant, inefficient, and obsolete industries desperately lobby for all kinds of intellectual property protections.

### ***The First-Mover Advantage***

Competitive rents are the least amount that an innovator can expect to earn in conditions of competition. Since the innovator initially is the only one to know the idea, there are many ways to profit from this first-mover advantage. As remarkable as the phenomenon of economists who believe ideas are transmitted freely, while writing a voluminous literature on technology transfer and the cost of information, is the other phenomenon of economists who believe that innovators have no first-mover advantage, whilst writing a voluminous literature on the strategic advantages of being first. These strategic advantages are documented in most game theory textbooks: Fudenberg and Tirole is one example.

The most striking implications of the first-mover advantage, may, however, lie elsewhere. It is captured by the observation first made by Jack Hirshleifer, that the innovator, by virtue of inside information, may be able to earn vastly more than the social value of the innovation. To understand Hirshleifer's argument, consider the recent innovation of the Ginger scooter, now relabeled the Segway, said to revolutionize urban transportation, and grant that this unlikely prediction was actually true. How could the inventor, Dean Kamen, profit from this knowledge? There was a point in the development of the scooter at which Mr. Kamen was the only one to know that urban transportation is soon to be revolutionized, and that the automobile itself is soon to be obsolete. Rather than surrounding himself with patents, and hawking his knowledge to venture capitalists, as he did, he could simply have sold short automobile stock using whatever funds he had available to him, and leveraging to the maximum extent possible. Then, rather than developing the scooter himself, he should simply have released the blueprints to the press. As soon as the blueprints were published, the stock owning public would naturally realize that the automobile industry is on the way out, and the price of automobile stocks would plummet. Mr. Kamen, having foreseen this, and having sold short the stocks prior to publishing his blueprints, would naturally have made a killing.

In practice of course, whatever Mr. Kamen's representations to venture capitalists might have been, the Segway has not revolutionized the transportation industry, nor was it likely to have done so, and shorting automobile stocks would have been a risky proposition. (Although in retrospect, a good decision for other reasons.) This is, after all, the way in which the born-again-socialist

George Soros made most of his money by selling short the British Pound in 1992, only Soros' predictions were correct. But invention is a risky business in general, and the intellectual monopolist who has a valueless idea does not generally fare so well either, and indeed even with the benefit of patent protection, Mr. Kamen has become less than immoderately wealthy by virtue of his innovation.

There are more obvious and more common advantages of being first-mover. The primary advantage is simply that it takes time and money to reverse engineer a product. That is, in the example of this book mentioned above, without copyright we would be in immediate competition with you as soon as we sold you a copy. But in most real world cases, reproduction and reverse engineering are expensive in the short run. Books, music, video and copyrightable items can be encrypted, and it takes time and money to crack encryption schemes. New products, not to speak of new processes, are generally costly to reverse engineer. Moreover, the expertise that comes with being the innovator, and having been in production for longer than competitors has substantial market value. The example of Boulton and Watt after the expiration of their patents is a case in point, but there are many others, such as the fact that patented drugs continue to command a substantial premium over their generic competitors, even long after the patent expires. In short – even without the benefit of legal protection, the innovator certainly will enjoy a short-term monopoly, and can depend on such forces as reputation and consumer loyalty working to his advantage.

But how is the poor inventor, working in his basement, to profit against the large heartless corporations? Will they not take advantage of his lack of capital to steal his idea and put it into production themselves? Here we appeal to the clever scheme, explained by Anton and Yao in an article in the *American Economic Review*, showing how the inventor can avoid this. To return to the example of the Ginger/Segway scooter, Mr. Kamen could have gone to one of the automobile companies, Ford, perhaps, and shown them his blueprint for free. He would then promise to keep it secret from their competitors, but only in exchange for a substantial share in Ford Motor Co. This creates what an economist would call an incentive compatible mechanism, and what a pundit would call a win-win situation. The secret would have substantial value, since Ford would enjoy a first mover advantage. As long as Mr. Kamen asked for less than the full value of the invention to Ford, they would be happy to pay, for if he were to reveal the secret to their competitors, they would lose their monopoly profits. On the other hand, Ford would understand that Mr. Kamen, sharing in the Ford

stock, would not reveal the secret to the other companies – as this would reduce the value of his stock. Let us note, in passing, that this argument reveals that competition is double-good for both society and inventors. First, for the reason exposed above. Second, because Mr. Kamen's threat to Ford is credible if and only if there is at least one competitor to Ford in the production of cars. Absent competition in the production of cars, the genial innovator would have much less bargaining power with the only producer of cars. Hence the moral: make sure to enforce competition, among innovators but also between not-so-innovative producers of old goods, such as cars. and shoes

### **Quantifying the First Mover Advantage**

How strong the first mover advantage is depends on whether profits are earned from venues in which duplication is difficult, or in which profits can be earned quickly. When the first mover advantage is strong, the economic rationale for protection is weak, since most worthwhile works to be produced in the absence of intellectual monopoly. Lobbyists from the book industry such as the Author's Guild, the RIAA, speaking for the recording industry, and the MPAA, speaking for the movie industry have been quite adamant about the need for protection of their intellectual property. So it is worth taking a look at how strong the first mover advantage is in these industries.

In the case of movies, prior to the advent of the VCR in the mid 70s, the bulk of film revenue was from theatrical performances, with a small portion coming from television reruns. The bulk of profits are earned in initial theatrical releases, which are typically several weeks to a month. Following the first run theatrical release, there is typically a second run, beginning one to two months after the end of the first run. The striking feature about the second run is that ticket prices are typically much lower than the first run. For example, in 2002, in Chicago, examining ticket prices on the internet, we find that the typical first run ticket costs \$9.00, and the typical second price ticket about \$3.00. This high degree of impatience on the part of moviegoers is precisely the type of environment in which the case for intellectual monopoly is weak – especially since theatrical performances can easily be monopolized even in the absence of copyright.

We can also estimate the willingness to pay for earlier delivery through the examination of express delivery charges. On October 1, 2002, Amazon.com, for example, charged \$0.99 per book delivered in 3-7 days, \$1.99 per book delivered in 2 days, and

\$2.99 per book delivered in 1 day. So some consumers at least are willing to pay \$1.00 extra to have a book delivered 24 hours sooner. This is obviously a substantial first-mover advantage.

Indeed, for books, we do find that up-front profits are typically the most important. Eric Flint reports that the “standard experience is that 80% of a book's sales happens in the first three months.” He provides the following data for his own novel with David Drake, *Oblique Approach*

<i>Royalty Period</i>	<i>Sales</i>
<i>July-Dec 1998</i>	30,431
<i>Jan-June 1999</i>	5,546
<i>July-Dec 1999</i>	835
<i>Jan-June 2000</i>	795

Our own data on a much broader base of fiction novels shows a decrease in sales over the initial four months of roughly a factor of six. The book industry, or at least for paperback novels, is an industry in which the cost of creation is relatively small. Flint reports that the “average paperback sells, traditionally, about 15,000 copies” which, with a royalty of \$2.00 per copy, would work out to about \$30,000, also consistent with our broader database.

In the case of recorded music, we have the benefit of a natural experiment. Prior to 1999 recorded music was effectively protected by copyright law and technology. With the ability of computers to rip tracks from CDs and convert them into MP3 format, the advent of the peer-to-peer network Napster in May 1999 effectively eliminated copyright for music – so much so that the complete elimination of intellectual monopoly is now sometimes called “Napsterization.” The impact of Napsterization on CD sales has been studied by Stan Liebowitz of the University of Texas. According to Liebowitz Napsterization had little or no impact on CD sales through the end of 2001. In 2002, a decline in CD sales that began in 2001 became more severe, and Liebowitz estimates that in the long-run sales will fall by 20%.

### **Complimentary Sales**

Another first-mover advantage, for creative works especially, is the well-documented and strong preference for originals, signed copies and early versions that are in scarce supply, to more widely available versions. Perhaps one of the most striking examples of the phenomenon is that of the Getty Art Museum, in Los Angeles. The Getty Museum bought, at astronomical prices, a

large number of very good forgeries of famous works of art. These forgeries were sufficiently good, that the experts of the Museum believed that they were originals. However, additional subtle evidence, and refined scientific testing established that indeed these works were fraudulent. Of course from the functional point of view the works were unchanged – from the viewers perspective, the painting still looked exactly the same. But the market price, once the works were clearly established as unoriginal, plummeted by orders of magnitude. Similarly, authorized copies of a variety of fashion products, distinguishable from the original at most by the presence or absence of a label, sell for a vastly lower price than the original. So while works of art may be currently protected by copyright – it is hard to make the case that there is any need to do so.

The preference for originals, signed or autographed copies and so forth, is just a special example of a more general phenomenon: the complimentary sale. That is, a creation, while not terribly scarce in some markets, is often quite scarce in other markets, and the innovator, by virtue of being the innovator, can generally command a premium for his services in areas not directly related to his idea. Examples of this abound. In music, live performances will remain scarce, no matter what the price of electronic copies. Movies will be produced as long as first run theatrical profits are sufficient to cover production costs, and no matter how many copies are given away over the Internet for free. Books will continue to be produced as long as initial hardcover sales are sufficient to cover production costs. Substantial money is to be earned by authors or inventors by going on the talk-show circuit. Even t-shirts signed by a famous author may be enough to pay for the opportunity cost of his labor in producing his great literary work – amazingly enough a number of small online comic strips have found it a profitable business model to give their strip away for free, and sell t-shirts. Activities more mundane than great literary work may also suffice to make lots of money from complimentary sales, as the Spanish soccer team *Real Madrid* has repeatedly proven by covering the large salaries of its “galactic” soccer stars (Beckham, Owens, Raul, Ronaldo, Zidane) through the sale of clothing items bearing their names and numbers.

The greatest complimentary sale of all, is, of course, the sale of advertising. Those who doubt the possibility of making a profit from giving a product away for free would do well to look into the history of the radio and television industry. How many people became fabulously wealthy from an industry that for the first 40 years of its existence had no choice but to provide its product for

free? It is argued of course, that in the absence of copyright, people would simply redistribute the product with commercials removed. In the absence of technical means such as encryption, this might be possible. But of course there is nothing to prevent the creator from embedding the advertisement as an integral part of the story. Product placements are quite common in movies and television. If other advertising possibilities diminish, these will become correspondingly more valuable. There is no reason why this cannot extend to other works, such as books. While Ian Fleming did not receive payment from Colt for equipping his spy with a gun of that manufacture, after the books became popular, he certainly could have made a profit by auctioning off the right to the James Bond gun. In fact the Bond movies (in which he did not use a .38 Colt Police Positive) seem to have done exactly that.

A similar possibility of complimentary sales arises also in the market for patentable ideas. The inventor naturally has established special expertise in the ideas surrounding his invention. He will be in great demand as a consultant by those who wish to make use of the idea. Would not Watt have been in great demand from producers of steam engines even if he had no patent? He would, in fact that is pretty much what he did until 1798 – he acted as an engineering consultant for those who wanted to build a steam engine. Indeed, the role of Boulton's and Watt's patent was purely that of preventing others from assembling steam engines, as most parts were produced by independent companies in any case. Would Transmeta have been willing to hire Linus Torvalds at a substantial salary, had he not created Linux? Despite having given his creation away for free, and despite an apparent reluctance to profit from his fame, for example by way of public appearances, Torvalds does appear to have earned a positive return on his innovation.

Ultimately no academic work can do more than scratch the surface of the first-mover advantage: it is limited only by human ingenuity, an area in which academic economists have no special advantage. For example, profits can be made by escrowing contingent orders in advance; through serials and cliffhangers, or even by selling tickets to a lottery involving innovation as one outcome. Looking back over history we see the ingenious methods adopted by entrepreneurs in markets where indivisibilities have posed a problem. In the medieval period, the need for convoys created a substantial indivisibility for merchants that was overcome through the clever use of contingent contracts. In modern times, Asian immigrants (among other) have overcome the need for a

minimum investment to start a small business by organizing small lottery clubs.

### ***Ideas of Uncertain Value***

Intellectual property absolutists, such as Jack Valenti, become extremely agitated about the fact that many innovations are risky. After all, it is bad enough that competitors should be allowed to “steal” “your” creation. But if the original project is risky, they will only choose to “steal” if you are successful: few illegal copies of such great flops as *Sahara* are widely distributed on the Internet.

What implication does the existence of uncertainty have for competition in the ideas sector? Does it make a difference that some ideas are revealed not to have any or little market value after the initial investment has already taken place, while other are hugely successful? It does not; it simply changes the “algebra” of computing profits. Imagine that producing an innovation has a given cost, which we may label  $C$ . The amount earned in competition with many imitators we may label  $q$ . The social value of the innovation we may label  $v$ . When uncertainty is absent the innovation is undertaken whenever  $C \leq q$ . However, if the project only succeeds with probability  $p$ , abstracting from risk aversion, the expected amount earned is only  $pq$ . So the condition for innovation to be undertaken and profitable without intellectual monopoly becomes  $C \leq pq$ . Now think about the monopolist. Given the same fixed cost of creating the first copy of the idea, if the profit under monopoly is  $Q$ , the innovation will take place as long as  $C \leq pQ$ . Naturally the lower the probability of success, the less likely the innovation is to occur – under either competition or monopoly. Of course, the social value of the innovation is  $pv$ , and if  $p$  is small enough  $C > pv$  and it is better from a social perspective that the innovation does not occur.

In short, the uncertainty surrounding the success of an innovation changes the specific calculations of how likely it is to take place; this is true with or without intellectual monopoly. But the basic theory of competitive innovation does not change on account of uncertainty – an uncertain outcome is equivalent to earning a lower rent, or having a higher cost. And when a lobbyist comes explaining how much more money he needs because his costs are high and his rewards uncertain...hold on to your pocket.

### ***The Social Value of Imitation***

Imitation is a great thing. It is among the most powerful technologies humans have ever developed: there is a debate over the

extent to which living beings other than *homo sapiens* can actually learn through imitation. In spite of the miracles that our mimetic instinct has been performing for us over the millennia, it has received very bad press in the literature concerned with innovation and ideas. This is not a view that we share, as imitation is a powerful tool of economic development.

It should be clear, in fact, that acts of imitation, carried out while respecting ordinary private property rights and the rights to personal privacy, are key components of the competitive markets that benefit us on a daily basis. Imitation may, or may not require reverse engineering; most times it does as it is rather difficult to imitate a product without even looking at it and examining its internal components. But imitation is not limited to reverse engineering, it involves, and this is what makes it particularly valuable, leaping ahead of the pack.

On the one hand, imitation is a technology that allows us to increase productive capacity. Innovators may increase productive capacity directly, while imitators increase productive capacity by purchasing one or more copies of the idea and then imitating it. Imitation, therefore, always requires an investment: not only do you need to purchase a copy of the idea (and if you try doing this shortly after the innovation has been released, it may be quite costly) but you also need to invest your time and other resources to carry out the imitation process. The output of the imitation process is additional productive capacity. As long as industry capacity is low enough that there are rents to be earned in selling copies of ideas at a price higher than marginal cost, people will make investment to increase capacity. Imitation is the main way in which such investments are implemented.

On the other hand, imitation is also a technology that allows further innovation. When you imitate you take as inputs a copy of the idea, various standard inputs available on the market, and your own skills; as output you get productive capacity for the idea. You do this because you are trying to collect as large a competitive rent as possible: making your copy of the idea a bit better, or cheaper, than the one the original innovators are selling is one way of increasing your rents. Indeed, it is a very powerful way of increasing your rents: it is the essence of competition. So, at the end, imitation is nothing else but an essential ingredient for competition, which may be characterized as imitation with lots of imitators.

Intellectual monopoly greatly discourages imitation. For a monopolist, the worst possibility is losing the monopoly. If an imitator improves upon the product, or learns how to produce it at

cheaper cost, regardless of prior licensing agreements, your competitor now has the upper hand and is a threat to your monopoly. Far more sensible simply to prevent imitation in the first place, by aggressive legal enforcement of patents and other forms of intellectual monopoly.

### ***Diversification***

The case of small cost-reducing innovations is particularly noteworthy. They constitute the traditional form of innovation covered by patent law, because there are many small innovations, they compete with each other, and each innovator has little real monopoly power. On the other hand, the demand for these innovations is essentially flat up to the level of production of the goods that make use of the innovation, and falls sharply once that point is reached. If the information about the innovation spreads quickly, this means that price fall quickly and abruptly to zero, leaving little competitive rent to cover the cost of R&D. Monopolists protected by patent law, on the other hand, can collect practically the entire social value of the innovation. It is striking however, that even in this case, the genius of competition may easily overcome the problem of indivisibility.

The key observation is that typically the firms that make use of small cost reducing innovations are large and publicly held. This means that share-holders hold diversified portfolios. Take for example the relatively small number of producers of hard disk drives. This includes IBM among others. At the moment these producers make many small innovations, which they patent, then license the patents to one another. However, from the perspective of a shareholder that holds a portfolio of many hard drive producers, this is unnecessary. All the benefits of these small innovations are captured by the small collection of hard drive producers, all of which the shareholder holds a small share of. Hence, from the perspective of the investor, if a small innovation reduces costs by more than the cost of invention, it does not matter which producer bears the cost, the investor reaps the entire benefit either way. So shareholders have an incentive, in the absence of patents, to instruct management to produce innovations, even if it creates a loss for the particular firm, provided that the industry as a whole benefits. As we shall see in the next chapter, this type of collective innovation played a role in the development of the steam engine that was superior to that of James Watt, and thanks to which the Industrial Revolution really got going.

### **Notes**

The tragic situation of Zimbabwe is too well documented on the daily press to require explicit references to be reported here.

Somewhat less publicized is the academic status of Mr. Michael Novak. According to the American Enterprise Institute website, Michael Novak is the George Frederick Jewett Scholar in Religion, Philosophy, and Public Policy, and “researches the three systems of the free society – the free polity, the free economy, and the culture of liberty – and their springs in religion and philosophy.” It might be imagined that formal or informal training in economics or logic would be a prerequisite for such a position, but the evidence suggests otherwise.

George J. Stigler was a great, if somewhat mordant, economist who, maybe because of his indefatigable free-market position, has often been seen as tolerant of monopolies; nothing could be further from the truth. Not only he had little sympathy for monopolies in general, he also was one of the few academic economists writing overtly against the “Schumpeterian” view of innovation, which we shall later cover and criticize at length. In Stigler [1956 p. 269] he asks “Is it monopoly or is it competition, that brings more rapid economic progress?” and his answer leaves no doubts, competition.

That limited capacity is the source of economic rents even in competitive industries is scarcely our original idea. We both learned of it as undergraduates when cost curves were introduced and the partial equilibrium of an industry explained. We are not particularly knowledgeable in the history of economic thought, but our impression is that the first exposition of the concept is in Alfred Marshall [1890 book V], who coined the term quasi-rents to, unnecessarily, distinguish them from the Ricardian rents accruing to inframarginal land. Unnecessarily because, in both cases, rents emerge from the existence of factors of production that are fixed at a point in time: land in one case and productive capacity in the other. In both cases, the rents accrue to the owners of the fixed factor. That land may, in general, not grow from one period to another, while productive capacity increases over time only implies that the rent accruing to land will not vanish even in the long run, while those accruing to the owner of productive capacity are eliminated, in the long run, by its expansion brought about by the forces of competition. Marshall appears to have also clearly understood that the ratio between the size of the market and the indivisibility plays a crucial role in the adoption of innovations:

*In almost every trade many things are done by hand, though it is well known that they could easily be done by some adaptations of machines that are already in use in that or some other trade, and which are not made only because there would not as yet be enough employment for them to remunerate the trouble and expenses of making them [1890 book IV footnote 1].*

That competition is not a gala dinner follows directly from Comrade Mao Tse-Tung's observation that the revolution is not a gala dinner either, and from the fact that competition is the source of an unending, but beneficial, revolution in our ways of producing the things we like.

Larry Jones pointed out to us that, until the Plant Variety Protection Act of 1970 destroyed competition there too, markets for new plants and animal species were a perfect example of our abstract model. Many colleagues at Agricultural Economics departments around the country have since confirmed that what Larry had learned while growing up in Sacramento, California, applied elsewhere as well. The Seabiscuit-horse versus Seabiscuit-book criticism of our theory is due to Arnold Kling, "A Metaphor's Metaphor", in *Tech Central Station*, available at [www.techcentralstation.com/030303B.html](http://www.techcentralstation.com/030303B.html)

Much discussion of the first-mover advantage in game theory can be found in Fudenberg and Tirole [1991]. The Hirshleifer model was developed in [1971] while the profit sharing scheme for protecting innovators can be found in Anton and Yao [1994].

Information about Dean Kamen and Ginger was widely reported in the press during 2001. Information about the Getty Museum, Linus Torvalds and Jack Valenti have also been widely reported in the press. James Bond's brand of gun is described in Fleming [1953].