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Why Was Technological Advance So Slow before 1800?

This is one of the great puzzles of world history, in the light of what came after 1800. What makes it so puzzling in part is that preindustrial societies differed from each other in every conceivable way socially and institutionally. Christian Europe had a horror of incest. In Roman Egypt the preferred marriage partner was a sibling. Christian Europe embraced alcohol with fervor and relish, and in good times its people consumed enormous quantities. The Muslim world abhorred it. Animal flesh was eaten with gusto in Europe. In Hindu India all but the sinful and debased avoided it. The Europeans in turn were horrified by the Aztec practice of eating the flesh of dead enemies.

Yet despite the bewildering variety of cultures and institutions, all these societies had one thing in common: the production technology improved very slowly. Indeed there were periods of regression as well as advance. But in general the drift was inexorably upward, so that cumulatively, over millennia, enormous advances occurred. A growing world population was a powerful and direct testament to these changes, as much as the written and archaeological remains of machines and devices.

But why was a society like England able to achieve modern rates of technological advance only after so many millennia? We will not address this puzzle fully until we discuss the Industrial Revolution itself. There is a common misapprehension that must be corrected first—that before 1800 the institutional framework of societies removed all incentive for people to invest in better technology.

17. Mokyr, 1990.

Clark (2007)

8 Institutions and Growth

Give a man the secure possession of a bleak rock, and he will turn it into a garden. . . . The magic of PROPERTY turns sand to gold.

—Arthur Young (1787)[1]

The popular misconception of the preindustrial world is of a cowering mass of peasants ruled by a small, violent, and stupid upper class that extracted from them all surplus beyond what was needed for subsistence and so gave no incentives for trade, investment, or improvement in technology. These exclusive and moronic ruling classes were aided in their suppression of all enterprise and innovation by organized religions of stultifying orthodoxy, which punished all deviation from established practices as heretical. The trial and condemnation of Galileo Galilei by the Holy Inquisition in 1633, for defending the Copernican view that the earth revolved around the sun (figure 8.1), seems an exemplar of the reign of superstition and prejudice that was responsible for the long Malthusian night.

There may have been societies before 1800 that fit this popular stereotype. There were frequent attempts by religious authorities to impose fallacious dogmas about the natural world. But we shall see that, as an explanation of the slow technological advance of the world as a whole before 1800, the prevailing view makes no sense. It is maintained only by a contemporary variety of dogmatism—that of modern economics and its priestly cast.

The central vision of modern economics, the key message of Adam Smith in 1776 and of his followers, is that people are the same everywhere in their material preferences and aspirations. They behave differently only because of differences in incentives. Given the right incentives—low tax rates on earnings,

1. Young, 1792, July 30, 1787, and November 7, 1787.

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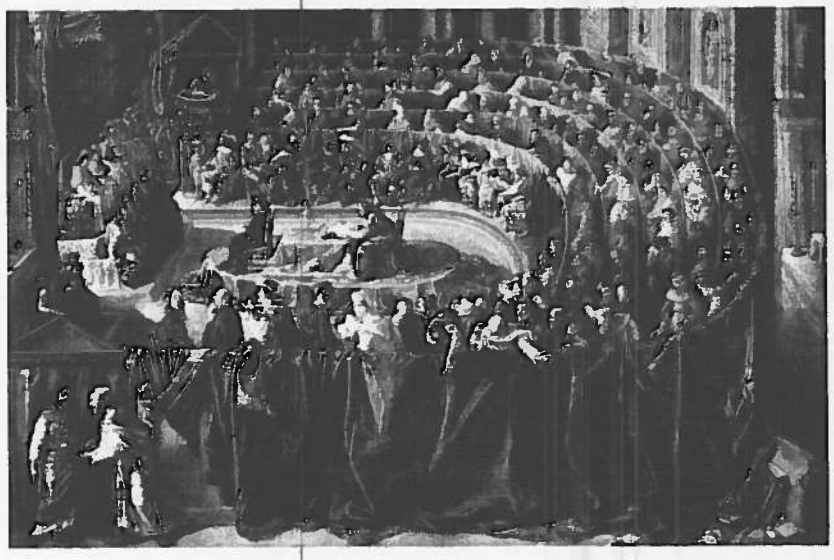

Figure 8.1 The trial of Galileo before the Inquisition, 1633, as portrayed in an anonymous seventeenth-century painting.

security of property and of the person, free markets in goods and labor—growth is guaranteed. The long Malthusian night persisted because of the inability of all societies before 1800 to create such institutions.

This vision of progress permeates the potted history of the world contained in the *Wealth of Nations* of 1776. Smith repeatedly explains the poor economic performance of the preindustrial world as a consequence of institutions that offered poor incentives. His vision permeates contemporary economics, from the practical councils of the International Monetary Fund and the World Bank to the theorists of university economics departments. The so-called *Washington Consensus* of the 1990s on the institutional prerequisites for growth in underdeveloped economies was an elaboration of the Smithian program, one that could have been penned by the master himself. It called for limited taxes and spending, low tax rates, private enterprise wherever possible, liberalized goods and capital markets, and security of property.

In economic history as well, the Smithian vision is the dominant intellectual tradition. Indeed much of modern quantitative economic history has been a search for empirical confirmation of his vision of growth. These empirical studies of past societies, however, rather than confirming Smith's hypothesis, systematically find that many early societies had all the prerequisites for economic growth, but no technological advance and hence no growth. While all societies before 1800 displayed slow rates of technological advance, some had institutions as favorable to economic growth as any the current World Bank could wish for.

Economic historians thus inhabit a strange netherworld. Their days are devoted to proving a vision of progress that all serious empirical studies in the field contradict. Trapped in this ever-tightening intellectual death spiral, they can maintain the vision only though a strange intellectual dissonance, appealing to more and more elaborate conceptions of how early institutions could unwittingly have provided poor incentives.[2]

We shall see below that private property institutions do play an important role in the escape from the Malthusian Trap, but only in a much more long-run and indirect fashion. But first we must clarify that there were preindustrial societies that had most, if not all, of the institutional prerequisites for growth hundreds, and probably thousands, of years before the Industrial Revolution.

Medieval England as an Incentivized Society

Medieval England in the years 1200–1500 experienced little or no overall technological advance, as we saw in figure 7.2. Yet medieval England had extraordinary institutional stability. Most individuals enjoyed great security both of their persons and of their property. Markets for goods, labor, capital, and even land were generally free. Indeed if we were to score medieval England using the criteria typically applied by the International Monetary Fund and the World Bank to evaluate the strength of economic incentives, it would rank much higher than all modern high-income economies—including modern England.

Table 8.1 gives a rough scoring of England on these criteria in 1300 and 2000, the details of which are supplied below. For five of the twelve criteria, the medieval economy had better institutions than the modern. For another five they were equivalent. There were only two out of twelve criteria according to which the medieval economy may have been worst.

2. See, for example, Greif, 2006.

Table 8.1 The Incentives of Medieval versus Modern England

Economic desiderata	1300	2000
Low tax rates	Yes	No
Modest social transfers	Yes	No
Stable money	Yes	No
Low public debt	Yes	No
Security of property	Yes	Yes
Security of the person	?	Yes
Social mobility	Yes	Yes
Free goods markets	Yes	Yes
Free labor markets	Yes	Yes
Free capital markets	Yes	Yes
Free land markets	Yes	No
Rewards for knowledge creation	?	Yes

Taxation

Preindustrial societies were generally low-tax societies. England, in particular, was an extremely lightly taxed nation. Figure 8.2 shows all government expenditures, both central and local, by year as a function of GNP from 1285 to 2000.[3] Before the Glorious Revolution of 1688–89, which established the modern constitutional democracy of Britain, government expenditures of all types were extremely modest. In the years 1600–88 these averaged just 2.2 percent of national income. Before the sixteenth century these expenditures were typically less than 1.5 percent of national income.

Before 1689 attempts by the king to increase his take were vigorously resisted. Thus the Poll Tax of 1380—which triggered a brief but widespread rebellion in which the rebels captured London and killed the archbishop of Canterbury and the king's chancellor—was a temporary war tax on all adult

3. Expenditures, rather than taxes, are used since the government in the years 1720–1815 resorted to large-scale issue of debt to fund itself. But debt is just deferred taxes and so should have the same disincentive effect.

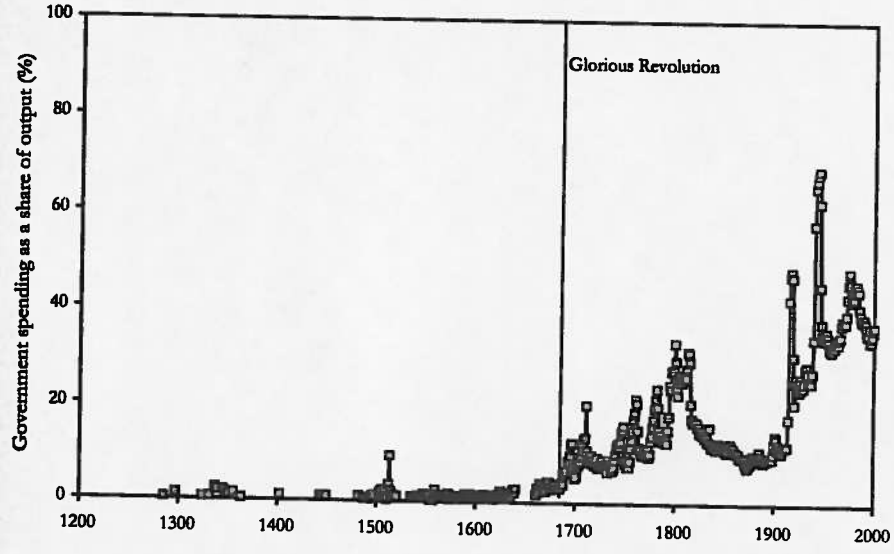

Figure 8.2 Government command of output as a percentage of GNP in England, 1285–2000.

males in England, equivalent to 1 percent of a laborer's annual earnings.[4] After this reaction no English government attempted a poll tax again, until the similarly ill-fated venture of Prime Minister Margaret Thatcher in 1990.

The Glorious Revolution had an immediate negative effect in raising government taxes and expenditures. Expenditures quickly rose to more than 10 percent of output, a level they have exceeded ever since. This spending was almost all for warfare. The share of government expenditures in national income has continued, with fluctuations, to rise to the present day. By the 1990s government expenditures constituted 36 percent of U.K. national income.

Yet the citizens of the United Kingdom are modestly taxed relative to those in other modern, high-income economies. A measure of the tax burden that is more directly geared to the disincentives to work implied in the tax system is the marginal total tax rate: the share of the last dollar in wages taken by the government, counting all forms of taxation including employers' contributions and sales taxes. Table 8.2 shows this rate for the average wage earner in a selection of economies in 2000, arranged in decreasing order of the take. This tax rate varied from 66 percent in Belgium to 32 percent in Japan.

4. The tax was 12 pence, about three times a farm laborer's day wage.

Table 8.2 Taxes and Government Spending by Country

Country	Marginal tax rate, 2000 (%)	Social spending as percentage of GNP, 1995	Hours of market employment per adult, 2000
Belgium	66	32	954
Germany	65	29	1,010
France	56	33	1,003
Italy	53	28	1,139
Ireland	53	23	1,240
Netherlands	51	30	1,037
Sweden	49	40	1,189
Denmark	49	37	1,220
Spain	46	25	1,146
United Kingdom	41	27	1,245
United States	34	19	1,364
Japan	32	16	1,312

Sources: Social spending from Lindert, 2004, 177–78, 236–37. Marginal tax rates from Organisation for Economic Co-operation and Development, Tax Database. Hours worked and population aged 20–64 from Organisation for Economic Co-operation and Development, Productivity Database.

Most of the money collected in taxes is used either to provide goods and services available to all, regardless of their income, or for transfers to those with low earnings.[5] The publicly provided common goods include complete or partial support for highways, law and order, defense, child care, education, health care, and the component of old age pensions not indexed to earnings. The third column of table 8.2 shows such social spending as a share of GDP in the same economies in 1995.

A system of high taxes on economic activity, combined with generous provision of income and services independent of effort, is precisely what the Washington Consensus would fear as a barrier to effort and initiative. The rational, self-interested individuals of the Smithian conception, facing such high marginal tax rates, should have produced significant declines in work hours. Indeed, based on the Smithian conception, it is not clear why economic

5. Some of the taxes on wages do fund pensions that are dependent in size on the earnings of the recipient, but this is less common.

Figure 8.3 Inland Revenue inquiry center, Mill Hill, London.

activity has not completely ground to a halt. The taxation systems of preindustrial economies like medieval England—which typically returned none of the income collected to consumers in the form of social services or transfers—should have discouraged individual initiative to a lesser extent than modern tax and transfer schemes.[6] Modern Europe may have no equivalent of the Inquisition, such as Galileo faced, yet it does have taxation systems that intrude just as shockingly into the lives of its citizens (figure 8.3).

These data suggest two things: If incentives are the key to growth, then some preindustrial societies like England had better incentives than modern high-income economies. And incentives may be much less important to explaining the level of output in economies than the Smithian vision assumes.

The last column of table 8.2 shows hours worked per person aged 20–64 in the same economies. Figure 8.4 shows how this correlates with the marginal tax rate for a larger group of economies within the Organisation for Economic Co-operation and Development (OECD), in which currently reported marginal tax rates vary between 20 and nearly 80 percent. There is a

6. A government that taxes wages and wastes the gains simply reduces the wages of everyone. But there is little sign within societies that work hours decline when wages are lower. A government that taxes and then redistributes the gains to all, regardless of work input, can eventually tax sufficiently to induce lower work hours.

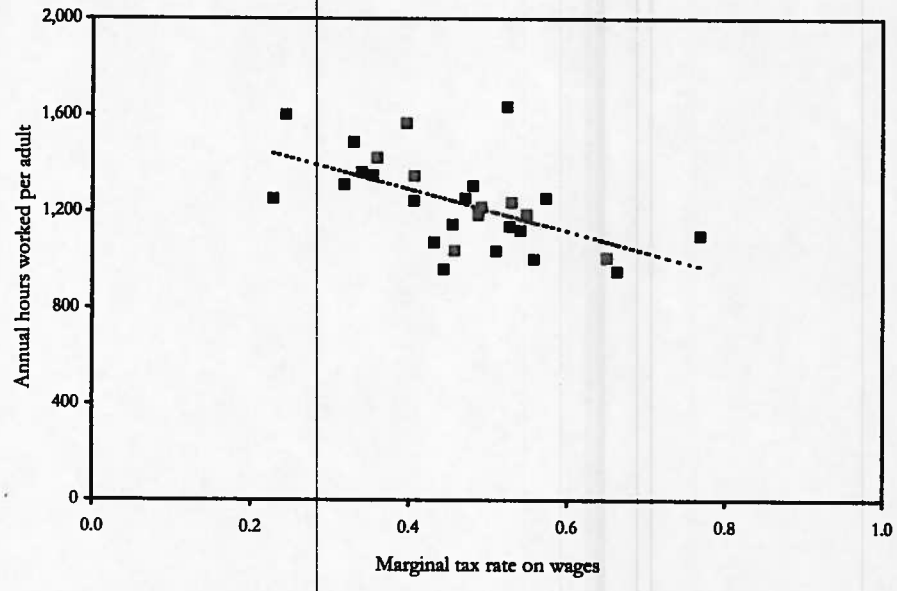

Figure 8.4 Hours worked per person aged 20–64 versus the marginal wage tax rate. Sources as for table 8.2.

negative correlation of hours and tax rates, but the effect is surprisingly modest. Average hours per adult are about 1,400 at a marginal tax rate of 20 percent on wages and 1,000 at a marginal tax rate of 70 percent.[7] In addition the effect on actual hours worked may be much less than on hours reported. High marginal tax rates have the effect of pushing workers into the undocumented "black" economy. The correlation between documented hours and tax rates may just reflect this substitution.[8]

Thus if for this same group of economies we graph marginal tax rates against income per adult, as is done in figure 8.5, we actually find a positive correlation. This has been dubbed by Peter Lindert the "free lunch paradox."[9] Surprisingly there is no evidence that the heavy taxes and transfers of modern states have any effect on output.

7. Edward Prescott, looking at changes over time in hours worked and tax rates, finds a much more significant effect; Prescott, 2004.

8. A recent survey estimated that such economic activity now constitutes as much as 18 percent of output in high-tax European economies. For example, 24–30 percent of Italian GDP was estimated to be produced in this way in 1990–93; Schneider and Enste, 2000, 80.

9. Lindert, 2004.

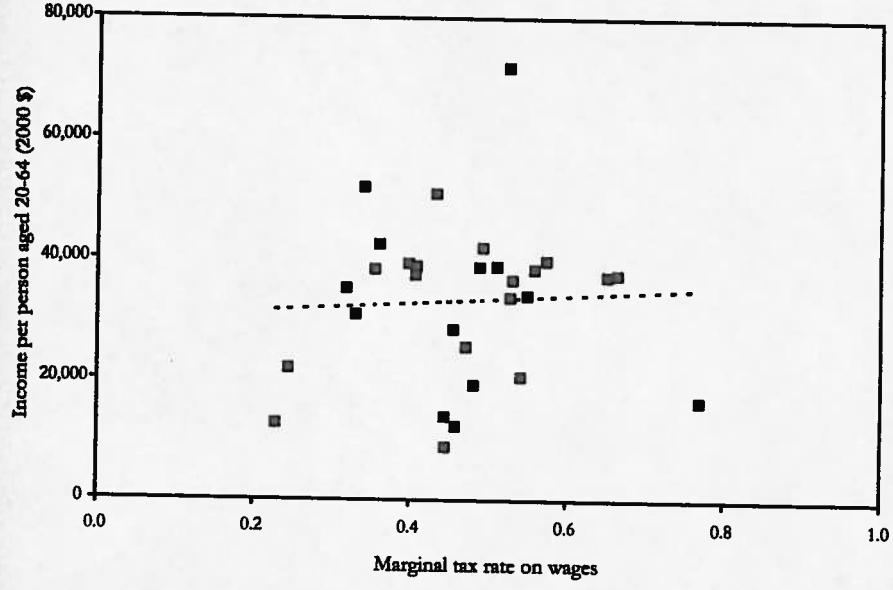

Figure 8.5 Income per person aged 20–64 versus the marginal wage tax rate. Income is GDP given in 2000 dollars in the Penn World Tables.

The expenditure shares for England before 1837 in figure 8.2 report just the activities of governments at various levels. In the preindustrial period in Europe the church was another important extorter of income, in the form of the tithe.

The tithe was theoretically 10 percent of gross output. If it had been collected in full the church would have received as much as 15 percent of the net agricultural income in the years before 1800, since some of the grain output had to be used as seed for the next year. However, the difficulties of collecting the tithe in kind, particularly on animal products, led to tithe owners collecting at a much lower rate. Tithe collections before 1800 averaged only 11 percent of land rents or 4 percent of farm output. So tithe income in preindustrial England was likely less than 4 percent of national income.[10]

Thus even allowing for the additional taxing power of the church, all taxes collected in preindustrial England before the Glorious Revolution were typically less than 6 percent of income.

10. Clark, 2002a.

Table 8.3 Share of Preindustrial Income Collected in Taxes

Country	Period	All taxes (including church) (%)
England	1285–1688	6
	1689–1800	14
China[a]	Ming, ca. 1550	6–8
	Qing, ca. 1650	4–8
	Qing, ca. 1750	8
Ottoman Empire[b]	1500–99	3.5
	1600–99	3.5
	1700–99	4.5

Sources: [a]Feuerwerker, 1984. [b]Pamuk, 2005, graph 1, central government only.

England is typical of other preindustrial societies in which we can estimate the share of taxes in all income. As table 8.3 shows, estimates for late Imperial China and for the Ottoman Empire suggest similarly low tax rates.

One reason why taxes were so light in preindustrial agrarian societies was that the ruling class had a rich source of income without resorting to taxation: land ownership. As figure 7.4 showed for England land rents accounted for about 20 percent of income. In England by 1300 most of the land owned by the ruling class was either leased out to tenants on a commercial basis or held by tenants on fixed-rent leases with hereditary rights.

Price Stability

Money, the use of tokens that carry value, is an institution of great value to any society. The percentage cost of holding a given stock of money per year is the nominal interest rate, which is the real interest rate plus the inflation rate. If you hold an average of $100 in your wallet, the real interest rate is 3 percent, and the inflation rate is 2 percent, then the annual cost of holding money, as opposed to some real asset like land, is $5. This cost leads people to economize on how large a cash balance they hold, and reduces the value of money in facilitating transactions and storing value. As the inflation rate rises the cost of holding cash becomes greater and so the real size of cash balances declines.

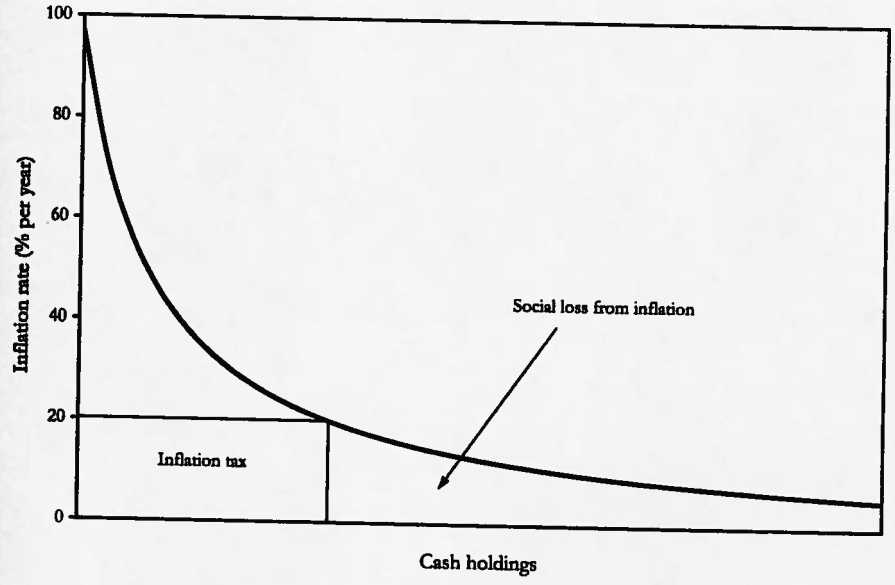

Figure 8.6 Demand for money and social costs of inflation.

Since token monies cost little to create, the optimal inflation rate from a social perspective is always zero or less. That is when money has its maximum value as a medium of exchange and a store of value. However, by printing more money and creating inflation, governments can extract an inflation tax from the economy. Thus from a revenue perspective the government would favor a relatively high level of inflation, to the cost of society as a whole.[11] Figure 8.6 shows the disjuncture between a revenue-maximizing government's incentives and the socially best outcome.

The figure shows the demand curve for cash balances as a function of the annual cost of holding money. The *inflation tax* is the area of the rectangle. When the revenue from this tax is maximized there is substantial inflation. This would create a significant social cost, called the *deadweight loss*, from all the uses of money that are now abandoned because of the cost the government has imposed.

11. If the government maintains an inflation rate of π and r is the real interest rate, then the issue of fiat money generates a revenue for the government per year of $(r + \pi)M$, where M is the real (constant value) money stock. rM is what it would cost per year for the government to borrow an amount M. But when $\pi > 0$, the public also has to acquire πM units of new cash each year to maintain their real cash balances.

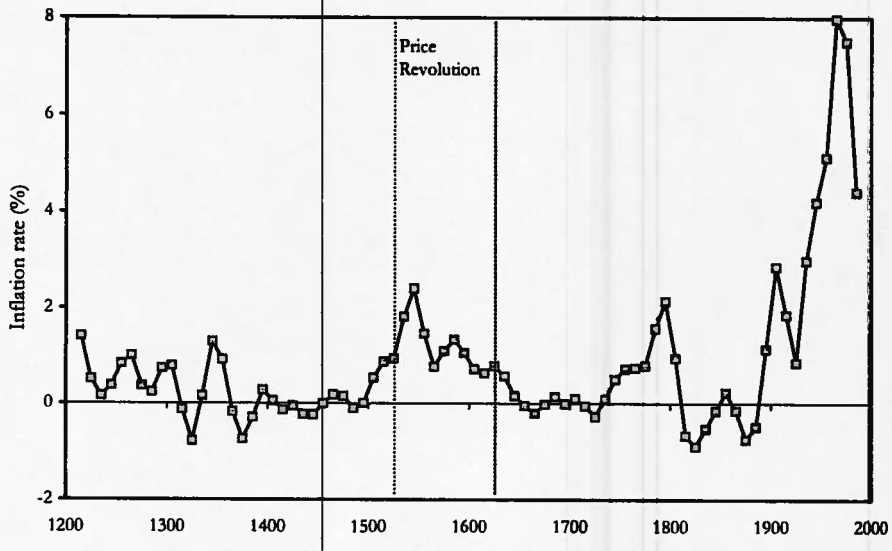

Figure 8.7 Inflation rates by forty-year periods in England, 1200–2000.

Weak modern governments rely heavily on the inflation tax, and many poor countries have been subjected to high inflation rates in recent decades. Inflation rates have also been high in even the richest economies during some periods over the past fifty years. However, in preindustrial England, and indeed in many preindustrial economies, inflation rates were low by modern standards. Figure 8.7 shows the English inflation rate from 1200 to 2000 over successive forty-year intervals. Before 1914 inflation rates rarely exceeded 2 percent per year, even in the period known as the *Price Revolution,* when the influx of silver from the New World helped drive up prices. In a country such as England, which had a highly regarded currency in the preindustrial era, the crown did not avail itself of the inflation tax, despite the close restrictions Parliament placed on its other tax revenues. Only in the twentieth century did significant inflation appear in England. By the late twentieth century annual inflation averaged 4–8 percent per year. Thus there has been a decline, not an improvement, in the quality of monetary management in England since the Industrial Revolution.

Even though there were periods of substantial inflation in some other preindustrial societies, other societies achieved long-run price stability. Thus in Roman Egypt wheat prices roughly doubled between the beginning of the first century AD and the middle of the third.[12] But that reflects an inflation rate of less than 0.3 percent per year.

Public Debt

Another macroeconomic success forced on preindustrial economies by their low tax bases was the general avoidance of extensive public debt. Before the Glorious Revolution English public debt, for example, was minuscule since the government could service with current revenues a debt of, at maximum, less than 10 percent of GDP.

An immediate consequence of the greater taxing power of the government after 1689, however, was an increase in public debt. Figure 8.8 shows the ratio of public debt to GNP for England from 1688 to 2000. The fiscal stresses of the "Second Hundred Years War" with the French saw debt rise by the 1820s to record levels of nearly 2.5 times GNP. Peace and economic growth had reduced the debt relative to GNP by 1914. But the stresses of the wars of the early twentieth century again inflated the debt to 2.5 times GNP by 1950. Since then the debt has declined. But at more than 40 percent of GNP it still substantially exceeds that of England before the Glorious Revolution.

Assuming the public has a limited perception of the level and significance of public debt, it will crowd out private investment, reducing the capital stock, and thus reduce the overall output of societies. An unaware public will not respond when governments finance current expenses with debt, as it would if it were aware and rational, by increasing its savings by the amount of the debt in anticipation of a future greater tax burden. Thus public debt will drive up interest rates and drive out private investments. Jeffrey Williamson, for example, argues that the huge accumulated debt of Britain during the period of the French wars was a major economic policy disaster that substantially slowed growth during the Industrial Revolution.[13]

The average OECD economy now has a public debt of 50–60 percent of GNP—another sign that modern growth has been associated with poorer macroeconomic performance.

12. Duncan-Jones, 1990, 145–55.

13. Williamson, 1984. Since the capital output ratio was typically 4 in the nineteenth century, if the debt of the 1820s reduced private capital on a 1:1 basis, then the capital stock in England would have been half its level in the absence of the public debt.

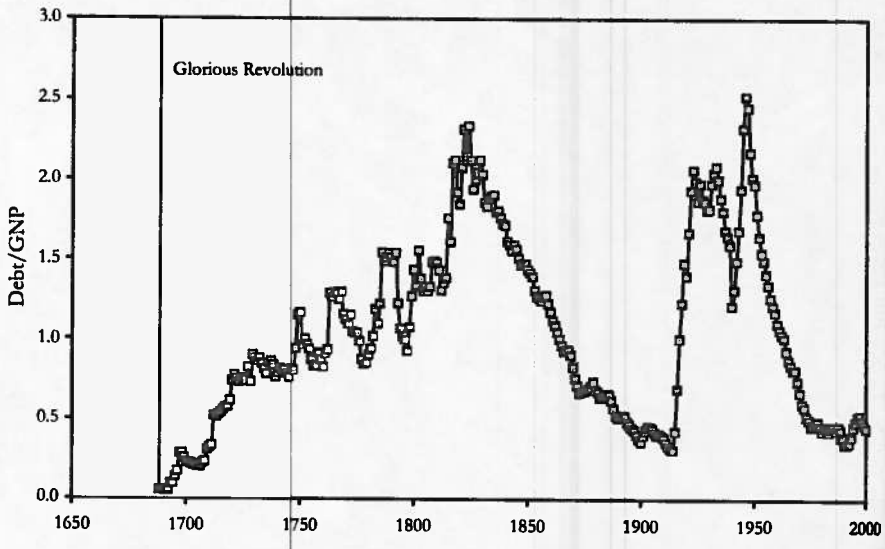

Figure 8.8 Ratio of debt to GNP in England, 1688–2000.

Security of Property

An indicator of the security of property in medieval England, and of the general stability of institutions, is the modest fluctuation in property values over time. Figure 8.9 shows the average real price of farmland per acre in England by decade from 1200 to 1349 relative to the price of farm output.[14] There is remarkably little variation in the real price by decade. Medieval farmland was an asset with little price risk. This implies few periods of disruption and uncertainty within the economy, for such disruption typically leaves its mark on the prices of such assets as land and housing.

In comparison the figure also shows the decadal average of the real price of arable land in the district of Zele, near Ghent, in Flanders from 1550 to 1699, which shows dramatically greater variation. The reason for this is easy to infer from the narrative history of Flanders. In 1581–92 Flanders was the setting for the battle over Dutch independence. Ghent was recaptured from the rebels in 1584 after fierce fighting. Flanders from then was mostly Spanish, but the Dutch continued to raid the countryside until 1607. The fighting is reflected in the huge depreciation in land values in Zele: by the 1580s they had sunk to less than 20 percent of their level in the 1550s. There was also warfare in Flanders in 1672–97 during the wars of the Dutch and the Habsburgs against Louis XIV. Land values then also declined sharply relative to the peaceful years of the 1660s.

14. The property sales are recorded in the cartularies of religious foundations and private families.

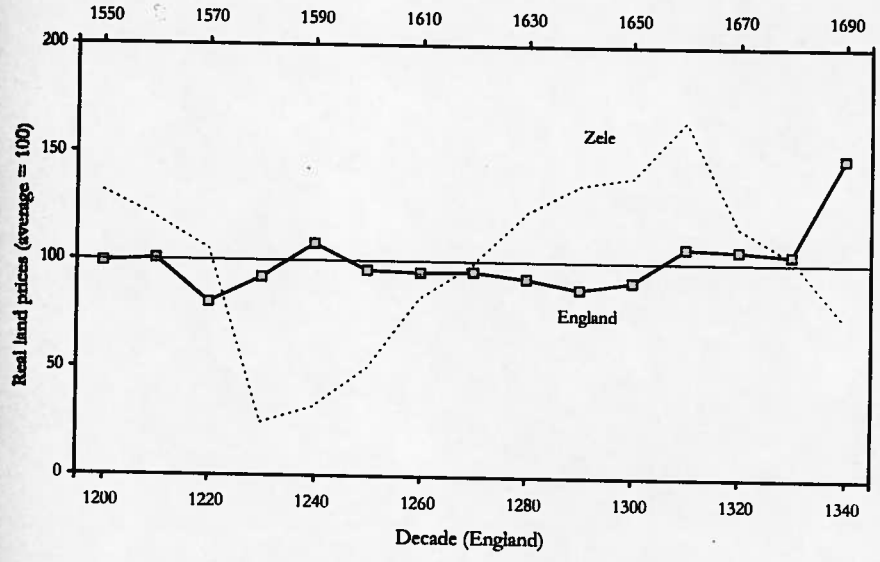

Figure 8.9 Real farmland prices in England, 1200–1349, and in Zele, 1550–1699. Prices for Zele from Clark, 1996.

Thus the sometimes turbulent nature of high politics in England in the medieval period—there were armed conflicts between the king and the barons during 1215–19, 1233, 1258–65, and much of 1312–26—had no impact on the average person. At the local level property rights were stable and secure.

Personal Security

A second aspect of the security and stability of medieval England was the comparatively low threat from physical violence, discussed in chapter 6. From the thirteenth century onward, the typical Englishman died in his bed. This was no Hobbesian world of plundered, burning villages strewn with the unburied dead.

In day-to-day life violence rates in the medieval period were high by comparison with those in modern England, but not such that they would interfere with the operation of economic incentives. Even at their worst in the thirteenth century, homicide rates, at 0.2 per thousand, still implied that the average person over his lifetime had only about a 0.7 percent chance of being murdered.[15] By the fourteenth century these rates were down to 0.12 per thousand. Such murder rates are at the high end for the modern world. But most travelers would not be afraid to visit modern societies with similar or higher homicide rates today: Trinidad and Tobago (0.12), Estonia (0.15), the Philippines (0.14), Bahamas (0.15), Mexico (0.16), Puerto Rico (0.21), Brazil (0.23).[16] And, as figure 6.8 shows, most of the decline in homicide rates toward modern levels had occurred by 1550, long before the onset of modern economic growth.

Social Mobility

Property and person might be secure, the objection will be voiced, but in a society in which there was a strict division between the noble class at the top and a mass of undifferentiated servile peasantry at the bottom, this security was that of a stultified social order, not that of an economy pregnant with the possibilities of progress. This is yet another caricature of the preindustrial world. Case after case, study after study, shows that even medieval England was a highly fluid society in which people lived at every possible economic level, from landless wage laborers to wealthy, and in which movement between conditions was frequent.

Taxation records and manorial court rolls reveal from the earliest years enormous income and wealth disparities. Records of the 1297 Subsidy (a tax on movables), for example, suggest huge variations in wealth, even above the minimum value of possessions (about a quarter of the annual wage of a laborer) that made households liable to the tax.[17]

Even at the lowest level, the laborers and peasants, there was an active land market from at least the early thirteenth century, which transferred even

15. Since people lived on average 35 years, and had a 0.00021 chance of being murdered in each year, 0.7 out of every 100 were murdered over their lifetimes.

16. World Health Organization, 2002, table A.7. Rates are for the latest available year in the 1990s.

17. Biddick, 1987.

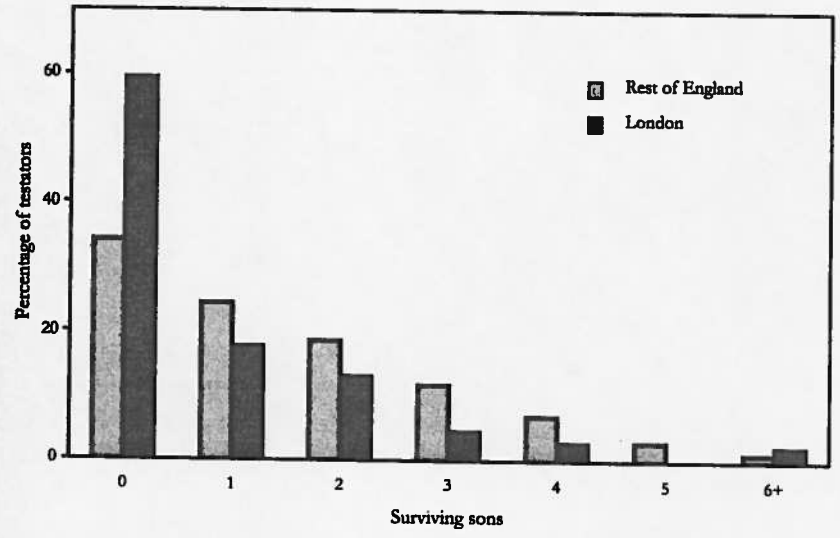

Figure 8.10 Sons per male testator in England, circa 1620.

land notionally held by nonfree tenants to unrelated individuals. Thus peasants or even laborers who were energetic and frugal could accumulate land and move up the rural social hierarchy. This fact shows up, even from the earliest years, in the great inequalities in landholdings. A survey of the royal manor of Havering in 1251, for example, reveals that, while four tenants held more than 200 acres of land each, forty-one held less than an acre and forty-six held between 1 and 3 acres.[18]

Another factor responsible for the great social mobility and fluidity in Malthusian societies like medieval England was the accidents of demography. Figure 8.10 illustrates the distribution of the numbers of surviving sons for male testators in England, both outside London and in London itself, from the wills discussed in chapter 6. The distributions shown here would have been characteristic for the whole Malthusian era. Outside London one-third of males leaving wills had no surviving son, while 11 percent had four or more. Few fathers had just one son to whom all their property and position devolved. Instead collateral inheritance was frequent, as were cases in which, to retain their social position, the sons of larger families would have to accumulate

18. MacIntosh, 1980.

property on their own. This meant that accidents of birth and inheritance were constantly moving people up and down the social ladder.

The data also illustrate the well-known fact that in the preindustrial era cities such as London were deadly places in which the population could not reproduce itself and had to be constantly replenished by rural migrants. Nearly 60 percent of London testators left no son. Thus the craft, merchant, legal, and administrative classes of London were constantly restocked by socially mobile recruits from the countryside.

Medieval England may have been a static society economically. But the overall stasis should not blind us to the churning dynamism of the social fabric, with individuals headed up and down the social scale, sometimes to an extraordinary extent. A substantial fraction of the landed aristocracy of England, even in the medieval period, actually had its foundation not in long aristocratic lineage or in military success, but in successful merchants and lawyers who from the twelfth century onward were using their profits to buy land and enter the aristocracy.[19] High church positions were even more open to the lower orders. In the medieval period only 27 percent of English bishops, the clerical aristocracy, came from the nobility. The rest were the sons of lesser gentry, farmers, or merchants and tradesmen.[20]

The social fluidity of medieval England was probably more the norm, rather than an exception, for the Malthusian era. Thus in Ming and Qing China, all the way from 1371 to 1904, commoners typically accounted for 40 percent or more of those recruited by way of examination into the highest levels of the imperial bureaucracy. And in China those with money, at least from the 1450s onward, could alternatively buy official ranks and titles.[21] In *ancien régime* France the ranks of the nobility were similarly stocked from financially successful merchants and government officers from earlier generations.[22]

Markets

Markets in medieval England were relatively complete and competitive. Labor, for example, was not immobile and fixed to the land or traditional occupations. Medieval Europe in general had a surprising degree of geographic mobility. Given the low reproductive success of the urban population there had to be a constant flow of labor from the country to the city. Thus the records of a 1292 tax levied by Philip the Fair on the commoner households of Paris show that 6 percent were foreigners: 2.1 percent English, 1.4 percent Italian, 0.8 percent German, 0.7 percent Flemish, 0.6 percent Jewish, and 0.4 percent Scottish.[23] A poll tax levied on aliens in England in 1440 revealed about 1,400–1,500 non-naturalized alien males in London at a time when the total adult male population of the city would be only about 15,000: nearly 10 percent of the population.[24]

Goods markets were similarly open. The grain trade in medieval London was so well developed that private granary space was available for hire by the week.[25] From 1211 onward local yields had no effect on the prices at which manors sold wheat. The national price was the only thing that mattered in predicting local prices.[26]

The earliest surviving records of transactions in property from the twelfth century already show an active land and house market. Manorial court records, which survive in quantity from the 1260s, also reveal a very active land market among the peasantry, trading small pieces of farmland back and forth between families.[27] The land market was certainly much less restricted than in modern England, where the decisions of planning authorities can change the value of an acre of land by millions of dollars.

Intellectual Property Rights

The one area of property rights in which medieval England may have been lacking compared to the modern world was intellectual property rights. In most early societies innovators had relatively poorly defined rights. Such societies lacked the legal notion that one could own property in ideas or innovations. Thus in both the Roman and Greek worlds, when an author published a

19. Wasson, 1998.
20. Chibi, 1998, table 1.
21. Ho, 1959.
22. Kalas, 1996. However, Japan's samurai class in the Tokugawa era (1603–1868) does seem to have been a closed elite; Moore, 1970.
23. Sussman, 2005, 18, 20.
24. Thrupp, 1957, 271. This assumes a total population for London of 50,000. The tax lists show few merchants, suggesting that the tax was targeted only to artisans and laborers.
25. Campbell et al., 1993, 101–3.
26. Clark, 2001a.
27. This is one of the reasons Alan Macfarlane, 1978, famously argued that by the Middle Ages England was no longer a peasant society.

book there was no legal or practical way to stop the pirating of the text. Copies could be freely made by anyone who acquired a version of the manuscript, and the copier could amend and alter the text at will. It was not uncommon for a text to be reissued under the name of a new "author."[28] Such pirating of works or ideas was frequently condemned as immoral, but writings and inventions were simply not viewed as commodities with a market value of their own.[29] There was no equivalent to the modern patent system before its introduction in Venice some time before 1416.

But institutions, as we shall see, often respond to economic circumstances rather than determine them. Societies with very low rates of technological innovation, such as those in most of the preindustrial world, would feel little need to establish institutions protecting the property rights of innovators. The establishment of institutions such as patent rights in northern Europe in the sixteenth century arose from the desire of countries to attract foreign artisans with specialized production knowledge. These workers would not emigrate without legal guarantees that their knowledge would be protected.

Other institutions that should have promoted innovation existed in societies like medieval England. Producers in many towns were organized into guilds that represented the interests of the trade. These guilds could tax members to facilitate lump-sum payments to innovators as an incentive to explain productive new techniques to the members. They also fostered competitions (based more on pride and status than on monetary rewards) between members to demonstrate new techniques.[30]

As long as we can find examples of Malthusian societies, like medieval England, which were fully incentivized yet witnessed only the glacially slow preindustrial pace of technological advance, then formal institutions cannot be the cause of the long Malthusian era in the simple way that most economists routinely imagine. If formal institutions are the key, it must be because somehow Malthusian economies provided little or no specific incentive for technological advance. But we shall see later when we come to study the Industrial Revolution itself that, while innovation lay at its core, the transition to higher rates of advance in efficiency was accomplished before there was any

28. This problem persisted into at least the seventeenth century in England, where publishers freely pirated the works of authors.

29. Long, 1991, 853–57.

30. Epstein, 1998.

significant improvement in incentives to innovate. Thus there must have been informal, self-reinforcing social norms in all preindustrial societies that discouraged innovation.

The next chapter explores why these norms might have been present in all preindustrial societies, but were loosened over time by the formative power of Malthusian mechanisms on the culture, and perhaps even the genetic makeup, of long-established agrarian societies.