Chapter 1: Introduction

In late 1764, while trying to repair a Newcomen steam engine, the idea of allowing steam to expand and condense in separate containers sprang into the mind of James Watt. He spent the next 6 months in unceasing labor building a model engine. In 1768, after a series of improvements, Watt applies for a patent on the idea; in August 1768 we find him in London about the patent, and he spends another 6 months working hard to obtain the patent, which he finally receives in January 1769. In 1775, after another major effort supported by his business partner Boulton, Watt secures an Act of Parliament extending his 1769 patent until the year 1800. Burke spoke eloquently in Parliament in the name of economic freedom and against the creation of unnecessary monopoly – but to no avail. Boulton's connections in Parliament were too solid to be defeated by simple principle. In 1782, Watt secured a further patent, made "necessary in consequence of ... having been so unfairly anticipated, by Wasborough in the crank motion." More dramatically, in 1781, when the superior and independently designed Hornblower machine is put into production, Boulton and Watt go after him with the full force of the legal system. In contrast to Watt, who died a rich man, the cost of the legal battle was such that Jonathan Hornblower was not only forced to close shop, but found himself ruined and in jail.

Prior to Watt's beginning of commercial production in 1776, there are 130 steam engines in the U.K., most using the inefficient Newcomen design. By 1800, when Watt's patents expired, there are at most 1000 steam engines used in the U.K., of which only 321 are superior Boulton and Watt engines, the rest being old Newcomen engines. The total horsepower of these engines is 10,000 at best. In 1815, fifteen years after the expiration of the Watt patents, it is estimated that 210,000 horsepower is installed in England alone. After the expiration of the Watt's and Boulton's patents in 1800, not only is there an explosion in the production of engines, but steam power finally comes into its own as the driving force of the industrial revolution. In the next 30 years steam engines are modified and improved, and such crucial innovations as the steam train, the steamboat and the steam jenny all come into wide usage. Many of the new improvements, such as those of William Bull, Richard Trevithick, and Arthur Woolf, became available by 1804: although developed earlier these

innovations were kept idle until the Boulton and Watt patent expired, for fear of incurring in the same fate as Hornblower.

Ironically, not only did Watt use the patent system as a legal cudgel with which to smash competition, but his development of the steam engine was hindered by the very same patent system. An important limitation of the original Newcomen engine was its inability to deliver a steady rotary motion. The most convenient solution, involving the combined use of the crank and a flywheel, a method patented in 1780 by James Pickard. Watt also made various attempts at efficiently transforming reciprocating into rotary motion reaching, apparently, the same solution as Pickard. But the existence of a patent forced him to contrive an alternative, and less efficient, mechanical device, the “sun and planet” gear. It was only in 1794, after the expiration of Pickard’s patent that Boulton and Watt adopted the economically and technically superior crank.

The impact of the expiration of his patents on Watt’s empire may be a surprise as well. Despite the fact that “many establishments for making steam-engines of Mr. Watt's principle were then commenced” never-the-less “it would appear that the object principally aimed at was cheapness rather than excellence, for they fell short as to performance of the Soho engines.” As a result we find that “Boulton and Watt for many years afterwards kept up their price and had increased orders.”

In most histories, James Watt is a heroic inventor, responsible for the beginning of the industrial revolution. The facts above suggest a different interpretation. Watt is one of many clever inventors working to improve steam power. After getting one step ahead of the pack, he remains ahead not by superior innovation, but by superior exploitation of the legal system. The fact that his business partner is a wealthy man with strong connections in Parliament, is not a minor help.

The evidence suggests that Watt’s efforts to use the legal system to inhibit competition set back the industrial revolution by a decade or two. The granting of the 1769 and, especially, of the 1775 patents likely delayed the mass adoption of the steam engine: innovation is stifled until his patents expire; and very few steam engines are built during the period of Watt’s legal monopoly. From the number of innovations that occur immediately after the expiration of the patent, it appears that Watt’s competitors simply waited until then before releasing their own innovations in an effort to avoid the fate of Hornblower. Also, we see that Watt’s

inventive skills are badly allocated: we find him spending as much time engaging in legal action in an effort to establish and preserve a monopoly as he does in actual invention.

Indeed, the story of James Watt contains most of the important elements of our argument *against* intellectual monopoly. The sort of wasteful effort to suppress competition and obtain special privileges we have seen in Watt is one of the greatest dangers of monopoly. It is commonly referred to as rent-seeking behavior. Watt's attempt to extend the duration of his 1769 patent is an especially egregious example of rent seeking: the patent extension is clearly unnecessary to provide incentive for the original invention, which had already taken place. On top of this, we see Watt using patents as a tool to suppress innovation by his competitors, such as Hornblower, Wasborough and others. Finally, there is the slow rate at which the steam engine was adopted before the expiration of Watt's patent. By keeping prices high and preventing other from producing cheaper steam engines, Boulton and Watt hampered capital accumulation and slowed economic growth. Intellectual property, as it is currently conceived, has other damaging social effects but the three listed here and exemplified in Watt's story are the most serious ones: rent-seeking, innovation suppression, and slow-down in the process of economic growth. We shall see that Watt's experience is the rule, not the exception.

Economists, beginning with Adam Smith – a friend and teacher of James Watt – have carefully documented the problems of monopoly. Because there are no countervailing market forces, government-enforced monopolies are viewed as particularly dangerous. Intellectual property legislation is one source of government-enforced monopolies; however, economists have generally argued in favor of patent and copyright protection. Despite the many problems with government grants of monopoly power, the argument is that, without the promise of monopoly that patents and copyrights entail, there would be insufficient incentive to innovate or create.

In the case of Watt, the argument goes, he would never have invested the time and effort to come up with his invention without the prospect of a patent. But that case is weak. Even after their patent expires, Boulton and Watt are able to maintain a substantial premium over the market by virtue of having been first, despite the fact that their competitors have had thirty years to learn how to imitate them. Moreover, when Watt developed his ideas and models, it was far from certain that he would be able to get a patent – at that time, getting a patent was an uncertain proposition

– part of the reason he had to lobby nonstop for a long time to get it. Indeed, it may well be that the idea of obtaining a monopoly occurred to Watt only after he finished his invention – there is no evidence he gave any thought to patent law during the development process. Finally, Watt had many competitors, such as Hornblower and Wasborough; had he not invented the condenser, it seems virtually certain someone else would have come up with the idea in the 35 years between the time it occurred to Watt, and the time his patents finally expired. Why this is not an isolated episode and why the traditional case for the protection of intellectual property is weak are two things we will argue through both theory and evidence.

This book elaborates on the idea that intellectual property is generally inhibiting to innovation, growth and prosperity. We argue that not only would innovation thrive in the absence of intellectual monopoly, but that we would enjoy greater growth and prosperity in its absence. Our focus is on the economics of intellectual property: patents, copyright, and downstream licenses. We are not seeking to understand what might and might not be legitimate under the current legal system, but to understand how laws and institutions might be crafted to encourage growth, innovation and creation.

To understand what we mean by "intellectual monopoly," however, some understanding of the existing legal framework is needed. There are three broad types of intellectual property recognized in most legal systems: patents, copyrights and trademarks.

Trademarks are different in nature than patents and copyrights: they serve to identify the providers of goods, services or ideas. We are unaware of any economic rationale for allowing market participants to masquerade as people they are not, and there are strong economic advantages in allowing market participants to voluntarily identify themselves. While we may wonder if it is necessary to allow the Intel Corporation a monopoly over the use of the word "inside," in general we have little dispute with trademarks.

Patents and copyrights, the two forms of intellectual property on which we focus, differ in the extent of coverage they provide. Patents apply to specific implementations of ideas – although in recent years in the U.S. there has been decreasing emphasis on specificity. Patents are of relatively short duration: in the United States, 20 years for patents covering techniques of manufacture, and 14 years for ornamentation. Patents provide

relatively broad protection: no one can legally use the idea, even if they independently rediscover it, without permission from the patent holder.

Copyrights are much narrower in scope, protecting only the specific details of a particular narrative. They are also much longer in duration – the life of the author plus 50 years for the many signatory countries of the Berne Convention, and in the U.S. since the Sonny Bono Copyright Extension Act – the life of the author plus 70 years. In the U.S. there are limitations on copyright not present in patent law: the right of fair use allows the purchaser of a copyrighted item limited rights to employ it, make copies of it and resell it, regardless of the desires of the copyright holder. In addition, certain derivative works are allowed without permission: parodies are allowed, for example, while sequels are not.

In the case of both patent and copyright, there are two important economic features. The first is what we call the *right of sale*. This is the right of a legitimate owner of intellectual property to sell it. In copyright law, this right applied to the creator is sometimes called the "right of first sale," but the right of sale extends also to the legitimate rights of others, for example, licensees, to sell the idea. The second feature of the law is the right to control the use of the intellectual property after sale. It is the second that produces monopoly – enforced by the obligation of the government to prosecute individuals or organizations that use the idea in ways prohibited by the copyright or patent holder.

We emphasize that we favor the right of sale. It is crucial that producers of intellectual property be able to profit from their invention. While sales could take place even in the absence of a legal right, markets function best in the presence of clearly defined property rights. Not only should the property rights of innovators be protected, but also the rights of those who have legitimately obtained the idea directly or indirectly from the original innovator.

It is with the right of the owner of intellectual property to control how the purchaser makes use of the idea or creation with which we disagree. Because this right gives the owner a monopoly over usage of the idea, we refer to it as *intellectual monopoly* to distinguish it from the right of sale. Hence, intellectual property is composed of two parts: the right of sale, and the intellectual monopoly. The first gives the producer or any rightful owner of the idea the power to sell to another party. The second gives the patent or copyright holder the right to control and limit the usage of the idea by any other person. The latter is not just a simple well-defined right of property. It establishes a monopoly that we do not

usually allow producers of other goods. We will argue that this monopoly creates many social costs, yet has little social benefit.

To foreshadow our argument, the original innovator has a natural first-mover advantage by virtue of initially being the only one to know of the idea or how to implement it. Furthermore, ideas are always scarce. The innovator can invariably use his first mover advantage and the scarcity of his idea to earn a profit. In the case of Watt, the first-mover advantage was extremely strong. Even after 31 years for competitors to reverse engineer his invention, Boulton and Watt were still able to command a substantial premium over the market. They were able to do so for many years, by virtue of the special expertise that comes with having been first.

In thinking about abolishing intellectual monopoly, it is important to recognize that even if existing copyright and patent laws were abolished, much of their impact could be recreated through private contracts. That is, in selling their idea, innovators could require purchasers to sign a contract agreeing to make use of it only in ways approved of by the seller. Shrink-wrap software agreements are a simple and common example of this type of downstream licensing. Notice that private agreements could not completely recreate existing patent protection, since independent invention could not be controlled. On the other hand, copyright protection would effectively be increased, since current copyright law obligates the seller to allow fair use, and this could be ruled out in a private agreement. Indeed, the current legal situation is murky, since some sellers do attempt to eliminate fair use through downstream licensing agreements. In any case, to implement our economic scheme of eliminating intellectual monopoly, it is necessary to go beyond merely abolishing patents and copyright to also limit downstream licensing agreements.

To summarize: when we are discussing the elimination of intellectual monopoly, we mean the elimination of patent and copyright except for the right of sale. We also mean that the government would not enforce downstream licensing agreements. That is, shrink-wrap, or other agreements about how intellectual property is to be used could not be enforced in the courts.

Since economists generally argue in favor of the enforcement of private contracts, it may be a surprise that we will be arguing against some of them in the name of competition. However, there are two key elements of the usual argument in favor of private contracts that are missing in the case of downstream licensing.

First, downstream licensing impacts people who are not party to the agreement. That is, if I purchase a book by signing a private agreement not to resell copies, this agreement impinges on the right of other people to buy the book from me. These kinds of agreements, in which a group of people agrees to limit their provision of some good or service, are usually called cartels and are generally illegal under anti-trust law. If you and I, as owners of bakeries, get together and sign a contract agreeing to limit the number of loaves of bread we will sell, not only will the courts not enforce that contract, but we will be subject to criminal prosecution as well.

Second, economists recognize the important element of transaction costs in determining which contracts should be enforced. "Possession is 9/10ths of the law" is a truth in economics as well as in common parlance. Take the case of slavery. Why should people not be allowed to sign private contracts binding them to slavery? In fact economists have consistently argued against slavery – during the 19th century David Ricardo and John Stuart Mill engaged in a heated public debate with literary luminaries such as Charles Dickens – with the economists opposing slavery, and the literary giants arguing in favor. The fact is that our labor cannot be separated from ourselves. For someone else to own our labor requires them to engage in intrusive and costly supervision. Such transaction costs are socially damaging as they imply violation of privacy and of essential civil liberties. Hence they are commonly rejected on economic, not just moral, grounds. Moreover, there is no economic reason to allow slavery. With well functioning markets, renting labor is a good substitute for owning it. And so we allow the rental of labor, but not the permanent sale.

For intellectual property we are proposing the reverse: allowing the permanent sale, but not rental. For with intellectual property, possession belongs to the buyer and not to the seller. If you sell me an idea, I now have that idea embodied either in me or in an object I own. For you to control the idea requires intrusive and costly supervision. Similarly if you sell me a book, a CD or a computer file. In each case, I have physical control of the item, and you can control its use only through intrusive measures. Moreover, in the case of well-functioning markets, owning is a good substitute for renting. Our basic argument against intellectual monopoly is that markets will function well in its absence, and so there is no need for a rental market as the latter only effectuates intellectual monopoly.

We emphasize that it is not rental versus sale that is the crucial distinction, but the presence of restrictions on the use made of an idea. In the case of an idea, such as an invention or mathematical formula, once you have passed the idea to me, rental has little meaning, since I can neither return the idea to you, nor promise to forget it after a fixed period of time. In the case of an object embodying an idea, such as a book or CD, you may well rent the object to me for a fixed period of time. However, in the absence of intellectual monopoly effectuated by downstream licensing, I am free to make a copy of the book or CD. There is no economic objection to such a rental without downstream licensing; on the other hand, while we would not prohibit such rentals, we would not expect such rental markets to be widespread in the absence of intellectual monopoly.

In addition to arguing for freedom of contract, economists also generally argue in favor of well-defined property rights. Secure property rights are a fundamental pillar of a well functioning market economy, leading to higher economic growth and increased prosperity for all. Does not the presence of strong intellectual property rights have a similar effect? No economic agent exercises productive effort without the prospect of controlling its fruits. What is true for physical effort must be true for the intellectual one: if strong property rights provide good incentives for the production of potatoes, must they not also provide good incentives for the production of ideas? Is not violation of patent or copyright theft? Can it be bad to steal potatoes, but good to steal ideas?

We are not arguing against intellectual property, merely against intellectual monopoly. We favor the right of sale, the right to sell ideas. We argue both that the original innovator should have that right, and that those who have purchased the idea should have the same right to sell what is now their idea. We are not arguing that while stealing potatoes is bad, stealing ideas is good. A record producer who promises an artist a payment in exchange for a musical production, and reneges on his promise is indeed guilty of theft, and should be punished by the full force of the law. A movie producer who is shown a copy of a script and who secretly copies it and makes a movie out of it without paying the writer is indeed guilty of theft, and should be punished by the full force of the law. It is the regulation of ideas after their sale with which we disagree. When you buy a potato you can eat it, throw it away, plant it or make it into a sculpture. When you buy a potato you can use the idea of a potato embodied in it to make better potatoes or to invent

french fries. Current laws allow producers of a CDs, books, computer software or medical drugs to take this freedom away from you. It is this confounding of intellectual property with intellectual monopoly against which we argue.

Everyone wants a monopoly, and all producers would impose downstream licensing agreements if they could. No one wants to compete against his own customers. Under current law only producers of ideas do not have to do so. It is a long jump from the assertion that innovators deserve compensation for their efforts to the conclusion that current patent and copyright protection is the best way of providing such reward. Statements such as "A patent is *the* way of rewarding somebody for coming up with a worthy commercial idea" abound in the business, legal and economic press. But we shall see that there are many other ways in which innovators are rewarded, most of them socially better than copyright and patents.

The U.S. Constitution allows Congress "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." Our perspective on patents and copyright is a similar one: promoting the progress of science and the useful arts is a crucial ingredient of economic welfare, from solving such profound economic problems as poverty, to such mundane economic problems as boredom. The question we shall focus on is whether intellectual monopoly is useful in promoting innovation and growth for the benefit of the average citizen/consumer/producer, or if, as we shall argue, it stifles innovation and growth and it redistributes wealth from the "average guy" to a few protected individuals who are either in control or closely associated to the big monopolies lobbying for intellectual property.

Traditionally, economists have been skeptical of government intervention in markets, for example, through regulation or trade-restrictions. Economists are also skeptical of intellectual monopoly, and the economics literature in general suggests that existing protections should be reduced.

In the case of regulation and free trade, economists also generally recognize that some regulation and trade-restrictions are desirable. They recognize too that allowing some intervention triggers rent-seeking behavior by would-be monopolists, and that as a result it is most practical to focus on eliminating government intervention. This is not the view with respect to intellectual

monopoly. Until recently conventional wisdom held that markets could not function at all in its absence. As a result, the conventional view has been that intellectual monopoly is an unavoidable evil if we are to have any innovation at all.

Modern economic research has shown that markets can function even in the absence of intellectual monopoly, and we shall see that many markets already function and function well in its absence. As a result, we take the same position on intellectual monopoly that economists take on trade restrictions: although some modest protection might be desirable in special cases, it is more practical to focus on no-trade restrictions as a general rule.

Notes

The bulk of the story of James Watt is drawn from two sources, Lord [1923] and Carnegie [1905]. The quotation about Wasborough is from Carnegie. The figures on the number of steam engines produced by Boulton and Watt between 1775 and 1800 are from Lord. Information on the role of Matthew Boulton in Watt's enterprise is drawn from Mantoux [1905]. The quotation about the fortunes of Boulton and Watt after the expiration of the Watt patents is taken from Thompson [1847] p. 110 and is quoted in Lord [1923]. The data on the spread of total horsepower between 1800 and 1815 and other details are drawn from *The Cambridge Economic History of Europe* [1965]. A careful historical account, from which some of our data are drawn, of the detrimental impact of the Newcomen's and of the Watt's patents on the rate of adoption of the steam technology can be found in Kanefsky [1979], Kanefsky and Robey [1980] and Smith[1977-8]. The story about Pickard's patent blocking adoption by Watt is told in von Tunzelmann[1978]. As both the Lord and Carnegie works are out of copyright, both are available online at the very good Rochester site on the history of steam power http://www.history.rochester.edu/steam.

A copy of the Berne Convention can be found at http://www.law.cornell.edu/treaties/berne/.

The debate between economists and others over slavery is discussed at some length in Levy and Peart [2001]. In addition to defending slavery, Dickens was a strong proponent of copyright law, and was extremely incensed that his works could be legally distributed in the U.S. without his permission. Ironically, a limited form of slavery is still allowed in the music and sport industries, where long-term contracts binding the artist or the athlete to a particular studio or team are commonplace.

The quote about patents being *the* reward is taken from *The Economist*, June 23rd 2001, page 42, with italics added. The U.S. Constitution is online at http://www.law.cornell.edu/constitution/constitution.overview.html.

Thanks

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Bibliography

Carnegie, Andrew [1905], *James Watt*, New York: Doubleday, Page & Company, May, 1905

Kanefsky, J. W. [1979], *The Diffusion of Power Technology in British Industry, 1760-1870,* University of Exeter, PhD Thesis.

Kanefsky, J. W. and J. Robey [1980], "Steam Engines in 18th Century Britain: a Quantitative Assessment", *Technology and Culture* **21**, 161-186

Levy, David M. and Sandra J. Peart [2001], *The Secret History of the Dismal Science* available online at http://www.econlib.org/library/Columns/LevyPeartdismal.html.

Lord, John [1923], *Capital and Steam Power*, London.

Mantoux, Paul [1905], *La revolution industrielle au XVIII siecle*, Paris.

Smith, A. [1977-8] "Steam and the City: the Committee of Proprietors of the Invention for Raising Water by Fire, 1715-1735", *Transactions of the Newcomen Society*, **49**, 5-20.

Thompson, Benjamin [1847], *Inventions, Improvements, and Practice of Benjamin Thompson, Colliery Engineer*.

von Tunzelmann, G. N. [1978], *Steam Power and British Industrialization to 1860,* Oxford: Clarendon.

The Economist, June 23rd 2001, page 42.

The Cambridge Economic History of Europe, Vol IV, Cambridge, U.K.: Cambridge University Press, 1965.