

## Chapter 1: Introduction

In late 1764, while repairing a small 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 few months in unceasing labor building a model of the new engine. In 1768, after a series of improvements and substantial borrowing, he applied for a patent on the idea. August 1768 found Watt in London about the patent and he spent another 6 months working hard to obtain it. The patent was finally awarded in January 1769. Nothing much happened, in terms of production, for a few years until, in 1775, after another major effort supported by his new business partner Matthew Boulton, Watt secured an Act of Parliament extending his 1769 patent until the year 1800. The great statesman Edmund Burke spoke eloquently in Parliament in the name of economic freedom and against the creation of unnecessary monopoly – but to no avail. The connections of Watt’s partner Boulton were too solid to be defeated by simple principle.

Once Watt’s patents were secured, a substantial portion of his energy was devoted to fending off rival inventors. In 1782, Watt secured an additional patent, made “necessary in consequence of ... having been so unfairly anticipated, by [Matthew] Wasborough in the crank motion.” More dramatically, in the 1790s, when the superior and independently designed Hornblower engine was put into production, Boulton and Watt went after him with the full force of the legal system. In contrast to Watt, who died a rich man, the inventor Jonathan Hornblower was not only forced to close shop, but found himself ruined and in jail.

Prior to the start of Watt’s commercial production in 1776, there were 510 steam engines in the U.K., most using the inefficient Newcomen design. These engines generated about 5,000 horsepower. By 1800, when Watt's patents expired, there were still only 2,250 steam engines used in the U.K., of which only 449 were the superior Boulton and Watt engines, the rest being old Newcomen engines. The total horsepower of these engines was 35,000 at best. In 1815, fifteen years after the expiration of the Watt patents, it is estimated that nearly 100,000 horsepower was installed in the U.K., while by 1830 the horsepower coming from steam engines reached 160,000. The fuel efficiency of steam engines is not thought to have changed at all during the period of Watt’s patent; while between 1810 and 1835 it is estimated to have increased by a factor of five. After the expiration of the patents in 1800, not only

was there an explosion in the production of engines, but steam power finally came into its own as the driving force of the industrial revolution. In the next 30 years steam engines were modified and improved, and such crucial innovations as the steam train, the steamboat and the steam jenny all came into wide usage. The key innovation was the high-pressure steam engine –development of which had been blocked by Watt by strategically using his 1775 patent. Many new improvements to the steam engine, 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. None of these innovators wished to incur the same fate as Jonathan Hornblower.

Ironically, not only did Watt use the patent system as a legal cudgel with which to smash competition, but his own efforts at developing a superior steam engine were hindered by the very same patent system he used to keep competitors at bay. 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, relied on a method patented in 1780 by James Pickard, which prevented Watt from using it. Ironically, 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 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 come as a surprise as well. Despite the fact that “many establishments for making steam-engines of Mr. Watt's principle were then commenced” nevertheless “it would appear that the object principally aimed at was cheapness rather than excellence, for they fell short as to performance of the Soho [Boulton and Watt] engines.” As a result we find that “Boulton and Watt for many years afterwards kept up their price and had increased orders.”

In fact, it is only after their patents expired that Boulton and Watt really started to manufacture steam engines. Before then their activity consisted primarily of extracting hefty monopolistic royalties. Independent contractors produced most of the parts, and Boulton and Watt merely oversaw the assembly of the components by the purchasers.

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 in the second half of the eighteenth century. After getting one step ahead of the pack, he remained ahead not by superior innovation, but by superior exploitation of the legal system. The fact that his business partner was a wealthy man with strong connections in Parliament, was 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 was stifled until his patents expired; and very few steam engines were built during the period of Watt's legal monopoly. From the number of innovations that occurred immediately after the expiration of the patent, it appears that Watt's competitors simply waited until then before releasing their own innovations. Also, we see that Watt's inventive skills were badly allocated: we find him spending more time engaged in legal action to establish and preserve his monopoly than he did in the actual improvement and production of his engine. From a strictly economic point of view Watt did not need such a long lasting patent – it is estimated that by 1783 – seventeen years before his patent expired – his enterprise broke even; so every dollar that came after was pure gravy.

While the view of Watt's enterprise we are proposing here may appear iconoclastic to many readers, it is neither new nor particularly original. Frederic Scherer, a strong and prestigious academic supporter of the patent system, after going through the details of the Boulton and Watt story, concluded his 1986 examination of their story with the following illuminating words

*Had there been no patent protection at all,...Boulton and Watt certainly would have been forced to follow a business policy quite different from that which they actually followed. Most of the firm's profits were derived from royalties on the use of engines rather than from the sale of manufactured engine components, and without patent protection the firm plainly could not have collected royalties. The alternative would have been to emphasize manufacturing and service activities as the principal source of profits, which in fact was the policy adopted when the expiration date of the patent for the separate condenser drew near in the late*

*1790s.... It is possible to conclude more definitely that the patent litigation activities of Boulton & Watt during the 1790s did not directly incite further technological progress.... Boulton and Watt's refusal to issue licenses allowing other engine makers to employ the separate-condenser principle clearly retarded the development and introduction of improvements.*

Indeed, the story of James Watt contains most of the important elements of our argument *against* intellectual property. The new idea accrues almost by chance to the innovator while he is carrying out a routine activity aimed at a completely different end. The patent comes many years after that and it is due more to a mixture of legal acumen and abundant resources available to “oil the gears of fortune” than anything else. Finally, after the patent protection is obtained, it is mostly used as a tool to prevent economic progress and hurt competitors.

The 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 was 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 others from producing cheaper or better steam engines, Boulton and Watt hampered capital accumulation and slowed economic growth.

Intellectual property, as it is currently conceived, still has all these damaging social effects – because its enforcement has been strengthened, its term extended and its reach expanded, current law is much worse. While the randomness in the procedure for obtaining a letter of patent that characterized Watt's period may have been reduced, it has not disappeared. It has shifted from the stage at which a patent is awarded to the stage at which it is litigated in court. A patent is now routinely issued to anyone that files an application with the USPTO. Anything and everything – including such allegedly “new” and “useful” ideas as the peanut butter and jelly sandwich – has been patented in recent years. The brutal legal fight, the peddling of all kinds of influence from legal to legislative,

and the complete randomness of it all, are, nowadays, characteristics of a different stage in the life of a patent. If the underlying invention is good for anything, either dozens of people will claim to have invented it and sue the actual innovator, or the patent holder will sue anyone anywhere who has come up with something similar, or who has the funny idea of competing with him.

In addition to the corrupt rent-seeking, the legal suppression of innovation and the reduced economic growth attendant upon Watt's monopolies, we may also add a significant loss of personal freedom. These social harms are not the necessary evils that we, as a society, must be willing to pay for innovative activity to occur. The opposite, indeed, is true: they are unnecessary evils, a residual of the middle ages from which free market societies emerged, a holdover of the days when governments and royalty granted monopolies to favored courtiers. Another world, a fairer and more decent world, is possible – that of competitive innovation.

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 particularly dangerous. Intellectual property is one type of government-enforced monopoly. Never the less, economists have generally argued in favor of patents 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 and 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 expired, Boulton and Watt were able to maintain a substantial premium over the market by virtue of having been first, despite the fact that their competitors had had thirty years to learn how to imitate them. Moreover, when Watt first 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 rather the rule than an isolated episode and why the 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, prosperity and freedom. We argue that not only would innovation thrive in the absence of intellectual monopoly, but that we, as a society, would enjoy greater growth and prosperity in its absence. We take the view point of the average citizen-consumer when debating if a policy is desirable, not that of a would be monopolist. There is no doubt in our minds that a handful of powerful monopolists would be worse off in a world without intellectual property; what matters is that everybody else would be substantially better off.

Our focus is on the economics of intellectual property: patents, copyright, and downstream licenses. We are not seeking to argue what might and might not be legitimate under the current legal system, but to understand how new laws and institutions might be crafted to encourage growth, innovation and creation. During those not so distant times in which tariffs and other protectionist prohibitions made free trade illegal and dangerous, economists arguing in favor of free trade did not insist that smugglers were carrying out lawful activities. They were breaking the foolish laws of the time in pretty much the same way that people engaged in various forms of “piracy” these days are breaking current laws. But legally or not, by violating trade prohibitions smugglers were carrying out socially useful trades: consumers wanted the goods and were willing to pay for them; producers had the goods but were prevented from selling them by unjust legal restrictions; smugglers, at a cost, allowed these two groups of people to trade. In the same way, while current day pirates may be violating existing intellectual property laws, they are also carrying out socially useful trades. Consumers are asking for cheap books, music, videos, and other products in convenient formats, and workers are willing to work to produce these goods at low cost. By violating intellectual property laws, contemporary “pirates” are allowing these socially beneficial trades to take place. This is why we advocate changing these laws to make lawful and permissible what is already socially good.

This is why too, in order to understand what intellectual property is and why it is socially damaging, some knowledge 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 partial copies of it and resell them, 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 patents 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, when applied to the creator this right 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. This second right produces a 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 a copy of the idea, directly or indirectly, from the original innovator. The former encourages innovation, the latter encourages the diffusion, adoption and improvement of innovations.

It is with the right of the owner of intellectual property to control how the purchaser makes use of the idea or creation that we disagree. Because this right gives the owner a monopoly over usage of the idea and prevents buyers from using the intellectual property they lawfully purchased, 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 a copy of the idea the power to sell it 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. It largely redistributes income and wealth from the many that do not have it, to the “lucky” ones who have managed to obtain it.

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 had been available 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. Economic research shows that the same mechanism is at work, for example in the contemporary market for pharmaceutical products. Many years after a medical patent has expired, when cheaper generic drugs are available that are perfect substitute for the original product, the first innovator still retains a substantial degree of market power and still charges a higher price.

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, which would already be a major step forward. 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 eliminate intellectual monopoly, it is necessary to go beyond merely abolishing patents and copyright to also limit downstream licensing agreements.

Economists as a rule favor both freedom of contract and well-defined property rights. It may come as a surprise that the two of us – two conservative economists – appear to be arguing the opposite. However, economists also favor competition over monopoly, and economists have come to learn and understand that competition does not fall from the sky; it is a system of organizing human economic interactions that requires nurturing and protection. The fact is that – like most free-market economists – we do not favor enforcing collusive contracts that are used to create monopolies – and this is what shrink wrap agreements are. Nor do we argue against property rights, which we view as essential to the smooth functioning of a competitive economy. Our argument is with intellectual monopoly. We favor the right of sale, the right to sell copies of ideas. We argue both that the original innovator should have that right, and that those who have purchased a copy of the idea should have the same right to sell what is now their copy of the idea. It is the monopolistic regulation of the right to use legally available technologies to make further copies of ideas *after their lawful 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 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, or against imitators for

that matter. Under current law only producers of (certain) ideas do not have to do so. It is a long and dangerous 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 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 personal nuisances 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, 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 of, or closely associated with, 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. Alas, this is not yet the conventional view with respect to intellectual monopoly. Until recently, conventional wisdom held that markets could not function at all in its absence. As a result, many economists still believe that intellectual monopoly is an unavoidable evil if we are to have any innovation at all.

Modern economic research, however, has shown that markets for ideas can function even in the absence of intellectual monopoly, and we shall see that markets for ideas and innovation function and function well absent intellectual monopoly. As a result, we take the same position on intellectual monopoly that economists

take on trade restrictions: although some modest amount of protection might be desirable in very special cases, it is more practical and useful to focus on the elimination of restrictions as a general rule. Similarly, while some modest amount of intellectual monopoly might be desirable in very special cases, it is more practical and useful to focus on the elimination of intellectual monopoly as a general rule.

Our analogy between intellectual property and trade restrictions is not a purely rhetorical tool, nor a random comparison. For centuries, human innovative activity took the form of creating new consumption goods, new machines and new staples of food. But the transmission of ideas from one producer to another and across countries was not nearly as fast, standardized, and routinized as it is today. Creative human activity was focused on the creation and reproduction of physical goods and not on the creation and reproduction of ideas. Free trade of commodities was therefore key in fostering progress: the more competitors came in with shoes like yours, the more you had to improve on your shoes to keep selling them.

This dialectic we used to call economic progress, and, after a few centuries of intellectual debate and numerous wars, Western societies came to understand that restricting international trade was damaging because protectionism prevents economic progress. Since at least the late Middle Ages, the battle has been between the forces of progress, individual freedom, competition and free trade, and those of stagnation, regulation of individual actions, monopoly, and trade protection. Now that the intellectual and political battle over free trade of physical goods seems won, and an increasing number of less advanced countries are joining the progressive ranks of free-trading nations, pressure for making intellectual property protection stronger is mounting in those very same countries that advocate free trade. This is not coincidence.

Most physical goods already are and, in the decades to come, will increasingly be, produced in the less developed countries. Most innovations and creations are taking place in the advanced world, and the IT and bio-engineering revolutions suggest this will continue for a while at least. It is not surprising then, that a new version of the eternal parasite of economic progress – mercantilism – is emerging in the rich countries of North America, Europe and Asia.

Economic progress springs from having things produced as efficiently as possible, so that they can sell at the lowest price. This wisdom applies to both the things we *buy* and to those we *sell*, and

therein lies the trap of mercantilism. Most of us have learned that the surest way to make a profit is to “buy cheap and sell dear.” When there is adequate competition and everyone tries to buy cheap and sell dear, then the *only* way I can buy cheap and sell dear is for me to be more efficient than you. This generates incentives for innovation and progress. The trap and tragedy of mercantilism is when this individually correct philosophy is transformed into a national policy: that we are all better off when our country as a whole buys cheap and sells dear. It was this myopic and distorted view of the way in which markets function that Smith, Ricardo, and the other classic economists were fighting against 250 years ago. At that time wheat producers in England wanted to restrict free trade in wheat so English producers could sell it dear.

The contemporary variation of this economic pest is one in which our collective interest is best served if we buy goods cheap and sell ideas dear. In the mind of those preaching this new version of the mercantilist credo, the World Trade Organization should enforce as much free trade as possible, so we can buy “their” products at a low price. It should also protect our “intellectual property” as much as possible, so we can sell “our” movies, software, and medicines at a high price. What this folly misses is that, now like three centuries ago, while it is good to buy “their” food cheap, if “they” buy movies and medicines at high prices, so do “we.” This has dramatic consequences on the incentives to progress: when someone can sell at high prices because of legal protection from imitators, they will not expend much effort looking for better and cheaper ways of doing things.

For centuries, the battle for economic progress has identified with the battle for free trade. In the decades to come, the battle for economic progress will identify, more and more, with the battle against intellectual monopoly. As in the battle for free trade, the first step must consist in destroying the intellectual foundations of the obscurantist position. Back then the mercantilist fallacy taught that, to become wealthy, a country must regulate trade and strive for trade surpluses. Today, the same fallacy teaches that without intellectual monopoly innovations would be impossible. Our goal here is to demolish that glass house.

## Notes

Much of the story of James Watt can be found in Carnegie [1905], Lord [1923], and Marsden [2004]. The quotation about Wasborough is from Carnegie. Information on the role of Boulton in Watt's enterprise is drawn from Mantoux [1905]. A lively description of the real Watt, as well of his legal wars against the Hornblowers – and many other – and of how he subsequently used his status to alter the public memory of the facts, can be found in Marsden [2004]. Lord [1923] gives figures on the number of steam engines produced by Boulton and Watt between 1775 and 1800, while the *The Cambridge Economic History of Europe* [1965] provides data on the spread of total horsepower between 1800 and 1815 and the spread of steam power more broadly. However, Kanefsky [1979] has largely discredited the Lord numbers, and the figures we quote on number of machines and horsepower are from Kanefsky and Robey [1980]. The 100,000 horsepower estimate for 1815 is the average of the figures they give for 1800 and 1830. These two studies together with that of Smith [1977-78] provide a careful historical account of the detrimental impact of the Newcomen's and of the Watt's patents on the rate of adoption of the steam technology. Data of the fuel efficiency, the "duty," of steam engines is from Nuvolari [2004]. The story about Pickard's patent blocking adoption by Watt is told in von Tunzelmann [1978]. 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]. Scherer's quotation about Boulton and Watt is from the pages 24-25 of Scherer [1984], while Scherer [1965] is the source of the break-even point estimate reported a little earlier.

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 [www.history.rochester.edu/steam](http://www.history.rochester.edu/steam). Later drafts of this chapter benefited enormously from the arrival of Google Book Search, which allowed us to check so many original historical sources about James Watt and the steam engine as we would have never thought possible before.

Information on U.S. Patent Law can be found at the U.S. Patent Office at [www.uspto.gov/main/patents.htm](http://www.uspto.gov/main/patents.htm). The Sony Bono Copyright Extension Act can be found online at [library.thinkquest.org/J001570/sonnybonolaw.html](http://library.thinkquest.org/J001570/sonnybonolaw.html), while the Berne Convention on Copyright can be found at [www.law.cornell.edu/treaties/berne/](http://www.law.cornell.edu/treaties/berne/). A useful discussion of fair use, including parodies, is Gall [2000].

For the statistical evidence about leading drugs keeping a large share of the market long after generic imitators are allowed to enter see, for example, Caves et al [1991]

The quote about patents being *the* reward is taken from *The Economist*, June 23<sup>rd</sup> 2001, page 42, with italics added.

The U.S. Constitution, not being copyrighted, is online at various places, such as <http://www.law.cornell.edu/constitution>.

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