CHAPTER TEN
INTELLECTUAL PROPERTY AND ECONOMIC DEVELOPMENT

> "*It is only by considering the trend of legal development that we can make sure of the direction in which efforts toward improvement can be guided most effectively.*" --Brander Matthews (1890).

The nineteenth century stands out in terms of the diversity across nations in intellectual property institutions, but this period also saw the origins of the movement towards the "harmonization" of laws that at present dominates global debates. Among the now-developed countries, the United States was unique in its conviction that democratic intellectual property rules and standards were key to achieving economic development. Democratic ends required security in patent property to create incentives for invention and innovation, whereas copyrights had to be abridged to ensure that the public interest in learning was not precluded. This calculus was distinct from that of European countries, which tended to regard patent rights as monopolistic and restricted them to protect vested interests and existing jobs; but at the same time the Europeans were less concerned about enhancing mass literacy and public education, and viewed "authors" as inherently meritorious and deserving of strong protection. European copyright regimes thus evolved in the direction of author's rights, while the United States lagged behind the rest of the world in terms of both domestic and foreign copyright protection. Americans not only refused to adhere to international copyright treaties long upheld by European countries, they continued to engage in foreign copyright piracy in the face of protests both at home and overseas. In direct contrast, U.S. international patent policies were directed towards influencing other countries to strengthen their patent laws in order to benefit globally competitive American patentees.

This chapter describes the rich variation in the historical experience of (then) follower countries, beginning with Switzerland during the period before and after adopting patent protection. Other countries like Germany and Japan were strongly influenced by the American system, but they tailored their institutions to fit the needs of their own particular circumstances. I trace the movement to harmonize patent and copyright laws to two separate sources that culminated in stipulations for a

system of uniformly strong patents and strong copyrights regardless of the level of economic development. Such a system did not exist anywhere in the world during the period under review here, when countries enjoyed greater freedom to choose appropriate institutions. Thus, the intellectual property system to which today's developing countries are required to subscribe constitutes an historical and economic anomaly. The final section of the chapter briefly addresses the lessons that one might draw from the economic history of intellectual property. It suggests that the same sort of self-interested strategies that the United States, Germany and Japan adopted would likely benefit other developing countries, but the menu of choices in the twenty first century is much more limited. Whereas intellectual property institutions stimulated American economic growth owing to their flexible responses to economic and social circumstances, policies in today's developing countries are not self-determined; they are structured for the most part by the political economy of the advanced nations.

Today very few developed countries would seriously consider eliminating statutory protection for inventions, but in the second half of the nineteenth century the "patent controversy"in Europe pitted advocates of patent rights against an effective abolitionist movement. For a short period the abolitionists were strong enough to obtain support for dismantling patent systems in a number of European countries. In 1863 the Congress of German Economists declared "patents of invention are injurious to common welfare;" and the movement achieved its greatest victory in Holland, which repealed its patent legislation in 1869.[1] The Swiss cantons did not adopt patent protection until 1888, with an extension in the scope of coverage in 1907.[2] The abolitionists based their arguments on the benefits of free trade and competition, and viewed patents as part of an inefficient protectionist and anticompetitive strategy analogous to tariffs on imports. Instead of state-sponsored monopoly awards, they argued, inventors could be rewarded by alternative policies, such as stipends from the government, payments from private industry or associations formed for that purpose, or simply through the lead time that the first inventor acquired over competitors by virtue of his prior knowledge.

According to one authority, the Netherlands eventually reinstated its patent system in 1912 and Switzerland introduced patent laws in 1888 largely because of a keen sense of morality, national pride

and international pressure to do so.[3] The appeal to "morality"as an explanatory factor is incapable of explaining the timing and nature of changes in strategies. The Netherlands and Switzerland were initially able to benefit from their ability to free-ride on the investments that other countries had made in technological advances. As for the cost of lower incentives for discoveries by domestic inventors, the Netherlands was never vaunted as a leader in technological innovation, and this is reflected in their low per capita patenting rates both before and after the period without patent laws. They recorded a total of only 4561 patents in the entire period from 1800 to 1869 and, even after adjusting for population, the Dutch patenting rate in 1869 was a mere 13.4 percent of the U.S. patenting rate. Moreover, between 1851 and 1865 88.6 percent of patents in the Netherlands were granted to foreigners.[4] Thus, the Netherlands had little economic reason to adopt patent protection, except for external political pressures and the possibility that some types of foreign investment might be deterred.

The case was somewhat different for Switzerland, which was noted for being innovative, but in a narrow range of pursuits. Since the scale of output and markets were quite limited, much of Swiss industry generated few incentives for innovation.[5] A number of the industries in which the Swiss excelled, such as the production of chocolate and other food products, and hand-made watches, were less susceptible to invention that warranted patent protection. For instance, despite the much larger consumer market in the United States, during the entire nineteenth century fewer than 300 U.S. patents related to chocolate composition or production. Improvements in other pursuits such as watch-making could be readily protected as trade secrets as long as the industry remained artisanal. However, with increased mechanization and worker mobility secrecy would ultimately prove to be ineffective, and innovators would be unable to appropriate returns without more formal means of exclusion. According to contemporary observers, the Swiss resolved to introduce patent legislation not because of a sudden newfound sense of morality, but because they feared that American manufacturers were surpassing them in the mass production of products such as boots, shoes and watches as a result of patented innovations.[6] Indeed, before 1890, American inventors obtained more than 2068 patents on watches, and the U.S. watchmaking industry benefited from strong economies of scale and rapidly falling prices of output, making them more competitive internationally.

What was the impact of the introduction of patent protection in Switzerland? Foreign inventors could obtain patents in the United States regardless of their domestic legislation, so we can approach this question tangentially by examining the patterns of patenting in the United States by Swiss residents before and after the 1888 reforms.[7] Between 1836 and 1888, Swiss residents obtained a grand total of 585 patents in the United States. Fully a third of these patents were for watches and music boxes, and only six were for textiles or dyeing, industries in which Switzerland was regarded as competitive early on. Swiss patentees were more oriented to the international market, rather than the small and unprotected domestic market where they could not hope to gain as much from their inventions. For instance, in 1872 Jean-Jacques Mullerpack of Basel collaborated with Leon Jarossonl of Lille, France to invent an improvement in dyeing black with aniline colours, which they assigned to William Morgan Brown of London, England.[8] Another Basel inventor, Alfred Kern, assigned his 1883 patent for violet aniline dyes to the Badische Anilin and Soda Fabrik of Mannheim, Germany.

After the patent reforms, the rate of Swiss patenting in the United States immediately increased. Swiss patentees obtained an annual average of 32.8 patents in the United States in the decade before the patent law was enacted in Switzerland.[9] After the Swiss allowed patenting, this figure increased to an average of 111 each year in the following six years, and in the period between 1895 to 1900 a total of 821 Swiss patents were filed in the United States. The decadal rate of patenting per million residents increased from 111.8 for the ten years up to the reforms, to 451 per million residents in the 1890s, 513 in the 1900s, 458 in the 1910s and 684 in the 1920s. U.S. statutes required worldwide novelty, and patents could not be granted for discoveries that had been in prior use, so the increase was not due to a backlog of trade secrets that were now patented. It is possible, of course, that the sustained increase in patenting (and citations) after the laws were introduced in 1888 was merely coincidental or that the reforms were adopted because they anticipated such increases. Interpretations of these patterns may vary, but it is plausible that the higher rates of patenting reflected rates of inventive activity that were induced by patent protection.

Moreover, the introduction of Swiss patent laws also affected the direction of inventions that Swiss residents patented in the United States. After the passage of the law, such patents covered a much broader range of inventions, including gas generators, textile machines, explosives, turbines, paints and dyes, and drawing instruments and lamps. The relative importance of watches and music boxes immediately fell from about a third before the reforms to 6.2 percent and 2.1 percent respectively in the 1890s, and even further to 3.8 percent and 0.3 percent between 1900 and 1909. Another indication that international patenting was not entirely unconnected to domestic Swiss inventions can be discerned from the fraction of Swiss patents (filed in the U.S.) that related to process innovations. Before 1888, 21 percent of the patent specifications mentioned a process. Between 1888 and 1907, the Swiss statutes included the requirement that patents should include mechanical models, which precluded patenting of pure processes. The fraction of specifications that mentioned a process fell during the period between 1888 and 1907, but returned to 22 percent when the restriction was modified in 1907.

In short, although the Swiss experience is often cited as proof of the redundancy of patent protection, the limitations of this special case should be taken into account. The domestic market was quite small and offered minimal opportunity or inducements for inventors to take advantage of economies of scale or cost-reducing innovations. Manufacturing tended to cluster in a few industries where innovation was largely irrelevant, such as premium chocolates, or in artisanal production that was susceptible to trade secrecy, such as watches and music boxes. In other arenas, notably chemicals, dyes and pharmaceuticals, Swiss industries were export-oriented, but even today their output tends to be quite specialized and high-valued rather than mass-produced. Export-oriented inventors were likely to have been more concerned about patent protection in the important overseas markets, rather than in the home market. Thus, between 1888 and 1907, although Swiss laws excluded patents for chemicals, pharmaceuticals and dyes, 20.7 percent of the Swiss patents filed in the United States were for just these types of inventions. During this period the 68.4 percent rate of patent assignment at issue for

these industries was quite high compared to other countries, and remained unchanged in the following decade even after chemicals gained Swiss patent protection. Thus, the scanty evidence on Switzerland seems to suggest that the introduction of patent rights was accompanied by changes in the rate and direction of inventive activity, although the direction of causation is open to question.

The "patent controversy" of the nineteenth century had been especially contentious among the states that comprised the German alliance.[10] The German Empire was founded in 1871, and in the first six years each state adopted its own policies. Alsace-Lorraine favoured a French style system, whereas others such as Hamburg and Bremen did not offer patent protection. One of the concerns expressed was that patent protection would allow an influx of American patentees, to the detriment of the domestic market. However, after strong lobbying by supporters of both sides of the debate, Germany passed a unified national Patent Act in 1877. The German patent law followed the American system, but it also incorporated features unique to Germany and its perceived needs. The 1877 statute created a centralized administration for the grant of a federal patent for original inventions. The patent examination process required that the patent should be new, nonobvious, and also capable of producing greater efficiency. Applications were initially examined by consultants to the Patent Office who were expert in their field but, due to perceived conflicts of interest, in 1891 examiners became permanent employees of the Patent Office, as in the United States. During the eight weeks before the grant, patent applications were open to public scrutiny and an opposition could be filed denying the validity of the patent. German patent fees were deliberately set high, with a renewal system that required payment of 30 marks for the first year, 50 marks for the second year, 100 marks for the third, and 50 marks annually after the third year. Part of the reason for high fees was to raise revenues by taxing foreign inventors and to eliminate protection for trivial inventions. The initial term of fifteen years was extended in 1923 to eighteen years. Industrial entrepreneurs succeeded in their objective of creating a "first to file" system, so patents were granted to the first applicant rather than to the "first and true inventor," but in 1936 the National Socialists introduced a first to invent system.

German patent policies exempted certain key industries in order to fulfill diffusion and development goals. Patents could not be obtained for food products, pharmaceuticals, or chemical products, although the process through which such items were produced could be protected. It was felt that open access to use existing innovations and the incentives to patent around existing processes spurred productivity and diffusion in these industries. The authorities further ensured the dissemination of information by publishing patent claims and specification before they were granted. The German patent system facilitated the use of inventions by firms, with the early application of a "work for hire" doctrine that allowed enterprises usufruct in the rights to inventions of employees. As in the United States, once patents were granted, the courts adopted an extremely liberal attitude in interpreting and enforcing existing rights. After 1891 a parallel and weaker version of patent protection could be obtained through a *gebrauchsmuster* or utility patent (sometimes called a petty patent), which was granted through a registration system.[11] Protection as a utility patent was available for inventions that could be represented by drawings or models with only a slight degree of novelty, and for a limited term of three years (renewable once for a total life of six years). Patent protection based on co-existing systems of registration and examination served distinct but complementary purposes.

Although the German system was close to the American patent system, it varied in important respects. The German regime resulted in patent grants that were lower in number, but likely higher in average value. Legal remedies for wilful infringement included not only fines, but also the possibility of imprisonment. The most significant departure from U.S. policies was that German patents were subject to working requirements. The grant of a patent could be revoked after the first three years if the patent was not worked, if the owner refused to grant licences for the use of an invention that was deemed in the public interest, or if the invention was primarily being exploited outside of Germany. However, in most cases, a compulsory licence was regarded as adequate. The German patent system, to many other developing countries, comprised an appropriate amalgam of incentives to domestic patentees and concessions to the fact that the roster of patentees tended to include more foreigners than native inventors.

This realization that successful institutions should be tailored to individual circumstances was especially evident in the early Japanese patent system. Japan emerged from the Meiji era as a follower nation which designed its institutions to emulate those of the most advanced industrial countries. The first effective national patent statute in Japan copied many features of the U.S. system, including the examination procedures. However, the overall system ultimately reflected Japanese priorities and the "wise eclectism of Japanese legislators."[12] Patents were not granted to foreigners; protection could not be obtained for fashion, food products, or medicines; patents that were not worked within three years could be revoked; and severe remedies were imposed for infringement, including penal servitude. After Japan became a signatory of the Paris Convention a new law was passed in 1899, which amended existing legislation to accord with the agreements of the Convention, and extended protection to foreigners. The influence of the German laws were evident in subsequent reforms in 1909 (petty or utility patents were protected) and 1921 (protection was removed from chemical products, work for hire doctrines were adopted, and an opposition procedure was introduced). The Act of 1921 also included a liability rule that permitted the state to revoke a patent grant on payment of appropriate compensation if it was deemed to serve the public interest. Medicines, food and chemical products could not be patented, but protection could be obtained for processes relating to their manufacture.

Britain and France initially had a disproportionate influence on international patent systems because of their numerous colonies. French patent laws were not only adopted in its own colonies, but also diffused to other countries through its influence on Spain's system since the Spanish Decree of 1811.[13] As for Spain itself, its experience during the nineteenth century is instructive since this country experienced lower rates and levels of economic development than the early industrializers. Like its European neighbours, early Spanish rules and institutions were vested in privileges which had lasting effects that could be detected even in the later period. The per capita rate of patenting in Spain was lower than other major European countries, and foreigners filed a significant fraction of patented inventions. Between 1759 and 1878, roughly one half of all grants were to citizens of other countries, notably France and (to a lesser extent) Britain. Thus, the transfer of foreign technology was a major concern in the political economy of Spain.

This dependence on foreign technologies was reflected in the structure of the Spanish patent system, which permitted patents of introduction as well as patents for invention.[14] Patents of introduction were granted to entrepreneurs who wished to produce foreign technologies that were new to Spain, with no requirement of claims to being the true inventor. Thus, the sole objective of these instruments was to enhance innovation and production in Spain. Since the owners of introduction patents could not prevent third parties from importing similar machines from abroad, they also had an incentive to maintain reasonable pricing structures. Introduction patents had a term of only five years, with a cost of 3000 reales, whereas the fees of patents for invention varied from 1000 reales for five years, 3000 reales for ten years, and 6000 reales for a term of fifteen years.[15] Patentees were required to work the patent within one year, and about a quarter of patents granted between 1826 and 1878 were actually implemented.[16] Since patents of introduction had a brief term, they encouraged the production of items with high expected profits and a quick payback period, after which monopoly rights expired, and the country could benefit from diffusion.

Developing countries throughout the world faced similar concerns as Japan, Spain and Germany did in constructing intellectual property systems. Most of these countries were net importers of foreign technologies and investment, with minimal stocks of domestic inventions and innovations. Their policy goals were primarily to raise revenues and moderate the impact of foreign technologies, rather than to create incentives for domestic invention. The majority of developing countries assessed very high fees when they established patent systems (especially given their low per capita incomes.)[17] Many of the societies in Central and South America, regardless of their colonial origins, levied the highest fees in the world for patent protection. The high costs might have been due to a number of factors, including the wish to raise revenues, a conviction that patent rights would be sought more by foreigners than by natives, and a desire to limit exclusive rights to valuable inventions. Nevertheless, the net impact of high fees was to insulate businessmen with considerable resources from competition and to perpetuate inequalities in wealth and enterprise.[18]

The decisive victory of the patent proponents in the nineteenth century shifted the focus of interest to the other extreme. The United States was the most prolific patenting nation in the world, many of the major American enterprises owed their success to patents and were expanding into international markets, and the U.S. patent system was recognized as the most successful. It is therefore not surprising that the U.S. was in the vanguard of efforts to attain uniformity, and its experience played a key role in ensuring that the international debate was resolved in favour of well-enforced patent rights. Part of the impetus for change occurred because the costs of discordant national rules became disproportionately burdensome for Americans as the volume of international trade in industrial products grew over time. Americans were also concerned about the lack of protection accorded to their exhibits in the increasingly prominent World's Fairs. Indeed, the first international patent convention was held in Austria in 1873, at the suggestion of U.S. policy makers, who wanted to be certain that their inventors would be adequately protected at the International Exposition in Vienna that year. It also yielded an opportunity to protest the provisions in Austrian law which discriminated against foreigners, including a requirement that patents had to be worked within one year or risk invalidation. Patent harmonization would lead to convergence towards the American model, despite resistance from nations which feared that their domestic industry would be overwhelmed by American patents.[19]

In the international sphere, the preferences and interests of the United States were directed towards replicating its domestic policies towards patent holders, which have always been the most liberal in the world. However, from the very beginning of the movement to international harmonization, deep divisions occurred regarding the extent to which restrictions should be placed on the rights of patentees. Most members continued to support measure that they deemed to be in the public interest, especially working requirements and compulsory licences for patentees, which the United States consistently and strenuously opposed.[20] These policy instruments had been widely used by other developed countries since the earliest years of the Venetian patent grants. France incorporated

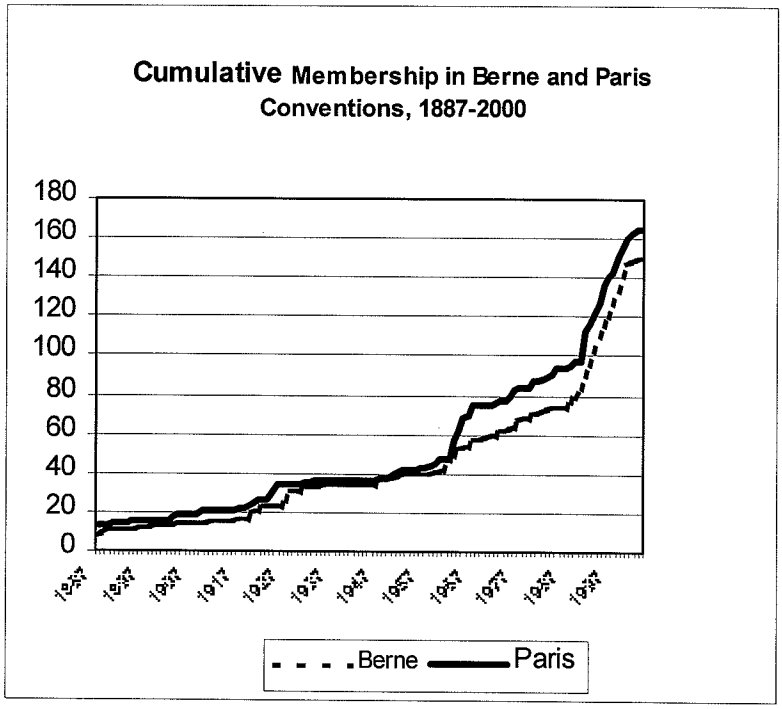
working requirements in its 1844 statutes; Germany stipulated both working requirements and compulsory licences; and so did Britain in the early twentieth century. During the colonial period, such statutory exceptions to patent and copyrights were also prevalent among the American states. The United States itself incorporated working requirements in its 1832 and 1836 patent statutes. Moreover, consent decrees in U.S. antitrust actions led to large scale infringements of patent rights that involved not only exclusive compulsory licences, but also the forced transfer of trade secrets and know-how.[21] The United States was therefore as zealous in its application of compulsory licencing in some contexts within its own borders, as in its efforts to prohibit other nations from using such restrictions to promote their own interests.

International conventions proliferated in subsequent years, and their tenor tended to reflect the opinions of the convenors.[22] Their objective was not to reach compromise solutions that would reflect the needs and wishes of all participants, but rather to promote preconceived ideas. It became clear that the goal of complete uniformity was not practicable, given the different objectives, ideologies and economic circumstances of participants. Nevertheless, in 1884 the International Union for the Protection of Industrial Property was formed.[23] The U.S. pressed for the adoption of reciprocity (which would ensure that American patentees were treated as favorably abroad as in the United States) but this principle was rejected in favor of "national treatment" (American patentees were to be granted the same rights as nationals of the foreign country). Ironically, because its patent laws were the most liberal towards patentees, the United States found itself with weaker bargaining abilities than nations who could make concessions by changing their provisions. This likely influenced the U.S. tendency to use bilateral trade sanctions rather than multilateral conventions to obtain reforms in international patent policies. It was commonplace in the nineteenth century to rationalize and advocate close links between trade policies, protection, and international laws regarding intellectual property. Indeed, French commentators proclaimed that "the laws on industrial property... will be truly disastrous if they do not have a counterweight in tariff legislation."[24]

The movement to harmonize intellectual property laws showed that institutions do not exist in a vacuum, but are part of a bundle of rights that are affected by other laws and policies. The United States, the most liberal in its policies towards patentees, had led the movement for harmonization of patent laws. In marked contrast, throughout the history of the U.S. system its copyright grants in general were more abridged than almost all other countries in the world. The term of copyright grants to American citizens were among the shortest in the world, the country applied the broadest interpretation of fair use exemptions, and the validity of the copyright depended on strict compliance with the requirements. U.S. failure to recognize the rights of foreign authors was also unique among the major industrial nations. In view of the strong protections of inventors under the U.S. patent system, to foreign observers its copyright policies appeared to be all the more reprehensible. The Report of the 1878 British Commission on Copyrights noted: "the original works published in America are, as yet, less numerous than those published in Great Britain. This naturally affords a temptation to the Americans to take advantage of the works of the older country ... The position of the American people in this respect is the more striking, from the circumstance that, with regard to the analogous right of patents for invention, they have entered into a treaty with this country for the reciprocal protection of inventors."[25]

Throughout the 19th century unsuccessful proposals to reform the law and to acknowledge foreign copyrights were repeatedly brought before Congress. Other countries had long recognized the rights of foreign authors in national laws and bilateral treaties, but France stood out in its favourable treatment of domestic and foreign copyrights as "perhaps, the foremost of all nations in the protection it accords to literary property."[26] This was especially true of its treatment of foreign authors and artists. For instance, France allowed copyrights to foreigners conditioned on manufacturing clauses in 1810, and granted foreign and domestic authors equal rights in 1852. In the following decade France entered into almost two dozen bilateral treaties, prompting a movement towards multilateral negotiations, such as the Congress on Literary and Artistic Property in 1858. In a parallel fashion to the status of the

Figure 1



Notes and Sources: The figure shows the cumulative number of nations adhering to the Paris Convention for the Protection of Industrial Property (1883), and the Berne Convention for the Protection of Literary and Artistic Works (1886). The data are from the World Intellectual Property Organization (http://www.wipo.org//treaties). Accessed February 20, 2003.

United States in patent matters, France's influence was evident in the subsequent evolution of international copyright laws. The International Literary and Artistic Association, which the French novelist Victor Hugo helped to establish, conceived of and organized the Convention which first met in Berne in 1883.

The Berne Convention included a number of countries that wished to establish an "International Union for the Protection of Literary and Artistic Works."[27] The preamble declared their intent to "protect effectively, and in as uniform a manner as possible, the rights of authors over their literary and artistic works."[28] Berne abolished compliance with formalities as a prerequisite for copyright protection since the creative act itself was the source of the property right. This rule was revolutionary, for it was inconsistent with the notion that the public welfare was primary; it implied that copyright was the default, whereas additions to the public domain would have to be achieved through affirmative actions and by means of specific limited exemptions. Of equal significance with such provisions was the underlying property rights philosophy which was decidedly from the natural rights school. In 1928 the Berne Convention followed the French precedent and acknowledged the moral rights of authors and artists. Despite the quest for harmonization, countries differed in the extent to which multilateral provisions governed domestic legislation.[29] Only a few countries complied with the letter of the law, and most kept stipulations such as deposit requirements through other types of legislation or regulations. In 1990 the majority of countries in the world still had a legal deposit system, even though their copyright laws did not require applicants to make deposits.

Unlike its leadership in patent conventions, the United States declined an invitation to a pivotal copyright conference in Berne in 1883. It attended but refused to sign the 1886 agreement of the Berne Convention and indeed failed to do so until 1988. As Figure 1 shows, the United States was among the last wave of entrants into the Convention. When the United States finally joined the Berne Convention it complied by removing prerequisites for copyright protection such as registration, and also lengthened the term of copyrights. However, it still has not introduced federal legislation in

accordance with Article 6bis, which declares the moral rights of authors "independently of the author's economic rights, and even after the transfer of the said rights."

The quest for harmonization in intellectual property rights resulted in a "race to the top," directed by the efforts and self interest of the countries which have had the strongest property rights (Figure 2). As outlined here, the movement to harmonize patents was driven by American efforts to ensure that its extraordinary patenting activity was remunerated within as well as beyond its borders. At the same time, the United States ignored international conventions to unify copyright legislation. Nevertheless, the harmonization of copyright laws proceeded, promoted by France and other civil law regimes which urged stronger protection for authors based on their "natural rights" although at the same time they infringed the rights of foreign inventors. The net result was that international pressure was applied to developing countries to establish strong patents *and* strong copyrights, although no individual developed country had adhered to both concepts simultaneously during their own early growth phase. This occurred even though theoretical models did not offer persuasive support for intellectual property harmonization, and indeed suggested that uniform policies might be detrimental even to the developed countries and to overall global welfare.[30]

LESSONS FROM EUROPEAN AND U.S. ECONOMIC HISTORY

Recent scholarship highlights the importance of institutions in long-run economic growth, but the specific relationship is still not clearly understood, despite a plethora of research on both the theoretical and empirical aspects of institutions and economic activity.[31] Indeed, despite evidence that institutions might be endogenous, some empirical studies still treat legal regimes, patent systems and other forms of property rights as exogenous determinants of economic performance. Moreover, institutional structures and their revisions are often discussed without attempts to distinguish between rules and their enforcement. There is a need for more research that contributes to a better understanding of the sources of institutional change, the specific means through which revisions are implemented, the impact of different rules and standards, the feedback mechanism between economic

factors and institutions, and the degree of substitutability across institutions. The analysis of patents and copyrights in American economic history indicated that legal and intellectual property institutions were endogenous, and that a major feature of American economic success owed to the credibility, flexibility and transparency of its institutional structure.

The United States Constitution authorized an intellectual property system that has had a disproportionate impact on the course of global economic history. By design, the statutes differentiated between patents and copyrights in ways that seemed warranted if the objective was to increase social welfare.[32] The patent system early on discriminated between foreign and domestic inventors, but within a few decades changed to protect the right of any inventor who filed for an American patent regardless of nationality. The copyright system, in contrast, encouraged piracy on an astonishing scale for one hundred years, in defiance of the recriminations and pressures exerted by other countries. The American patent system required an initial search and examination that ensured the patentee was the "first and true" creator of the invention in the world, whereas copyrights were granted through mere registration. Patents were based on the assumption of novelty and held invalid if this assumption was violated, whereas essentially similar but independent creation was copyrightable. Unauthorized use of patented inventions was prohibited, whereas "fair use" of copyrighted material was permissible if certain conditions were met.[33] Copyright holders were also granted the right to derivative works, whereas the patent holder was not. Patented inventions involved greater initial investments, effort, and originality than copyrighted products and was likely to respond strongly to material incentives.[34] Similarly, the conditions of the "fair use" doctrine of copyrights weighed the benefits of diffusion against costs of exclusion. Fair use was not allowed in the case of patents because the disincentive effect was likely to be higher, and the costs of negotiation between the patentee and potential users would generally be lower because the market of potential users is more narrow for patents.

Copyright "piracy" in developing countries may indeed create disincentives for foreign investment, deleterious effects on local industries, the misallocation of resources to counterfeiting and a

fall in quality. However, U.S. policies prior to the recognition of international copyrights in 1891 were based on the argument that publishing constituted an "infant industry." Far from being deterred by the reprinting of foreign literary and artistic works, their ready availability promoted domestic output to the extent that, by the turn of the century, the balance of trade was moving in favour of the United States. At this point, self interest dictated reforms in the copyright laws, although the provisions still included clauses to ensure the protection of U.S. manufacturers and printers. The policies of Britain towards its colonies were also quite similar, in their recognition of the benefits of price discrimination across countries that varied in terms of economic development. During the nineteenth century British administered a two-tiered international intellectual property system that attempted to address the needs of its colonies. In 1847 Britain passed the Foreign Reprints Act which allowed colonies to import the works of British authors without copyright protection, and also allowed legal price discrimination with significantly lower prices for overseas editions. In short, it was recognized that developing countries required appropriate institutions that might differ from those of more advanced economies.

In the realm of patent policies the stipulations of the United States Constitution can still be recognized in the modern patent system, both here and in other countries. The framers of the world's first modern patent institution paid close attention to the provision of broad access to, and strict enforcement of, property rights in new inventions. The early patent regime was extremely effective at stimulating the growth of a market for technology and promoting technical change. Another reason for its success, however, has been its flexibility and its utilitarian nature. Intellectual property institutions were from the outset in a state of continual evolution, and have undergone a number of fundamental modifications. Much of the change came through formal legislation or judicial initiatives and reinterpretation inspired by changing circumstances, but also important were innovations in the structure of the market for patented technologies (and more recently in copyrighted materials) made directly by private agents responding to economic opportunities. That such adjustments so often proved to be constructive owed partly to the virtues of having a market as a central feature of the

intellectual property system, and partly to the democratic structure of economic and political institutions.

Today, most research and development is carried out in the developed countries, and its citizens obtain the vast majority of patents filed throughout the world. The average value of patents in these countries is higher than those granted in the developing countries, based on the value of the underlying ideas as well as the value of the patent protection accorded to the invention. A number of countries recognized this when they created incentives for domestic ingenuity as well as the diffusion of foreign inventions through a two tier system. Germany distinguished between the high-value/high-cost grant of a full patent granted mainly to multinationals, and a lower-value/low-cost petty patent grant. In the case of the petty patent, the cost of administration was low because, unlike regular patents, they were not subject to an initial examination. In both Germany and Japan, they proved to be an effective way of allowing residents to participate in the patent system and created an incentive for the commercialization of follow-on inventions. Like any other right of exclusion they were subject to abuse, but the potential harm was lower than in the case of full patents due to their short life. Spanish patents similarly distinguished between full and truncated patent rights in order to promote the transfer of technology and commercialization.

At present, criticisms have been leveled against developing countries like India (which did not offer patent protection for drugs, chemicals and alloys, optical glass, or semiconductors), Thailand (which did not allow patents for chemicals, drugs, food and beverages, and agricultural machinery) and Brazil (chemicals, drugs, and foodstuffs were not protected before the 1990s) for not offering universal patent protection.[35] Historically, the majority of developed countries other than the United States exempted particular industries from protection. The French statute of 1791 exempted medicines from patent grants. England countered continental supremacy in chemicals by not offering patent protection for such products, and until recently issued compulsory licences for pharmaceuticals and food products. Similarly, Germany (emulated by Japan) did not issue patents for food products, pharmaceuticals or

chemical products, although firms could obtain protection for innovations in the manufacturing processes. Consequently, there is ample historical precedent for a policy of discretionary grants across sectors or products in order to enhance the public interest in diffusion and access.

Early American policy makers were well aware of the European history of copyrights as a form of censorship and monopoly rights that imposed restraints on widespread literacy and learning. They chose to deliberately reject those provisions as incompatible with the objectives of a true democracy. The European system of privileges was enshrined in moral rights copyright regimes, due to the successful rhetoric of French and British publishers who appropriated the notion of author's rights.[36] In contrast, American policies were drawn up with the realization that appropriate policies towards copyright were complicated because, in addition to economic questions, copyrights had critical implications for basic rights, the diffusion of knowledge and democratic access to learning. As Senator Ruggles expressed it, weaker copyright protection "serves to promote that general diffusion of knowledge and intelligence, on which depends so essentially the preservation and support of our free institutions."[37] The fair use doctrine is still a prerequisite for ensuring that copyright grants are compatible with an effective social contract.

The historical record also highlights the costs and benefits of alternative means of appropriation and rewards. A number of economic theorists have recommended the use of other policy instruments such as state grants and prizes, but the abundant evidence from France during the Age of Enlightenment illustrated the inefficiencies and corruption that were associated with a nonmarket orientation. In both historical and contemporary experience, technological change in many industries does not depend on patent and copyright protection.[38] During the nineteenth century, American publishers of unprotected reprints were able to appropriate returns from a variety of strategies, including privately created tradeable rights of exclusion ("synthetic copyrights"), lead time or first mover advantages, and through cartelization. The more "reputable" publishers were able to secure greater returns because of they offered products that were more likely to be free of defects, thus

leading to appropriation through reputation.[39] Legal decisions evolved in the direction of private law, with formalized protection of trade secrets and well-developed common law doctrines of unfair competition that attained similar ends.[40] In France the law of private contracts strengthened an uncertain system of patent property rights. Price discrimination may have been a strategy that increased the returns to British copyright owners relative to weakly enforced property rights.

Property rights had value only within an appropriate institutional context. The legal system comprised an important aspect of an intellectual property regime, since the value of any property right to its owner depended on his ability to enforce his claims. England possessed a judicial and legal system that extended back for centuries, and its common law influenced the progress of numerous countries in the world. Nevertheless, the intellectual property laws were interpreted by judges in a manner that reinforced the existing class system, and hindered market transactions. The legal system was notorious for its inconsistency, arbitrary decisions, and uncertainty. The United States from the very beginning was fortunate to possess a remarkable cohort of judges and legal practitioners who adopted the maxim "salus populi suprema lex est" [social welfare is the ultimate law] and interpreted the law in ways that furthered economic development. Early jurisprudence favoured the security of property and contracts, and enhanced private incentives for invention and markets in invention. However, courts were very much aware of the needs of the community as well, and tempered their interpretations of property rights to ensure that a balance would be maintained between private welfare and social welfare. Cases at equity allowed decisions that incorporated delicate adjustments to the rights of all parties concerned. This calculus ensured that the legal system reinforced the rights of intellectual property holders while minimizing the costs of exclusion.

The experience in Europe and America underlined the importance of ensuring access to property rights and to the return from individual efforts to all members of society, however humble their social background or their invention. Both the British and French patent systems reflected their origins in royal privilege. The British system quite consciously promoted the interests of groups who

had more wealth or access to private information and capital, and favored inventors of more capital-intensive devices as opposed to smaller incremental inventions in labor-intensive industries. Despite a series of changes in the laws, these patterns characterized patenting and trade in technological information in Britain until late in the century or beyond. In contrast, the United States was concerned with fashioning a system that induced enterprise from all members of society regardless of their social class or income. Consequently, when markets expanded, relatively ordinary individuals responded to these increases in profit opportunities. It is noteworthy that the remarkable advances in early American technology were associated with a process of democratization among both the creators of incremental inventions and the "great inventors." Moreover, even among the relatively disadvantaged class of women inventors, a far greater number in the United States were able to obtain patents and profit from their ideas than was the case in England.

These individuals were responding in part to policies that encourage widespread participation. Today a set of Patent Office reports from the nineteenth century still remains among the possessions of the last of the Shakers, a religious sect in New Gloucester, Maine that incorporated innovative artisanal technologies. Features that improved on access included low fees, protection of the rights of only the true inventor, a centralized examination system, and secure property rights that were enforced by a legal system that also tried to protect social welfare. The examination system played an important part in ensuring that inventors who did not have the resources to conduct searches were able to secure the services of a trained cadre of professional examiners at minimal cost. This process ensured that inventive ideas could be transformed into tradeable assets, and the securitization of invention encouraged markets in patents. Such markets disproportionately benefited relatively poor inventors who did not own the resources to exploit their patented inventions, but could still gain returns by selling or licensing their rights. The spread of markets allowed them to specialize through a division of labour in invention and commercialization.

The commitment of public organizations to the most pragmatic aspects of provision and diffusion played a significant role in the democratization of innovation in America. The American

system stood out in its insistence on a rationalized record-keeping system, prompt publication of information, free distribution to libraries and patent offices, and the adherence to predictable rules and procedures. American statutes made provisions for the dissemination of information about the patent system itself, as well as investments in publishing patent specifications and expiration dates, and made them readily available. The French had indulged in high flown rhetoric about the rights of man, but failed to follow through on the more mundane provisions. For instance, in its early laws, France stipulated that patent descriptions were to be made available to the public, but since no specific procedure for their publication was introduced, the effect was to limit diffusion. Similarly, England administered patents in such a convoluted fashion that it was prohibitively expensive to obtain information. The wealthy could manouevre around these barriers, but their costs were disproportionately felt by the less well-endowed.

Some of the changes in the American and European intellectual property regimes this study assessed, such as the introduction of the examination of patent applications or additions to the subject matter of copyrights, implemented what might be thought of as technical improvements. However, others such as the extension of copyrights to foreign nationals, the gradual strengthening of copyright protection, product exemptions, and the use of compulsory licences, involved adaptations that seem related to the stage of economic development. This analysis of the evolution of intellectual property regimes in Europe and the United States raises questions about the desirability of applying the same system to all places at all times. Indeed, the major lesson that one derives from this economic history of the United States in the European mirror is that intellectual property rights best promoted the progress of science and useful arts when they evolved in tandem with other institutions and in accordance with the needs and interests of social and economic development.[41] In sum, the historical record suggests that appropriate intellectual property systems were not independent of the level of development nor of the overall institutional environment.

The United States created a utilitarian market-based model of intellectual property grants which balanced social costs and benefits, with the ultimate objective of protecting social welfare and ensuring

the primacy of the public domain.[42] International harmonization with European doctrines introduced significant distortions in the fundamental principles of American copyright and its democratic provisions. For instance, compliance with the Berne Convention that accorded copyright protection to all creations on their fixation in tangible form drastically reversed the relationship between copyright and the public domain. Previously, U.S. policies viewed copyright as a limited exemption to the public domain; after 1988 the scope and rights of the public and the public domain became a limited exception to copyright. This change in the default rule had serious implications for the democratic and Constitutional underpinnings of American copyright policies, as did extensions in the term of copyright protection that effectively ensured a perpetual grant. The reaction to these fundamental reverses has been muted, in part because of the feeling that democratization is outdated in the corporate and high technology environment of the twenty first century.

The process of the democratization of invention is far from being an historical curiosity, and indeed is of even greater importance to countries that are now attempting to extract the mass of their population from poverty. The growth process in these countries profits from the contributions of foreign corporations and the transfer of technologies, and strong intellectual property rights may contribute to the stock of foreign innovations. However, economic development also requires decentralized strategies that extend to the informal economy and to rural communities that tend to be untouched by large scale projects that incorporate foreign technologies. Some might question the extent to which untutored peasants or women in the household can contribute to invention or productivity gains, but similar doubts were equally present among nineteenth-century European commentators on the American experiment. The American response was based on the conviction that increased efforts and self-determination could be induced through appropriate incentives and institutions to a broad spectrum of the population. Today, the need for a similar process can be discerned in the cost barriers and the paucity of incentives for residents in developing countries to create and market incremental inventions that can dramatically improve their standards of living. The notion of broad

access would be consistent with variation in intellectual property institutions across and within nations to provide for essential pharmaceutical treatments and for the distribution of basic educational materials at marginal cost. Although the nature of the specific rules and standards might differ from their historical precursors, the principle of the democratization of invention is still vital to achieving advances in global welfare.

ENDNOTES

1. This discussion draws on Machlup and Penrose, "The Patent Controversy in the Nineteenth Century," Journal of Economic History, vol. x (1) 1959: 1-29.

2. National treatment in international patent laws meant that the Swiss could take out patents in foreign countries on the same grounds as citizens of that country, even though no one could get patents in Switzerland. After the patent reforms, the Swiss Law of 1888 protected only inventions that were represented by mechanical models, and excluded chemicals, pharmaceuticals and dyeing, as well as process inventions. The statute of June 1907 removed the model requirement but did not allow patents for chemical substances (processes were patentable).

3. See Eric Schiff, Industrialization without National Patents: The Netherlands, 1869-1912; Switzerland, 1850-1907, Princeton: Princeton University Press,1971.

4. After the patent laws were reintroduced in 1912, the major beneficiaries were again foreign inventors, who obtained 79.3 of the patents issued in the Netherlands.

5.Schiff (1971) claims (without providing any data) that the chocolate industry benefited or was not harmed by the lack of patent rights, for "The great days of the industry began in the 1870s" (p. 110). On the other hand, other evidence suggests that the growth of the industry started only after the patent laws were changed. A. Muriel Farrer, "The Swiss Chocolate Industry," Economic Journal, vol. 18 (69) 1908: 110-114, points out that the chocolate industry was initially quite small. After the patent reforms, "chocolate has attained a position of surprising eminence in an unusually short period of time." In 1890, total exports of Swiss cocoa products earned only £85,331 but after this period "exports increased from year to year by leaps and bounds" and were about £434,600 in 1900. (In comparison, the English family firm of Cadburys alone sold over £1 million in 1905 and £2.3 million in 1914. Charles Dellheim, "The Creation of a Company Culture: Cadburys, 1861-1931," American Historical Review, Vol. 92, No. 1, Supplement to Volume 92. (Feb., 1987), pp. 13-44.) This is not to suggest any causality between the introduction of the patent system and the subsequent prosperity of the Swiss chocolate industry; instead, the facts refute Schiff's implication that the industry was flourishing in the period without a patent system.

6.See Scientific American, v 54 (18), p 280, 1 May 1886: "A few years ago a commission of Swiss manufacturers who visited this country returned home almost in despair of competing with us even in the manufacture of watches; and in their report they recommend, as of the utmost necessity, the creation of a patent system in Switzerland similar to our own. Sir William Thomson, President of the Mathematical and Physical Section of the British Association, has declared that "if Europe does not amend its patent laws, America will speedily become the nursery of useful inventions for the world.""

7.In 1888 the population of Switzerland approached three million residents. It should be noted that a sample of "international patents" represents the upper tails of the distribution of patented inventions in terms of commercial value, and may not reflect the patterns for average inventions.

8.Specification forming part of Letters Patent No. 134,066, dated December 17, 1872.

9. These figures, from the US Patent Office Records, include Swiss patents that were either filed or cited in the United States Patent Office. The conclusions hold if only patent grants are included.

10.The information on the German system was drawn from J. Vojacek, A Survey of the Principal National Patent Systems, New York: Prentice-Hall, 1936. The German patent system later influenced legislation in a number of countries, including that of Argentina, Austria, Brazil, Denmark, Finland, Holland, Norway, Poland, Russia and Sweden.

11.Geoge von Gehr, "A Survey of the Principal National Patent Systems from the Historical and Comparative points of View," John Marshal Law Quarterly, 1936:334-400.

12.Vojacek, p. 160.

13."[P]ractically all European and most of the Latin American patent laws issued at this period were more or less modeled on the French law." Jan Vojacek, p. 135, A survey of the principal national patent systems, New York, Prentice-Hall, 1936. The description of the Spanish system is drawn from Patricio Saiz Gonzalez's excellent study, Invencion, Patentes e Innovacion en la Espana Contemporanea, Oficina Espanola de Patentes y Marcas, Madrid, 1999.

14.Thus, the "foreign content" of Spanish technology could be viewed as the sum of inventions patented by foreigners, and patents of introduction obtained by Spaniards for foreign inventions. This implied that roughly two thirds of Spanish patents were drawn from overseas sources.

15.See Patricio Saiz Gonzalez, Invencion, Patentes e Innovacion, p. 133. These fees were set in 1826, and maintained through 1878. During this period, the average annual salary for an official was 4275, and that of an agricultural worker was about 1050 reales. Between 1759-1878, some 77.5 percent of patents were for inventions, and the rest for introductions. Seventy three percent of patents by Spaniards were for inventions, relative to some 80 percent of the patents obtained by French citizens.

16.Only 16.5 percent of foreign patents were implemented, relative to 34.7 percent of Spanish patents, and 12.6 percent of patents obtained by nonresidents. See Patricio Saiz Gonzalez, "Patents, International Technology Transfer and Spanish Industrial Dependence (1759-1878)," p. 11, mimeo, 1999.

17. B. Zorina Khan and Kenneth L. Sokoloff, "The Innovation of Patent Systems in the Nineteenth Century: A Comparative Perspective," Unpublished manuscript (2003).

18.It should be noted that the influence of colonial heritage is not nearly so powerful as some have claimed. The general imperial policy of Britain towards its colonies allowed for original legislation in the constituent colonies in accordance with local conditions. There was, for example, enormous diversity in the characteristics of the patent systems of the colonies that remained under British rule at this time.

19. One commentator pointed to "the extremely liberal propositions of the United States, which one could only recognize as approaching the ideal of the future." Cited in Penrose, p. 81.

20. American opposition gradually had an effect, as seen in the history of revisions to the Paris Convention since 1883. At that time "parallel imports" were permitted and members were allowed to stipulate that the patent should be exploited. In 1911 patent rights could be revoked only after three years and only if the patentee was unable to justify why the patent was idle. At present, trade-related intellectual property rights agreements contain a weak provision that "members may provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties." TRIPS Agreement, *Article 30: Exceptions to Rights Conferred.*

21. See B. Zorina Khan, "Federal Antitrust Agencies and Public Policy towards Patents and Innovation," Cornell Journal of Law and Public Policy, vol. 9 (Fall) 1999:133-169; B. Zorina Khan, "The Calculus of Enforcement: Legal and Economic Issues in Antitrust and Innovation," Advances in the Study of Entrepreneurship, Innovation, and Economic Growth, vol. 12 (1999): 61-106. U.S. copyright policies also allowed for compulsory licences in certain industries.

22. See Edith Penrose, Economics of the International Patent System, Baltimore, Johns Hopkins Press, 1951. These included Conferences in 1878, 1880 and 1883. Participants of the 1880 conference were drawn from Argentina, Austria-Hungary, Belgium, Brazil, France, Britain, Guatemala, Italy, Luxemburg, Netherlands, Portugal, Russia, San Salvador, Sweden, Norway, Switzerland, Turkey, the United States, Uruguay, and Venezuela. There were also additional meetings in Rome (1886), Madrid (1890-91), Brussels (1897-1900), Washington (1911), The Hague (1925) and London (1934).

23. The first signatories were Belgium, Portugal, France, Guatemala, Italy, the Netherlands, San Salvador, Serbia, Spain and Switzerland The United States became a member in 1887, and a significant number of developing countries followed suit, including Brazil, Bulgaria, Cuba, the Dominican Republic, Ceylon, Mexico, Trinidad and Tobago and Indonesia, among others. Recall that neither Switzerland nor the Netherlands at this time had a patent system in place. According to the terms of the Union, nationals of these countries could obtain patents in other countries on equal terms with the citizens of the patent-granting domain.

24. Cited in Penrose, Economics, p. 77.

25. Reprint of Report in Putnam (1890), pp. 269-270.

26. Brander Matthews, "The Evolution of Copyright," in George H. Putnam,The Question of Copyright, New York: G P Putnam's Sons, (1896), p. 336.

27.France, Belgium, Britain, Germany, Spain, Haiti, Italy, Switzerland and Tunisia ratified the 1886 agreement.

28.The actual Articles were more modest in scope, requiring national treatment of authors belonging to the Union and minimum protection for translation and public performance rights. It authorized the establishment of a physical office in Switzerland, whose official language would be French. The convention was revised in 1908 to extend the duration of copyright and to include modern technologies.

29.The Universal Copyright Convention (UCC) was adopted in 1952 and formalized in 1955, as a complementary agreement to the Berne Convention. The UCC membership included the United States, and many developing countries that did not wish to comply with the Berne Convention, since they viewed its provisions as overly favourable to the developed world. Members of the Berne Convention also became signatory members of the UCC, which is subject to the conditions of Berne. The four stipulations of the Universal Copyright Convention were that member nations could not grant favourable treatment for domestic works relative to foreign works; formal copyright notice must appear in all copies of a work; the term of copyright protection must exceed the life of the author plus an additional 25 years; and members were required to grant an exclusive right of translation for a seven-year period to other members of the UCC.

30. Elhanan Helpman, "Innovation, imitation and intellectual property rights," Econometrica, vol. 61, 1993; I. Diwan and D. Rodrik, "Patents, Appropriate Technology and North-South Trade," Journal of International Economics, vol. 30, 1991, 27-47. Developed countries such as Canada which have net inflows of intellectual property may also be harmed by stronger international intellectual property rights. See also Alan V. Deardorff,"Welfare Effects of Global Patent Protection," Economica, New Series, Vol. 59, No. 233. (Feb., 1992), pp. 35-51. Deardorff attempted to assess the welfare implications of extending patent regimes from a country of innovation producers to a country of innovation consumers. He found that the welfare of the producer increased unambiguously, but the welfare of the consumer country fell, and it was possible for the net effects on global welfare to be negative overall.

31. For an excellent overview of the debate on institutions and economic growth, see Stanley L. Engerman and Kenneth L. Sokoloff, "Institutional and Non-Institutional Explanations of Economic Differences," NBER Working Paper No. 9989, Sept. 2003; and Douglass North, "Institutions, Institutional Change and Economic Performance,"Cambridge: Cambridge University Press, 1990.

32."Notwithstanding this allusion to patents, the mistake should not be made of supposing that patents and copyrights stand on the same basis as to natural exclusive right, for they do not; the difference between them, in this regard, is radical." P. 86-87, "International Copyright," W E Simonds, in George H. Putnam, The Question of Copyright, New York, G P Putnam's Sons, 1896: 77-130.

33. See Chapter 8. In Folsom v. Marsh, Folsom v. Marsh, 9 F. Cas. 342, 1841, Joseph Story effectively outlined the doctrine of fair use as it is employed in modern decisions. The case dealt with a life of George Washington, which included eleven volumes of Washington's letters, and discussed the existence and ownership of property in letters. Story felt that the defendant's work was of "inestimable value" but did not fall within the range of fair use, and specified that "we must often, in deciding questions of this sort, look to the nature and objects of the selections made, the quantity and value of the materials used, and the degree in which the use may prejudice the sale, or diminish the profits, or supersede the objects, of the original work."

34.Alfred Bell & Co. v. Catalda Fine Arts, Inc. 191 F. 2d 1951 "we have often distinguished between the limited protection accorded a copyright owner and the extensive protection granted a patent owner."

35. See Edwin Mansfield,"Intellectual Property Protection, FDI and Technology Transfer," IFC Discussion Paper No. 19, World Bank, 1994. Mansfield surveyed American multinational corporations and found that, from their point of view as well, IPRs protection "plays a somewhat different role in each of these industries" (Edwin Mansfield, "Unauthorized Use of Intellectual Property: Effects of Investment, Technology Transfer, and Innovation," p. 121, in Wallerstein, Mogee and Schoen (eds), Global Dimensions of Intellectual Property Rights in Science and Technology, National Academy Press (1991).)

36. The United States resisted the European system for almost two centuries but now, under the guise of the Berne Convention and laws such as the Digital Millenium Copyright Act, its copyright doctrines have been captured by publishers whose policies are very much in keeping with those of publishers in the eighteenth century, who tried to justify grants of perpetual privileges in terms of authors' creative rights.

37.Senate Report to accompany S. 32, 25th Congress, 2d Session, June 25, 1838, p. 5.

38.Cohen, Wesley, Richard Nelson and John Walsh, "Protecting their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)," NBER working paper No. 7552, 2000.

39. The reputational effect may partly explain why foreign pharmaceutical firms in Brazil increased their share of the domestic market even in the absence of patent protection. See C R Frischtak, "The Protection of Intellectual Property Rights and Industrial Technology Development in Brazil," in F W Rushing and C G Brown (eds), Intellectual Property Rights in Science, Technology, and Economic Performance, Westview, 1990.

40. For arguments that favour the application of trade secrets legislation in developing countries in some contexts, see Stevenson, G, "Trade Secrets: Protecting Indigenous Ethnobiological Knowledge," NYU J. Intl Law & Policy vol. 32 (Summer) 2000: 1119-30.

41.See the Roundtable on Intellectual Property and Indigenous Peoples, World Intellectual Property Organization (July 23 and 24, 1998), referring to some of the problems of ensuring that IPRs do not operate to the disadvantage of community norms that regard new ideas and inventions as part of the public domain. William P. Alford, To Steal a Book is an Elegant Offense, Palo Alto: Stanford University Press, 1995, argues that Chinese IPR policy is explicated by such community values. Copying or "plagiarism" are not held to be reprehensible because they are consistent with principles that revere the ancestral past and ancient customs. Such practices were prevalent in classical Chinese literary and artistic works. Alford argues that, unlike China, Taiwan has succeeded in changing its political institutions and privatizing its culture and this commercial market orientation helps to explain its greater success in intellectual property reforms.

42. Copyright scholars have been concerned that modern technologies such as digital music have disturbed this balance by reducing existing consumer rights and facilitating enforcement that infringes on the public domain and on social welfare. See, for instance, Jessica Litman, Digital Copyright,New York: Prometheus Books, 2001, p. 14, who argues that "copyright is now seen as a tool for copyright owners to extract all potential commercial value from works of authorship, even if that means that uses that have long been deemed legal are now brought within the copyright owner's control." It is interesting to note that the features these scholars find objectionable -- such as the ability of digital copyright owners to control use after the first sale of the item -- are perfectly in keeping with the moral rights system of the Berne Convention.