

Which Institutions Caused the British Industrial Revolution?

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1. Introduction

The period 1760-1850, known as the British Industrial Revolution (BIR) had an enormous long term impact on Western Europe: it prepared the ground for the economic transformation that made the difference between the West and the Rest of the World (Mokyr 2005a). As argued by many (e.g., Mokyr 2005a, Lucas 2002), the major novelty brought about by the BIR was sustained growth (also called modern growth). Growth before 1750 was, if not totally absent, different in nature from what was to occur in the 19th century and later. Despite the absence of growth itself, the BIR represents the transition from the slowly-growing economy of the early modern period to the faster growth of the post 1830 period (Mokyr and Voth 2010).

Table 1 shows various scholars' estimates concerning output growth and TFP growth for Britain for the period around the BIR. What is remarkable about the period after 1750 in Britain is not output growth or TFP performance as such; these measures grew slowly as compared to their modern counterparts, but rather the change in the "quality" of the economic processes not shown by these data.

	Feinstein (1981)	Crafts (1985)	Crafts and Harley (1992)	Antras and Voth (2003)
Output				
1760-1800	1,1	1	1	
1801-1831	2,7	2	1,9	
TFP				
1760-1800	0,2	0,2	0,1	0,27
1801-1831	1,3	0,7	0,35	0,54

Table 1: Output and TFP growth rates for Britain for 1760-1860
(source: Voightländer and Voth 2006:323)

Until 1750 the slow and reversible economic growth can be explained in terms of the negative feedback effects in which economic growth created the causes of its own demise (Mokyr 2002b). Three mechanisms accounted for these effects: (1) Population dynamics. When income per capita rises, the Malthusian theory predicts a population increase, which leads to higher fertility. Such a population increase will at some point run up against some fixed resource, often believed to be food supply or farmland. (2) The limitations on human knowledge. Before 1750 those people who engaged in a systematic search for better techniques made few advances because they did not know why things worked. (3) Institutions. When economic progress took place in a society, it frequently generated a variety of social and political institutions that ended up terminating it (i.e., rent-seeking coalitions such as guilds or government-enforced monopolies).

In modern growth, according to Mokyr (2002a, 2002b), these three negative effects have been turned around and have become positive.¹ The question of what caused the BIR, i.e.,

¹ The above three negative feedbacks were replaced by the following, respectively. (1) In modern growth rich and industrialized countries have reduced demographic growth, preferring well-educated people, while poor countries are still subject to growing population. (2) The limitations on the knowledge base no longer impose as

modern growth is, in the words of Clark (2003), one of history's great mysteries and is a crucial one in economics.

Various theories offer an explanation for the "why England" question. One influential group of these theories is institutional explanations. Institutional theories on the BIR in general do not deny that the essence of the BIR was macroinventions² which were subject to the greatest extent to exogenous factors, as argued by many (Helpman 1998, Mokyr 1990, 1999, 2002a, Lipsey et al. 2005). To a non-negligible extent macroinventions were due to talented inventors whose activities cannot be regarded as consequences only of the prevailing social, economic and demographic factors; that is, the inventions were the results of individual genius, rather than the outcome of a conscious social process (Freeman and Louça 2001). Put differently, macroinventions arose partly from outside the economy; British inventors were on numerous occasions simply lucky (Mokyr 1990) and macroinventions came simply "out of the blue". But this is not to say that institutions could not play a role; on the contrary. The uniqueness of Britain was precisely its extremely favorable institutional background for technological advances, which constituted Britain's advantage over the Continent when it comes to the "why in Britain?" question. In fact in Britain there was a congruence of favorable developments in all subsystems of society as well as the positive mutual interconnection of these developments (Freeman and Louça 2001).³ So, macroinventions could not have come partly "out of the blue" if the institutional background had not supported this, which undermines the significance of the institutional explanations.⁴

Today the view that institutions matter for sustained growth is commonplace. The question is rather "which institutions" and "how" they matter. The question of how institutions account for the BIR is a difficult one and what is even more difficult is to answer the question of to what extent institutional changes were necessary for the BIR.

Institutional economics and economic history has provided us with different institutional explanations of the BIR.⁵ These views are sometimes in harmony with one other, sometimes they conflict with or contradict one other, and sometimes one view even refutes another. In what follows I will provide a detailed overview of the institutional explanations of the BIR, by highlighting the eventual conflicts in the views. The lessons one can draw from the

much constraint on the development of the economy as used to be the case; instead, science and technology affect one other and evolve in a mutually reinforcing way. (3) After 1750, due to the emergence of open access orders in terms of North et al. (2009), the institutional framework supported markets and the rule of law, and accordingly reduced rent-seeking and other institutional biases.

² Mokyr (1990) proposes calling major technological advances macroinventions, which create essentially new techniques and tend to be abrupt and discontinuous. They represent a break compared to previous techniques. As Mokyr (1999) suggests, the idea of macroinventions is akin to the notion of speciation in biology: speciation is the emergence of a new category of life that is distinct from everything that existed before. By analogy, macroinventions are inventions that start the emergence of a new "technological species". They are usually followed by a large number of microinventions that improve and refine them or make them workable without changing the context of the macroinventions. Mokyr's macroinventions are in fact General Purpose Technologies (GPTs), as is also suggested by Lipsey et al. (2005).

³ In this sense the BIR was not a sudden event; instead, it was a contingent culmination of evolutionary paths that had been in place for centuries (Lipsey et al. 2005:258). In fact, as far as the theories explaining the timing and location of the Industrial Revolution are concerned, it is possible to distinguish two kinds of explanations. One (e.g., Jones 1981, Crafts 1977) sees the evolution of the Western countries as a highly unlikely event, the result of a fortunate concatenation of circumstances. In this respect, it differs dramatically from unified growth theory (e.g., Galor and Weil 2000) where the seeds of economic development of the West were sown centuries before, and once they were there, growth was unavoidable. This latter can be paralleled with Landes (1994) who argues that both the Industrial Revolution and Britain's role in it were determined by that country's starting conditions.

⁴ Of course, Britain had both a technological and an institutional "advantage" which can explain the country's development.

⁵ What is more, over the last few decades a much more complete and accurate picture of the BIR has emerged on account of detailed data-oriented work by economic historians.

shortcomings of these explanations, together with some *a priori* requirements vis-à-vis such an explanation makes me turn to a more general theory of institutions, namely the theory of social order⁶ of North et al. (2009) to understand why England had the industrial revolution first.

The structure of the paper is the following. In section 2 I will discuss the explanations centered on various political, legal and property rights institutions. In section 3 I will show institutional theories emphasizing the role of culture, or informal institutions, in general. In section 4 I will move to a more abstract level and turn to the theory of social order (North et al. 200) to propose this theory as an umbrella explanation for the BIR.

2. Formal institutions

One way for institutions to induce innovations and modern growth is through a direct encouragement of technological progress, that is, through the patent system. Another is through secure property rights, enforceable contracts and constraints on the powers of the executive. Institutional economics does not cease to emphasize the importance of both for development. In what follows I will summarize the literature on both, including both the pros and cons present in the literature.

2.1. Political (state) institutions

2.1.1. The Glorious Revolution: secure property rights and constrained government

North and Weingast (1989) in their influential paper identified the institutional breakthroughs in Britain with the Glorious Revolution of 1688 and its aftermath. They emphasized the importance of the fact that the Crown and the Parliament accepted complementary roles, that is, they saw each check the power of the other while building a stable and non-arbitrary state. For them, and for North (1981), constraints on the executive were paramount from the viewpoint of modern economic growth.

Three elements of governmental organization were problematic before the Glorious Revolution (North and Weingast 1989:813). First, the royal prerogative allowed the King to ignore legislation. “Second, the Star Chamber, combining legislative, executive, and judicial powers, played a key role” ... “sometimes having the final word on the prerogative” (ibid p. 813). Finally, the Crown paid the judges, who served at its pleasure. The most important changes emphasized by North and Weingast are the reversal of these three practices as a result of the Glorious Revolution.

Thus the political history of England before the BIR, in their sense, reflects two propositions: (1) the establishment of secure and stable property rights for private persons is a necessary and sufficient condition for economic growth, (2) the establishment of such rights depended on the creation of representative democracy. Therefore they believe that there was an inanimate relationship between the Glorious Revolution and the BIR in the sense that the Glorious Revolution created the preconditions for the BIR.

The Glorious Revolution, in their understanding, seems to be a turning point from the viewpoint of the appearance of modern growth, for the following reasons. First, by the beginning of the eighteenth century, the English government was sufficiently constrained in its powers that private initiative and enterprise flowered. Second, the relevant constraints on the state were primarily legal and were embodied in the highest levels of law, i.e., the

⁶ By social order they mean the complex of military, political, economic and religious institutions of social organization.

constitution. Third, the decisive moments of constitutional change were in the years immediately following the Glorious Revolution of 1688, with the passage of the Bill of Rights of 1689 and the Act of Settlement of 1701. Fourth, these constitutional developments were the product of design by forward-looking individuals. Fifth, the state was not predatory, due to the control of Parliament. The importance of this fact is that the profits of the technological breakthroughs generated for entrepreneurs were not expropriated by the state.

In North and Weingast's account, by changing the "rules of the game" which determined the costs and benefits of different actions taken by the king, the Glorious Revolution solved the problem of credibility because it was either not feasible or not desirable for the king to renege on commitments after 1688. At the same time, North and Weingast emphasize that the new rules were self-enforcing because of a credible threat of removal of any Monarch who violated them. These new institutions served to "limit economic intervention and allow private rights and markets to prevail in large segments of the economy" (ibid p. 808).

In sum, North and Weingast characterize the Glorious Revolution as a change in the *de jure* institutions, alternatively formal institutions, specifically emphasizing how this constrained the future actions of the king. What they suggest is that the security of private property rights and, in parallel with this, the commitment of the state not to infringe these rights, were the *sine qua non* preconditions for the BIR.

Epstein (2000) is largely in harmony with the above views by offering a more sophisticated view of the impact of political constitutions on solving coordination problems and permitting Smithian growth, that is, growth dependent on efficiency gains from spatial specialization and division of labor. He suggests that economic freedom and limited government, due to the Glorious Revolution, are the keys to economic growth. In his opinion, the essential element for growth is undisputed jurisdictional sovereignty over the realm both in economic and political spheres. This behavior of the government probably rested on the notion of free trade, an idea which was introduced by Adam Smith's book: profit-seeking activities were seen as promoting social welfare.

Restraints on government initiated by the Glorious Revolution are important from the viewpoint of the improvements in public and private finance in England, too. Klerman and Mahoney (2005), by adhering to the argument of North and Weingast (1989)⁷, emphasize the crucial role of judicial independence in promoting financial development. Judicial independence plays a central role in constraining the government as it makes it more difficult for the government to engage in opportunistic behavior. Judicial independence is clearly an 18th-century phenomenon in England: judges gained formal independence in a series of steps starting in 1701. In particular, Parliament enacted statutes granting judges security of tenure and increasing salaries. So, the role of the Glorious Revolution is quite clear in this process, particularly in assuring *de jure* independence.⁸

Klerman and Mahoney (2005), in their empirical analysis, investigate the effects of two aspects of judicial independence – namely the security of tenure for judges and judicial salaries⁹ – on abnormal returns of securities in London. They find that increases in judicial independence increased the value of financial assets.

But the relationship between the Glorious Revolution and the private economy is rather controversial in the literature. While North and Weingast argue that due to the security of property rights, the cost of capital to the British government declined substantially, a phenomenon which they interpret as a fall in the required risk premium, Sussman and Yafeh

⁷ The Revolution of 1688 led to a "fundamental redesign of the fiscal and governmental institutions" (North and Weingast 1989:804).

⁸ According to Klerman and Mahoney (2005), *de facto* judicial independence existed even before the 18th century, while *de jure* independence was established by the Act of Settlement.

⁹ Note, however, that the concept of judicial independence is much broader than is understood by them.

(2006) provide evidence that the risk premium on English government bonds remained high until the mid-19th century. Accordingly, their analysis contradicts the view that the government's credibility improved after 1688. Sussman and Yafeh (2006) also show that the volume of British government debt remained low for nearly a century after the institutional changes described by North and Weingast. And what is more, they show that British interest rates moved in tandem with Dutch interest rates, suggesting that Britain did not embark on a different path following the institutional changes of the late 17th century; instead, some of the trends in interest rates in Britain were actually shared by the Netherlands as well.

In contrast to the above, Quinn (2001) argues that the risk premium on government debt declined in the 1690s, and interest rates on private debts increased. To provide evidence for this claim he collected rates of return on loans held by a London goldsmith-banker named Sir Francis Child. Due to an analysis of Child's portfolio, he rejects the hypothesis that an increased supply of loanable funds was the dominant result of the Glorious Revolution. Quinn (2001) also finds that in the 1690s Child and his customers began to own government debt, East India Company bonds, and other corporate assets. This evidence of advances in financial technique confirms that private-sector behavior was being altered by the revolution in public finance.

De Long and Shleifer (1993) also deal with the effects of a limited government on economic prosperity. They empirically analyze the relationship between the type of the government (either constrained or absolutist) and the growth of urban populations as a measure of economic growth for medieval Europe for the period circa 1050-1800. They find evidence for the view, put forward by many scholars (e.g., Olson 1991), that limited governments are more concerned with economic development than absolutist ones. The reason behind this, in brief, is that a constrained government bound by rules tends to impose lower and less-destructive taxes. However, this well-known fact alone cannot explain why England led the Industrial Revolution, since England was not the only country to have a constrained government. While De Long and Shleifer (1993) do not focus on the period of 1650-1800, I think their results can point to the fact that the English case was substantially different from those in other countries with limited government. This is the finding that 17th and 18th century England exerted the only significant shift on the regression coefficient: the removal of England cuts the estimated effect of an absolutist government on city growth by almost 30 percent. This suggests that Britain's institutions other than limited government and the rule of law also mattered when it comes to the causes of BIR.

Thus, the question is not that whether secure property rights (economic freedom) can promote development or not – we know that they can – but whether they really were at the heart of the factors leading to the Industrial Revolution. Fortunately, important historical databases have recently become available, making it possible to empirically test the above hypothesis.

One approach to examining whether the Glorious Revolution was crucial to the future development of Britain is Murrell's (2009). Murrell examines empirical evidence regarding when change came to England. He uses the econometrics of unknown structural breaks to estimate the years in which breaks occur in many data series related to various socioeconomic factors¹⁰. He found 58 break dates, 29 of which fall before 1688, with 13 of the significant ones doing so. In sum, his results establish that there is nothing in usable data sources to suggest a structural break in development as a result of the 1689-1701 measures; in other words, improvements were under way before 1688.

¹⁰ Murrell (2009) has in total 58 variables, including various price indexes, product prices, growth rates, GDP data, data related to patents, data related to the severity of punishments. See Table 1 in Murrell (2009).

Murrell also analyses the content of two critical laws, namely the Bill of Rights and the Act of Settlement to see whether their clauses really did define the nature, power and duties of the government. The results are interesting: of the fifteen measures in the Bill of Rights, only two were unarguably new, and many of them did not survive as viable constitutional measures, meaning that it is simply impossible to characterize the Bill of Rights as providing either new legal protection of property rights or new defense against prerogative taxation or new Parliamentary rights on taxation. Figure 1 shows that the proportion of severe punishments for property crimes did not increase at the times of the Glorious Revolution. As for the Act of Settlement, of the nine distinct measures five were new, two were old, and two reflected much historical precedent. Of the five truly new, four did not survive. So Murrell's (2009) analyses provide strong evidence that the Bill of Rights and the Act of Settlement comprised mostly old measures that survived and new measures that did not. To sum up, Murrell (2009) argues that the constitutional changes of 1689 and 1701 largely summarized what was already in existence in Britain.

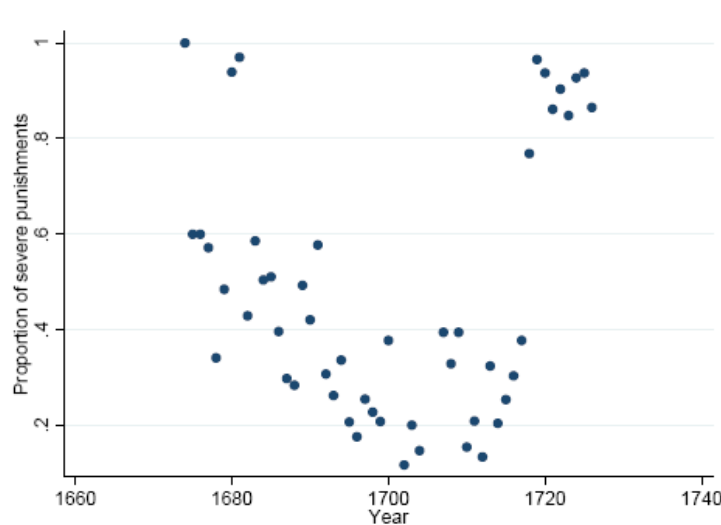


Figure 1: The behavior of judges: severe punishments as a proportion of all punishments for property crimes (source: Murrell 2009:87)

The view that the enforcement of property rights by the state was crucial to the BIR is strongly contested by Clark (1996), too. In accordance with Murrell (2009), based on his empirical analysis, he argues that nothing special happened in 1688 from this point of view: secure private property rights existed in England almost as early as 1600, or probably earlier (see also Figure 1). He also disputes the view put forth by North and Weingast (1989) which claims that economic growth needs a stable and non-autocratic political system. North and Weingast's argument runs in the following way. Government interest rates declined after the Glorious Revolution (from 10 percent to 3 percent), which is a sign that the government operated differently after 1688: a new stable government was established with private capital markets.

To test whether North and Weingast's insight is true, Clark analyzed whether important political events of the 16th and 17th centuries affected rates of return in the private capital market. He found that the Glorious Revolution seems to have had no effect on rates of return in the English economy between 1660 and 1730¹¹: the rates of return on capital fell in the 100

¹¹ In a formal test of three series (real property: land, houses, tithes; rent charges; and bonds and mortgages) Clark (1996) demonstrated that none of the political or military convulsions of the 17th century seems to have had any significant effect on private capital markets in the predicted direction.

years prior to the BIR, which thus shows there was no connection with political events.¹² That is, the financial revolution started before the BIR; data show that capital assets were traded in an integrated market even before the BIR. All this means that the private economy largely before 1688 was basically insulated from political events (Clark 1996).

So the view that Britain's advantage in leading the Industrial Revolution was due to its efficient enforcement of property rights after 1688 needs to be revisited. Of course, this is not to say that secure property rights may not be necessary conditions for growth, but, based on the above-cited empirical analyses, they are not sufficient, and an adequate explanation for the BIR requires factors other than the emergence of stable private property rights. This argument also suggests that the major role of Parliament at that time may not have been to secure property rights¹³, but was something different.

Clearly, Parliament seems to have had a crucial importance in inducing favorable changes both in technology and institutions. It was a meta-institution that had the legitimacy to change other institutions. As explained by Mokyr (2008) Britain was almost unique in Europe to have developed a parliament after 1650, which acquired a position of legitimacy and power. Mokyr and Voth (2010) emphasize another aspect of the British political constellation which seems to be central, namely that *de jure* and *de facto* power coincided to a great extent: both were in Parliament's hands.¹⁴

In what follows I will summarize the theories ascribing importance to the Glorious Revolution on other grounds than securing property rights.

2.1.2. The Glorious Revolution: a new political equilibrium, lower rent-seeking and reorganized property rights

Pincus and Robinson (2011) revisit North and Weingast's (1989) argument and the evidence supporting it. They argue that North and Weingast were correct in their belief that the Glorious Revolution was a decisive turning point in the political and economic history of England. However, they suggest that the causal account provided by North and Weingast is not substantiated by what actually happened in the wake of the Glorious Revolution.

As opposed to North and Weingast's argument that the Glorious Revolution established new *de jure* rules, Pincus and Robinson (2011) argue that rather than being *de jure*, the most significant of these were *de facto*, alternatively "informal", in the sense that they emerged from the context of the change in the English political equilibrium.

After a profound analysis of English history, they come to the conclusion that nothing in the Declaration of Rights, or in the Revolution Settlement of 1689, created a new method for Parliament to audit royal spending, provided new guarantees for the supremacy of common law courts, or provided new credible threats of removal against miscreant rulers, nor did the Settlement introduce more stable or predictable governments. Pincus and Robinson (2011) also claim that 1688 did not change the security of property rights.

What the Glorious Revolution brought about is that the Whigs came to power and they imposed their particular vision on the state. The Whigs were increasingly becoming the political party of the manufacturing sector, the export-driven long distance trades, and the newly dynamic cities and towns. The newly dynamic economy shifted the social balance. Manufacturers, urban dwellers, and colonial traders became much wealthier.

¹² Note that Murrell (2009) also finds, based on an analysis of institutional and administrative innovations, that many key developments affecting government finance were a product of the era before 1688.

¹³ It is worth noting that Olson (1982) argued that the security of property rights might have ambiguous effects: bad property rights (a privilege) could be damaging to economic development even if they were well-secured.

¹⁴ Bearing in mind the model of Acemoglu et al. (2005a) explaining how political institutions affect economic performance, the significance of the above is hardly questionable.

These arguments suggest that the right way to think of the Glorious Revolution is as part of a change in the political equilibrium. In Pincus and Robinson's account the Glorious Revolution was not significant because it was a change in the *de jure* rules, but it was important in helping to cement a change in the distribution of *de facto* power in the country in favor of the newly dynamic manufacturing middle classes. This consolidated a change that had already been under way. Moreover, the importance of this change for future economic growth did not stem from the fact that it established a credible commitment to property rights. Rather, the Glorious Revolution was important because in the new political equilibrium Parliament was dominated by the Whig Party which had a specific program of economic modernization.¹⁵

The Glorious Revolution is given a different significance by Mokyr and Nye (2007) who argue that Parliament contributed to reduce rent-seeking activity. In their view, the success of Britain was the result of the emergence of a progressive oligarchic regime that divided the surpluses generated by the new economy between the large landlords and the newly rising businessmen, and that tied both groups to a centralized government structure. The government provided uniform rules and regulation. Wealth (inherited or earned) remained the source of political power, but as its base broadened, its political objectives shifted.

This process was facilitated by the existence of Parliament, a meta-institution that wrote the rules according to which other institutions changed.¹⁶ Parliament changed British laws in accordance with what its members viewed as their interests. There is no question that Parliament was a mechanism by which the richest and most powerful families in England manipulated the system to advance their interests. Clearly, in the decades after the Glorious Revolution rent-seeking activity was the norm. But at some point, a gradual change in the culture of legislation occurred: purely redistributive actions began to lose ground.

Parliament became the arbitrator of disputes between special interest groups. So, basically elites allowed processes to unfold that ultimately destroyed some of their entrenched positions. The results were that production shifted from agriculture to industry, from local to national markets. But why did elites create democracy when in fact political power is the key to the distribution of income?

Acemoglu and Robinson (2000) suggest a convincing answer to this question. They propose a "political loser hypothesis" (as opposed to an "economic loser hypothesis") which argues that it is groups whose political power – not economic rents – are eroded that will block technological advances.¹⁷ If agents have and maintain political power, i.e., are not political losers, then they have no incentive to block progress. And this is precisely what happened in Britain after the Glorious Revolution: the landlord class retained its political power.¹⁸ Accordingly, landlords did not use their political power to seek more rents – because the cost of transformation was not on landlords, but on the consuming middle classes – instead, as they were part of the ruling elites, they passively assisted economic and technical transformations.

So, as opposed to North and Weingast (1989), according to whom the major role of Parliament was to serve as constraint on the executive, Mokyr and Nye (2007) see its role in

¹⁵ Pincus and Robinson (2011) show that Whig institutions such as the Bank of England, the Land Tax, and the new East India Company, which favored economic development, were largely due to a provision of essential infrastructure for their war effort.

¹⁶ Olson also (1982:78-83) pointed to the Glorious Revolution as a watershed. According to him, the Glorious Revolution weakened most distributional coalitions.

¹⁷ In the same spirit Mokyr (1990:243) notes about Britain, "... the landowning elite, which controlled political power before 1850, contributed little to the Industrial Revolution in terms of technology or entrepreneurship. It did not, however, resist it."

¹⁸ Despite the franchise reforms of 1832, 1867 and 1884, the House of Lords guaranteed the security of landed interests until the Liberal government of Asquith after 1906.

reducing rent-seeking redistribution. The result was that in Britain there was an environment in which the Olsonian “stationary bandits” did not create obstacles high enough to suppress the technological potential of the country, which was critical for the BIR.

Another major function of Parliament is depicted by Bogart and Richardson (2011) when focusing on its role in altering property rights. The fact that property rights were secure in Britain largely before the Glorious Revolution (see Figure 1 or Clark 1996) does not mean that there could not have been problems with them: Britain’s property rights system, inherited from the past, was inflexible. The role of Parliament, according to Bogart and Richardson (2011) consisted in reorganizing rights to land and resources, which enabled landholders and communities to exploit opportunities that could not be accommodated otherwise; entrepreneurs, landowners, and localities would have forgone investment opportunities without alterations in their property rights.

As analyzed by these two scholars, holders of equitable estates could neither mortgage, nor lease, nor sell much of the land under their control; holders under many types of tenures could transfer property only to particular persons or members of a local community; and residents in common-field villages often had to keep land in traditional uses. To overcome these problems, Parliament established procedures for processing petitions from groups hoping to reorganize rights to land and resources.

Bogart and Richardson (2011) focus on three kinds of acts, namely estate, statutory authority, and enclosure acts, from 1700 to 1830. Figure 2 shows the activity of Parliament in this respect. These acts loosened constraints on investment inherent in Britain’s medieval landholding system. Estate acts enabled holders of property to take certain actions prohibited by the rules under which they had inherited their land. They were necessary because the inheritance system limited estate holders’ power over their property, particularly the ability to sell or lease land. They facilitated the enforcement of contracts by clarifying permissible transactions and the rights of pertinent parties. Acts establishing statutory authorities created new organizations that built, operated, and maintained infrastructure and public services. Enclosure acts disbanded collectively managed common-field villages and assigned to individuals rights to particular pieces of property.

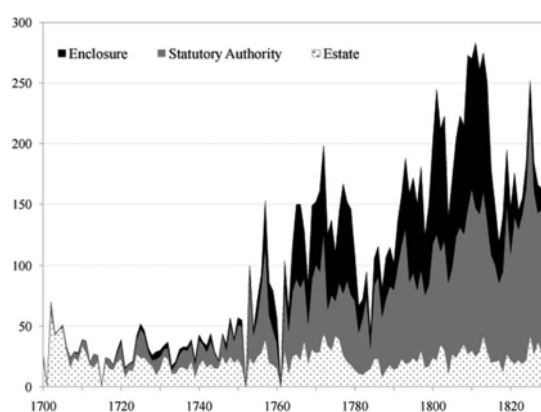


Figure 2: Number of acts reorganizing property rights, 1700–1830
(source: Bogart and Richardson 2011:250)

To account for the significance of these acts, Bogart and Richardson (2011) empirically examined the relationship between certain economic variables (the real interest rate and the volume of foreign trade) and legislation reorganizing property rights. Their major finding is that causation runs from changes in economic conditions to changes in the quantity of legislation. So, Parliament responded elastically to changes in public demands for reorganizing property rights. According to Bogart and Richardson (2011), relaxing these constraints was probably a necessary condition for English economic development.

2.2. Patents

Among the institutions affecting the BIR intellectual property rights are traditionally thought of as being extremely important: “Innovation will be encouraged by modifying the institutional environment, so that the private rate of return approaches the social rate of return. Prizes and awards provide incentives for specific inventions, but do not provide a legal basis for ownership of intellectual property. The development of patent laws provides such protection. ... [B]y 1700 ... England had begun to protect private property in knowledge with its patent law. The stage was now set for the industrial revolution” (North and Thomas 1973:155-156).

North (1981:164-166) provided the canonical statement that the rate of technological change depended on the inventor’s ability to capture a larger share of the benefits of his invention. Patents are seen as one of factors inducing innovation through providing incentives to innovators. But was this really the case during the BIR? Did intellectual property rights really matter for inventions? As we will see below, the answer given by the literature to the question of whether intellectual property rights afforded to inventors during the BIR levered technological and industrial progress is generally negative.

Dutton (1984) was the first to consider in a systematic way the connection between the patent system and inventive activities in the BIR. He argues that a group of “quasi professional inventors” emerged during the BIR who took their profits through the sale or licensing of their intellectual property rights. Sullivan (1989) confirms this view by showing the existence of a structural break in 1757 in the time series of total British patents: after 1757 there was acceleration in the pace of invention, which is demonstrated in Figure 3.¹⁹

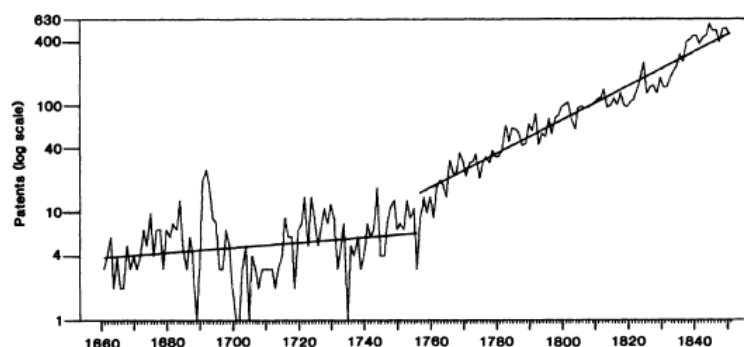


Figure 3: English patents with estimated trend lines, 1661-1851
(Source: Sullivan 1989:430)

Now the question is whether the increase in the number of patents from 1757 onwards can be interpreted such that patents were the cause of the BIR? The answer is basically negative. Two kinds of counter-argument occur in the literature.

One line of argument proceeds by shedding light on the bad characteristics of the British patent law and patent system. MacLeod’s (1988) evaluation of the British patent system is very cautious when she draws attention to the unorthodox use of patents, the most typical case of which was where the patent was used to obtain support through specific government concessions. Mokyr (2010b, 2010a) also stresses that the idea that technological progress depended on inventors’ incentives through the patent system is dubious for both historical and theoretical reasons.

¹⁹ However, one has to be cautious when evaluating the increase in patents. Sullivan (1989) argues that the increase in patenting may be a sign of the increase in patentable inventions, and not in inventions in general, because many inventions are not patentable.

To a large degree, patent institutions in Britain, created in 1624, offered rather limited incentives to investors (Khan and Sokoloff 2004). The British patent institutions had many defects. The fees were extremely high, the system was too complicated, there was no examination, and as the “first and true inventor” included importers of inventions that had been created abroad, the interpretation had to be proved (Khan and Sokoloff 2004). No patent was fully valid till it had been tested by the courts, but judges were on the whole hostile to patentees, and people rarely sued: between 1770 and 1850 only 257 patent cases came before the courts, out of 11,962 patents granted (Dutton 1984:71). In addition, the patent system was riddled by the widely-condemned practice of so-called caveats, which were an expression of the intent to file a particular patent later on, and by the acquisition of a block on any application before warning the filer. Finally, many patents were infringed upon, and judges before 1825 or so were often hostile to patentees, considering them monopolists (Mokyr 2010a).²⁰

Patents laws were revised only in 1852, but the process continued to discourage technological creativity. In addition, Britain’s advantage over its neighbors was only limited in this respect since many European countries adopted a patent law similar to Britain’s.

Another line of the counter-argument against the strategic importance of patents in the BIR argues the reverse interpretation, namely, that the growth of patenting after 1760 followed industrial development. In a series of papers, Greasley and Oxley (1997a, 1997b), and Oxley and Greasley (1997) consider possible causal linkages between industrial production and other aggregate level data that have traditionally been identified in the economic history literature as potential candidates for “drivers of growth”, including patents. Here, typically bidirectional causality between patents (levels or growth rates) and industrial production (levels or growth rates) was identified.

Greasley and Oxley (2007) add to these debates by investigating the causal links between patenting activity and industrial output at the sector level during the period 1780–1851. Using time series methods they consider the existence of bi- and multi-variate causality between patents and 16 sectors of the British economy. The two scholars, based on their empirical results, conclude that the rise in patented inventions after 1780 was a consequence, not a cause, of the BIR.

Since patenting procedures and institutions did not change materially in the period to 1851 (see also Sullivan 1989), the simple implication is that the value of protecting the intellectual property embodied in technical inventions rose sharply during the Industrial Revolution. These findings offer support to those historians, including MacLeod (1988), who argue that inventors “rediscovered” the patent system after 1760 and learned to use it to best effect.²¹ Greasley and Oxley’s (2007) results show that patenting activity was particularly associated with the “new” fast growth sectors of the BIR, notably cotton and iron. Probably this increased propensity to patenting was caused by an increased awareness of the benefits of patenting (Sullivan 1989).

Allen (1983) also emphasizes that patents should not be seen as key factors in British technological progress. He draws attention to the role of collective invention²² before the BIR, akin to modern open-source technology (Nuvolari 2004).

²⁰ MacLeod’s (1986) analysis of the 1690s boom in patenting is a good example of how the mere number of patents is highly misleading in evaluating inventions. She argues that the spectacular increase in the number of patents does not indicate an increase in inventions, but the fact that the ready availability of capital promoted many worthless new projects.

²¹ The fact that patents did not cause industrial growth together with the fact that not all inventions are patentable indicates that patents are a not a satisfactory measure of technological progress during the BIR.

²² In collective invention settings, inventors freely release to one another pertinent technical information on the construction details and the performance of the technologies they have just introduced. This represents knowledge spillovers. As an example see Nuvolari’s (2004) steam pumping engine case.

More recently, Mokyr (2010a) draws attention to cultural factors when arguing that patents were not crucial in Britain (see also section 3). Originating in the Baconian program²³, most of the people who generated useful knowledge during the BIR did not do so primarily to generate income directly. Their primary aim was not to maximize profit, but rather to signal and demonstrate to their peers their intellectual and technical capabilities. There was an intuitive sense that knowledge should be free-access because anything that limited access to useful knowledge was bad for the Baconian program. There was also a moral sense that inventors, like scientists, were serving the public good, and should be rewarded by honors, not necessarily financial rewards.

So, the above arguments place serious doubt on the strategic importance of the patent system in advancing technology. Just to give one additional support for this claim, remember that the key-technologies that lay at the heart of the BIR, such as high pressure steam engines, steamboats, iron production techniques, etc. were also developed in a collective invention fashion, and consequently they were never patented.²⁴

2.3. Private-order institutions

Institutions that created bridges between prescriptive and propositional knowledge, in the spirit of the Baconian program, such as universities, polytechnic schools, research institutions, museums and agricultural research stations were also important in facilitating economic progress in Britain. These together with various other institutions (professional journals, technical encyclopedias) made the country uniquely suited to induce technological progress.

In addition, at that time technical seminars and scientific associations were commonplace in England. As Mokyr (2010b) argues, Britain created private organizations that encouraged innovation and the dissemination of knowledge beyond the patent system. A notable example is the Royal Society of Arts, founded in 1754, which aimed explicitly at disseminating existing technical knowledge, at augmenting it through an award program²⁵, encouraging networking, and the publication of periodicals. Another institution was the Royal Institution which was founded in 1799, devoted to research and charged with providing public lectures on scientific and technical issues. These private institutions together with The Mechanics Institute were adequate for the creation of a stimulating environment for most British inventors. Figure 4 shows the mushrooming of scientific organizations in the 18th century.

Despite these institutions aimed at disseminating scientific ideas, a unique characteristic of the BIR was that before 1850 the contribution of formal science to technology remained modest (Mokyr 2002a). Much of the technological progress came from the semi-formal and pragmatic knowledge generated by great engineers, or in other words, by a technological elite of inventors, engineers, mechanics and skilled craftsmen, whose dexterity and ingenuity was critical (Mokyr and Voth 2010). This seems to be true when thinking of the direct effect of science. However, examples of the importance of science and mathematics to some of the inventions of the BIR can certainly be found. It is equally true that many of the most prominent breakthroughs in manufacturing, especially in the mechanical processing of textiles, were not based on science, and that in other areas of progress, such as steam power,

²³ Mokyr (2005b) argues that the intellectual origins of the Industrial Revolution are traced back to the Baconian program of the seventeenth century, which aimed at expanding the set of useful knowledge. The eighteenth-century Enlightenment in the West carried out this program through a series of institutional developments that both increased the amount of knowledge and its accessibility to those who could make best use of it. The Industrial Enlightenment in Mokyr's (2005b) terms was about the expansion of useful knowledge and consisted of the emergence of institutions devoted to the flow of ideas.

²⁴ Moser (2007) also shows that only a small portion of the significant inventions made in Britain were ever patented by the middle of the 19th century.

²⁵ Note that only inventions which had not been patented were eligible for the Society's prizes (Mokyr 2010b).

progress occurred on the basis of trial and error, not a deep understanding of the underlying physical processes. As argued by Mokyr and Voth (2010) trial and error, serendipity, and sheer intuition never quite disappeared from the scene.²⁶

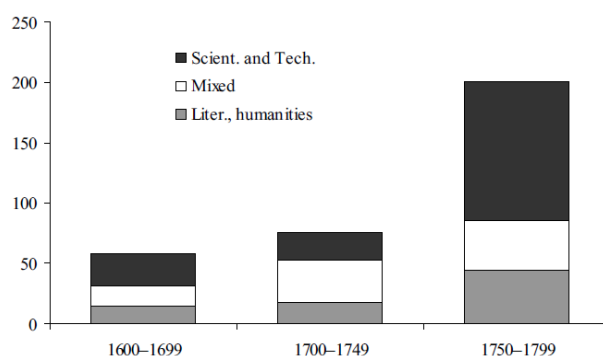


Figure 4: Scientific societies by period and main purpose
(source: Mokyr 2005b:335)

Due to the practice-oriented character of Britain, many inventions were imported, further developed and utilized in Britain.²⁷ Technical training through master-apprentice relationships was at a relatively high level, favoring learning by doing and creating a favorable climate towards inventions and experimentations. Apprenticeship was an ideal way to transmit the kind of tacit artisanal knowledge that was essential to competence.

To sum up, private-order institutions – mainly those that can be associated with scientific dissemination – were mushrooming in England, and clearly, these institutions were embedded in the Enlightenment and informal institutions (see also section 3).

2.4. Markets as the cause of the industrial revolution

Adam Smith (1776) was probably the first economist to emphasize the role of the market in understanding why England was the first country to experience an industrial revolution. He stressed the importance of specialization through which markets, and particularly the size of the market, can induce development. In his view, the best way to improve productivity was division of labor: one is more productive if one concentrates on one thing than if one tries to do several. One can acquire whatever one does not produce from others who concentrate on other things. The degree of the division of labor is proportional to the size of the market, which makes all factors limiting the extension of the market – such as transportation costs, or the likes of non-tariff barriers to trade – obstacles to development.²⁸

The Smithian story of development can easily be continued: urbanization created a feedback process in the sense that large markets where wealthy merchants were located attracted artisans and fueled a second wave of specialization and division of labor. Craftsmen

²⁶ In contrast, according to Lipsey et al. (2005), the development of science, mainly Newtonian mechanics was a necessary precondition for the BIR: “Indeed, it does not seem an overstatement to say that Newtonian mechanics provided the intellectual basis for the First Industrial Revolution, which in its two stages, was almost wholly mechanical” (Lipsey et al. 2005:241).

²⁷ In many cases the first successful applications of the new techniques appeared in Britain. Among these the most remarkable were gas-lighting, chlorine bleaching, the Jacquard loom and the Robert continuous paper-making machine. See Mokyr (2005a).

²⁸ Note that Smith was well acquainted with some of the institutional foundations of development, too: “... commerce and manufactures gradually introduced order and good government, and with them, the liberty and security of the individuals” (Smith 1776, Book 3, Chapter 4, <http://www.marxists.org/reference/archive/smith-adam/works/wealth-of-nations/book03/ch04.htm>).

were attracted by other craftsmen, they could share some costs of production, provide protection to each other via the creation of guilds, and they could also complement each other. So as the urban population increased, the possibilities for division of labor increased as well.

The division of labor was not the only cause of growth in the pre-modern era, of course. What is clearly missing from the above account of pre-modern progress is an explanation of innovation. On the other hand, the virtuous cycle described above seldom worked so well; there were numerous bottlenecks such as barriers to trade or contractual insecurities.

Acemoglu et al. (2005b) also placed emphasis on markets in inducing growth by offering an explanation for Europe's rise based on the interaction between Atlantic trade and medieval political institutions. They suggest that Atlantic trade – the opening of the sea routes to the New World, Africa, and Asia and the building of colonial empires – contributed to European growth between 1500 and 1850 through an indirect institutional channel as well as via direct effects. Their hypothesis is that Atlantic trade generated large profits for commercial interests in favor of institutional change in countries that met two crucial preconditions: easy access to the Atlantic and non-absolutist initial institutions. (England and the Netherlands were the two examples of such countries.) Here Atlantic trade provided substantial profits and altered the balance of political power by enriching and strengthening commercial interests outside the royal circle, which enabled them to demand and obtain the institutional changes necessary for economic growth. This group could then demand and obtain significant institutional reforms protecting their property rights. These merchants also received strong support from Whigs who sought to constrain the king (see also section 2.1.2).²⁹

Opposing the Atlantic trade argument to a certain extent, Greasle and Oxley (1998), utilizing two types of robust cointegration-based causality tests, argue that domestic forces, notably technological progress, shaped the industrial revolution, whereas overseas trade expansion was mainly a consequence of industrial growth. They investigate Granger-causality between industrial production, and population, real wages, overseas trade, and technological activity for Britain during the period 1780-1851. Basically, they find that the origins of the BRI seem to lie within the domestic market: what was distinctive about the British marketplace in the period 1780 to 1851 was a conjunction of critical real wage, population, and technological creativity levels. To the extent that the first industrial revolution offers a template, exports appear not to provide a simple pathway to industrialization.

Another weak point of Acemoglu et al. (2005b) is emphasized by Wagener (2009:312) who says that “the restriction to Atlantic long distance trade leaves unmentioned the much earlier, also sea-bound development of Italy with Genoa, Venice, and Pisa and of Flanders with Brugge, Antwerp, and Gent and the rise of the Hanse league of towns”. Also unmentioned is the catching-up of the West European interior regions that was only delayed by the higher transportation costs. So probably access to the Atlantic alone is not enough to explain the British development.

Markets are also at the heart of an explanation for the BIR in Allen (2001, 2009), but for completely different reasons to the above. Allen argues that the success of Britain originated from markets, or to be more precise, from commercial gains. As he emphasizes, the success of markets created a structure of wages and prices that differentiated Britain from the Continent. More specifically, in Britain wages were high, and energy was cheap, which were the fundamental reasons for technological breakthroughs in the 18th century.

²⁹ Ferreira, Pessôa, and Santos (2010) show in their model that without trade one cannot fully explain the Industrial Revolution, although their model is not about providing an explanation for why the Industrial Revolution happened in Britain. The reason for this in their two-sector model is very simple: without international commerce England would not be able to shift resources to the production of manufacturing goods at the rate one observes in the data.

The underlying assumption of Allen is that technology was invented by people to make money, and inventions were investments where future profits had to offset current cost. So inventors in Britain were led to invent machines that substituted energy and capital for labor. The market was important for that because the balance between the profits and costs of an invention depended on the size of its market. Briefly, British inventions were biased: they were labor saving and capital using. Accordingly, cost reductions were greater in Britain than in the Continent, so the new technologies were adopted in Britain and not in the Continent.

So, in Allen's (2009) framework invention is considered an economic activity, the character and pace of which depended on factors that affected profits and prices. The conclusion is that the famous inventions of the industrial revolution were made in Britain because they were profitable only in Britain (under British conditions). In his account, the favorable legal framework and culture were also attributable to commercial roots.

The market is a key institution in Zanden (2008, 2009) as well, but he considers another aspect of the market critical, namely the extent of market integration. While he does not focus on England, but on Western Europe, when analyzing efficient institutions which developed in the Middle Ages³⁰, his results shed some light on the British case, too. What he emphasizes is the extent of market integration in an economy and the depth and breadth of factor markets, while bearing in mind the assumption that efficient institutions reduce transaction costs, and therefore lead to high levels of market integration and dense markets. As direct measures of market integration he uses the variability of (annual) prices and the convergence of prices. The variability of prices reflects the extent to which markets are able to cushion shocks via trade: generally, there is low variability in market systems with low transaction costs and high volumes of trade. He finds empirical evidence for Europe's advantage in terms of both market integration and the prevalence of dense factor markets. Since England was not the only case for such evidence, Zanden (2008, 2009) cannot explain the Little Divergence.

More recently, Desmet and Parente (2009) by bearing in mind different mechanisms also pointed to the role of the markets in inducing the Industrial Revolution. While their model is a formal one, and their emphasis is not purely institutional, they clearly attach significance to the market mechanism as such. The novelty of their paper lies in the mechanism by which larger markets bring about the BIR, rather than in the idea that an expansion of markets is critical.

In their theory a gradual expansion of the market, coupled with an increasing variety of consumer goods and growing firm size, sows the seeds for process innovation, which allows the economy to move from Malthusian stagnation to modern growth. They show that their theory is empirically plausible by deriving its quantitative implications in a model calibrated to the historical record of England over the period 1300-2000.

The model works as follows. The subsistence constraint, together with low initial agricultural productivity, implies that the economy starts off with most of its population employed in agriculture. Given that so few people live and work in the city and given the fixed operating cost, only a small number of industrial varieties are produced, implying that goods are not particularly substitutable. Mark-ups are high, and hence, firms are small. As a result, firms do not find it profitable to incur the fixed costs of innovation. However, during this Malthusian phase with stagnant living standards, exogenous increases in agricultural TFP allow for increases in the population and a larger urban base. Eventually, the population reaches a critical size, making industrial firms sufficiently large to warrant process innovation. At this point, firms endogenously lower their marginal costs, and hence, an industrial revolution ensues. While the size of the market depends on a country's total

³⁰ Zanden joins those scholars who argue that the BIR could be interpreted as the culmination of a process of economic expansion begun in the Middle Ages (see footnote 3).

population, it is also affected by transportation costs, internal and external trade barriers, and other institutions.

Basically, Desmet and Parente's (2009) theory on how markets lead to modern growth is a Smithian one in the sense that the extent of the market plays a critical role in inducing an industrial revolution, although the mechanism behind the extension of the market is different from the division of labor.

3. Informal institutions, culture

A conclusion from the above is that the formal institutions were favorable for inventors and entrepreneurs, but secure property rights, the rule of law, the constraints on the executive, and patents in themselves were not sufficient to induce major technological changes. Informal institutions and more particularly, culture played a crucial role. Despite the significant role attributed to norms and ideology in early work on institutions (e.g., North 1981), the economics literature has only recently come to view culture³¹ as of similar importance (e.g., Guiso et al. 2006, Tabellini 2008).

The latest research by Mokyr (2010b, 2008) sheds particular light on the overwhelming role of informal institutions, including culture, in which Britain's configuration was unique. According to him, at the level of embeddedness³², "cultural beliefs" created an environment in which inventors and entrepreneurs could operate. This is about recognizing the importance of accepted codes of behavior, patterns of beliefs, trust, etc., that is, informal institutions that channel creativity into productive activities.³³ In fact, according to him, what was unique in Britain was the growth of a set of these social norms beyond the rule of law and explicit penalties for opportunistic behavior. The development of such behavioral rules can be to a large extent attributable to the Enlightenment which made productive activity as such more attractive relative to rent-seeking.³⁴ Mokyr (2008) argues that in eighteenth century Britain such institutions played a major role in allowing markets to operate and also helped Britain take the technological lead: in Britain, more than anywhere else, informal institutions were becoming more favorably disposed toward technologically innovative entrepreneurship.

It may come as a surprise, but formal law enforcement was a last resort in Britain; markets functioned well because of the above-mentioned informal rules (Mokyr 2008). The key to successful economic exchanges was not necessarily impartial and efficient third-party enforcement, but precisely the existence of a level of trust or other self-enforcing institutions that supported free-market activities. Within a circle of commerce, finance and manufacturing, trust relations and private settlement of disputes prevailed over third party enforcement. Most business was conducted on informal codes and relied on reputation; voluntary compliance, respect for property (private-order institutions) was important in Britain. These norms involved a variety of devices associated with "gentlemanly" behavior.³⁵

³¹ The notion of culture here is the one now common in the economics literature and consistent with that accepted in cultural anthropology: values or beliefs that are socially transmitted through teaching or imitation, within a pre-defined group of individuals.

³² See Williamson (2000) to identify the hierarchy of institutions.

³³ The origin of the view that culture, or broadly speaking, informal institutions play an important role in development can be found in Weber's (1930) theory: he traced back the transition to rapid modern economic growth to a transformation of the motivation structure triggered by the Reformation. According to him, the spirit of capitalism follows from the protestant ethic.

³⁴ Mokyr (2005b, 2006) provides a detailed analysis of the role of the Enlightenment in sustained economic growth.

³⁵ Note, however, that these norms applied only to the "middle class" that emerged before 1760 and included intelligent and well-educated people.

The idea of being a “gentleman” has acquired a meaning of behavioral codes that signaled that a person was trustworthy. People who felt constrained by the gentlemanly code of behavior behaved honorably, kept their word and did not renege on promises. This behavior made it possible to overcome the kind of free riding and opportunistic behavior that seem to require coercion by formal state institutions. As shown by Mokyr (2010b) a primary example of the operation of gentlemanly codes was the 18th century credit market in Britain. Credit markets depended on a set of self-enforcing codes framed by norms of gentlemanly conduct. This credit market was primarily enforced by reputational mechanisms; accordingly commercial disputes rarely came before the courts and were often settled through private arbitration.³⁶

Briefly, based on Mokyr’s analyses, informal rules were even more important than formal rules. What mattered was that within the merchant and artisan classes there existed a level of trust that made it possible to transact with non-kin.³⁷ Thus it can be argued that such informal institutions led to the emergence of a small, but significant economic elite that carried the BIR.

Having said that, the question of how the middle classes gained ground vis-à-vis aristocrats still remains. In an innovative paper, Doepke and Zilibotti (2007) argue that the rise of a bourgeois elite in industrializing Britain may be regarded as a surprise. Before the transformation got under way, aristocrats had all the odds stacked in their favor – available funds, political connections, access to education. Despite this fact only a few members of the old political elite actually got rich through manufacturing after 1750. Doepke and Zilibotti argue that this is because the middle classes had accumulated a larger stock of “patience capital”, that is, a host of cultural practices and norms that make the delay of immediate gratification accepted and expected. Over centuries, the middle class built up both financial capital and valuable cultural traits. As the new technologies of the Industrial Revolution suddenly offered greater returns to patience, the groups best-placed to exploit them were not the elite but the middle classes. Those people who acquired “patience capital” - which was the kind of culture that played a central role in the subsequent development of capitalist industrialism - became key figures in British society.

The above insights are given emphasis in McCloskey (2006) as well, although she focuses on another aspect of culture, which she refers to as ‘bourgeois virtues’ that developed in the West and are the following: Hope (optimism, entrepreneurship), Faith (identity, integrity, loyalty, honesty), Love (benevolence, friendship, agape), Justice (social balance and honesty), Courage (autonomy, daring, endurance), Temperance (individual balance and restraint, humility), Prudence (know-how, foresight, phronesis). As she carefully explains, all these virtues are beneficial for the development of capitalism. Of course, McCloskey’s focus is not only on England, but – bearing in mind the close connection between Weber’s protestant ethic and the bourgeois virtues – England was probably a pioneering country in exhibiting these virtues.

The view that culture was crucial in England’s development is given empirical evidence in a recent paper by Murrell and Schmidt (2011). They investigate the relationship between culture and formal institutions in 17th-century England. For the institutional variables, they use reports on 17th-century court decisions. Their cultural variables reflect data on word usage in a catalog of publications (books, pamphlets, etc) from the seventeenth century, the *English*

³⁶ Zanden (2009) also argues that low interest rates are the proof of trust in markets. He also shows that the interest rate in Western Europe was low as compared to other regions of the world, which was an essential precondition for the dynamic economic development of Western Europe after the BIR.

³⁷ What also mattered from this point of view was the fact that the British nation witnessed a blossoming of voluntary organizations (e.g., clubs) that created linkages supporting market activity. This was a kind of social network. For a detailed overview see Mokyr (2010b, 2008).

Short Title Catalogue. They try to capture the diffusion of a “Whig” political culture, which emphasized the virtues of freedom and the necessity of constraints on the monarchy.

They find a gradual cultural development over the whole time period (1559-1714). They also find that until 1640 the diffusion of Whig culture is limited, but then there is dramatic change with over half of the cultural diffusion completed by 1660 (see Figure 5). The process of cultural change was therefore largely completed in the years before the Bill of Rights of 1689 and the Act of Settlement of 1701, the two major pieces of constitutional legislation.

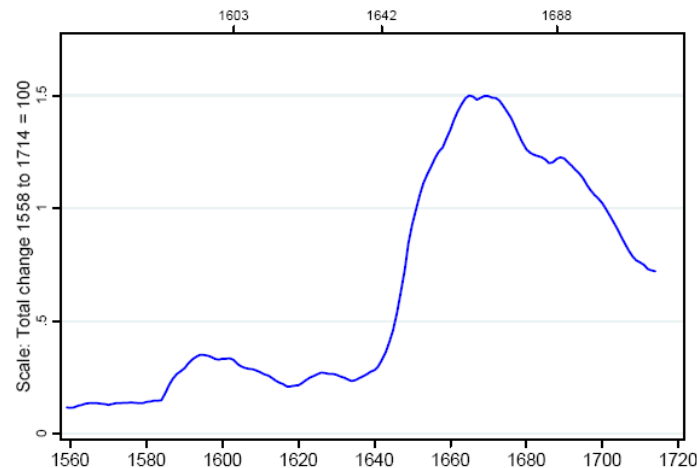


Figure 5: Yearly changes in the importance of “Whig” culture in England, 1558-1714
(source: Murrell and Schmidt 2011:44)

Since Murrell and Schmidt (2011) have yearly data from 1559 to 1714, they apply standard time-series methods to analyze interactions between cultural diffusion and institutional development. They use a vector error correction model, which relates changes in culture and institutions to each other and to deviations of each from their long-run relationships. The results suggest that culture and case-law institutions co-evolve but that statute law is a product of the other two. This co-evolutionary process is shown in Figure 6.

In sum, in Murrell and Schmidt’s (2011) empirical analysis culture seems fundamental to the development of formal institutions, spurring direct changes in case law and indirect changes in statute law (in the longer term).

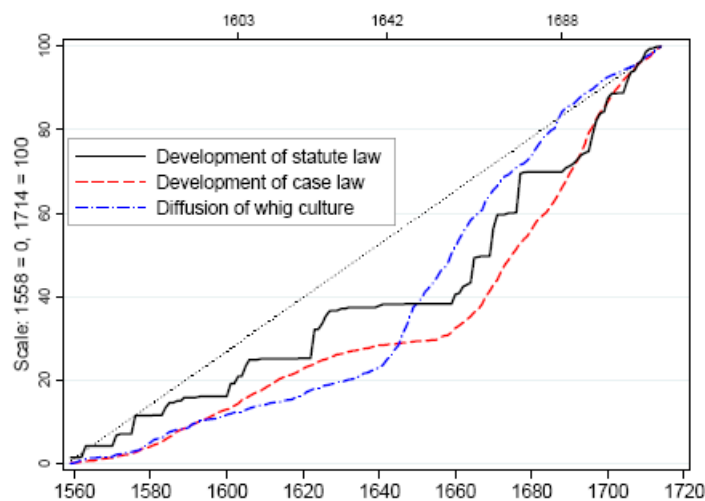


Figure 6: Institutional development and cultural diffusion, England 1559-1714
(source: Murrell and Schmidt 2011:46)

A conclusion of this section is that England's uniqueness in informal institutions was favorable to an industrial revolution; that is, modern growth is almost unanimously accepted and proved by various scholars, although England's uniqueness in industrial revolution-favoring formal institutions is much more doubtful. This may suggest that a perspective which takes into account the co-evolution of formal and informal institutions would be more fruitful in answering the "why in England" question.

4. An umbrella view: England's shift from limited access order to open access order

The above overview of the literature on the institutional causes of the BIR has summarized its major positions, and clearly shows that each focuses only on one particular institution. The view that the ruler was efficiently constrained in England, signifying the protection of private property from the predatory tendencies of a monarch is commonly held in the literature. As discussed above, North and Weingast (1989) argued that this was due to the Glorious Revolution, more precisely to the Parliament after 1688, while others (e.g., Mokyr and Voth 2010, Murrell 2009, Clark 1996) doubt the significance of 1688 and argue that the constraints on monarchs were real enough before 1688.

The culture view can also be weakened by those who seek to make culture endogenous to economic institutions (e.g., Aoki 2007). According to them, beliefs and values are simply elements of institutions; there is no analytical distinction between formal legal rules, informal social customs, and inward beliefs and values. These perspectives, which derive from a certain game-theoretical approach, define institutions as endogenous and self-enforcing.

Without recalling all the theories mentioned above, one can argue that the above-discussed theories centering on a given institution in the explanation for such a complex problem as the "why in Britain" question can be questioned on at least two grounds. One is whether England was really unique in the particular institution emphasized by the theory. Bearing in mind for instance the Atlantic trade argument, it is clear that other countries also opened markets towards new territories, not only England. As for patent law, as mentioned above, the Continent also had a similar patent law to England. The other ground on which one can question certain theories is whether the particular institution in which England was unique really did cause the industrial revolution. Here let me recall once again the debate on the importance of Parliament after the Glorious Revolution: many researchers have provided evidence that the commitment of the government was not enough to induce the industrial revolution.

To arrive at a more accurate institutional account of the BIR one has to take into consideration certain requirements. In my view, there are at least three requirements that any theory of institutions must meet. The first is the recognition that any institution does many things and that it is doubtful that we can really separate one function of an institution from the others (see Ogilvie 2007). The second is the recognition of the importance of the self-sustaining character of the institutional framework. Thirdly, we have to admit that there are inherent complementarities between certain institutions, and that a whole cluster of institutions may be mutually reinforcing, so we cannot study one institution in isolation. As explained by Williamson (2000) various institutions are related to and depend on each other, where the direction and the concrete form of the dependence are determined by a hierarchy of institutions. For our concerns here, it means that the norms, beliefs and culture, that is, informal institutions at the level of embeddedness, pose a constraint on the political and legal (formal) institutions at the level below, but some feedback mechanisms operate as well, allowing in this way a kind of co-evolutionary process to take place in institutional changes (see also Hayek 1960).

I believe that the theory of social order developed by North et al. (2009), emphasizing the co-evolution of institutions, offers a new and convincing framework for understanding how institutional changes led to an industrial revolution, and accordingly sustained growth in England. The pre-industrial-revolution economy in particular was characterized by “limited-access” institutions that coercively limited economic entry to valuable resources and organizations in order to create rents for the powerful elites, while excluding the vast mass of economic agents.

In the light of the theory of North et al. (2009) what really happened in Britain in the 18th century – and this was precisely the uniqueness of Britain – was the transition from a limited access order (called also a natural state) to an open access order that relies on competition and open access to form organizations both in the political and economic systems. England’s transition in the 18th century from a limited access order to an open access order represented a fundamental change in the broad institutional setting, embodying a particular mix of political, legal and economic institutions. This means that only a particular constellation of various institutions (social order in terms of North et al.) was appropriate for an industrial revolution, and here England was unique as compared to the Continental countries. Put differently, the institutional uniqueness of Britain consisted in the emergence of open access social order institutions, which, in turn, led to modern growth.

Thus, the major question is how and why a transition to the open access order was initiated in the limited access order-England. In this respect, North et al. (2009) argue that the transition was (and had to be) consistent with the logic of the natural state. So, basically the crucial question is why elites transformed their universal privileges into impersonal rights shared equally among elites?

To answer this question, one has to understand the process that evolved in England over several centuries in which the rule of law, and particularly its major characteristic, *impersonality*, solidified by numerous “good” institutions became the standard. This evolutionary process is brilliantly described, among others, by Hayek (1960) and Glaeser and Shleifer (2002).

The rule of law requires laws that apply equally to all citizens and judicial systems that apply the laws impartially (Hayek 1960). *Impersonality*, i.e., treating everyone the same without regard to their individual identity, is the underlying institution in this (Wallis 2011). Wallis (2011) argues that impersonal relationships occur when two individuals interact in a way that does not depend on their personal identity, irrespective of whether they are personally known to each other or not. He clearly separates it from an *anonymous* relationship. Anonymous exchange refers to situations where people who are not personally known to each other interact, although the actors know the social identity (or the group, organization, tribe, city, etc.) of the other in the relationship. Anonymous exchange explicitly does not require people be treated the same, as the actors are constrained by kinship ties, etc.

As explained by Wallis (2011) in detail, natural states create organizations that make anonymous relationships sustainable on a large scale, but impersonality exclusively underpins open access societies.

The evolution of impersonality in England is very much related to the evolution of land ownership, as is shown in North et al. (2009). Land ownership was special in England, and it played a major role in the transition to open access society. English land law is one example of how the rule of law for elites may develop.

In English land law, the freeholder was an impersonal category based on land tenure that granted all freeholders the right to use the king’s court and the right to vote (if they had enough land). Once all elite landowners possessed the same rights (inheritance rights and the right to devise by will), the elite had the interest to protect these rights. By the end of the 16th century ownership rights in land were relatively secure and impersonal in England, and by the

end of the 17th century organizations associated with land and landownership had been moved outside the immediate control of the state. So, the evolution of land ownership clearly points to how elites found it in their interest to support and obey the rules impartially.

A second factor that contributed to the rise of impersonal rules was free entry to form organizations. England began chartering joint-stocks companies in the mid 16th century, the largest of which engaged in overseas trade and colonization: The Russia Company (1553), The Virginia Company (1606), The East India Company, The Africa Company, The Massachusetts Bay Company, The Hudson Bay Company. These were all natural state creations, i.e., organizations controlled by the elites. However, in parallel with the rise of commercial and trading interests many of the new rules sought by the commercial constituency were in the form of greater rights and impersonality. In this way, elites found it in their interest to support free entry because they always had greater fear of each other than of the rest of the population. That is, at a certain point elites found themselves in a position of supporting free trade and entrepreneurship. This process, including mutually reinforcing incremental institutional changes³⁸, prepared England to be the first to meet the doorstep conditions³⁹ that created the possibility for impersonal elite relationships, and accordingly transformed England from a limited access order into an open access order.

To sum up, what was special and unique in England was an evolutionary process which, for the first time in history, transformed a limited access to an open access society. This complex institutional change led, in turn, to the BIR which was feasible only in the institutional context present at that time in England. In this sense no single institution was responsible for the BIR, but rather the integrity of formal and informal institutions. The evolutionary view that modern growth in England is due to processes started earlier than 1688 and decades before the Glorious Revolution is given empirical evidence as well, for instance in Kishtainy (2011). All this suggests that the BIR, i.e., the emergence of modern economic growth in England may have had deep roots.

³⁸ Open access to organizations transformed the nature of political and economic competition.

³⁹ These are as follows: (1) the rule of law for elites, (2) perpetually lived organizations in the public and private spheres, and (3) consolidated control of the military.

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