Mercantilism, the Enlightenment, and the Industrial Revolution

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Introduction

Economic historians will insist on claiming Eli Heckscher as one of their own. His magisterial *Mercantilism* has every sign of a true economic historian: a reliance on the sources, a clear and analytic framework, a good “nose” for asking the right questions, and an excellent “feel” for the period. Yet the book seems to have been strangely neglected by economic historians in recent decades.[1] Mercantilism as a major topic in the institutional development of Europe has not yet been taken up by the New Institutional Economics. One can only speculate as to the reasons, but it is clear that once the relations between the state and the economy will start to attract the interest of this school, they will find a treasure of insight and information in those two volumes. Where Heckscher’s work has been better appreciated has been among the scholars working on the political economy of the eighteenth century, especially in the work by Ekelund and Tollison (1982, 1997) and Root (1994) whose interest in rent-seeking led them inevitably to the Mercantilist State. While these scholars have not always agreed with Heckscher’s view of mercantilism, they have clearly shown due respect for Heckscher’s work.

My perspective will be somewhat different if overlapping with their work. The central question I am concerned with today is not economic policy or regulation but long-term economic growth, which began in earnest in Europe just about at the time when classic mercantilism went on the defensive and eventually declined. Heckscher, of course, noted this in passing (1955, Vol. I, p. 275) and noted that the growing aversion to compulsory limitations on economic activity, while going back to the middle ages, was felt most strongly in England and thus was a cause of the

[1]Of the forty five references to Heckscher’s work on Mercantilism in the two leading Economic History journals, thirty five were made before 1971, and only four since 1980. Of the thirteen citations in the entire economics and history sections of J-STOR to Heckscher’s work on Mercantilism, only five papers qualify as economic history proper. A recent well-reviewed book (Epstein, 2000), clearly concerned with similar issues, does not even refer to it.

Industrial Revolution. But it is fair to say that explaining the Industrial Revolution was not the main focus of his work.

In pointing this out, however, Heckscher identified something that subsequent economic historians have been ignoring at their peril, namely that the causes of the Industrial Revolution include intellectual changes, that is, changes in what people knew and believed to be true. It is not enough to postulate economic change in terms of changes in technology, prices, population, and physical constraints: what people *believed* about their world and one another was central.[2] Such belief systems can be self-reinforcing and constitute a system that can produce a multiple of equilibria, some of which are more conducive to economic progress than others. In that sense, the Industrial Revolution may have been more "contingent" than economic historians often tend to believe (Mokyr, 1998, pp. 31-32).

For those who wish to understand of what is known as the "Great Divergence" or the "European Miracle," it seems natural to examine the intellectual roots of economic progress beside the economic and social ones. In Mokyr (2002) I explore in detail one set of reasons why intellectual factors mattered next to the standard tales of factor endowments and socio-political environment. The argument is that the Industrial Revolution involved above all changes in technology, and that technology is knowledge, that is, possesses a clear-cut intellectual dimension. Knowledge itself, however, is socially constructed, if not precisely in the way that the constructionist school in the study of technology would have us believe. Instead, intellectual changes matter to economic changes because societies set research agendas according to certain preferences and beliefs held by a small

[2] It is interesting to note that the one economist who can claim to have continued in Heckscher's tradition of combining international economics and economic history, Charles Kindleberger, identified intellectual and doctrinal forces as a powerful agent of economic change and liberalization (see Kindleberger, 1975).

but key minority, because the "invisible colleges" that created new knowledge committed to certain methods and conventions regarding its discovery and codification, and because culture and technology determined the costs of access to existing knowledge.

In eighteenth century Europe, this key development involved a movement I have labeled "the Industrial Enlightenment." Although the Enlightenment was composed of many diverse and often contradictory streams, most of its key figures shared a belief that economic progress could be achieved by studying natural phenomena and regularities, reducing them to general principles wherever possible, summarizing them in systematic and accessible forms, so that they could be applied to "the useful arts" (that is, production). The implication of this belief was that the propositional knowledge we identify today largely as "science" (but which includes a great deal more) needed to be made accessible to people on the shop floor, the ship, the mine, and the farm. It also included the desire to generalize patterns and regularities at higher levels into systems and catalogs. Above all, the Industrial Enlightenment was firmly committed to the Baconian ideal that the purpose of knowledge was to bring about material progress to mankind. Many of its most illustrious practitioners, such as Benjamin Franklin, Joseph Priestley, Count Rumford, Claude Berthollet, and Humphry Davy carried out this program themselves. In most cases, however, the Industrial Enlightenment created publications and organizations that made knowledge accessible to those who could best make use of it (Mokyr, 2002, ch. 2).

In this paper, I propose to explore a different and more elusive way in which the Enlightenment affected the Industrial Revolution, namely through its impact on institutions. The argument I will make is complementary to the one that focuses on useful knowledge alone. The logic is, essentially this: technological change was a necessary condition for long-term *sustained* economic growth. The Industrial Revolution provided a stream of innovations, improvements, and adaptations, which, in the longer term, generated growth beyond the wildest dreams of even the most optimistic Enlightenment *philosophe*. Yet without changes in the institutional environment of Europe, such technological progress might have been slower in coming and more importantly, might have been arrested, as it had before, by what might best be called negative institutional feedback.

Negative institutional feedback involves political changes resulting from economic growth that tended to slow down and even reverse growth. Throughout history, the wealth resulting from economic growth has tended to attract predators and parasites the way jam attracts houseflies: successful commercial and industrial regions raised the envy and greed of less fortunate or resourceful neighbors. Enterprise, industry, and ingenuity created opportunities for internal rent-seekers who found politics or violence more remunerative than hard work. Commercial and financial success "invited" tax collectors, pirates, and default-prone borrowers. Either way, it generated, in almost dialectical way, the means to its own demise. The most obvious and costly form of negative institutional feedback before 1815 was, of course, war. Britain, France, the United Provinces and most other Continental powers fought one another constantly in hugely costly attempts to redistribute taxable citizens and activities from one to the other, a typical "mercantilist" kind of policy.[3] Economic growth indirectly helped instigate these conflicts. Wealth accumulation, because it was mostly a result of "Smithian Growth," was usually confined to a region or city and thus created an incentive for greedy and well-armed neighbors to engage in armed rent-seeking. It hence stands to reason that, had nothing changed in the eighteenth century but the means and will to change technology, the process of economic change would have run into serious barriers.

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[3] O'Brien (2003) notes that between the nine-years war (starting in 1688) and the Congress of Vienna in 1815, Britain and France were at or on the brink of war for more than half the period, justifying the term "Second Hundred Years War."

Moreover, as I have noted before (Mokyr, 1999; 2002), technological progress itself is always in danger of running into resistance by groups that are opposed to innovation for a variety of reasons. Overcoming such institutional resistance is almost always one of the main challenges of technological progress. It was not different in the eighteenth century. With some important exceptions, most Enlightenment figures were favorably disposed to innovation and opposed to attempts to slow it down by reliance on political power. This derived not so much from their belief that technology held the key to sustained human progress as much as that they believed that free markets should be allowed to determine which techniques were used and which were not. Once that principle is allowed for, resistance to new technology becomes almost impossible, since the essence of such institutional resistance is to use *non-market* controls to prevent new techniques from being adopted. After all, a market test would normally favor a new and improved technique over the status quo.

One could, of course, argue about the extent to which intellectual development takes priority over "real" changes determined by supply and demand and political facts on the ground. Ekelund and Tollison (1997, p. 14) dismiss ideological causation as a position that "may possess some merit as an auxiliary, supporting" explanation. They feel that intellectuals have been flattering themselves to think that their thought affects public policy, yet they fail to realize the impact of the Enlightenment on institutional changes (in fact, the term does not appear in their book). Instead, they claim that because a positive theory of idea formation or the role of ideology is absent, they prefer to focus on economic activity as the basis of institutional change. Ideology, they claim, is "a grin without a cat." This seems a peculiar position to take in view of the events in the West in the last quarter of the eighteenth century, during which two political revolutions were a source of profound institutional change, subsequently spilling over to the entire Western world. Are we to conclude that the Enlightenment's impact on the thought and consequent actions of Mirabeau, Sieyès, Jefferson, Paine and the likes and the institutional changes they wrought are really a grin without a cat? A full and "positive" theory of the formation of ideas is perhaps still beyond us, though the distinction between ideas and institutions is artificial to start with if Greif's (2003) approach to institutional analysis is accepted. Even if we cannot understand the "causes" of the Enlightenment at all – a point I do not accept – it still could be a bona fide explanation of the phenomena that followed it.[4]

Institutional progress and the Enlightenment

Economic historians speak of technological progress without – as yet – the misgivings of many well-meaning but misguided historians and social scientists who feel that the normative tinge of the word "progress" reeks of Whiggish positivism or worse. While technological progress is itself not a neutral term, at least technology has tended to move in one direction. Few have been audacious enough to use the term "institutional progress." It is rare (though not unheard of) for it to be reversed, that is, for knowledge of superior techniques and products to be lost. Institutional change is much trickier. Effective markets can disintegrate as fast as they can emerge. The trust in contracts and rule of law, to say nothing of peace and the respect for life and property on which efficient allocations depend, have been abruptly reversed more than once. In our own age, international labor mobility is threatened once again by bigotry and stupidity, international movement of goods and services by violence and terrorism, and international capital mobility by poor management and dishonesty. To speak of "institutional progress" is therefore riskier than to speak of the advance of

[4]Ekelund and Tollison observation that ideas need to be "sold" somehow does not really weaken the thrust of the point I am making here. The "selling" of ideas can take place through persuasion and rhetoric, the use of improved logic and facts, without a necessary concomitant change in the economic environment. The impact of Malthus's theory of population, a cornerstone of classical Political Economy and subsequent public policy – e.g., the Poor Law Reform of 1834 – , is a case in point.

technology – it might be worse than "teleological," even worse than "triumphalist": it might be wrong. Some Enlightenment thinkers made the unwarranted leap that individuals and social institutions were subject to similar regularities as natural phenomena and once these regularities were understood, society could be manipulated and harnessed in the same way. This hope has been deeply disappointed in the twentieth century.

All the same, the impact of the Enlightenment on the economies of the West transcended its impact on the generation and diffusion of technology. The institutional negative feedback mechanisms characteristic of pre-1750 societies I delineated above might well have sharply reduced any social gains from technological creativity had nothing else changed. Vested interests and rent-seeking could have – and in many places did – threaten continuing technological progress. Without question "institutional progress" [defined, for instance, as a reduction in the rate of return on rent-seeking activities relative to those in productive activities, or as the reduction in the sum of the deadweight losses from foregone gains from trade or factor mobility] was less monotonic and far more subject to reversals and set-backs than technological progress. Yet non-monotonicity does not mean there was no trend. Lacking the impact of the Enlightenment, the non-Western world remained far more vulnerable to negative institutional feedback that previously had checked economic growth. It turned out to be easier to transfer Western technology than Western institutions to other areas, and the somewhat tenuous co-evolution of the two was often absent altogether in non-Western economies, leading to a great deal of political tensions and social upheaval.

During and after the technological advances of the late eighteenth century, struggles ensued about their implementation. The outcomes of these struggles were by no means inevitable. Logic, coherence, facts, appeals to authority – in short, rhetoric – played an importance role in the emergence and shaping of the institutions that shaped and supported material progress. Without arguing that some institutions are uniformly "bad" or "good," reasonable conjectures about their impact on growth can be made. The definition of "institutions" here includes the formal rules and conventions by which society organizes its economic affairs as well as the beliefs about the behavior of others that generate regularities in social interactions (Greif, 2003).

In that sense Enlightenment thought may be regarded as the growing realization that the economic game was not zero-sum: exchange was a positive-sum game, and redistribution a negative-sum one.[5] In pointing out the fallacy of the mercantilist zero-sum assumption, David Hume and Adam Smith were the most eloquent and influential spokesmen for this tradition.[6] Smith's celebrated statement was that the doctrine, invented by the spirit of monopoly, taught nations that "commerce, which ought naturally to be, among nations as among individuals, a bond of union and friendship, has become the most fertile source of discord and animosity" ([1776], 1976, Vol. I, p. 519). These opinions were common Enlightenment views especially among physiocrats such as Turgot and early critics of mercantilism such as Davenant and Barbon.[7] Mercantilist thinking was based primarily on the idea that in order to win the competitive game overseas, domestic producers required subsidies and their competitors should be slapped with tariffs. But by 1773 Matthew

[5]The Mercantilists, as Sir Josiah Child (1630-99) put it, held that "all trade is a kind of warfare" (Gay, 1969, p. 346). The idea that the production and exchange are not a zero sum game is actually quite counterintuitive and has taken a great deal of persuasion and struggle to catch on. See Rubin (2002, p. 22) and Wright (2000, p. 327).

[6]Smith's understanding of this point was well-expressed by Nathan Rosenberg (1960, pp. 560ff) who notes that Smith recognizes that "the pursuit of one's economic interest is not necessarily confined to the economic arena. When it spills over to the political arena, it leads to actions which detract from, rather than add to, the economic welfare of society... the competitive order which Smith advocated was an institutional arrangement which was characterized by the absence of all special privilege and sources of market influence." It is in this light that we have to understand Smith's well-known objections to the apprenticeship system, joint-stock corporations, and other forms of potential rent-seeking.

[7]Turgot noted in 1773 that "There is no merchant who would not like to be the sole seller of his commodity ... these fools do not see that this same monopoly which they practice... against their own fellow citizens who are sellers in their turn ... in this balance of annoyance and injustice ... there is no advantage to any party; but there is a real loss to the whole of national commerce" (Groenewegen, ed., 1977 p. 184).

Boulton told Lord Warwick that Birmingham manufacturers would defeat their Continental competitors by mechanization and the "separation of process" (that is, the division of labor and specialization) (Uglow, 2002, p. 212). In other words, the game would be played with productivity as the main control variable.

The impact of institutional changes falls into three broad categories: bad institutions impeded the efficient allocation of resources and the emergence of welfare-enhancing exchange; they channeled human creativity and talent into non-productive and possibly destructive uses; and they created barriers to technological progress through built-in resistance. Some forms of economic change were more dependent on institutional progress than others. The emergence of spot markets, local fairs, short-term labor contracts and land rentals could be arranged without a great deal of institutional support. But technological progress and the supply of long-term venture capital that carried it required more complex arrangements and often were encumbered by incomplete contracts, poorly defined property rights, asymmetric information, and the threat of default. Patent licensing, firm-specific human capital, the agency problems generated by expensive overhead capital and durable equipment and the division of knowledge, all required the emergence of new institutions. The importance of these more complex but thinner markets rises in the period following the Industrial Revolution, and the need for formal or informal support of these rather unstable and fragile markets increased. At the same time, as the quasi-rents from innovation, through intellectual property rights or first-mover advantage increased, the threat that these rents – essential in their role as incentives for the risky investments they entailed – would be expropriated by tax collectors, monopolists, or other rent-seekers increased.

Rent-seeking and Institutional Progress

Adam Smith's eloquent case against rent-seeking is well-known. The people living off the "public revenue," wrote Smith, "themselves produce nothing [and] are all maintained by the produce of other men's labour. When multiplied to an unnecessary number, they may in a particular year consume so great a share of this produce as not to leave a sufficiency for maintaining the productive labourers...next year's produce will therefore be less than that of the foregoing..." (Smith, [1776], Vol. I, pp. 363-4). This famous paragraph summed up much of Enlightenment thinking of the time, and its influence on the changes that were introduced in the way the economic game was played in the West were far-reaching. The idea was that rent-seeking, privileges, and transfers were not only unjust, but that they were harmful.[8]

A central issue in the importance of institutions in enabling the Industrial Revolution remained the incentive structure, and specifically the opportunities for rent-seeking because they led not only to inefficiencies but also to the danger that opportunistic behavior would extinguish technological creativity itself. Modern economists have returned to the issue (Baumol, 2002; Murphy, Shleifer and Vishny, 1991; Shleifer and Vishny, 1998; Ekelund and Tollison, 1997). It has been increasingly realized that rent-seeking and corruption were more than just a minor irritant or a re-distributive mechanism with only second-order effects on overall economic performance. Not all corruption is created equal, of course, and many cases of bribery and graft may be interpreted as an attempt to save the free market from those who would regulate it out of existence (Root, 1994). More important, rent-seeking is far more pervasive than venality: it is the manipulation of the formal institutions and informal customs of a society to redistribute income. It is perfectly consistent with

[8] Emma Rothschild (2001) has challenged the view that many of the more extreme liberal views came from Smith himself and argued that they emanated in Britain after Smith's death.

"a rule of law" – when the law meant to redistribute income rather than stimulate growth. In the Britain of 1700, government-enforced monopolies, privileges and prohibitions, tariffs, rules and regulations, and rent-seeking in other forms still imposed a heavy toll. Britain was not unique, nor the worst case.[9] But efficiency and economic performance were seriously impeded by the continuous attempt of well-connected, able, resourceful "entrepreneurs" to harness the state and its apparatus to divert resources their way. The realization that these policies reduced the size of the national pie and was to be abolished had to be imposed by force on the continent by French revolutionaries or Prussian civil servants, whereas in Britain they grew, so to speak, organically, within the existing political structure. Reforms reduced the opportunities for rent-seeking, though never eliminating them. In the Middle East, India, East Asia, or Africa it is hard to find any trace of such reforms until the Europeans had shown the way. Here, then, is the second taproot of Western exceptionalism.

Rent-seeking, Shleifer and Vishny argue, is subject to economies of scale. In part this is the case because there are fixed costs in setting up the institutions and arrangements that produce rents, in part it is because by reducing the rate of return to productive entrepreneurship, rent-seeking makes the return on itself relatively more attractive. It may therefore seem plausible that the existence of rent-seeking was consistent with multiple equilibria, a high-income (with little or no rent-seeking) and a low-income equilibrium in which the returns to all activities are low but the returns to rent-seeking remain above those to productive entrepreneurship. The simple set-up proposed by Murphy, Shleifer, and Vishny (1993) implies that the "bad" equilibrium is stable, and it requires a fairly

[9] Not all monopolies were necessarily inefficient, poorly managed, and economically harmful, as Carlos and Nicholas (1990) have shown. And yet the danger that they would eventually be tempted more and more into rent seeking was quite real. The same is true for craft guilds which, as Epstein (1998) has argued, met a real economic need of organizing and transmitting useful knowledge and yet increasingly became a technologically reactionary entrenched distributional coalition. The notion that in the absence of competition such organizations will slide into rent seeking even if that was not their original intent was the great contribution that political economy made to the institutional progress the West experienced after the Enlightenment.

substantial change in the rate of return to rent-seeking relative to its opportunity cost to shift the economy from one in which there is a lot of rent-seeking and concomitant underdevelopment to one where rent-seeking is dominated for most people by making money the honest and socially-beneficial way. I would hypothesize that the Enlightenment spawned reforms — whether revolutionary as in France or America, reactive as in Prussia and Austria, or more gradual as in Britain — that by the middle of the nineteenth century had led to a decline in the returns to rent-seeking as an economic activity. I can find no evidence that on the eve of the Industrial Revolution rent-seeking in Europe was in any way less serious than in China.[10] China may not have had an enlightenment; it did not have mercantilism either. But, unlike China, in the areas of Europe most affected by the Enlightenment, rent-seeking increasingly clashed with the free market ideology that many Enlightenment thinkers espoused.

We have to be cautious what activities we include in rent-seeking: Shleifer and Vishny (1998, p. 55), much in Adam Smith's spirit, define all government service, military work, and organized religion as rent-seeking. Such a definition seems inappropriate as it contains too much and too little. Rent-seeking is an activity that aims purely at redistribution and produces little or nothing of value itself. Some bureaucrats, lawyers, soldiers, and priests catered to a real social need such as national defense or the enforcement of property rights. Some talented "entrepreneurs" worked hard within the government bureaucracy to produce something of value that the private market turned out to be incapable of.[11] Organized religion seems to be responding to market signals, and defining it

[10]Indeed, Wong (1997 p. 133) notes that "trade was never as exhaustively exploited by Chinese rulers as it was by European ones."

[11]Classic examples are the careers of Marriner Eccles and Mary Switzer, documented in the last two chapters of the second edition of J.R.T. Hughes, *The Vital Few*.

as rent-seeking altogether must be seen as inconsistent with the consumer sovereignty of those who demand this service. At the same time, a large number of rent-seeking institutions from journeymen's associations to pirates and pickpockets were not sponsored by the government (and even resisted by it), yet that did not prevent them from imposing deadweight burdens on society.

In France and elsewhere on the continent, the post-1789 Revolution implied a valiant attempt to put an end to corrupt, inefficient rent-seeking regimes and the introduction of economic institutions that purported to be "rational" that is, maximize the public welfare.[12] In retrospect, such aspirations seem hopelessly naive, but it would be rash to argue that they were wholly ineffective or that the post-1815 Reaction was able to turn the clock back to 1789. It may be naive to believe that the Enlightenment somehow "caused" the French Revolution, it is equally naive to believe that the reforms enacted during the post 1789 years were not permeated with the ideas we associate with it.

Institutional progress inspired by the Enlightenment in the Western world took place on a number of frontiers. One of the most important of them was the elimination of a variety of costly barriers to entry whose effect was to secure exclusionary rents for insiders. Guilds were among the first targets of the revolutionary reformers, monopolies were another. In Britain the golden age of the great trading monopolies was largely over by 1720 (Harris, 2000), but the notion that free entry into an industry or an occupation was a natural rights only gained acceptance very slowly. Root (1994, p. 157) notes that the philosophical argument in favor of a free market took a long time to penetrate the public policies of Parliament. Harris points out (2000, p. 135) that the main barriers to entry into the state of joint-stock enterprise were not so much to get Parliament to vote a private incorporation bill, but the sums spent in an attempt to overcome resistance from existing firms or

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[12]The *opus classicus* on the institutional impact of the French Revolution in wiping out local *priviléges* remains Rosenthal (1992).

other vested interests.[13] By the late seventeenth century the seeds had already been planted: in international trade, monopolistic practices became increasingly difficult to maintain, and Lockean ideas of personal liberty – a harbinger of Enlightenment views – were already in the air after 1688, though the battle for free trade continued through much of the eighteenth century (Ormrod, 2003, pp. 126-27). The long-term trend in British economic policy was to eliminate commercial barriers and to create a more open and competitive society. The great monopoly of the East India company was ended by two parliamentary acts in 1813 and 1833, the restriction on the emigration of skilled artisans removed in 1824, the export prohibition on machinery in 1843, and the Navigation Acts were repealed in 1849 after having declined for many decades.[14]

Rent seeking in *ancien régime* Europe relied on the concept of *privileges* or sanctioned liberties: the legal and customary rights that certain groups had obtained to keep out others from their status regardless of the merit of a claim.[15] Such rules created exclusion rents.[16] This included the *noblesse d'epée* of France, the great trading monopolies of Britain, the oligarchs of the United

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[13]The best-known example is the Calico Act of 1700 (reinforced in 1721) which prohibited the printing of calicoes and later even the wearing of printed cotton goods (passed at the urging of the light wool and silk industry lobbies). It seems a stretch to argue with O'Brien, Griffiths and Hunt (1991) that this blatant act of rent-seeking was an example of British pragmatism. Perhaps a better example of British pragmatism was the rather matter of fact manner in which the Act was repealed in 1774 at the urging of Richard Arkwright, the inventor of the spinning throstle.

[14]The enforcement of these prohibitions by all accounts left a lot to be desired. Witnesses to an 1841 Select Committee admitted that exportation of prohibited machinery took place through the major ports rather than through remote moonlit beaches; insurance premiums against customs detection were quoted at 30 to 45 percent in 1825, providing some indication as to the social costs of this exclusionary policy (Jeremy, 1981, pp. 42-43).

[15]The idea that rent-seeking lay at the bottom of the institutional failures or the ancient régime in Europe was proposed in the early 1980s in a series of papers and books by Ekelund and Tollison (1981, 1984, 1997) but virtually ignored by economic historians.

[16]Epstein (2000, p. 15) points out that "freedoms" or "liberties" were concepts that defined inequalities in social and economic status and the entitlement to an income stream that such privileges conferred. It is not always easy to tell whether the monopolies of the time were invariably rent-seeking institutions or whether they were in part the result of scale economies and other sources of "natural" monopolies. Ville and Jones (1996) have pointed out that much of the evidence adduced by recent writers to support the notion that the large monopolies were efficient organizations is also consistent with a rent-seeking interpretation, but the evidence on this is still in dispute (Carlos and Nicholas, 1996).

Provinces, the guilds of Germany, and the powerful Catholic Church of southern Europe. Many of those privileges were inherited, others bestowed or acquired as political favors or purchased for cash. The main *privilège* in pre-revolutionary France was of course a tax exemption, but the country could count many petty municipal offices such as "wardens of the oysters sellers' guild, gaugers of cheese and curds, and inspectors of tripe who gloried in their small dignities and enjoyed their exemptions" (Schama, 1989, p. 68).

It is easy to exaggerate the negative impact of guilds. In Britain they had already been weakened considerably by the beginning of the eighteenth century, whereas in France they showed a remarkable ability to adapt to the capitalist market, while at the same time "guilds and regulations...created zones of solidarity, credit, and trust in which family and matrimonial strategies played an important role" (Roche, 1998, p. 149). Yet Deyon and Guignet (1980) point out the inherent tensions in the ancien régime between local vested interests which were invariably conservative, and more progressive forces inspired by the Enlightenment.[17] Progressive thinkers, whether physiocrat, late-mercantilist, or liberal, differed on many issues but all felt an aversion to those who took advantage of political or social power to appropriate a larger portion of the surplus. In France, the abolition of guilds was at the center of Turgot's plan to reform the French economy, as he realized the extent to which guilds constrained the mobility of labor (Heckscher, 1955, Vol. I, pp. 216-17). Turgot, in many ways, personifies the best parts of the institutional elements of the Industrial Enlightenment. His idea was that free competition should be implemented if necessary by using state compulsion as a weapon of persuasion to abolish all exclusive organizations such as associations, fraternities and unions (ibid., 217). Yet the plan failed, in large part because the guilds

[17]Even in the supposedly liberal United Provinces, guild regulations in the cities could protect long-established rights and vested interests "at the expense of the general interest" (Ormrod, 2002, p. 111).

were indispensable in the complex system of royal finances in the *ancien régime*.[18]

The State and the Industrial Revolution

The era before the Industrial Revolution witnessed in some areas the rise of a powerful state with a precommitment to a minimum protection of property rights and the ability to solve the contestabilities and coordination failures of pre-modern societies. In other areas the rise of a modern uncontested state was more slow and wobbly. Yet the decline of privileges and rent-seeking must also be found in the changing of the dominant ideology underlying the rulers and the civil servants in those nation states: there was a growing realization that the medieval concept of limiting competition and treating membership in any cartel or entry-limiting arrangement as an asset was as harmful and irrational as it was unfair. This is the institutional element of the Enlightenment that turned out to be crucial to the economic miracle that Europe experienced in the nineteenth century. Ekelund and Tollison (1981) rightly point out that there was a difference between the political forces supporting the liberalization of labor markets and those supporting the liberalization of commodity markets.[19]

A prevalent notion among the New Institutionalists is that the main source of uncertainty of property rights was the state itself, and that "better" property rights and less rent-seeking occurred when the state committed itself to abstain from unilaterally grabbing assets from its citizens.[20] The

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[18]In Spain, the once powerful guilds or *gremios* were weakened under the reformist King Carlos III who ordered in 1777 that all local guilds were to admit craftsmen from other parts of Spain in an attempt to weaken their local monopolies (Herr, 1958, pp. 124-26). Despite the vigorous campaign against them led by the government, the rent-seeking economy in Spain was not really dislodged.

[19]In their view (pp. 52-53), common law courts tried to enforce monopolies in output markets, while weakening them in labor markets.

[20]For a criticism of the North-Weingast view of institutional change triggered by the glorious revolution, see Epstein (2000); O'Brien (2002); and Sussman and Yafeh (2002).

standard institutional interpretation proposed by what O'Brien (2002, p. 245) has called the "North American Whigs" is that following the glorious revolution of 1688, Britain adopted a set of institutions that assured better property rights, restricted the government from arbitrarily taxing Britons, defended free enterprise and innovation, made contracting and transacting less uncertain and in general created the kind of economy that inexorably led to economic growth.[21] This literature, as has been widely recognized, suffers from a number of lacunae. One of them is that it fails to fully specify how lower transactions costs and more certain property rights led to technological innovations. A second is one of timing: as O'Brien has pointed out it ignores the institutional achievements made during the British civil war, which, the valiant attempts of the Stuart restoration notwithstanding, turned out to be largely irreversible. The key to economic success, outside of technological creativity, was the reduction of the opportunities for rent-seeking that the regime provided or tolerated. Much of the government apparatus set up before the mid eighteenth century, in Britain as elsewhere, was geared toward rent-seeking of one kind or another. Ekelund and Tollison (1981, p. 66) argue that the struggle between Parliament and King in the seventeenth century was not a confrontation between those who favored free markets and those who favored monopolies and privileges but about who would get the right to issue the monopolies that generated the rents. The best-known set of policies through which mercantilism promoted rent-seeking was through protectionism, which is often held interchangeable with it. The redistribution was meant to be primarily from foreigners to the citizens of the country in question, but of course it also redistributed resources from some citizens to others. Protection was at the heart of the negative institutional feedback that shrank the commercial profits of the United Provinces, and helps explain

[21]The *opus classicus* of this literature is North and Weingast (1989).

why the Netherlands did not become the originating region of the Industrial Revolution. In the decades after 1660, the defensive efforts and the discriminatory policies of other European economies slowly eroded Dutch leadership (Ormrod, 2003; De Vries and V.D. Woude, 1997, ch. 10).

The government, of course, was not the only predator: any pirate, con-artist, forger, or highwayman was a rent-seeker and increased transaction cost, lowered the net marginal product of capital, and weakened incentives to engage in "productive" activity. When the state gradually assumed a monopoly on violence, the potential dangers it imposed to Smithian growth came to overshadow the others; but in eighteenth century Europe such "predatory absolutism" in its purer forms existed nowhere. In England there was not even a professional police force to protect private property, and much of the enforcement against local violence depended on private mechanisms.

Arguably, then, the main risk to Smithian growth imposed by the state was not the threat it imposed to property rights as such, but the dangers that political and military actions imposed on the gains from international trade. In addition to protective tariffs, many of the numerous wars between 1651 and 1815 took the form of raids on merchant ships and colonies, blockades, embargoes, and the like. Enlightenment thinkers realized the huge social costs of such wars and increasingly took a more cosmopolitan and pacifist approach.[22] The hugely expensive wars fought between the European powers between 1793 and 1815 are thus in some sense ironic, because they

[22]The best example is Voltaire's famous quote from his *Philosophical Dictionary* [(1766), 1962] in which he sounded uncharacteristically emotional in describing people on the battle field dying in indescribable torment seeing in their last moments the city of their birth destroyed amidst the cries of women and children perishing among the ruins. Two years later the *Académie Française* ran a competition on the best essay that "explained the advantages of peace and invited nations to unite in order to secure general tranquillity" (Guicciardi, 2001, pp. 1412-13). The complaints about war were primarily about its moral consequence, with the economic costs relegated to a secondary position, but David Hume in his *Of Commerce* (1754) presented a typically brilliant analysis of the social consequences not just of war but of being a "very martial people" and the general equilibrium effects of war on incentives and occupational choice.

were the result of an enlightenment-inspired revolution. The Revolutionary and Napoleonic wars cannot be said to be primarily by "mercantilist" motives. Yet mercantilist tactics and methods, as exemplified by the Continental Blockade, the Orders in Council, and the Jefferson Embargo, clearly were not to fade without a fight. After 1815, however, the *pax Britannica* meant that at least within most of Europe predatory wars of the kinds waged by Louis XIV or Frederick the Great were no longer a likely threat.

Yet the problem was not just the insecurity and uncertainty of property rights, but the nature of these rights themselves. A government monopoly, a tax farm, or a law prohibiting the manufacturing or import of a rival product or the export of a complement might be regarded as a property right and was in many cases nearly perfectly secure, yet it *reduced* efficiency.[23] The correlation of the power of distributional coalitions and vested interests with the increasingly powerful and centralized state is rather unclear. Epstein (2000, p. 36) argues that the rise of the modern state increased efficiency: in his view the main institutional bottleneck to economic growth in pre-modern states arose from the coordination failures caused by the absence of undivided sovereignty over the political and economic spheres. Because these states did not have a monopoly of power within their borders, various bodies derived income from "jurisdictional rights that constrained Smithian growth." This conclusion is contestable: rent-seeking could and did occur under autocratic unified governments as it did under the parcellized authorities that Epstein feels jeopardized Smithian growth. He also underestimates the ability of societies in weak or non-existent states to create self-enforcing institutions that overcame many of the coordination failures he observes (Greif,

[23]Adam Smith (1978, p. 11) observes that "not only property but all exclusive rights are real rights" yet it was clear that many of these real rights were regarded by him with horror. Schama (1989, p. 69) points out that before the Revolution the venal offices that collected one form of rent or another were treated as simply another kind of private property and no one could imagine their expropriation without adequate compensation.

2003, forthcoming). Indeed, Ekelund and Tollison (1997, esp. pp. 51-52, 66, 73) have argued exactly the reverse: the strong absolutist state was ideally located for low-cost rent seeking, while a government such as Britain's in which authority was fragmented between two authorities (Royal vs. Parliamentary) who competed in the supply of restrictive legislation eventually experienced the rise of "a free economy" as a by-product of this competition. The problem is that Parliament and local authorities could be just as profligate in handing out and enforcing exclusions and exemptions, but after 1750 increasingly elected not to do so. That is not to say that rent-seeking and what Hilton Root calls "the corruption of the spoils system" was absent in Britain, only that it was more costly to bribe Parliament into redistributing income and controlling access. Clearly, however, such rent-seeking took place and was at times successful. Adam Smith was guilty of only a little exaggeration when he exclaimed that Britain's woolen manufacturers have been more successful than any other class of workmen in persuading the legislature that the prosperity of the nation depended upon the success and extension of their particular business (1776, Vol. II , p. 165).

Indeed, the ancien régime in Europe redistributed income and wealth in many ways and through many channels. A minimalist approach to rent-seeking might blur the many distortions of this system. One issue that has engaged historians is the redistribution due to grain price control. Many European governments felt that grain was somehow different from other commodities and implicitly recognized that the population at large had an entitlement to cheap bread, a sentiment surely prompted by bread riots that were rife in Europe. Root (1994, p. 85) notes that the regulations of the "moral economy" served some interests at the expense of others, and in the process imposed a deadweight interest on the economy. Food rioters were primarily urban dwellers, and could organize more easily than those who paid the price for these transfers. The logical conflict that this created for Enlightenment thinkers could not be easily resolved: many Enlightenment thinkers felt with Montesquieu that "the state owes all its citizens an assured subsistence, nourishment, appropriate clothing and work that does not damage their health." Poverty was clearly unacceptable to the *philosophes,* but direct interventions in the market mechanisms were slowly recognized as harmful. The pressure for freeing the grain trade was central to the economic Enlightenment on both sides of the channel, something on which Adam Smith and the physiocrats could agree. In Britain, despite food riots, grain market regulation had fallen on hard times in the second half of the seventeenth century (Outhwaite, 1981), and redistribution increasingly took place through outdoor relief. By recognizing that poverty was primarily an economic and political problem and not a moral one, and by realizing that by increasing the prosperity of the nation poverty, too, would be diminished eventually, eighteenth century thought helped pave the road the classic liberalism that secured the gains of the Industrial Revolution (Norberg, 2003).

There was nothing inexorable or self-evident in those changes. Nothing like them took place in nineteenth century China, despite its being a sophisticated commercial economy and the rather remarkable process of growth in eighteenth century China. Nothing of the kind, either, took place in the Ottoman world, Japan, or South America. Some of the European nations, such as Spain and Russia, for one reason or another were so lightly touched by it that their institutions – despite some sincere attempts at reform – seriously slowed down the pace of economic modernization.[24] Whatever

[24]The case of Spain is especially instructive. There can be no doubt that there was a Spanish Enlightenment, culminating in the *Discurso sobre el fomento de la industria popular* published in 1774 attributed to Pedro Rodríguez de Campomanes, and which has been compared to *The Wealth of Nations* by no less an authority than Schumpeter (1954, p. 173). In his younger days, Campomanes had tried to implement a long list of enlightened economic reforms under the reform-minded king Carlos III. Yet the impact of the Enlightenment on Spain remained superficial. Many of the key books of the Enlightenment, including the *Encyclopédie* remained banned, and while clandestine circulation was rampant, the Spanish Enlightenment collided with deeply entrenched interests which eventually defeated it (Storrs, 2003). Herr (1958, pp. 198-200) estimates that less than 1 percent of the Spanish population welcomed the Enlightenment, a tenth as many as in France.

subsequent economic growth occurred in these economies subsequently was spurred by prior economic success in the West. At the time, surely, it looked anything but pre-ordained even in the West. In 1784 Kant reflected that the "age of Enlightenment" in which he lived was not yet "an enlightened age." Peter Gay assesses that the distinction was penetrating and important, because even late in the eighteenth century the *philosophes* had ample reason for uncertainty and occasional gloom (1966, p. 20). Certainly, at that time the prospects for an age of relatively free market economies and a curtailment of the rent-seeking economy still looked anything but inevitable.

And yet, as it turned out, Enlightenment ideas had an unmistakable impact on politics, perhaps beyond the wildest dreams of the *philosophes*. Already in the eighteenth century, the influence of Enlightenment thinkers on public policy could be found in the institutional reforms associated with the so-called "enlightened despots."[25] The locus classicus of the impact of Enlightenment thinking on institutional change was in France. Although Turgot's Enlightenment-inspired reforms failed, Quesnay's disciples in positions of power (known as the *économistes)* were quite influential in reforming the French grain trade in the 1760s. After 1789, of course, reform became the norm. The revolutionary assembly in France abolished feudal privileges, guilds, tax-exemptions and every other "liberty" it could think of, an idea that would still have been unthinkable at the time of the death of Louis XIV in 1715 and in fact was still viewed as absurd at the time of

[25]One example is the Austrian Joseph von Sonnenfels (1732-1817), the first professor of Political Economy at the University of Vienna, who influenced public policy under Maria Theresa (curtailing the power of the guilds and reforming the judiciary). "As a publicist, Sonnenfels had learned how to mobilize public opinion to act as a lever applying pressure to government" (Wangermann, 1981, p. 135; see also Wangermann, 2003). In Milan, the Supreme Economic Council set up in 1765 to reform economic and social policy counted such Enlightenment heavyweights as Cesare Beccaria and the brothers Alessandro and Pietro Verri. The success of these pre-revolutionary Enlightenment reformers was spotty, since it depended on the cooperation of powerful governments, yet they can be viewed as precursors to the more fundamental reforms introduced by the revolutionary authorities after 1790.

the dismissal of Turgot in 1776.[26] The impact of Enlightenment thinking on institutional reform was equally marked in the United States. Indeed, its impact on political changes throughout the West – whether they were deemed desirable or not – seems beyond dispute. In and of itself that, of course, does not explain the Industrial Revolution or anything else about the European Miracle. But whereas other societies of course underwent various political and institutional transformations, none of them had the explicit purpose of the creation of institutions that enhanced efficiency and trade, supported economic freedom, solved difficult coordination problems, and were conducive to continuing technological progress.

The issue of coordination failures is central to the arguments made by Epstein (2000) and some of the most widely observed reforms in eighteenth century Britain, such as the Parliamentary enclosures and the establishment of turnpike trusts took this form. A pet project of Enlightenment rationalization was standardization, especially that of weights and measures, leading to the introduction of a standardized system in the Anglo-Saxon world and the metric system everywhere else. A unified and rational code of commercial law is another example in point. In Britain, many of the old rules were weakened or simply repealed by Parliament in the early nineteenth century, including the Statute of Apprentices and Artificers in 1814 and the Bubble Act in 1825. Many of the rules still on the books in the eighteenth century were not enforced, and rent seeking arrangements were costly to attain and uncertain in their yield. British redistributive policies were already in sharp decline on the eve of the Industrial Revolution. Yet the Industrial Revolution required considerably further change in the institutional basis of business, and Enlightenment ideas helped bring these

[26]Even at the time itself, the victory of free markets over privilege and restriction was far from a foregone conclusion. As many of the famous *cahiers de doléances* (complaints written on the eve of the French Revolution) contained concerns about encroachments on rent-seeking limitations as did those complaining about the arrangements themselves.

about. Britain's great asset was not so much that she had "better" government but rather that its political institutions were nimbler and more flexible, so that they could be changed at low social cost by a body assigned to changing the rules and laws by which the economic game was played. Following North (1990, p. 80) we might call this adaptive efficiency, meaning not only the adaptation of the allocation of resources but of the institutions themselves. To bring this about, what was needed was a meta-institution such as parliament that was authorized to change the rules in a consensual manner, another paradigmatic Enlightenment idea.

It might therefore be argued that the economic success of the North American colonies (in contrast with those South of the Rio Grande) was due not just to the importation of institutions from their European counterparts in areas in which Europeans could settle (as argued recently by Acemoglu, Johnson, and Robinson, 2001), but from the British-inspired Enlightenment principles that supported them. The American constitution differed a great deal from the British system, and diverged further away from it in the decades after independence. What it owed to its western European roots was not only institutional adaptability and the ideas of secure property rights and the rule of law, but the deeper Enlightenment notions of economic freedom, the importance of maximum mobility of goods and factors within an economy, and the desirability of equal access and competition. It might be conjectured that the economic success of areas in the new world was in part determined by the degree to which Enlightenment principles had penetrated the mother country and in part by the ability of the mother countries to transfer them to their new world offshoots (usually embodied in the minds of emigrants and travelers). The life-lines, including the flow of books and pamphlets, to the colonies ran primarily through the mother country, and European settlers in non-European regions reflected the ideology and institutions of their mother countries plus a deviation that grew over time. Yet it seems that European settlers only generated economic growth overseas when their institutions reflected the more enlightened values of the nineteenth century.

Enlightenment and Free Trade

Another margin at which the Enlightenment was successful was the liberalization of trade and the elimination of both internal and external toll- and tariff barriers. Foreign trade had always been the pivot of mercantilist rent-seeking. The Corn Laws, first passed in 1670 and reinstated in 1815, were the crowning achievement of rent-seeking landowners. In the eighteenth century and deep into the nineteenth, Anglo-Saxon liberalism seemed to indicate internal free trade with continued protection for external trade. The later stages of the Enlightenment, inspired and informed by post-Smithian political economy, extended liberalism to foreign trade, but its triumph was late in the making, and after 1815 much of the Continent had a greater commitment to free international trade than the English-speaking areas (Nye, 1991).

It is debatable whether free trade theory and ideology were wholly a consequence of the Enlightenment, and even more so if Enlightenment ideas necessarily led to support of free trade.[27] We should not rashly equate Smith with Scottish Enlightenment, much less with the entire movement.[28] The Enlightenment did advocate a "civilized consortium of nations" (Howe, 2002, p. 195) and in all its forms disapproved of any kind of commercial policy motivated by what Hume called "the Jealousy of Trade." All the same, the Enlightenment was never unanimous on commercial policy. Irwin (1996, 116-23) traces the eighteenth century roots of the infant industry

[27]Kindleberger (1975, p. 23) notes that the first case of practice following theory goes to Grand Duke Francis of Tuscany who permitted the free export of Siennese grain after reading Sallustio Bandini's *Economical Discourse* in 1737.

[28]David Hume, while certainly no mercantilist, was of two minds about it and noted that a "tax on German linens encourages home manufactures and thereby multiplies our people and our industry" (Hume, 1985, p. 98).

argument in support of tariffs and shows how by the time of Hamilton's *Report* (1792) the argument had been thrashed about for at least half a century. Yet the switch from the flawed mercantilist arguments for protection to a more "rational" argument to defend free trade was a notable event itself, because it indicates that old claims referring to rights and liberties no longer were acceptable. Adam Smith and his most influential followers never bought into the infant industry argument, and advocated more or less unconditional free trade. It is hard to disentangle the trade-enhancing effects of the decline of protectionism until 1875 from the effects of other factors such as technological change in transport and communications, and other institutional changes favoring increased foreign trade. What is not hard, however, is to trace the post-Waterloo movement toward the decline of protectionism to its Enlightenment roots – above all to the political economy that the Scottish Enlightenment produced.

The origins of this movement, of course, predated the nineteenth century. William Grenville, William Pitt the younger's cousin and foreign secretary of state, was strongly influenced by Smith's teaching and opposed price regulation of flour pointing out that it would lead to scarcity. He repeatedly lectured the prime minister on the virtues of free trade, and had a strong impact on younger Whig MP's such as Francis Horner, Henry Brooke Parnell and David Ricardo, whose influence on the reform movement of the 1830s was decisive.[29] Smith's student, Dugald Stewart was a prime producer of nineteenth century "whiggery," an enormously effective and eloquent teacher at Edinburgh, and it was Stewart's lectures that turned *Wealth of Nations* into the fountainhead of all economic theory. Stewart "made the book virtually Holy Scripture to generations of Edinburgh-

[29]William Pitt himself was known to have a deep admiration for Smith. Ross (1998, p. xxv) notes that the doctrines of *Wealth of Nations* "exerted a a seminal influence on this outstanding British statesman of the era." There is a possibly apocryphal story of Pitt telling Smith during a London visit "Sir, we will stand till you are first seated, for we are all your scholars" (Ross, 1995, 375-76).

educated thnkers, economists, and politicians — who in turn spread its influence to Oxford, Cambridge, London, and the rest of the English-speaking world" (Herman, 2001, pp. 229-30; see also Rothschild, 2001).[30]

To convince ourselves that the free trade and the renunciation of rent-seeking mercantilism had deep intellectual roots in the Enlightenment, we need look no further than to the main political figures who influenced policy in the decades after 1815. In Britain, the dominant figure in the "liberal Tory" governments was William Huskisson – most famous among economists for being apparently the first person ever killed by a moving train on the opening day of the Manchester and Liverpool Railway – who already in the mid 1820s passed a series of tariff reductions and was instrumental in reforming the Navigation Acts though they were not formally abolished till 1851.[31]

In Prussia, figures deeply influenced by Smith were Peter Beuth, a local administrator in Westphalia, subsequently head of the Department of Trade and Industry and considered the "father" of Prussian industry; Theodor von Schön, an East Prussian advisor to Stein (taught by Smith's main disciple in Königsberg, Christian Jacob Kraus); and Ludwig von Vincke, the governor of Westphalia, who religiously read a chapter a day in *The Wealth of Nations* and referred to Adam Smith as "the Divine Smith*.*"[32] Stein himself, of course, was in every aspect a child of the Enlightenment and his successor, Hardenberg, considered the free market system for goods and labor the way to maximize economic efficiency and forge a new public spirit. His 1810 General

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[30]Among Stewart's pupils were two future Prime Ministers, Palmerston and John Russell, as well as other senior officials.

[31]Huskisson's interest in and debt to Political Economy – in particular Smith and Ricardo – had been part of his entire political career. His program was to remove all state support and protection for manufacturing and agriculture to weaken and remove the private interests that hampered free trade (Howe, 2002, p. 199). Huskisson "zealously and consistently subscribed to the theories of Adam Smith. Smith's teaching is reflected in practically every reform in the twenties" (Brady, 1967, p. 133).

[32]Behrens (1985, p. 187). Kindleberger (1978, p. 190). See also Schumpeter (1954, p. 501). Beuth, a convinced Smithian, was one of the chief figures in the transformation of Prussia from a rent-seeking to a competition-oriented society, and served, among others as director of a variety of academies and colleges to support industry.

Taxation Laws sought to reduce rent seeking in the form of tax exemptions and guilds, created an income tax which would be assessed equally on all Prussian residents as a proportion of income, and introduced freedom of occupational choice which meant anyone who paid a trade tax could carry on any trade.[33] To be sure, the influence of the Enlightenment might have been less of a stimulus for reform than the concern about French military power after the defeat of 1806 and the need to reform the Prussian state if the country was to maintain its position as a great power. The Prussian Enlightenment, more so than the British one, carried the germs of the Enlightenment's deadliest offspring – nationalism – and its statism clearly was in some way an "illiberal" interpretation of Smith and led to the ideas of *Nationalökonomie* that eventually were to extinguish free trade. What tends to be overlooked, however, is that the Enlightenment, even when it was ambiguous about free trade, was always in strong support of free *internal* trade: the U.S. constitution, as well as the French reforms of 1791 (abolishing internal tariffs) and the post-1815 movement toward a German *Zollverein* reflected this sentiment.[34] The insane system of tolls and duties on Germany's magnificent river system that hampered trade in the eighteenth century was dismantled. Arguably, the lion's share of gains from trade were to be had in internal rather than external trade.

The success of the Enlightenment thinkers in affecting legislation and policy should not surprise us: they were telling the most dynamic and resourceful parts of society what they wanted to hear. Yet there was no guarantee that the dynamic elements in society would necessarily win the power struggle with the forces of reaction. The victory of the *philosophes* must be explained by their

[33]Hardenberg, even more than Stein, believed "competition to be the greatest incentive and regulator of our industry" (cited by Koch, 1978, p. 178).

[34]The Zollverein was preceded by the Prussian Maassen Tariff Law of 1818 abolishing all internal tariffs in Prussia, influenced by a memorandum by G.J.C. Kunth, Beuth's mentor.

ability to act against the status quo from within the establishment. Many of the leading lights of the eighteenth century were well-born, politically well-connected, and even when they ran afoul of the regime, the relations rarely degenerated into hostility. This "cosy fraternizing with the enemy" as Gay (1966, p. 24) calls it did not come without a price, but it allowed the *philosophes* to be politically effective without necessarily threatening the status quo. In France, this relationship in the end imploded (though it was soon restored), but elsewhere it made it possible for their ideas to be adopted by the men who voted on policy decisions. It is this simultaneous affiliation with the Enlightenment and the Establishment that rendered their ideas effective.

To be sure, intellectual factors were not exogenous to the system. Kindleberger (1975, p. 35) cites Mill's statement that a good cause seldom triumphs unless someone's interest is bound up with it, but adds that in the British case it was more a view of the world at peace, with cosmopolitan interests served as well as national. Such cosmopolitan views, inspired by the Enlightenment, soon ran afoul with national interests. The intellectual triumph of the political economists which "overwhelmed the Tories when it did not convert them" are to Kindleberger the most consistent and persuasive explanation of the rise of free trade in the first half of the nineteenth century. The notion that ideology and "cultural beliefs" could support one institutional equilibrium as opposed to another was made in detail by Avner Greif in 1994, and the idea that there is a one-to-one mapping from economic conditions to an ideological infrastructure – a favorite idea amongst economic determinists and left wing ideologues – seems bizarre today. The real point is not to realize that "someone's interests" were enhanced by economic rationalization but to ask why and how these interests defeated the resistance of those whose interests were not. Ideological change involved above all *persuasion*, and here the importance of the *philosophes* and their influence on policy makers must be an integral part of the story.

Technology and Institutions in the Industrial Revolution

The distinction I have drawn between the impact of the Enlightenment on technology and its impact on institutions is of course arbitrary and it is time to consider their overlap. It is here that the Northian view of modern institutionally-rooted economic growth that focuses on institutions and the view that concentrates on technology and useful knowledge converge. As noted, rent-seeking can thwart innovation through the siphoning-off of talent: a dollar made by a legal or institutional innovation that will gives someone an advantageous position at the expense of his competitors despite the lack of any difference in efficiency (and with a possible deadweight cost to the rest of society), is no less valuable than one made by a successful innovator or entrepreneur.[35] It is up to society and its institutions to set up the incentives correctly. In this area, too, the Enlightenment wrote a new page and helped draw the distinction between “the West” and much of the world that missed out on the movement.

One critical mechanism at work here was the degree to which society wanted to and could reward inventors. This was a major issue with which every Enlightenment society struggled (Hilaire-Pérez, 2000). On the one hand, Enlightenment thinking increasingly abhorred state-enforced monopolies, realizing full well that they were more often than not rent-seeking devices. On the other hand, patents were viewed by some Enlightenment writers to be one of the more effective ways of

[35]The choice of Lavoisier as an example of a rent-seeker by Shleifer and Vishny (ibid., p. 55) is somewhat ironic. Lavoisier was a tax-farmer rather than a tax collector, and as such he clearly was a rent-seeker since tax farming was hugely profitable. And yet Lavoisier was a distinguished public servant apart from his scientific career. He did not actually “choose” to become a tax collector, as they suggest, but rather married into the occupation as was the custom then. There is little evidence to suggest that his political activities reduced his scientific accomplishments – unlike his star student Armand Seguin, who ended up selling shoes to the French army.

encouraging invention and channeling talent into where it could produce the most useful products for society, and where markets, rather than officials, would determine the value of an invention.[36] The growing use of patents to reward and encourage invention was thus a typical Enlightenment-inspired phenomenon, even if the origins of the institution precede the Enlightenment. Yet Enlightenment thought remained inevitably ambiguous about this matter: the British Society of Arts, founded in 1754, was a classic example of an organization that embodied many of the ideals of the Industrial Enlightenment. Its purpose was "to embolden enterprise, to enlarge science, to refine art, to improve manufacture and to extend our commerce." Its activities included an active program of awards and prizes for successful inventors: over 6,200 prizes were granted between 1754 and 1784 (Wood, 1913; Hudson and Luckhurst, 1954). The society took the view that patents were a monopoly, and that no one should be excluded from useful knowledge. It therefore ruled out (until 1845) all persons who had taken out a patent from being considered for a prize and even toyed with the idea of requiring every prize-winner to commit to never take out a patent (Hilaire-Pérez, 2000, p. 197).

Another interesting overlap between the institutional and the purely technological aspects of the Enlightenment can be found in the notion that the patent system, while protecting the intellectual property rights to the use of a novel technique, placed the knowledge itself in the public domain. In Britain this was laid out in a decision by chief justice Lord Mansfield, who decreed in 1778 that the specifications should be sufficiently precise and detailed so as to fully explain it to a technically educated person. In the Netherlands, where patenting had existed from the 1580s, the

[36] In a celebrated statement, Adam Smith (1978, p. 83) noted that "the inventor of a new machine or any other invention has the exclusive privilege of making and vending that invention for the space of 14 years ... as a reward for his ingenuity .... For if the legislative should appoint pecuniary rewards for the inventors of new machines etc., they would hardly ever be so precisely proportional to the merit of the invention as this is."

practice of specification was abandoned in the mid-1630s but revived in the 1770s (Davids, 2000, p. 267). In the United States, Thomson (2002) has listed the various ways in which knowledge about and contained in patents was disseminated (including lists and descriptions of new patents in *Scientific American* and the Franklin Institute). “Through their mediation, private knowledge became public” writes Thomson (p. 11), although he notes that only a select few could make effective use of this public knowledge. Perhaps, however, that is all that mattered. The creation of new techniques – as opposed to widespread application – is confined to a very small minority of society, and to understand why it occurred we have to look at the opportunities and capabilities of those few rather than at society-wide averages.

The other main area in which technological innovation and institutional change overlapped was in the resistance of vested interests to new technology (Mokyr, 1994, 2002). Historians of technology, with some important exceptions, have paid scant attention to the political economy of technological change. For most of recorded history, vested interests have banded together to try to stop progress, because it clearly threatened the value of their human and physical capital.[37] The resistance derives from two separate sources: one was the rational selfish behavior of powerful lobbies protecting their assets, standing in society, and political power base. The other comes from those who are sincerely concerned about the unknown effects of new technology and are unwilling to face the inevitable risks that radically new technologies imply.

Mercantilism, while not designed that way, ultimately became a set of policy tools serving the status quo. Heckscher noted that everywhere conflicts emerged between those who “would attempt something new” and mistrustful fellow professionals, often relying on lawsuits and

[37]One student of the history of technology (Cyril S. Smith, cited by K.D. White, 1984), p. 27) sighs that "every invention is born into an uncongenial society, has few friends and many enemies, and only the hardiest and luckiest survive."

administrative interventions. While the outcome of these struggles was not inevitably in favor of the entrenched vested interests, “every opportunity was taken to render it impossible to introduce a novelty without expensive and tedious conflicts... the system normally penalized innovation” (1955, Vol. I, p. 171).[38] Above all, the Enlightenment took a dim view of the limitations imposed on economic freedom by the guild system. Economic historians have long pointed to the urban guild system as it emerged in the centuries before 1800 as a serious brake on innovation.[39]

At one level, Enlightenment thinking viewed technological change as “progress” and implicitly felt that social resistance to it was undesirable. Yet there was a strand of thought, associated with Rousseau and with later elements in romanticism such as Cobbett and Carlyle that viewed industrialization as dangerous at best and evil and destructive at worst. Ideological resistance to technological change is deeply ingrained in the human psyche. Most of the *philosophes*, however, did not support this line.[40] Many Enlightenment thinkers resented rent-seeking lobbies representing vested interests, who tried to block innovations. Yet they also realized that technological change was often socially disruptive and could lead to tensions. The struggle between innovators and those who resisted novelty came to a crashing crescendo during the Industrial Revolution when the old

[38] That this resistance by the mercantilist environment to technological progress was not unique to France is evidenced by a lament by William Petty from 1679: “Although the inventor often times drunk with the opinion of his own merit, thinks all the world will invade and incroach upon him, yet I have observed that the generality of men will scarce be hired to make use of new practices, which themselves have not been thoroughly tried...for as when a new invention is first propounded, in the beginning every man objects, and the poor inventor runs the gantloop of all petulent wits...not one [inventor] of a hundred outlives this torture...and moreover, this commonly is so long a doing that the poor inventor is either dead or disabled by the debts contracted to pursue his design.”

[39] Kellenbenz (1974, p. 243), for example, simply states that "guilds defended the interests of their members against outsiders, and these included the inventors who, with their new equipment and techniques, threatened to disturb their members' economic status. They were just against progress." Much earlier Pirenne pointed out that "the essential aim [of the craft guild] was to protect the artisan, not only from external competition, but also from the competition of his fellow-members." The consequence was "the destruction of all initiative. No one was permitted to harm others by methods which enabled him to produce more quickly and more cheaply than they. Technical progress took on the appearance of disloyalty" (Pirenne, 1936, pp. 185-6; for a similar description of the Italian guilds, see Cipolla, 1968).

[40] Peter Gay (1966, p. 25) points out that Rousseau was treated by the other *philosophes* as a madman long before his clinical symptoms became apparent.

regulations in the wool industry were repealed in 1809, followed by the abolition of the 250- year old Statute of Artificers in 1814. The Luddite rebellion – a complex set of events that involved a variety of grievances, not all of which were related to rent-seeking – was mercilessly suppressed. It would be a stretch to associate the harsh actions of the British army in the midlands between 1811 and 1816 with anything like the Enlightenment. Yet the legislation passed in the late eighteenth and early nineteenth century reflected the struggle between innovating employers and workers trying to protect their specific human and physical capital behind customary practices. In a very real sense, the debate between old regulations and privileges and the enlightenment forces of laissez faire coincided with the debate between the force opposed to innovation and those that favored it. Thus Horn (2002) suggests that the Combination Acts and other legislation restricting personal liberty in the 1790s was not only intended to save the regime from French-inspired revolutionary turmoil, but also to protect the Industrial Revolution from resistance "from below." Whether British entrepreneurs were able to take advantage of a historical opportunity, or whether the fear of popular uprising was only a pretext for passing a program favoring powerful industrial interests, it appears that rent-seeking inspired resistance against new technology had been driven into a corner by that time. As Paul Mantoux put it well many years ago, "Whether [the] resistance was instinctive or considered, peaceful or violent, it obviously had no chance of success" (Mantoux, 1928, p. 408). Had that not been the case, sustained progress would have been severely hampered and possibly brought to an end.[41] It is also clear, moreover, that the growth of international trade and the gradual

[41]As Randall has shown, in the West of England the new machines were met by violent crowds, protesting against jennies, flying shuttles, gig mills, and scribbling machines (Randall, 1986; 1989). Moreover, in these areas magistrates were persuaded by fear or propaganda that the machine breakers were in the right. The tradition of violence in the West of England, writes Randall, deterred all but the most determined innovators. Worker resistance was responsible for the slow growth and depression of the industry rather than the reverse (Randall, 1989). The West of England, as a result, lost its supremacy in the wool industry to Yorkshire. Horn (2003) has indeed argued that the waves of machine-breaking that swept over France in the early years of the French Revolution, delayed mechanization in France and consolidated the lead that British manufacturing held over the French by discouraging the

opening-up of the British economy to foreign competition in the eighteenth century strengthened the forces favoring innovation, and in this way the two movements reinforced each other.[42]

Conclusions

The transformations in Europe that weakened the negative institutional feedback were invariably slow, muddled, and contested. Had there been no institutional change in the critical years after 1750, there is a real danger that whatever gains were made through improved industry, greater efficiency, improved trade, or better technology would have been be grabbed by tax collectors, monopolists, lawyers, or foreign invaders, terminating economic progress. In this counterfactual scenario, it seems likely that the first wave of inventions we often identify with Ashton's famous "wave of gadgets" would have fizzled out as had happened in the past. Institutional changes required, however, intellectual foundations and beliefs to catch on, perhaps as a necessary rather than a sufficient condition. What made the Industrial Revolution different from the previous "spurts" of technological progress was that it came after the Enlightenment.

It is easy to overstate the novelty of the institutions that emerged in the eighteenth century. Greif (2003, ch. XIII, pp. 17-18) sees a continuity between the late middle ages and the emergence of modern institutions in the late eighteenth century: individualism, man-made formal law, corporatism, self governance, and rules that are determined through an institutionalized process in

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introduction of British machines . In 1830 the French inventor Barthélemy Thimonnier devised a working sewing machine using a chain-stitch system that made it a combination sewing- and embroidery machine. Thimonnier ran into violent opposition from tailors. His army uniform factory in Paris, in which he had the new devices installed, was raided twice in the 1840s, and the machines were destroyed. Like many other French inventors, he died a poor and bitter man.

[42]A resolution passed by the Justices of the Peace in Preston in 1779 fully summarizes the position of the British authorities: "Resolved that the sole cause of great riots was the new machines employed in the cotton manufacture; that the country notwithstanding has greatly benefited by their erection; that destroying them in this country would only be the means of transferring them to another country, and that, if a total stop were put by the legislature to their erection in Britain, it would only tend to their establishment in foreign countries, to the detriment of the trade of Britain" (cited in Mantoux, [1905] 1961, p. 403).

which those are subject to them can be heard and have an input all emerged in late medieval Europe. Yet these elements did not trigger modern growth. In between, notes Greif, came an interlude of absolutism and mercantilism. Yet these phenomena may have been no more than a deviation from the path of institutional development. This original interpretation needs to be complemented with an understanding, however, of the sources of victory of growth-enhancing institutions, especially because the victory was far from ubiquitous. It is from this perspective that the economic significance of the Enlightenment should be interpreted.

Is it possible to speculate as to the "causes" of the Industrial Enlightenment? Explaining why the Enlightenment *itself* took place when and where it did is a daunting task that clearly lies outside the comparative advantage of the economic historian. The Enlightenment, much like the Renaissance and the Reformation that preceded it, were based on a foundation of skepticism and rejection. It amounted to a re-examination and eventual rejection of certain deeply entrenched concepts. In the study of the natural world, this was tantamount to an entirely new approach summarized by the Royal Society's motto *nullius in verba*—on no one's word: a rejection of authority and an insistence of empirical verifiability. In the economic organization of society this led to challenges to such venerable institutions as the sanctity of privilege and "liberties," of the separation between *savants* and *fabricants*, of vested interests and exclusions that had ruled for centuries, of old customs of weights and measures, of rights to levy tolls and taxes on goods and people that moved, of customary rights to veto the re-arrangement of land use, of the divine rights of kings, and similar institutions. The question is not so much why such ideas occurred – they did in every society that suffered from built-in inefficiencies – but why they *succeeded*. The Enlightenment and the people inspired by it reformed some of the worst institutional features of "traditional" Europe, at least in some areas. The experience of the preceding centuries in casting doubt on age-old customs, conventions, and beliefs must be central here, but success was more likely to occur in a world in which political fragmentation placed limits on the resistance to and suppression of new ideas that reactionary coalitions in defense of the status quo could generate.

It also stands to reason that the emergence of free market capitalism, the growth of long-distance commerce, and the intellectual changes we associate with the Enlightenment reinforced one another in subtle ways. Indeed it is often thought that commercial capitalism brought about the Industrial Revolution as its inevitable culmination. This approach fails to take into account the vulnerability of prosperity based on Smithian growth and its susceptibility to negative institutional feedback, above all the danger the mercantilist policies would eventually throttle the economic progress triggered by commercial expansion. Previous episodes of growth ("efflorescences" in Goldstone's (2002) terminology) had been self-limiting. The modern age succeeded in short-circuiting these mechanisms and created a positive feedback where before it had been negative. The Enlightenment then may be thought off as a mechanism by which commercial Europe became industrialized Europe, but there was nothing inexorable or automatic about that transformation.

Not everything in the Enlightenment mattered equally to subsequent economic development. But those who feel that between 1750 and 1850 the critical seeds that created the "Great Divergence" between the West and the Rest were sown will simply not be able to ignore the changes in what people believed, how they dealt with knowledge, and how they made sense of their environment. Needless to say, the movement affected only a small portion of the populations of the West. But perhaps that is all that mattered. Much of the economic growth was brought about by a relatively small group of inventors, entrepreneurs, engineers, and their counterparts in politics, administration, and social thought. To paraphrase Keynes's hackneyed observation, practical men, who believe themselves exempt from intellectual influences, were usually the slaves of some defunct Enlightenment *philosophe*. Keynes was "sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas .... soon or late, it is ideas, not vested interests, which are dangerous for good or evil" (1936, pp. 383-84). As has been pointed out often, Keynes's own impact on economic policy after 1945 illustrates this statement. But the same is true for the emergence of modern economic growth.

As Peter Gay (1969, p. 347) notes in his monumental work on the Enlightenment, the *philosophes*' passion for decency and shrewdness in political economy had their part in overthrowing mercantilism, but the Enlightenment could not have done its work in isolation: expanding trade and increasing productivity invited the conception of a dynamic world economy. Yet he fails to fully explicate how much of the "expanding trade and increasing productivity" were *themselves* a consequence of the Baconian ideology of knowledge and the emergence of the Industrial Enlightenment. In that sense the technological elements of the Industrial Enlightenment fed back into the political economy, just as the political elements encouraged and buttressed innovation. It is of such positive feedback that the stuff of sustainable economic growth is made.

References

Acemoglu, Daron, Johnson, Simon and Robinson, James. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* Vol. 91 No.5 (Dec) pp. 1369-1401.

Baker, Keith Michael. 1981. "Enlightenment and Revolution in France: Old Problems, Renewed Approaches." *The Journal of Modern History*, Vol. 53, No. 2. (June), pp. 281-30

Baumol, William. 2002. *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism*. Princeton, NJ: Princeton University Press.

Behrens, C.B.A 1985. *Society, Government, and the Enlightenment: The Experiences of Eighteenth-Century France and Prussia.* German Democratic Republic: Thames and Hudson.

Brady, Alexander. 1967. *William Huskisson and liberal reform: an essay on the changes in economic policy in the twenties of the nineteenth century*. London: Oxford University Press .

Carlos, Ann and Nicholas, Stephen. 1990. "Agency Problems in Early Chartered Companies: The Case of the Hudson's Bay Company." *Journal of Economic History* 50(4): 853-75.

———. 1996. "Theory and History: Seventeenth-Century Joint-Stock Chartered Trading Companies." *Journal of Economic History* 56(4): 916-24.

Cipolla, Carlo. 1968. "The Economic Decline of Italy." In Brian Pullan, ed., *Crisis and Change in the Venetian Economy in the Sixteenth and Seventeenth Centuries*. London: Methuen.

Davids, Karel. 2000. "Patents and Patentees in the Dutch Republic between c. 1580 and 1720." *History and Technology* 16, pp. 263–83.

De Vries, Jan and van der Woude, A.M. 1997. *The First Modern Economy: Success, Failure, and Perseverance of the Dutch Economy, 1500-1815.* Cambridge: Cambridge University Press.

Deyon, Pierre, and Philippe Guignet. 1980. "The Royal Manufactures and Economic and Technological Progress in France before the Industrial Revolution." *Journal of European Economic History* 9, no. 3 (Winter), pp. 611–32.

Ekelund, Robert B. Jr., and Tollison, Robert D., 1981. *Mercantilism as a Rent-Seeking Society*. College Station: Texas

A&M University Press.

Ekelund, Robert B. Jr., and Tollison, Robert D. 1984. “A Rent-Seeking Theory of French Mercantilism.” In James Buchanan and Robert D. Tollison, eds., *The Theory of Public Choice,* pp. 206-223. Ann Arbor: University of Michigan Press.

Ekelund, Robert B. Jr., and Tollison, Robert D., 1997. *Politicized Economies: Monarchy, Monopoly, and Mercantilism.* College Station: Texas A&M University Press.

Epstein, S. R. 1998. “Craft Guilds, Apprenticeships, and Technological Change in Pre-industrial Europe.” *Journal of Economic History* 58, no. 3 (Sept.) pp. 684–713.

Epstein, S.R. 2000. *Freedom and Growth: The Rise of States and Markets in Europe, 1300-1750*. London: Routledge.

Gay, Peter. 1966. *The Enlightenment: an Interpretation. The Rise of Modern Paganism*. New York: W.W. Norton.

Gay, 1969. *The Enlightenment: an Interpretation*. *The Science of Freedom*. New York: W.W. Norton.

Goldstone, Jack A. 2002. “Efflorescences and Economic growth in World History: Rethinking the ‘Rise of the West’ and the Industrial Revolution.” *Journal of World History,* Vol. 13, No. 2, pp. 323-89.

Greif, Avner. 1994. “Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies,” *The Journal of Political Economy,* Vol. 102, No. 5. (Oct.), pp. 912-950.

Greif, 2003. *Institutions: Theory and History.* Cambridge: Cambridge University Press. Forthcoming

Guicciardi, Jean-Pierre. 2001. “War and Peace,” in Michel Delon, ed., *Encyclopedia of the Enlightenment Vol. 2,* pp. 1411-1414. Chicago: Fitzroy Dearborn.

Groenewegen, P.D., ed. 1977. *The Economics of A.R.J. Turgot.* The Hague: Martinus Nijhoff.

Harris, Ron. 2000. *Industrializing English Law: Entrepreneurship and Business Organization, 1720–1844.* Cambridge: Cambridge University Press.

Heckscher, Eli F. 1955. *Mercantilism* (2 Vols.) Translated by Mendel Shapiro. London: George Allen and Unwin.

Herr, Richard. 1958. *The Eighteenth-Century Revolution in Spain.* Princeton, New Jersey: Princeton University Press

Hilaire-Pérez, Liliane. 2000. *L’invention technique au siècle des lumières.* Paris: Albin Michel.

Horn, Jeff. 2003. “Machine Breaking in England and France during the Age of Revolution,” unpub. ms., Manhattan College.

Howe, Anthony. 2002. “Restoring Free Trade: the British Experience 1776-1873.” In Donald Winch and Patrick

O'Brien, eds., *The Political Economy of British Historical Experience, 1688-1914,* pp. 193-213. Oxford: Oxford University Press.

Hudson, Derek, and Kenneth W. Luckhurst. 1954. *The Royal Society of Arts, 1754–1954*. London: John Murray.

Hughes, Jonathan. 1966. *The vital few; American economic progress and its protagonists*. Boston: Houghton Mifflin

Hume, David. [1742] 1985. "Of the Rise and Progress of the Arts and Sciences (1742)." In David Hume, *Essays: Moral, Political and Literary*. Edited by Eugene F. Miller. Indianapolis: Liberty Fund.

Irwin, Douglas A. 1996. *Against the Tide: an Intellectual History of Free Trade*. Princeton: Princeton University Press.

Jeremy, David.1981. *Transatlantic Industrial Revolution:The Diffusion of Textile Technologies Between Britain and America, 1790-1830s.* Cambridge, Mass.: MIT Press.

Kaplan, Steven L. 1976. *Bread, Politics and Political Economy in the Reign of Louis XV*. The Hague: Martinus Nijhoff.

Kellenbenz, Herman. 1974. "Technology in the Age of the Scientific Revolution, 1500–1700." In Carlo Cipolla, ed., *The Fontana Economic History of Europe*. Vol. 2, London: Fontana.

Keynes, John Maynard. 1936. *The General Theory of, Employment, Interest, and Money.* New York: Harcourt, Brace.

Kindleberger, Charles P. 1975. "The Rise of Free Trade in Western Europe, 1820-1875" *The Journal of Economic History*, Vol. 35, No. 1, (March), pp. 20-55.

———. *Economic Response: Comparative Studies in Trade, Finance, and Growth*. Cambridge, MA: Harvard University Press.

Koch, H.W. 1978. *A History of Prussia*. London: Longman Group Limited.

Mantoux, Paul. 1961. *The Industrial Revolution in the Eighteenth Century*. New York: Harper Torchbooks. Rev. ed., orig. pub. 1905, first English translation 1928.

Mokyr, 1994 "Progress and Inertia in Technological Change." In John James and Mark Thomas, eds., *Capitalism in Context: Essays in Honor of R. M. Hartwell*, pp. 230–54. Chicago: University of Chicago Press.

Mokyr, Joel. 1998. "Editor's Introduction: The New Economic history and the Industrial Revolution." In Joel Mokyr, ed., *The British Industrial Revolution: An Economic Perspective*. Boulder: Westview Press, pp. 1-127.

——— .1999. "The Second Industrial Revolution, 1870–1914." In Valerio Castronovo, ed., *Storia dell'economia Mondiale,* pp. 219–245. Rome: Laterza.

———. 2002. *The Gifts of Athena: Historical Origins of the Knowledge Economy*. Princeton: Princeton University Press.

——— . forthcoming. "King Kong and Cold Fusion: Counterfactual analysis and the History of Technology." In Philip Tetlock, Ned Lebow, and Geoffrey Parker, eds., *Counterfactual Analysis in History and the Social Sciences*.

Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny. 1991. "The Allocation of Talent: Implications for Growth." *Quarterly Journal of Economics* 106, no. 2 (May), pp. 503-30.

——— . 1993. "Why is Rent Seeking so Costly to Growth." *American Economic Review*, Papers and Proceedings, Vol. 83, No. 2 (May), pp. 409-14.

Norberg, Kathryn. 2003. "Poverty." in Alan Charles Kors, ed. *Encyclopedia of the Enlightenment.* Vol 3, pp. 347-53. New York: Oxford University Press.

North, Douglass C. 1990. *Institutions, Institutional Change, and Economic Performance*. Cambridge: Cambridge University Press.

North, Douglass C., and Barry Weingast. 1989. "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth Century England." *Journal of Economic History* 49, no. 4 (Dec.), pp. 803–32.

Nye, John V. 1991. "The myth of free-trade Britain and fortress France: tariffs and trade in the nineteenth century." *The Journal of Economic History*, Vol. 51, No. 1 (March), pp. 23-47.

O'Brien, Patrick K. 2002. "Fiscal Exceptionalism: Great Britain and its European Rivals from Civil War to Triumph at Trafalgar and Waterloo." In Donald Winch and Patrick O'Brien, eds., *The Political Economy of British Historical Experience, 1688-1914,* pp. 245-265. Oxford: Oxford University Press.

O'Brien, Patrick, Trevor Griffiths, and Philip Hunt. 1991. "Political Components of the Industrial Revolution: Parliament and the English Cotton Textile Industry, 1660–1774." *Economic History Review* 44, no. 3 (Aug.), pp. 395–423.

Olson, Mancur. 1982. *The Rise and Decline of Nations*. New Haven: Yale University.

Ormrod, David. 2003. *The Rise of Commercial Empires: England and the Netherlands in the Age of Mercantilism, 1650-1770.* Cambridge: Cambridge University Press.

Outhwaite, R.B. 1981. "Dearth and Government Intervention in English Grain Markets, 1590-1700. *Economic History Review* 34, no. 3 (Aug.), pp. 389-406.

Petty, William. 1679. *A Treatise of Taxes and Contributions.* London: Obadiah Blagrave.

Pirenne, Henri. 1936. *Economic and Social History of Medieval Europe*. New York: Harcourt Brace & World.

Randall, Adrian J. 1986. “The Philosophy of Luddism: The Case of the West of England Workers, ca. 1790–1809.” *Technology and Culture* 27, no. 1 (Jan.), pp. 1–17.

———. 1989. “Work, Culture and Resistance to Machinery in the West of England Woollen Industry.” In Pat Hudson, ed., *Regions and Industries: A Perspective on the Industrial Revolution in Britain*, pp. 175–98. Cambridge: Cambridge University Press.

Roche, Daniel. 1998. *France in the Enlightenment*. Harvard: Harvard University Press.

Root, Hilton. 1994. *The Fountain of Privilege: Political Foundations of Markets in Old Regime France and England.* Berkeley and Los Angeles: University of California Press.

Rosenberg, Nathan. 1960. “Some Institutional Aspects of the *Wealth of Nations.*” *Journal of Political Economy* Vol. 68, no. 6 (Dec.), pp. 557-570.

Rosenthal, Jean-Laurent. 1992. *The Fruits of Revolution: Property Rights, Litigation, and French Agriculture, 1700-1860.* Cambridge: Cambridge University Press.

Ross, Ian Simpson. 1995. *The Life of Adam Smith*. Oxford: Clarendon Press.

———. *On the Wealth of Nations: Contemporary Responses to Adam Smith.* Bristol: Thoemmes Press.

Rothschild, Emma. 2001. *Economic Sentiments: Adam Smith, Condorcet, and the Enlightenment.* Cambridge: Harvard University Press.

Rubin, Paul H. 2002. *Darwinian Politics: The Evolutionary Origin of Freedom*. New Brunswick: Rutgers University Press.

Schama, Simon. 1989. *Citizens : a Chronicle of the French Revolution*. New York: Knopf.

Schumpeter, Joseph. 1954. *History of Economic Analysis.* New York, Oxford University Press.

Shleifer, Andrei and Vishny, Robert. 1998. *The grabbing hand : government pathologies and their cures*. Cambridge, MA: Harvard University Press.

Smith, Adam. [1776] 1976. *The Wealth of Nations*. Edited by Edwin Cannan. Chicago: University of Chicago Press.

Smith, Adam. [1762-63] 1978. *Lectures on Jurisprudence*. Edited by Ronald Meek, D.D. Raphael, and P.G. Stein. Oxford: Clarendon Press.

Storrs, Christopher. 2003. “Spain.” In Alan Charles Kors, ed., *Encyclopedia of the Enlightenment,* Vol. 4, pp. 109-112. New York: Oxford University Press.

Sussman, Nathan and Yafeh, Yishay. 2002. "Constitutions, Commitment, and the Historical Evidence on the Relation between Institutions, Property Rights and Financial Development." Working paper, Hebrew University of Jerusalem.

Thomson, Ross. 2002. "Mediating the Public and the Private: The Patent System, Technological Learning, and Invention in the Antebellum U.S." Presented at the 2002 Economic history Asociation Meetings, St. Louis.

Uglow, Jenny. 2002. *Lunar Men: Five Friends whose Curiosity changed the World*. New York: Farrar Straus and Giroux.

Ville, Simon and Jones, S.R.H. 1996."Efficient Transactors or Rent-Seeking Monopolists? The Rationale for Early Chartered Trading Companies." *Journal of Economic History*. 56(4): 898-915.

Voltaire [1766(1962)]. *Philosophical Dictionary*, edited by Peter Gay. New York: Basic Books.

Wangermann, Ernst. 1981. "Reform Catholicism and Political Radicalism in the Austrian Enlightenment," in Roy Porter and Mikuláš Teich, eds., *The Enlightenment in National Context*. Cambridge: Cambridge University Press, pp. 127-140.

———. "Austria." In Alan Charles Kors, ed. *Encyclopedia of the Enlightenment.* Vol 1, pp. 100-03. New York: Oxford University Press.

White, K.D. 1984 *Greek and Roman Technology*. Ithaca: Cornell University Press.

Wong, R. Bin 1997. *China Transformed: Historical Change and the Limits of European Experience.* Ithaca: Cornell University Press.

Wood, Henry Trueman. 1913. *A History of the Royal Society of Arts*. London: John Murray.

Wright, Robert. 2000. *Nonzero: The Logic of Human Destiny*. New York: Vintage Books.