

HISTORY LESSONS:

HISTORICAL PERSPECTIVES ON PATENT SYSTEMS IN ECONOMIC DEVELOPMENT

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I. INTRODUCTION

Growth rates in per capita income vary enormously across countries and an objective of the development agenda is to ensure that convergence is toward higher standards of living. Integral to this objective is the design of institutions to encourage private actors to undertake investments that are conducive to improvements in social welfare. Technological change has likewise long been realized to make a fundamental contribution to prospects for economic and social progress. It is therefore hardly surprising that there is a long history of public policies and laws crafted to stimulate would-be inventors, innovators, and investors to contribute to the advance and diffusion of technological knowledge. A further task of analysts who wish to explain the sources of cross-country variation in national income is to understand why there is persistence over time in outcomes, and here it is clear that a historical approach is not only appropriate, but required. This chapter therefore assesses the evolution of institutions toward inventions across countries over the past two centuries, highlights the extent to which such institutions have always been customized to suit the needs of social and economic circumstances, and discusses potential implications for policies toward today's developing societies.

Over this critical period from the late eighteenth century evidence accumulated to indicate that ongoing technological progress was feasible, capable of altering the fate of nations, and responded to material incentives. Consequently, the early industrializers' appreciation of the potential importance of technology policies grew over this era.¹ A wide variety of schemes were introduced and debated at one time or another, including subsidies, state investments, prizes and honorific awards, public buyouts, and permanent monopolies. By the end of the nineteenth century, patent systems had emerged as the dominant method by which national governments promoted the growth of intellectual capital in invention. An institution that had been rather obscure a century before had come to be regarded as a virtual necessity for any country with plans to industrialize or modernize.

Despite the consensus about the importance of patent laws and their implementation, important differences existed across countries in how intellectual property institutions were structured; and these

were evident even after a series of international conventions over the 1870s and 1880s strove to obtain more uniformity. Many scholars have suggested that this historical experience offers a valuable opportunity to study the effects of differences in patent systems, but there has been limited attention to what the sources of these differences were, and whether there were systematic patterns in the institutions countries chose to adopt. The issues are related because, if the particular choice of patent system is a function of a society's potential or actual inventive activity, then the estimation of the impact of patent system is far from straightforward. Given the limited knowledge of what the historical record was, and the significance of whether patent institutions were exogenous or endogenous, this chapter will focus on the crucial patterns in the evolution of patent systems over the nineteenth century, and will present evidence to support the notion that their characteristics were not exogenously determined. These conclusions bear on any assessment of the efficacy of the current regime of intellectual property rights, which has to a large extent removed such flexibility and self-determination from the portfolio of choices that today's developing economies confront.

In the first section, we discuss the evolution over time and the implications of several salient differences among the patent systems of the three leading industrial nations. As we detail below, Britain, France and the United States were early leaders in industrialization and in establishing formal property rights in new technological information. Instead of adopting the precedent set by European standards, the United States crafted a unique approach for the design of its patent rules and standards, incorporating principles that assured broad and equal stakes in intellectual property rights to all of society. The framers of the system were confident that relatively equal access to resources and the potential for returns would ultimately generate greater economic development; and, as Stanley Engerman and Kenneth Sokoloff have shown in a variety of contexts, those expectations were soon realized.³ The intellectual property institutions in United States allowed authors and inventors, regardless of their status and background, to have the opportunity to obtain and exploit rights to their creativity. This system also took direct positive action to help inventors exploit their output and facilitated the development of an extensive market in

patents and patented technologies. In return, American institutions required and facilitated disclosure so as to promote social progress in the forms of learning and additional technological change.

The second section focuses on the diffusion of patent institutions to the rest of the world, identifies systematic patterns in the characteristics of the systems they adopted, and considers the sources of these regularities. It is perhaps not entirely surprising that as patent systems spread, and were revised, across the world, that the great majority of countries (with several prominent exceptions such as Germany and parts of Scandinavia) followed the Anglo-French approach. Many imposed restrictions to an even greater degree, with higher fees and more attention to working requirements. It could well be argued that follower countries adopted such institutions because they were better suited to their circumstances and thus more likely to promote their economic growth (or, at least, the objectives of influential interest groups.) Follower countries were acutely aware that the bulk of new technologies were being generated abroad, and may have wanted to have their patent systems focus on providing incentives to facilitate the diffusion of inventions to their shores rather than to stimulate domestic invention. Alternatively, it might have been the case that the policymakers in these countries held that only inventors of very important inventions – as reflected in the willingness to pay high fees – deserved patent rights, or that inventors who sought patent protection (especially in cases where they were typically foreigners) might reasonably be required to share their rents with the government treasury.

The final sections conclude with a discussion of whether the relatively poor follower countries (today's developing economies) are better off with the current intellectual property rights regime. In the international sphere, in part because of active lobbying by the United States, patent systems proliferated among the newly developing countries, but their structures and objectives were not entirely aligned with the fundamental principles of American intellectual property rights. We find it telling that, in the earlier era through the end of the nineteenth century, when follower countries had greater leeway in choosing their patent institutions, most did not offer much in the way of access to patent rights to the great majority of their population. We emphasize that policy measures can only be effective if based on a realization

that intellectual property systems in developing countries are part of a network of institutions that tend to replicate and perpetuate initial conditions. At the same time, harmonization, by restricting the menu of choices that face developing countries today, is likely to impose further constraints on the development agenda.

II. PATENT INSTITUTIONS IN THE MAJOR INDUSTRIAL NATIONS

At the beginning of the eighteenth century, Britain and a number of other European countries possessed vast empires that spanned the globe, and the American colonies simply comprised yet another entity subject to their dominion. The twentieth century, however, became known as “the American century” because of the rapid rise of the United States as the world’s foremost industrial power. Academic debates have centered on the reasons for this trajectory, in part in order to inform policy and to discern the lessons that history might hold for today’s developing societies. A number of influential scholars have pointed to the influence of intellectual property institutions as a factor in explaining the historical growth paths.⁴ As Figure 1 readily shows, even without adjusting for population, the scale of patenting in the United States equaled or exceeded the entire sum of patents filed in the major European countries. It is not coincidental that European scholars have been sceptical of the beneficent effects of patent systems, whereas those who are more sanguine have tended to be students of the American experience.⁵

BRITISH PATENT SYSTEM

Britain, the first industrial nation, introduced in 1624 a patent system which has been in continuous operation for a longer period than any other in the world.⁶ The Statute of Monopolies offered a grant of a patent for fourteen years for “the sole making or working of any manner of new manufacture within this realm to the first and true inventor....”⁷ The “first and true inventor” was broadly interpreted to include importers of inventions that had been created abroad, and patent agents frequently applied for patents under their own names on behalf of inventors from overseas. Certain salient features of the

British patent system reflected its origins in royal privilege well into the nineteenth century. In effect, the British system advantaged 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 (including major reforms in 1852 and 1883), these patterns characterized patenting and trade in technological information in Britain until well into the twentieth century.

Before 1852, inventors who wished to obtain protection throughout the realm had to contend with the prohibitive bureaucracy of three separate patent systems, and to pay fees that ranged from £100 (four times per capita income at mid-century) for an English patent, to £300 for patent rights that extended to Ireland and Scotland.⁸ Potential patentees were well advised to incur additional charges in order to obtain the help of a patent agent who could aid in negotiating the numerous steps and offices that were required for pursuit of the application in London. The cumbersome process of patent applications (variously described as “mediaeval” and “fantastical”) afforded ample material for satire, but obviously imposed severe constraints on the impecunious inventor who wished to obtain protection for his discovery.⁹ The complicated system also inhibited the diffusion of information and made it difficult, if not prohibitive, for inventors outside of London to conduct patent searches. However, it created substantial rents for a select class who had incentives to attempt to block prospects for reform, so it is not coincidental that the staunchest defenders of the unreformed patent system included employees of the patent applications bureaucracy, patent agents and lawyers.

The defects of the British system led to numerous investigations and calls for institutional reform, especially after 1829. The Crystal Palace Exhibition in 1851 contributed to the official recognition of the need for legislation to meet some of these longstanding criticisms. In 1852 the patent laws were revised in the first major adjustment of the system in two centuries.¹¹ The patent application process was rationalized in one Patent Office, and fees were adjusted. A renewal system was adopted, so patentees initially paid £25 and later installments of £50 (after three years) and £100 (after seven years) to maintain

the patent for a full term of fourteen years. Provision was made for the printing and publication of the patent records. The 1852 reforms undoubtedly instituted improvements over the former opaque procedures. Nevertheless, the system retained many of the former features that had implied that patents were in effect viewed as privileges rather than merited rights, and only temporarily abated expressions of dissatisfaction.

The state of the common law regarding patents, which was confused and prejudicial to the appropriation of returns, comprised an inefficiency that endured until the end of the nineteenth century . For instance, British patents were granted for inventions that were novel and useful, and courts did not hesitate to enforce both of these conditions. Utility under the patent law was regarded as unrelated to the commercial success of the patented invention.¹² Moreover, nineteenth-century courts held that, if part of an invention had value whereas part had no value, the entire patent was deemed to be void.¹³ The question of utility was decided by judges and juries who tended to be hostile toward grants they viewed as unwarranted monopolies, and led to arbitrary decisions.¹⁴ Since the legal system was unpredictable, patent rights could not be regarded as settled unless the patent had been contested in court with a favorable outcome.¹⁵

Other constraints on the market for inventions related to policies towards assignments. Ever vigilant to protect an unsuspecting public from fraudulent financial schemes on the scale of the South Sea Bubble, ownership of patent rights was limited to five investors (later extended to twelve). Nevertheless, the law did not offer any relief to the purchaser of an invalid or worthless patent, so potential purchasers were well advised to engage in extensive searches before entering into contracts.¹⁶ When coupled with the lack of assurance inherent in a registration system, the purchase of a patent right involved a substantive amount of risk and high transactions costs -- all indicative of a speculative instrument. It is therefore not surprising that the market for assignments and licenses seems to have been somewhat limited, and even in the year after the 1852 reforms only 273 assignments were recorded as the law required.¹⁷

In 1883 new legislation introduced procedures that were somewhat simpler. The fees fell to £4 for the initial term of four years and the remaining £150 could be paid in annual increments.¹⁸ For the first time, applications could be forwarded to the Patent Office through the post office. This statute introduced opposition proceedings, which enabled interested parties to contest the proposed patent within two months of the filing of the patent specifications.¹⁹ Compulsory licenses were introduced in 1883 (and strengthened in 1919 as “Licences of Right”) for fear that foreign inventors might injure British industry by refusing to grant other manufacturers the right to use their patent. In 1907 patentees who manufactured abroad were required to also make the patented product in Britain.

It is worth noting that a number of the proposals for change were explicitly drawn from the American system, including lower fees and examinations for novelty. The 1852 patent reform bills had included calls for an examination system but this was amended in the House of Commons and the measure was not included in the final version. Opponents were allegedly reluctant to vest examiners with the necessary discretionary power, and pragmatics pointed to the shortage of a cadre of officials with the required expertise. The 1883 act provided for the employment of “examiners” but their activity was limited to ensuring that the material was patentable and properly described. Indeed, it was not until 1905 that the British system included an examination for novelty, and even then the process was not regarded as stringent as in other countries.

Changes in the British patent system were in part motivated by the realization that England’s early industrial and technological supremacy was threatened by the United States and other nations in Europe. The debate about patent rights in this period was far ranging, and (like today) explicitly linked questions of trade, comparative advantage and intellectual property. Proposals extended from the creation of a national fund to reward inventors through the abolition of any property rights in inventions; however, policies that had emerged from this era of activism were far from optimal. Legal advances in the nineteenth century were piecemeal and inadequate, consisting as they did of compromises between those with vested interests in maintaining rents under the former system, inventors of limited means who stood

to benefit from changes, and manufacturers and politicians who wished to deter short-run foreign competition even if at high costs in the long run.

FRENCH PATENT SYSTEM

The early French policies towards inventions and innovations in the eighteenth century are worth a close examination because they were based on an extensive array of rewards and incentives, and illustrate the relative benefits and costs of alternative routes to statutory grants of patent rights.²⁰ During this period inventors or introducers of inventions could benefit from medals, titles, pensions that sometimes extended to spouses and offspring, loans (some interest-free), prizes and lump-sum grants, bounties or subsidies for production, exemptions from taxes, or monopoly grants in the form of exclusive privileges. Exclusive rights could extend to a specific region or throughout the entire kingdom, and their term varied from five years to perpetuity. This flexibility came at a cost, for such awards, prizes and privileges could be arbitrary and based on non-economic criteria.²³ Eighteenth century correspondence and records provide numerous examples of awards to undistinguished inventions that were made based on court connections.²⁴ At the other end of the spectrum large sums were awarded to the “deserving” on the basis of age or family need.²⁵ Members of the scientific community who examined applications were not necessarily qualified to assess their potential commercial value. Even if the privilege was commercially successful, active trade in these rights was inhibited because official permission had to be obtained first. Moreover, the administrative and opportunity costs of such a system were nontrivial on the part of both supplicants and the state bureaucracy.

It was this complex network of state policies towards inventors and their inventions that was replaced after the outbreak of the French Revolution. The French patent system of 1791 declared that it comprised a major break with the past and proclaimed the natural rights of inventors, but in many ways the system resembled that of its neighbor across the channel. Throughout the nineteenth century, one detects patterns and consequences of the French policies towards inventors that are reminiscent of the former system of privileges owing only to a select group of society. Although the legal rhetoric implied

that the primary intent of the legislation was to recognize the natural rights of inventors, the actual clauses led to results that were different from these proclamations and reflected former mercantilist policies.

Until 1844, patents were voided if the inventor attempted to obtain a patent from another country for the same invention, in order to prevent the international diffusion of French technologies. In order to qualify for a patent of importation, the applicant had to have obtained practical knowledge of how the item worked through personal risk and effort, although he was not obliged to prove that the invention had been patented elsewhere nor to even state its country of origin.

Access to property rights in invention was limited by high fees, and France relied on a registration system that left the sorting of claims about priority, novelty, and general validity to the courts. The lack of a third-party assessment that examination systems provide raised the transactions costs in trading patent rights, likely hampering the growth of a market for patented technologies. The statutes placed another limit on the rights of inventors in the form of working requirements because “it would be injurious to society at large, to allow any one individual to cramp the efforts and attempts of more industrious inventors by obtaining a patent upon which he did not intend to work.”³⁶ Patentees therefore had to put the invention into practice within two years from the initial grant, or face a tribunal which had the power to repeal the patent unless the patentee could point to unforeseen events which had prevented his complying with the provisions of the law.

The outlook for the evolution of an extensive market in technological knowledge (if not the impetus to further invention as well) was further clouded by the significant obstacles that hindered those who wished to consult the specifications of previously-granted patents. The French patent statutes included a statement regarding the right of the public to view patent specifications, which echoed the “bargain” theory of patents that underlay American and British grants. In return for the limited monopoly right, the patentee was expected to describe the invention in such terms that a workman skilled in the arts could replicate the invention and this information was expected to be made public. However, since no provision was made for the publication or distribution of these descriptions, in effect the statutory clause

was a dead letter. At least until 1902, specifications were only available in manuscript form in the office in which they had originally been lodged, and printed information was limited to brief titles in patent indexes.⁴⁰ The attempt to obtain information was also inhibited by restrictions placed on access – viewers had to state their motives; foreigners had to be assisted by French attorneys; and no extract from the manuscript could be copied until the patent had expired.

The state remained involved in the discretionary promotion of invention and innovation through policies beyond the granting of patents. In the first place, the patent statutes did not limit their offer of potential appropriation of returns only to property rights vested in patents. If the inventor of a discovery could prove its utility, it was possible to make a gift of the invention to the nation in exchange for an award from funds that were set aside for the encouragement of enterprise. Second, panels of eminent scientists and industrialists, belonging to institutions such as the Société d'encouragement pour l'industrie nationale, distributed a number of medals each year to stimulate new discoveries in areas they considered to be worth pursuing, and they also rewarded “deserving” inventors and manufacturers. Third, the award of assistance and pensions to supplicant inventors and their families continued well into the nineteenth century. As a result, inventors had an incentive to direct their attention to rent-seeking activities in place of, or in addition to, productive efforts to commercialize their discoveries.⁴³

Similarly, patent assignments were filed in the office of the Prefect for the district, but since there was no central source of information it was difficult to trace the records for specific inventions. Like patents themselves, assignments and licences were issued with a caveat emptor clause. This was partially due to the nature of patent property under a registration system, and partially to the uncertainties of legal jurisprudence in this area. The case law suggested that the burden of proof of validity was on the purchaser of a patent in the case of “vices apparents” such as a lack of novelty. The purchaser could be protected if the exchange involved “vices cachés” (hidden flaws), however it was not evident which specific circumstances would qualify, and the jurisprudence contained conflicting decisions. The patentee was advised to draw up a contract explicitly stating what was implicit, that the trade was conducted

without any guarantees. For both parties, the risk and uncertainties associated with the exchange reduced the net expected benefits from trade.

The basic principles of the modern French patent system were evident in the early French statutes and were retained in later revisions. Since France during the *ancien régime* was likely the first country to introduce systematic examinations of applications for privileges, it is somewhat ironic that commentators point to the retention of registration without prior examination as the defining feature of the “French system.”⁴⁶ In 1910 fees remained high, although somewhat lower in real terms, at one hundred francs per year. If the patent was assigned the annual fees for the entire term of the patent had to be paid in advance. Working requirements were still in place, and patentees were not allowed to satisfy the requirement by importing the article even if the patentee had manufactured it in another European country. However, the requirement was waived if the patentee could persuade the tribunal that the patent was not worked because of unavoidable circumstances. The list of acceptable reasons that could be presented to the courts to justify inaction included a lack of capital, political or commercial crises, the availability of superior inventions which rendered the patent unprofitable, high price of raw materials, or competition from infringers. Thus, with a modicum of ingenuity this particular restriction could be evaded, but the time costs and uncertainty could not be avoided.

AMERICAN PATENT SYSTEM

The third major model for patent institutions was that of the United States. From the introduction of the first federal intellectual property laws in 1790, the U.S. made a sharp and deliberate break from Old World precedent. Its system stood out as offering strong incentives for invention, both across all segments of the population and an extensive range of technologies. The U.S. system provided for relatively widespread opportunities to obtain patents and universal public access to databases with patent specifications. Both the patent rules and the legal system encouraged extensive trade in patented technologies. Another significant divergence from the Old World approach was the explicit rejection of

constraints on the rights of legitimate patents in the form of working requirements or provision for compulsory licensing. These were viewed as an unwarranted infringement on productive inputs into economic progress, because the disincentives to inventors were held to outweigh any potential benefits to industry or the public.

The primary feature of the “American system” is that all applications are subject to an examination for conformity with the laws and for novelty.⁵⁰ The examination system that was set in place in 1836 enabled early reviews of the basic validity of the patent grant, and by reducing uncertainty about its asset value, facilitated enforcement of rights and trade in patented technologies. The French had opposed examination in part because they were reluctant to create positions of power that could be abused by office holders, but the characteristic U.S. response to such potential problems was to institute a policy of checks and balances. Employees of the Patent Office were not permitted to obtain patent rights. In order to constrain the ability of examiners to engage in arbitrary actions, the applicant was given the right to file a bill in equity to contest the decisions of the Patent Office and the further ability to appeal to the Supreme Court of the United States.

The American patent system likewise stands out in its insistence on affordable fees. The legislature debated the question of appropriate fees, and the first patent law in 1790 set the rate at the minimal sum of \$3.70 plus copy costs. In 1793 the fees were increased to \$30, and were maintained at this level until 1861, when they were raised to \$35 (at a time when the average per capita income was approximately \$128 in the country as a whole, and \$180 in the inventive Northeast region.) The term was changed from fourteen years (with the possibility of an extension) to seventeen years (with no extensions.) The 1869 Report of the Commissioner of Patents compared the \$35 fee for a US patent to the significantly higher charges in European countries such as Britain, France, Russia (\$450), Belgium (\$420) and Austria (\$350), among others. The Commissioner speculated that both the private and social cost of patenting were lower in a system of impartial specialized examiners, than under a system where similar services were performed on a fee-per-service basis by private solicitors. He pointed out that in the

U.S. the fees were not intended to exact a price for the patent privilege – the disclosure of information was the price of the patent property right – rather, they were imposed merely to cover the administrative expenses of the Office.⁵² As policy makers intended, the much lower costs of obtaining patents in the U.S., as compared to other industrial nations, extended the opportunity to gain property rights in invention to a broader spectrum of the population. In other work, we have shown that artisans and people from other rather ordinary occupations accounted for a markedly larger share of patentees in the U.S. than in Britain during the early nineteenth century.⁵³

The basic parameters of the U.S. patent system were thus transparent and predictable, in itself an aid to those who wished to obtain patent rights. In addition, American legislators were concerned with ensuring that information about the stock of patented knowledge was readily available and diffused rapidly, and took pragmatic steps to facilitate the process.⁵⁴ As early as 1805 Congress stipulated that the Secretary of State should publish an annual list of patents granted the preceding year, and after 1832 also required the publication in newspapers of notices regarding expired patents. The Patent Office functioned as an extension station for knowledge, a source of centralized information on the state of the arts. However, Congress was also concerned with the question of providing for decentralized access to patent materials in outlying areas. They debated policies such as how to ensure that copies of specifications and models were publicly available in each state. The Patent Office maintained repositories throughout the country, where inventors could forward their patent models at the expense of the Patent Office. Rural inventors could apply for patents without significant obstacles, because applications could be submitted by mail free of postage.

American laws employed the language of the English statute in granting patents to "the first and true inventor." Nevertheless, unlike in England, the phrase was used literally, to grant patents for inventions that were original in the world, not simply within U.S. borders. Unlike many other countries of the world, patents for imported discoveries were never permitted. American patent laws provided strong protection for citizens of the United States, but varied over time in its treatment of foreign inventors. The

earliest statutes of 1793, 1800 and 1832, restricted patent property to citizens or to residents who declared that they intended to become citizens (although it should be noted that even in the earliest years, foreigners frequently were successful in their petitions to Congress to gain American patents .) As such, while an American could not appropriate patent rights to a foreign invention, he could freely use the idea without any need to bear licensing or similar costs that would otherwise have been due if the inventor had been able to obtain a patent in this country. In 1836, the stipulations on citizenship or residency were removed, but were replaced with discriminatory patent fees that owed to a policy of reciprocity for the higher fees in other countries: foreigners could obtain a patent in the U.S. for a fee of \$300, or \$500 if they were British. After 1861 patent rights (with the exception of caveats) were available to all applicants on the same basis without regard to nationality. During the proceedings to celebrate the centenary of the U.S. patent system, this liberality was noted as one of its essential features, and indeed was acknowledged throughout the world. Nevertheless, this “generosity” had hardly any real implications in an environment where few foreign technologists were competitive with domestic U.S. inventors, as gauged by the low percentage of patents claimed by nonresident patentees until well into the twentieth century.

The American patent system was based on the presumption that social welfare coincided with the individual welfare of inventors. Accordingly, legislators emphatically rejected restrictions on the rights of American inventors.⁶¹ Another very important feature of the U.S. system was that it was extraordinarily favorable to trade in patent rights. From the special provision made in the 1790 law for keeping a registry of all assignments onward, it is clear that the framers of the system expected and desired an extensive market in patents to develop. On one hand, assignments provide a straightforward index of the effectiveness of the American system, because trade in inventions would hardly proliferate if patent rights were uncertain or worthless. But the market in patents that the extensive volume of assignments reflects is, in fact, far more significant. In defining a tradable asset, the system enhanced the potential private and social returns all the more, by enabling patentees to extract income from their ideas by selling them off to a party best positioned for commercial exploitation, and thereby encouraging a

division of labor that helped creative individuals specialize in their comparative advantage.

As seen in Figure 1, it is apparent that the volume of trade in U.S. patents was much higher than that in British patents, and the contrast is the more remarkable in that the British figures include licenses together with assignments.⁶³ It is difficult to explain the difference without relying primarily on the role of the examination system in providing some validation to patents, and thus decreasing the transactions costs of market exchange. The patent system also encouraged trade in technology by requiring immediate public disclosure of the specifications of patents and by helping to disseminate this information broadly. As mentioned above, early in the nineteenth century the Patent Office began regularly to publish descriptions of patent grants, and maintained offices throughout the country where models of recently patented inventions could be displayed and examined. Public knowledge about new patents and developments in technology was likewise spread by the growing legions of patent agents or lawyers who materialized soon after the 1836 law, especially in major cities and other localities where rates of patenting were high. Over time, intermediation in this market for technology grew ever more articulated in a process not unlike the evolution of financial intermediaries. As the extent of the market for technology expanded over the course of the nineteenth century, creative individuals with a comparative advantage in technology appear to have increasingly specialized in inventive activity. This tendency was likely reinforced by the increasing importance to inventors of specialized technical knowledge as technology became more complex.

Overall, the patent system played a larger role in the processes of technological change in the U.S. than it did in Britain or France. The much lower cost of obtaining a patent in the U.S. attracted a broader spectrum of the population to pursue property rights protection, especially during the first three-quarters of the century when individuals with very modest education levels were still represented among even the most prominent of great inventors. Of perhaps even more importance over the longer term, the patent system was crucial in facilitating markets in technological knowledge by defining legally enforceable rights in intellectual capital. At least judging from the experience of the U.S., the greater ease

of effecting transactions involving technological knowledge could and did encourage creative individuals to invest in invention-augmenting human capital to raise their productivity at invention. Not only did the most productive inventors of the late-nineteenth century specialize at invention, and rely extensively on the market to extract their returns, but inventors in the geographic areas with the highest rates of inventive activity were more likely to trade in patent rights. The operations of this market for technology thus seem likely to have raised the level of inventive activity (and patenting) both through increasing the return to such investment and by increasing the productivity of resources allocated toward invention.

III. FOLLOWER COUNTRIES AND PATENT INSTITUTIONS

Tracing back at least as far as Alexander Gerschenkron, scholars of long-term economic development have wondered whether follower countries naturally evolve, if not benefit from, a systematically different set of institutions than early industrializers. Gerschenkron's analysis, in particular, focused on capital market institutions, but some of his insights might well apply to the question of what sort of intellectual property institutions follower countries might evolve.⁶⁶ As with financial capital, follower countries might have had difficulty mobilizing all forms of capital (including social and intellectual capital) to invest in inventive activity and thus be expected to be more oriented toward developing institutions that would mobilize technological knowledge from foreign sources. As societies decided to establish or revise their patent institutions, they were able to draw from the example and experiences of the three leading industrial nations of the early nineteenth century, each of which was also a pioneer in formulating innovations in public policy toward technology. However, the nations who came after Britain, the U.S., and France, modified existing institutions to fit their own particular needs. They adopted patent systems that were very much focused on securing, or adjusting to, flows of technology from abroad, especially technological knowledge that was embodied in actual production.

Table 1 categorizes the salient features of patent laws and systems in these countries, which clearly exhibit significant diversity. The Spanish experience during the nineteenth century is instructive since this country lagged well behind the early industrializers. Per capita rates of patenting in Spain were

lower than in other major European countries and foreigners filed the majority of patented inventions; 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 or grants to entrepreneurs who wished to produce foreign technologies that were new to Spain, with no requirement of claims to being the true inventor. Patentees were required to work the patent within one year, and the rather high proportion of about a quarter of patents granted between 1826 and 1878 were actually implemented. Since patents of introduction had a brief term, they encouraged the production of items with greater expected profits and a quick payback period, after which monopoly rights expired, and the country could benefit from diffusion.

One of the features that stands out from the table is that, with only a few exceptions, nearly all these societies were like Spain in maintaining working requirements (or in a few cases compulsory licensing) as a central component of their patent systems. Similarly, the great majority of follower countries had provisions for so-called patents of importation - whereby those who were the first to introduce a new foreign technology to the country (regardless of whether he or she was the inventor) could obtain a property right (typically lasting until the original foreign patent on the technology expired.)

It was only late in the century, after international patent conventions--under pressure from the U.S.--urged countries to adopt the principle that original inventors alone had the right to a patent, that such awards of property rights to the importer of a technology were disallowed. Even then, many countries specified that the first applicant for a patent would be presumed to be the inventor, and only the actual inventor would have legal standing to have the patent voided.

It might be further noted that the influence of colonial heritage is not nearly as powerful as one might have expected. There was, for example, enormous diversity in the characteristics of the patent systems of the British colonies. The quite different institutional path of the more developed follower countries is also of much relevance for studying whether the selection of patent system characteristics was exogenous or endogenous. Germany had very high fees for obtaining patents that were of interest to

foreigners, but also offered “petty patents” that were considerably more accessible to local residents. Japan emerged from the Meiji era as a follower nation which deliberately designed institutions to emulate those of the most advanced industrial countries. The influence of the German laws were evident in subsequent Japanese reforms in 1909 (petty patents for minor inventions were protected) and 1921 (protection was removed from chemical products, work for hire doctrines were adopted, and an opposition procedure was introduced). However, even in its earliest statute, differences existed that reflected Japanese priorities. For instance, 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. Subsequent legislation also permitted the state to revoke a patent grant on payment of appropriate compensation if it was deemed in the public interest. Medicines, food and chemical products could not be patented, but protection could be obtained for processes relating to their manufacture.

It might be argued that follower countries that are particularly underdeveloped have no interest in maintaining a patent system, since the native population would not be very likely to make new contributions to technological knowledge. It is traditional to point to Switzerland (up to 1888) and the Netherlands (1869-1912) as models for progress without patents, but we incline to the view that these examples do not have much general significance beyond their unique circumstances. For instance, in Switzerland the scale of output and markets were quite limited, much of Swiss industry generated few incentives for invention, and most of the items in which Swiss manufacturers excelled, such as hand-made watches, chocolates and food products, were not susceptible to technological improvements that warranted patent protection. Export-oriented inventors were further likely to have been more concerned about patent protection in the important overseas markets, rather than in the home market. Once technical changes began to render artisanal methods obsolete in products with mass markets, the Swiss endogenously adopted patent laws because of falling competitiveness in their key industrial sectors.

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. After the introduction of its own domestic system, the rate of Swiss patenting in the United States immediately increased relative to the previous era. 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, and the relative importance of watches and music boxes immediately fell. Thus, the evidence on Switzerland suggests that the introduction of patent rights was accompanied by changes in the rate and direction of inventive activity. 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.

In the more typical developing country, one could justify the implementation of an effective patent system if it were necessary to make substantial investments to import technologies from abroad or if the cooperation or assistance of the original inventor were an important factor for diffusion and later upgrades. To the extent that capital-intensive technologies were more likely than labor-intensive technologies to satisfy either of these criteria, another striking feature of the characteristics of patent systems in follower countries might make sense. As Table 1 shows, many of the follower countries (especially those that were less developed) assessed very high fees for patents, at rates that are all the more remarkable for the relatively low per capita incomes prevailing there. Indeed, many Central and South American countries were distinguished for having fees for patent protection that were among the highest in the world, and the pattern holds across quite a range of national institutional heritages (Brazil, British Honduras, and Peru for example). The logic is that high fees might not be such a disincentive to investing in a country with high patenting costs if the application of the technology required a major outlay for the actual investment in plant; the marginal increment of the cost of the patent would be relatively insignificant for the potential investor (especially given that even the high fees of the late-nineteenth century might not seem so lofty to the foreigners who predominated among the patentees – see

Table 2). Of course, another possible explanation for the high fees is that they helped insulate businessmen with considerable resources from competition. Given that onerous patent fees were typical in Central and South America, where inequality in wealth and political influence was extreme, as compared to say Spain and Portugal (which also had rather low per capita incomes), this hypothesis is perhaps worth further investigation.

Such differences, whether or not advisable, were gradually eliminated or moderated as international conventions proliferated, whose overarching goal was to pursue uniform international patent laws. International gatherings tended to reflect the objectives of the convenors, rather than real attempts to reach compromise solutions that would reflect the needs and wishes of all participants. 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, despite resistance from other nations, patent harmonization implied convergence towards the American model.

IV. HISTORY LESSONS FOR PATENTS AND POLICY IN THE 21ST CENTURY

The historical comparison of patent systems supports the claim that intellectual property institutions over the past two centuries were largely endogenous. In other words, the evidence suggests that the types of patent systems adopted were systematically related to factors associated with the potential for inventive activity or economic development more generally. Although the major question of whether the type of patent institutions a country evolves are good for social welfare (as opposed to generating narrow benefits for a politically influential group) remains open, this finding has at least three implications. First, that patent rules vary with context implies there may be significant costs to harmonization of intellectual property regimes across countries at different levels of economic development. Second, constraints that are imposed in one policy arena (namely, intellectual policy rights) may have countervailing or unintended consequences in other unconstrained areas (such as competition policies, taxes, trade practices or tariffs, or contract laws.) Third, scholars who try to relate patterns of invention to the characteristics of patent systems should adjust for the likelihood that those characteristics are not exogenous with respect to domestic conditions.

Endogenous growth models encouragingly suggest that technological change is not exogenous, but can be induced through effective policies, and proposals to bridge this divide have become a global priority. We believe that any effective discussion of the desirable and feasible elements of appropriate intellectual property institutions needs to incorporate the lessons of history and here present some of the preliminary conclusions that can be drawn from the historical record. Such conclusions are based on the premise that, for all their flaws, the market-orientation of effective patent institutions comprises the most productive means of inducing technological and social progress. Although some researchers have recommended the use of nonmarket policy instruments such as state grants and prizes, the abundant evidence from France during the Age of Enlightenment and from developing countries today illustrates the inefficiencies and corruption that tend to be associated with their use.

At the most general level, the experience in Europe and America underlines that successful policies assure to all members of society access to property rights and to the returns from individual efforts. In practical terms, this translates into policies that encourage widespread participation, such as affordable fees and the adherence to predictable rules and procedures. Perhaps even more important are effective mechanisms to disseminate and manage information. An examination system worked well for the United States because from the earliest decades it was fortunate to possess high stocks of information and human capital; for other countries, an opposition system effectively economized on these relatively scarce resources. Today much is made of the benefits of information on the Internet, but the reality is that such sources are likely to be of little use to the majority of the population in developing countries, and the commitment of public organizations to the supposedly elementary aspects of provision and diffusion may play a much more productive role in the democratization of innovation.

Corporate interest groups in the twentieth century successfully lobbied to prohibit discriminatory enforcement that varied across sectors or products, but the historical record demonstrates that, except for the United States, the majority of countries adopted different levels of protection for vital industries such as drugs, foodstuffs, and national security. A further distinction was made between different types of patent grants, such as the two-tier system that Germany introduced in the nineteenth century. German patent rules distinguished between the high-value/high-cost grant of a full patent that is likely to be dominated by multinationals, and a lower-value/low-cost model with a shorter term. The cost of

administration was low because, unlike regular patents, petty patents 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. Thus, today's developing countries might similarly create incentives for domestic ingenuity as well as diffusion through a two-tier system that allows weaker property rights for incremental inventions with a shorter term.

A significant part of the value of any property right derives from its enforcement. The legal system comprises an important aspect of an intellectual property regime, implying that changes in IPR rules must occur in tandem with developments in the courts, the judiciary, the legal system, and society in general. To other countries that wish to emulate the success of the United States in patenting, the prescription necessarily includes similar attention to legal institutions. For developing countries with a much inferior stock of legal resources, in practical terms this is likely to require a long-term evolutionary process of building legal capital, providing at least one reason to suggest that policies to strengthen intellectual property rights are unlikely to succeed in the short run. In terms of a more rule-oriented level of enforcement, from the very beginning of the movement towards international harmonization of patent laws, deep divisions have occurred regarding the extent to which restrictions should be placed on the rights of patentees, including stipulations about working requirements and compulsory licences. The United States has consistently opposed these mechanisms and for good reason since such legal expropriation tends to be arbitrarily applied, and associated with significant disincentives for invention.

A final aspect of this discussion relates to the cultural context of intellectual property rights regimes. The United States created institutions that accorded well with the needs of an economic and political democracy based on a belief in individual rights and an entrepreneurial free-market orientation. However, such institutions may function less effectively in societies with alternative values, such as states which are not liberal democracies or indigenous communities in which additions to knowledge and innovations are regarded as a public good. Scholars of China in particular fault the attempt to dictate western intellectual property precepts to a country where Confucian philosophy and traditional values still prevail. At the very least, attempts to institute western-style intellectual property regimes should begin with an understanding that effective reforms may require fundamental social and cultural changes that are

unlikely to occur overnight, even with the strongest of political wills on the part of developing countries.

In sum, the quest for harmonization in intellectual property rights has resulted in a “race to the top,” directed by the efforts and self interest of the countries which have had the strongest property rights.

In the international sphere, the preferences and interests of the United States have been to replicate its domestic policies towards patent holders, which have been the most liberal in the world. 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, implemented what might be thought of as technical improvements. However, others such as 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 aspect of the economic history of Europe and America is that intellectual property rights best promoted the progress of science and arts when they evolved in tandem with other institutions and in accordance with the needs and interests of social and economic development in each nation. As Thomas Jefferson long ago pointed out, perhaps one of the most crucial elements of achieving growth is to ensure that institutions are sufficiently flexible in responding to the needs of a developing society.

Table 1
DESCRIPTIVE CHARACTERISTICS OF PATENT SYSTEMS

	Examination System	Working Req. or Compul Lic.	Pats for Imp. or Introduct.	Cost
EUROPE				
Austria				
1871	-	Y	Y	\$\$
1899	Y	Y	N	\$\$\$\$
Belgium				
1848	N	Y	Y	\$\$\$
1871	N	Y	Y	\$\$\$
1899	N	Y	N	\$\$
Denmark				
1871	-	Y	-	\$\$
1899	Y	Y	N	\$\$
France				
1848	N	Y	Y	\$\$\$
1871	N	Y	-	\$\$\$
1899	N	Y	N	\$\$\$
Germany				
1891	Y	Y	N	\$\$\$\$
1899	Y	Y	N	\$\$\$\$
Great Britain				
1848	N	N	Y	\$\$\$\$
1871	N	Y	Y	\$\$\$\$
1899	N	Y	N	\$\$\$\$
Italy				
1871	N	Y	Y	\$\$
1891	N	Y	Y	\$\$\$
1899	N	Y	Y	\$\$\$
Norway				
1871	--	Y	--	\$\$
1899	Y	Y	N	\$\$
Portugal				
1848	N	Y	Y	\$
1899	N	Y	Y	\$

	Examination System	Working Req. or Compul Lic.	Pats for Imp. or Introduct.	Cost
Prussia				
1871	Y	Y	N	\$\$
Russia				
1848	-	Y	Y	\$\$\$\$
1871	-	Y	Y	\$\$\$\$
1899	Y	Y	Y	\$\$\$\$
Spain				
1848	N	Y	Y	\$\$\$
1871	N	Y	Y	\$\$\$
1899	N	Y	Y	\$\$
Sweden				
1848	--	Y	Y	—
1871	--	Y	-	\$\$
1899	Y	Y	N	\$\$

SOUTH AND CENTRAL AMERICA

Argentina				
1891	N	Y	Y	\$\$\$\$
Brazil				
1871	N	Y	Y	\$\$\$
1891	N	Y	--	\$\$\$\$
1899	N	Y	N	\$\$\$\$
Br. Guiana				
1891	N	N	-	\$\$\$\$
Br. Honduras				
1891	N	N	-	\$\$\$\$
Chile				
1891	N	Y	-	\$\$\$
Colombia				
1891	N	Y	-	\$\$\$

—

		Examination System	Working Req. or Compul Lic.	Pats for Imp. or Introduct.	Cost
Cuba	1871	N	Y	Y	\$\$\$
Equador	1891	N	Y	Y	\$\$
Guatemala	1891	N	Y	Y	\$\$\$
Mexico	1871	N	Y	N	\$\$\$\$
	1899	N	N	N	\$\$\$\$
Peru	1891	N	Y	N	\$\$\$\$
Uruguay	1891	N	Y	-	\$\$\$\$
Venezuela	1891	N	Y	N	\$\$\$\$
OTHERS					
Barbados	1891	N	Y	-	\$\$\$
Canada	1871	--	Y	N	\$
	1899	Y	Y	N	\$
Fiji	1891	N	N	-	\$\$
Hawaii	1891	Y*	N	Y	\$\$
India	1891	N	Y	-	\$\$\$\$
-					
-					

	Examination System	Working Req. or Compul Lic.	Pats for Imp. or Introduct.	Cost
Jamaica				
1891	N	Y	-	\$\$\$
Japan				
1899	Y	Y	N	\$\$
Liberia				
1891	Y*	Y	-	\$\$\$
Mauritius				
1891	N	N	N	\$\$
New South Wales				
1891	N	N	N	\$
New Zealand				
1891	N	Y	N	\$\$
South Africa				
1891	N	N	--	\$\$\$
United States				
1848	Y	N	N	\$
1899	Y	N	N	\$

Notes and Sources:

* Although this country officially had an examination system, its patent office does not appear to have carried out a serious examination of applications for novelty or utility. The code for cost pertains to the estimated cost in current \$US for a patent taken to a term of fifteen years. In those countries where the maximum term is less than fifteen, the cost is for a patent of that term. \$ - <=\$100; \$\$ - >\$100 and <\$250; \$\$\$ - \$401< and =>\$250; and \$\$\$\$ >\$400.

1848: John Kingsley and Joseph Piesson, Laws and Practice of All Nations and Governments Relating to Patents of Inventions (New York: Kingsley and Piesson, 1848).

1871: United States and International Patent Office Manual (New York: Fitch and Co., 1871).

1891: Epitome of the World's Patent Laws and Statistics (New York: The British and European Patent Agency, 1891).

1899: Arthur Greeley, Foreign Patent and Trademark Laws (Washington, D.C.: John Byrne and Co., 1899).

Table 2
PROPORTION OF PATENTS AWARDED TO FOREIGN RESIDENTS, c. 1900

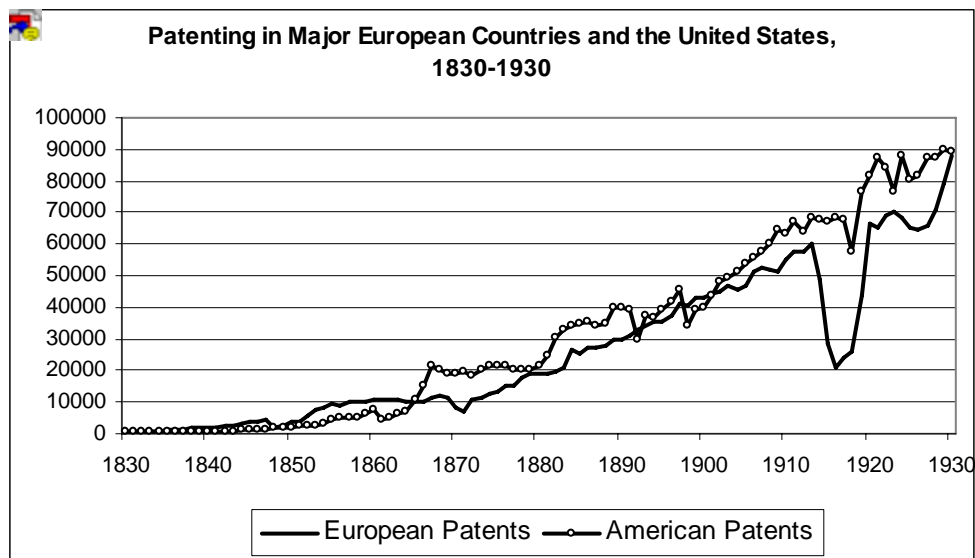
Australia	1905	37.8*
Austria	1894	60.4
	1898	67.2
	1902	77.0
Belgium	1901	78.4
Brazil	1896	44.5
Canada	1893	78.3
	1903	86.0
Denmark	1903	69.2
France	1906	52.5
	1911	51.9
Germany	1895	33.2
	1900	36.9
	1905	34.5
Hungary	1895	80.7
	1900	78.4
	1905	72.7
India	1899	69.9*
Italy	1904	64.4
Luxembourg	1907	98.3
Mexico	1904	57.6
New Zealand	1898	65.9
Norway	1907	77.8
Portugal	1907	86.3

Russia	1898	82.8
	1908	74.8
Sweden	1894	56.9
Tunisia	1904	68.0
Turkey	1909	94.1
U.K.	1901	53.2
U.S.A.	1901	13.3

*Based on the proportion of patent applications submitted by foreign residents.

Source: World Intellectual Property Rights Organization, 100 Years Protection of Industrial Property: Statistics. Geneva, 1983.

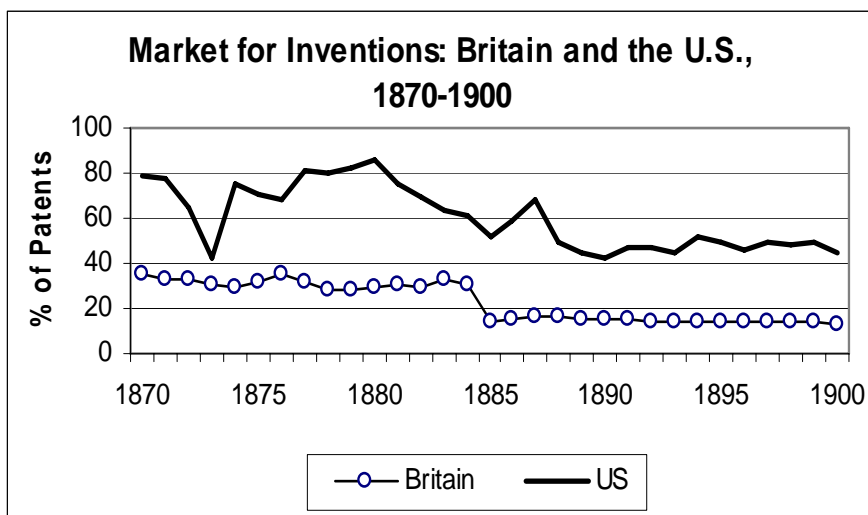
FIGURE 1



Notes and Sources:

Patent applications for France, Britain, Netherlands, Germany, Belgium and Spain are compared to applications for the United States. Federico, P.J., "Historical Patent Statistics: 1791-1961." Journal of the Patent Office Society 46 (Feb, 1964): 89-171.

FIGURE 2



Notes and Sources: United States: Annual Report of the Commissioner of Patents, various years. Since the number of words per assignment fell significantly over time, this biases the trend downward. The figure reports the ratio of assignments in the given year to the number of patents in that year. Britain: The series represents all assignments and licenses as a fraction of total patents sealed in that year. Annual Report of the Commissioners/Comptroller General of Patents, various years.

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ENDNOTES

¹ Especially after the landmark British Crystal Palace Exhibition of 1851, there was a continued fascination with inventive property, including whether patent systems were desirable for all countries, how they should be designed, and (for individuals) how to make money from them. See Machlup and Penrose (1950) for an excellent account of one part of the debate.

³ Engerman and Sokoloff (2002). William Easterly (2000) provides a theoretical model that shows how noninclusive groups will tend to under-invest in human capital and infrastructure when there is leakage to another group and evidence that supports the Engerman and Sokoloff hypothesis.

⁴ Notably, Douglass C. North, (1981); Nathan Rosenberg and L. E. Birdzell, Jr. (1986). For an influential Japanese Commission in the 19th century: "We have looked about us to see what nations are the greatest so we can be like them. We asked ourselves 'What is it that makes the United States such a great nation?' and we have investigated and found that it was patents and we will have patents" (cited in Khan, 2005).

⁵ "There is no evidence that it was institutional changes providing better rewards for innovators in the industrial era that unleashed mankind's creative potential"(Clark, 2003); see also Mokyr (1990). However, a number of U.S. scholars recently have criticized the modern American patent system, drawing on both theory and practice (Jaffe and Lerner, 2004; Stiglitz, 2006);

⁶ The standard references for the early British patent system are Boehm and Silberston (1967), Dutton (1984) and Macleod (1988).

⁷ 21 Jac I C 3, 1623, Sec. 6.

⁸ The complexity of the system is evident in the fact that nobody seems to have had a clear idea of the specific costs, and estimates ranged from £274 to £350. These charges should be compared to mid-century per capita income of roughly £25 in England.

⁹ For instance, Jeremy Bentham, who favored the grant of patents, noted: "A new idea presents itself to some workman or artist... He goes, with a joyful heart, to the public office to ask for his patent. But what does he encounter? Clerks, lawyers, and officers of state, who reap beforehand the fruits of his industry. This privilege is not given, but is, in fact *sold* for from £100 to £200 – sums greater than he ever possessed in his life. He finds

himself caught in a snare which the law, or rather extortion which has obtained the force of the law, has spread for the industrious inventor. It is a tax levied upon ingenuity, and no man can set bounds to the value of the services it may have lost to the nation." From the Works of Jeremy Bentham, cited in Moureen Coulter, Property in Ideas, p. 76.

¹¹ The 1852 law did not apply to British colonies, which were able to adopt legislation suited to their individual circumstances.

¹² According to *Badische Anilin und Soda Fabrik v Levinstein*, 4 RPC 462, 466: "I do not think that it is a correct test of utility to enquire whether the invented product was at the time of the patent likely to be in commercial demand or capable of being produced at a cost which would make it a profitable venture."

¹³ *United Horsenail Co v Stewart*, 2 RPC 132.

¹⁴ For instance, Justice Grove instructed the jury in *Young v Rosenthal*, 1 RPC 41 that if the invention "is not as good as those existing before, or no better than those existing before in any particular point, then you would say it is not useful."

¹⁵ According to an editorial in 1862, "there can be no doubt that a large amount of property is bound up in patent rights, and that the utmost uncertainty exists as to the legal value of that property" (Newton's London Journal, cited in Coulter, p. 140).

¹⁶ The case law on licenses was more convoluted. See for instance *Lawes v Purser*, 6 Ell and Bl 930, where a licensee refused to continue payments on the grounds that the patent was void. It was held that the licensee could not make such a defense as long as the contract for the invalid patent had been executed without fraud.

¹⁷ See the first report of the Commissioner of Patents, 1853. The patent agency of Munn & Co. noted that: "From January 1, 1865 to the 1st of December, the whole number of applications for patents to the British Patent Office will not have exceeded three thousand. Within the same period the applications made by Munn & Co. to the United States Patent Office number at least three thousand five hundred; thus showing that our professional business considerably exceeds the entire business of the British Patent Office." Scientific American 13 (23 Dec., 1865): 415.

¹⁸ Despite the relatively low number of patents granted in England, between 1852 and 1880 the patent office had made a profit of over £2 million (Report of the Commissioners of Patents for 1880).

¹⁹ The patent would be refused if the idea had been stolen, if it had previously been patented in Britain, or if the patent specification was different from the description in the provisional patent. See 46 and 47 Vic C 57, 1883.

²⁰ Excellent assessments of such issues during the Enlightenment include Liliane Hilaire-Perez (2000.)

²³ A law of October 16, 1791 created the Bureau of Consultation of Arts and the Trades which consisted of 30 members drawn from various academies. They were to examine and report on the inventions, making recommendations about the rewards to offer to inventors. In 1797 this committee was replaced by the National Institute of the Sciences and Arts. The Minister of the Interior was also authorized to propose to the National Assembly any major discoveries which had been made either in France or imported to France "particulierement lorsque ces decouvertes feront dues a des travaux penibles, ou a voyages longs et perilleux." [Sec. V of Law of 1791]. Under this law Coste d'Arnobat received 5,000 livres on the 29th of December for the importation of rhubarb into France. Archives Nationales, Files in F/12/2424 "Encouragement donne aux artistes et aux inventeurs de 1786 a 1793."

²⁴ Archives Nationales, Files in F12/992, No. 239 (Oct. 1781). M. le Chevalier de Gruyere requested a privilege for the manufacture of a vegetable-based cosmetic rouge. He was willing to pay 1.2 million livres for the grant. His application was supported by influential women at court.

²⁵ Archives Nationales, F12/992, No. 3376.

³⁶ Perpigna, p. 29.

⁴⁰ The law of 1844 only allowed for the publication of the full text of patents that were judged to be important.

⁴³ Archives Nationales, F/12/1025 (1816.) The “privilege mentality” could be detected in the records for Felix Lemaistre of Paris, who invented a shoe that could be made in one piece without sewing, and tried to get the state to purchase the invention. His file includes a letter from the Under-Secretary of State rejecting Lemaistre’s proposal to have the government take over the invention. “C’est a vous a gerer dans vos seuls interets l’exploitation de votre decouverte ou a quelques speculateurs particuliers qui puissent y associer par des avances de fonds.”Lemaistre sold the rights in October of the following year to a firm in Paris.

⁴⁶ In 1968 a partial examination system was adopted which was similar to the early British reforms along these lines, since it did not include a search for novelty, merely a test for accordance with the law: “[il] se situe a mi-chemin entre la libre delivrance et l’examen prealable ... en effet, l’administration n’avait pas les moyens de pratiquer un tel examen.” (Marcellin, Yves. La Procedure Francaise de Delivrance des Brevets d’Invention. p. 21, , Editions Cedat, Rosny-Sous-Bois.) The changes were made to give value to patents and to protect the interests Of third parties. It was only in 1978 that an examination for novelty was introduced.

⁵⁰ Although the statutes proposed to grant patents for “new and useful”inventions, in practice the utility claim was never enforced. Courts declared that it was up to the market, not to administrators, to determine what was useful. In the 1817 case, *Lowell v. Lewis*, 15 F Cas 1018, Joseph Story charged the jury that the utility of the invention “is a circumstance very material to the interest of the patentee, but of no importance to the public. If it is not extensively useful, it will silently sink into contempt and disregard.”⁴³ It was thus the role of the market, rather than the courts, to determine the ultimate success of the patent. This policy was continued by the Patent Office, which also did not attempt to gauge the social or technical value of an invention, deciding conflicting claims predominantly on the basis of novelty.

⁵² Report, 1869, pp. 4-9.

⁵³ In work focusing on the period before the Civil War, we found that not only were the occupations reflective of a broad cross-section of the U.S. population, but the level of formal schooling was equally inclusive as well. See Khan and Sokoloff (1993, 1998, 2004) and Khan (2005, 2007).

⁵⁴ When a fire destroyed the Patent Office records in 1836, Congress appropriated \$100,000 for the restoration of the patent records up to that date. See the Act of 1837, Section 4. As early as 1828 the office freely distributed circulars with information about the law relating to patents, and how to apply for a patent. These ad hoc circulars became more extensive and were subsequently entitled the Rules of Practice, and were formalized by the Act of 1870. After 1870 the Patent Office began to publish weekly information on patents granted in the form of an Official Gazette. By 1891 over 3,000 copies of the Gazette were being distributed each week without charge to libraries, depositories, and members of Congress, and a further 3,000 copies were circulated to subscribers for a nominal fee of \$5 per year.

⁶¹ The 1832 and 1836 laws stipulated that foreigners had to exploit their patented invention within eighteen months, but these clauses seem to have been interpreted by the courts in a fairly liberal fashion. See Tatham et al v Lowber et al, 23 F Cas 721April 21, 1847. In any case, such provisions proved to be quite transient and

were not included in subsequent legislation. Working requirements or compulsory licenses were regarded as unwarranted infringements of the rights of “meritorious inventors,” and incompatible with the philosophy of U.S. patent grants. Patentees were not required to pay annuities to maintain their property, there were no opposition proceedings, and once granted a patent could not be revoked unless there was evidence of fraud.

⁶³ The law required that assignments be reported to the Patent Office within three months in order for them to be legally binding. If one estimates the volume of assignments over the late-nineteenth century from the reports of the fees the Patent Office collected from registering assignments, and compares the ratios of annual estimated totals to the ratios of the reported number of assignments and licenses to patents in Britain, one can gauge the relative volume of trade in patents to the number of patents in the two countries.

⁶⁶Gerschenkron (1976) explicitly identified the ability to draw on the technologies developed in those countries that had industrialized earlier as one of the greatest advantages for follower countries.