

## **9. Time Preference and Interest Rates**

### **Introduction**

We saw above in chapter 8 that anthropologists have explained the existence of time preference wired into peoples' personalities as a result of the tradeoff in the Malthusian era between consuming more now and producing more offspring, and consuming less and passing consumption opportunities on to children. The claim made is that selective pressures in the Malthusian economy requires time preference rates to be about 2.3-2.8%. That would imply that all the way from 100,000 BCE to 1800 the underlying rate of interest would be the same, and we would not be able to explain any change in the rate of technological advance through increases in interest rates.

We will see below that rates of return were much higher in much of the Malthusian world than these arguments for selective pressures would predict, but that rates seem to have declined steadily as we moved to the modern world. Thus it seems possible that evolutionary forces were also operating on interest rates. How can we reconcile this with the claims of evolutionary anthropology for a fixed underlying rate of time preference?

## Why the Rate of Return Matters

The rate of return on capital is one of the most important prices in any economy, because it determines how much future benefits and costs are weighed relative to current benefits and costs. At a 3% rate of return, for example, \$100 invested now will be worth the amounts shown in table 1 in ten, twenty, thirty, forty and fifty years. If you were prepared to wait thirty years you could

**TABLE 1: RETURNS FROM WAITING AT DIFFERENT RATES OF RETURN**

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No. of years	Interest Rate 3% (\$)	Interest Rate 5% (\$)	Interest Rate 10% (\$)	Interest Rate 12% (\$)
0	100	100	100	100
10	134	163	259	311
20	181	265	673	965
30	243	432	1,745	2,996
40	326	704	4,526	9,305
50	438	1,147	11,739	28,900

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consume 2.4 times as much as you can consume from \$100 now at a 3% real interest rate. At a 10% interest rate you could consume 30 times as much in 30 years. As a converse of this table it implies that with a 10% rate of return on capital \$1 received twenty years from now is worth only 15¢, and \$1 received thirty years from now 6¢. Thus as the rate of return rises future costs and benefits become less and less important in guiding peoples' actions now. The future matters less and less in the everyday decisions of people.

To illustrate this consider the following examples of land leases. When London was expanding greatly in the nineteenth century much agricultural land was sold for building housing. Often land owned by noble families in England could not be sold outright, because ancestors of the current owners had signed covenants restricting sale of the land (in order to ensure that the assets of the family were not squandered by a spendthrift heir). Thus much of London was built on land which was only leased to the homeowners for 99 years. When many of these leases expired in the 1960s and 1970s some of the most valuable real estate in England reverted to these noble families. Thus the Duke of Westminster is the richest person in England. What was the cost in 1860 of being able to sell only a 99 year lease on land as opposed to selling it outright?

The capital value of a piece of land which has an annual rent of  $v$  per year will be

$$P = \frac{v}{(1+r)} + \frac{v}{(1+r)^2} + \frac{v}{(1+r)^3} + \dots = \frac{v}{r}$$

Thus if the land rents for £100 per year, and the interest rate is 5%, then the value of the land will be £2,000. The value of a lease for 99 years will be

$$P_{99} = \frac{v}{(1+r)} + \frac{v}{(1+r)^2} + \frac{v}{(1+r)^3} + \dots + \frac{v}{(1+r)^{99}}$$

$$= \frac{v}{r} - \left[ \frac{v}{(1+r)^{100}} + \frac{v}{(1+r)^{101}} + \frac{v}{(1+r)^{102}} + \dots \right]$$

$$= \frac{v}{r} - \frac{1}{(1+r)^{99}} \left[ \frac{v}{(1+r)^1} + \frac{v}{(1+r)^2} + \frac{v}{(1+r)^3} + \dots \right]$$

$$= \frac{v}{r} \left[ 1 - \frac{1}{(1+r)^{99}} \right]$$

$$P_{99} = P \left[ 1 - \frac{1}{(1+r)^{99}} \right]$$

At a 5% interest rate  $1/(1+r)^{99}$  is equal to .008. Thus if the land would sell outright for £2,000, it would lease for 99 years for £1,984, £6 less than for outright sale. Thus the covenants that limited land sales by noble families in Britain in the nineteenth century cost the people at the time almost nothing in terms of income. But it preserved for future generations of these families a huge wealth in land. The future rents from years 100 to the end of time have a tiny effect on the current value of the land. Consequently future events have very little ability to influence what people do now when there is a significant rate of return on capital.

A modern illustration of this effect is found near here at Stanford University. When Leland Stanford left the land on which Stanford University stands to the university, he included a stipulation that the land could never be sold. In response the university has simply leased the lands to Xerox and other corporations for 999 years. This would reduce the sum received, compared to an outright sale, by 0.000000000015% (assuming a modern real interest rate of a meager 3%). Leland Stanford's stipulations simply have no binding effect on the actions of Stanford University now.

Similarly at even a moderate interest rate such as 3% it is possible for anyone who wishes to do so to found a major university in their own name, as long as they are prepared to wait long enough. Thus if you were to leave \$1000 in your will, and specify that it was to be kept in the bank earning interest for 500 years, and then taken out and used to endow a university in your

name you would have accumulated \$2.6 billion, enough to endow a modest sized university. If you were willing to wait 600 years you would have \$50 billion, more than any university currently has in its endowment. One person who early on realized the power of compound interest was Benjamin Franklin who in his will when he died in 1790 left \$1000 for the poor of Philadelphia and Boston, but with the stipulation that it was to be kept in the bank for 200 years before it was distributed. When the money was finally distributed in 1990 charities for the poor in each of these cities received \$5 million.

The level of the rate of interest can thus effect even simple things like how much of the land in a society is left as woodland, and how much is cleared for farmland. Suppose for example that an acre of farmland (producing grain) rents for  $v$  per year. Suppose also that an acre of trees cut for timber yields an amount  $p$ , but that it takes 25 years for the trees to grow to maturity. The cost of producing a crop of timber in present value terms is thus,

$$\begin{aligned} Cost &= \frac{v}{(1+r)} + \frac{v}{(1+r)^2} + \frac{v}{(1+r)^3} + \dots + \frac{v}{(1+r)^{25}} \\ &= \frac{v}{r} \left[ 1 - \frac{1}{(1+r)^{25}} \right] \end{aligned}$$

since the land cannot be used to grow grain for each of these 25 years. The future rents all have to be discounted to equal dollars of this year. The value of the timber produced will be

$$\frac{p}{(1+r)^{25}}$$

Since the timber is not sold till 25 years from now, and the money received has to be discounted to the present. To make it profitable to plant timber the value of timber relative to grain has to rise until

$$\frac{p}{(1+r)^{25}} = \frac{v}{r} \left[ 1 - \frac{1}{(1+r)^{25}} \right]$$

$$\frac{p}{v} = \frac{1}{r} \left[ (1+r)^{25} - 1 \right]$$

As  $r$  gets larger,  $p/v$  has to be correspondingly larger before anyone finds it profitable to plant trees. The way this happens is through the supply of timber falling so that wood becomes scarcer relative to grain. Suppose that the demand curve for wood is such that

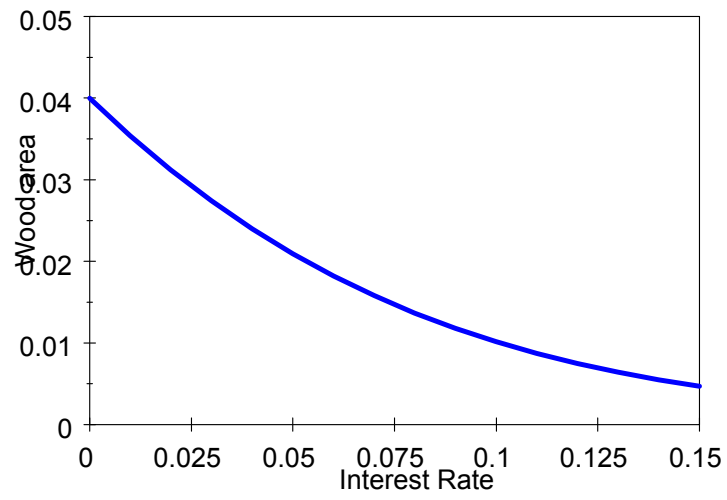
$$p = \frac{1}{Q}$$

where  $Q$  is the quantity of wood produced per year. In this case the relationship between the interest rate and the quantity of woodland grown in the economy will be as shown in figure 1. As can be seen as the interest rate moves from 0% to 15% with this specification of the demand function, the amount of wooded area drops by 88%. Thus if interest rates were higher in somewhere like England before 1350 it should show up in such ways as, for example, deforestation.<sup>1</sup>

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<sup>1</sup> This also suggests that the current deforestation occurring in the tropics may also be sensitive to economic variables such as the interest rate.

**FIGURE 1: WOODLAND AREA AS A FUNCTION OF THE INTEREST RATE**



## THE RATE OF RETURN

Modern real rates of return on capital tend to be about 3% per year for safe long term investments. Real rates of return before 1349 in Western Europe were much higher, typically above 10%.<sup>2</sup> Rates of return across Western Europe show roughly the same pattern from 1200 to 1700. They all tended to fall after the onset of the Black Death, reaching modern levels soon after 1700.

The first set of evidence concerns **Rent Charges**. These were perpetual fixed nominal obligations secured by land or houses. The ratio of the sum paid per year to the price of such a rent charge gives the interest rate for a fairly risk free asset. The major risk in buying a rent charge would be that since it is an obligation fixed in nominal terms, if there is inflation the buyer gets a lower real rate of return. The real rate of return,  $r$ , is thus,

$$r = R/V - \pi$$

where  $R$  = annual payment,  $V$  = price of rent charge, and  $\pi$  = rate of price inflation. Before the twentieth century rate of inflation tended to be low, typically less than 1% per year. Thus the ratio of  $R$  to  $V$  gives a good measure of the rate of return. Table 9.1 shows the available information on rent charges from various parts of Europe from 1150 onwards. The decline after 1349 is quite clear, though it occurs more rapidly in England than elsewhere.

The second set of evidence concerns **land sales**. The ratio of the rental value of land to its price gives another measure of the rate of return on capital. The real rate of return measured in this way is,

$$r = R/V + (\pi_L - \pi)$$

where  $\pi_L$  is the rate of increase of land prices and  $\pi$  is the general rate of inflation.  $(\pi_L - \pi)$  is the rate of increase of real land values.<sup>3</sup> But the rate of increase in real land values would

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<sup>2</sup>Rates of return from lending to princes and kings were often much higher than this. But these rates included a substantial premium for the danger that the lender would default, as they often did.

<sup>3</sup>Suppose, for example, that land prices increase in a year by 3%,



necessarily be low in the long run. If the rate of increase of real land prices was 1% per year from 1300 to 1800, for example, it would increase the real value of land by 144 times over this period. Thus the rent/price ratio of land will generally give a good approximation to the real interest rate. Table 3 shows the information from this source. The movement of rates of return is very similar to that shown by the rent charges.

Table 4 shows even more detailed information from within the medieval period in England on the return on rent charges from 1170 to 1400. There are clear signs in the table of a decline in rates of return starting around 1300. Figure 1 shows the average of the evidence from these two sources for England.

Europe was not the only society where rates of return were very high. Evidence from temple endowments in medieval India suggests even higher rates of return of about 15%. Indeed there seems a general tendency for early societies to have high rates of return, much higher than suggested by evolutionary models.

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while general prices increase by 2%. Then the increase in real land prices is  $3\% - 2\% = 1\%$ .

**TABLE 2: THE RATE OF RETURN ON CAPITAL, 1150-1800 – RENT CHARGES**

PERIOD	England (%)	France (%)	Germany (%)
pre-1351	10.6	11.0	10.2
1351-1400	4.5	-	9.7
1401-1450			8.5
1451-1500	4.0	9.2	6.5
1501-1550	4.6	8.2	5.3
1551-1600	6.0	8.3	-
1601-1650	6.0	6.6	-
1651-1700	5.3	-	-
1701-1750	4.3	4.2	-
1751-1800	4.0	4.8	-

Source: Clark, "The Cost of Capital," table 3. The pre-1349 observations have been treated slightly differently than in the source.

**TABLE 3: THE RATE OF RETURN ON CAPITAL, 1150-1800 - LAND**

PERIOD	England (%)	France (%)	Germany (%)
pre-1351	9.7	10.0	10.7
1351-1400	9.4	-	8.1
1401-1450	5.6	-	9.6
1451-1500	5.0	6.4	7.6
1501-1550	5.5	-	-
1551-1600	5.8	4.3	-
1601-1650	5.4	3.9	-
1651-1700	5.4	4.4	-
1701-1750	4.3	3.8	-
1751-1800	3.6	2.7	4.7

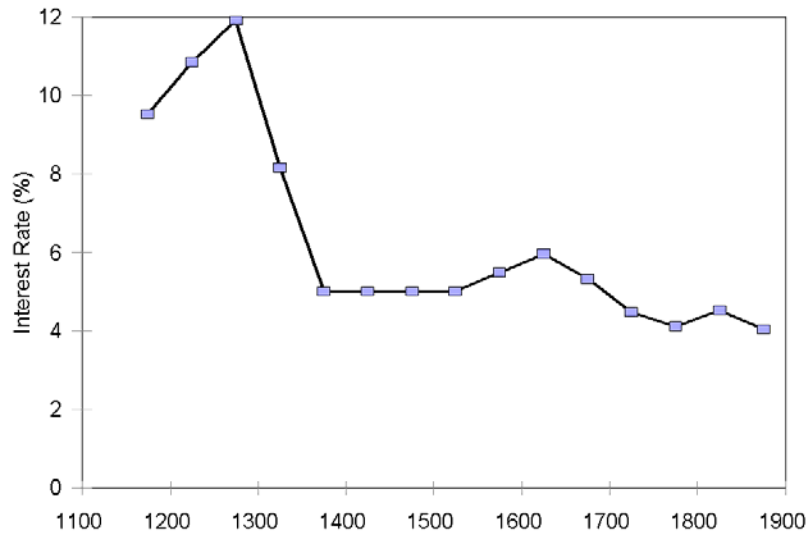
Source: Clark, "The Cost of Capital," table 3.

**Table 4: The Rate of Return from Rent Charge Conveyances – England 1170-1560**

Decade	All transfers	Median Return	Transfers between Lay	Median return
1170	8	9.2	0	-
1180	4	10.5	0	-
1190	6	9.7	3	9.9
1200	24	8.9	6	9.2
1210	19	10.5	2	11.4
1220	44	10.0	17	10.0
1230	44	10.2	11	9.9
1240	52	10.0	19	10.0
1250	51	10.0	14	10.0
1260	36	10.0	11	11.6
1270	42	10.7	18	11.9
1280	22	10.8	16	10.6
1290	11	10.0	7	10.0
1300	8	8.2	6	7.9
1310	2	8.0	2	8.0
1340	1	7.5	0	-
1370	1	5.0	0	-
1440	1	5.0	0	-
1530	1	5.0	0	-
1540	1	5.0	1	5.0
1560	1	5.0	0	-

Note: “Lay” are private individuals.

**FIGURE 2: THE AVERAGE RATE OF RETURN,  
ENGLAND, 1170-1899**



## Risks and Returns

Why were rates of return so high in early societies? This is a very puzzling question. First we need to consider whether there were objective features of the environment of the medieval economy which made interest rates high. That is, were medieval people just people like you or me who faced economic constraints that forced interest rates up? It is a truism of modern investment theory that there is a tradeoff between risks and returns. Stocks yield a higher average return than bonds, but bonds have a lower variance in earnings. Short term bonds yield less than long term bonds, but again short term bonds have less variance in earnings. Were medieval returns so high just because all investments were so risky?

There are two types of risk. The first risk is that the borrower would default or the obligation would be lost. This risk depends on a number of factors including the general level of the stability of an economy. In some societies all investments are very insecure because they are dependent on an unstable political regime. If the government changes the investment can become worthless. Thus companies investing in Russia at present demand a very high rate of return because of three sorts of risks. First the government may change and the new regime may freeze the assets of foreign countries or refuse to honor contracts. Secondly the Russian legal and political system is so corrupt that companies may be unable to enforce their contracts even without any political change. Finally the direction the Russian economy will take is very unclear. It might grow strongly, it might decline.

If the force impeding investment and innovation is the fear of confiscation of property, then people will only risk resources in investment where the rate of return is high enough to compensate them for these risks. Thus the Mexican Revolution of 1910-17 created a long period of uncertainty in the Mexican economy. Though industrial capital was largely undamaged by the fighting, there was great uncertainty as to the property rights which would prevail in the end. Investment largely ceased and share values plummeted.<sup>4</sup> At the end of the English Civil war in 1650 the victorious parliament sold most of the deposed King's estates. The perpetuities owned by the crown sold in 1650 for an average implied rate of return of 11.2%, at a time when private perpetuities

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<sup>4</sup> See Haber(1989), pp. 122-149.

yielded a return of about 5.5%.<sup>5</sup> The huge premium in returns available to investors in the seized Royal property reflected the political uncertainty that attached to these property rights.<sup>6</sup> The political uncertainties of the hyperinflation period in Weimar Germany led to a dramatic decline in the value of equity, even though this was a real asset, and the economy was experiencing full employment of resources. The real value of shares dropped to 2.7% of their 1913 level by October 1922, and were so low that the auto maker Daimler with its 3 large works as well as large land holdings and technical know-how was valued at 327 of its own cars.<sup>7</sup>

It is hard to measure directly the risks to investment in pre-industrial society from political instability and warfare. From a distance the series of wars and insurrections makes the period seem turbulent. I have already mentioned the long running wars that dominated medieval and early modern Europe. There was also internal political turmoil. For the years 1540 to 1770 for England, however, we do have enough information that we can try and estimate how much political turmoil internally was likely to affect interest rates. Between 1540 and 1770 there were a number of periods when the England experienced political turmoil, internal warfare, and important changes of political regime.

In the late sixteenth century the impending death of the childless Elizabeth I created great political uncertainty. Since at least 1578 (when Elizabeth reached the age of 45) it was clear that she would die childless, and that the Tudor dynasty would come to an end. At the end of her reign there were five serious contenders for the throne, none of whom the aging Elizabeth seems to have had the slightest affection for. James VI of Scotland was the successor by the laws of primogenitor, but he was king of the traditional enemy of England, Elizabeth had executed his mother in 1586, and Henry VIII by Parliamentary Acts and in his will had barred the house of Stuart from the succession. Lady Arbella Stuart was descended from the same line as James, but had the advantage of being English. Under the terms of Henry VIII's will the crown should have passed to the House of Suffolk, and to the

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<sup>5</sup> On crown perpetuities (fee-farm rents) see Madge (1938), p. 237. See figure 5 below for private perpetuities.

<sup>6</sup> These properties were recovered by the crown in 1660. The Parliament was prepared to sell these perpetuities even though they commanded a low price as a means of giving a wide class of people an interest in the survival of the new regime.

<sup>7</sup> Bresciani-Turroni (1937), pp.

descendants of Catherine Grey. But the marriage of her mother to the Duke of Suffolk was of doubtful validity, as was her own marriage. The last major claimant was Philip II of Spain and if he should step aside his daughter the Infanta. The claims of the Infanta were pushed by the Catholic minority. Elizabeth herself increased the uncertainty of the succession by having an act passed imposing severe penalties on anyone making claims as to the royal succession except for the succession affirmed by Parliament, but then preventing Parliament from selecting a successor.<sup>8</sup>

The implication of all this is that rates of return on capital should have risen for two different reasons in the waning years of Elizabeth. The uncertainty of the succession meant that there could be a bloody power struggle after Elizabeth died. But also the lack of a successor meant that Elizabeth could not credibly commit to any long term contract with her subjects, if we interpret monarchs as behaving like predators in the North and Weingast fashion. If she wanted to expropriate in the declining years of her reign, she could do so at little cost to herself.

After the death of Elizabeth I childless in 1603 the crown passed peaceably to the Scottish House of Stuart. But the Stuart kings had from early on an unhappy relationship with the English Parliament. Between 1603 and 1688 there was an interminable struggle between the Crown and the English Parliament over the respective powers of each, fueled in the years after 1660 by the Catholic sympathies of the monarchy and the Protestantism of the people.<sup>9</sup> Unlike many other European countries the English Parliament traditionally had control over taxation, and it used this power to try and rein in the monarch. The monarch had the revenue of the royal estate at his or her disposal. But the stinginess of Parliament had been a problem even under Elizabeth I, so that after 1589 these estates were depleted by sales to meet war and other expenses. As a result the monarchy was always short of funds and had to resort to various illegal and semi-legal exactions and confiscations to raise revenue.

The crown had some success with these measures in the early seventeenth century. It deliberately allowed obsolete regulations introduced in the mid sixteenth century limiting the economic

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<sup>8</sup> Hurstfield (1973), "The Succession Struggle in Late Elizabethan England" gives the details of the succession debate. Peter Wentworth, an MP who spoke in the commons on the succession, and published a pamphlet was sent to the Tower in 1593 as a result and died there four years later (p. 107).

<sup>9</sup> See Ashton (1978), Hill (1961), Jones (1978).



activity of groups to remain in force, then encouraged professional informers to inform against the transgressors, who were fined. So systematic was this revenue collecting device that in some cases private individuals were given the monopoly of the right to inform under particular statutes, and the power to treat with transgressors for payment of fines. The crown similarly sold monopoly privileges for new and for existing products.<sup>10</sup> The crown also resorted to forced loans, to revival of feudal privileges, and to various other semi legal and unpredictable exactions in its scramble for money.<sup>11</sup> Even when Parliament did consent to levy taxes the assessment of incomes of wealth were often wildly unrealistic and were heavily influenced by political connections. Thus the tax burden on the richest was very light, some magnates being omitted from the tax lists altogether. The middle income groups being less influential bore more than a proportionate burden.

Thus though the total burden of taxes was light in the early seventeenth century, the collection was inefficient, unpredictable, and subject to political influence and corruption. A measure of the level of corruption in the governing classes is given by the admission by Francis Bacon, the famous philosopher and the chief justice of the land, when he was accused of corruption in 1621 that he had taken substantial “gifts” from those whose cases he was ruling upon (he denied any venal intent).<sup>12</sup>

The conflict between King and parliament resulted in open warfare in the years 1639-40 (against Scottish dissenters), and in 1642-46, 1648, and 1651 when rival Royalist and Parliamentary armies vied for control of the country. One author describes these years as "one of the most damaging periods in the history of England."<sup>13</sup> Armies marched across the countryside destroying crops and requisitioning food. Some towns were sacked in the war, including Brentford, Birmingham, and Wycombe, and others such as Hull, Chelmsford and Bristol were subjected to sieges.

Then from 1649 to 1660 the country was subject to a Puritan control that was uncertain and vacillating, and gradually dissolved internally. The property of the king and his supporters formed a major source of revenue in the years 1649-1653. Meanwhile

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<sup>10</sup> Clay (1984), Vol. II, pp. 256-7.

<sup>11</sup> In 1616 James I began also to raise revenue by selling peerages.

<sup>12</sup> Hurstfield (1973), “Political Corruption in Modern England: the Historian’s Problem,” pp. 145-7.

<sup>13</sup> Baker (1986), p. 8.

Parliament debated all kinds of radical proposals which would have affected property rights - there were proposals for further sales or Royalists lands, and for the abolition of tithe rights. As the control of the Puritans unraveled by 1659 the army was having to support itself by quartering itself on the population, and open plunder by the army seemed but a short step distant.

The restoration of the Monarchy in 1660 led to further uncertainty as some, but not all confiscated property was restored to its original owners. The monarchy was restored in the person of Charles II in 1660, and the conflict between crown and Parliament was seemingly resolved. But soon the old strains were appearing. Charles had Catholic sympathies in a Protestant country where religion was an important political issue. In 1670 Charles II entered into a secret treaty with France wherein the French committed themselves to subsidizing Charles and in return Charles agreed to collaborate with the French in a war on Holland, and to declare himself a Catholic at a suitable moment. As the 1670s proceeded it became clear that Charles was going to be succeeded by his openly Catholic brother James, the Duke of York. In 1679 there was a rebellion by Protestant dissenters in Scotland, and Parliament passed a Bill excluding James from the succession. In 1682 a coup was planned by disaffected Royal advisors, and in 1683 a plot to murder Charles II and James was uncovered.

James II became king in 1685. James was a Catholic in a largely Protestant country at a time when Catholicism was feared as representing a danger to the English state. Thus the succession of James I in 1685 created great uncertainty. There was immediately an avowed Protestant rebellion in the west of the country led by Charles' illegitimate son the Duke of Monmouth. This was defeated but the policies of James, particularly his introduction of Catholic officers into the army and his raising of an Irish army of dubious loyalty to the English Parliament, resulted in widespread fear and disaffection. When James II had a son and heir in 1688, William of Orange, a claimant to the throne in his own right and the husband of James's daughter Mary from a previous marriage, invaded in collusion with English allies. James found little support and fled, and in 1689 the Parliament declared he had abdicated and installed William and Mary as monarchs. Under the new constitutional order Parliament had much more control over the actions of the monarchy. Indeed in 1700 William was so discouraged by parliamentary control that he left for Holland and threatened to abdicate. This new constitutional order is the foundation of the modern British state, which is the direct

descendant of this “Glorious Revolution.”

The success of the Revolution was not immediately obvious, for its outcome became part of the great power struggle that was engaging Europe in the late seventeenth century. William had come to England to claim the throne in part because the Dutch needed to preserve England as an ally in their struggle to stay free from French hegemony. Thus from 1688 to 1695 the new regime was engaged in a War against France on the continent, and internal wars against the partisans of James in Ireland and Scotland who were supported by the French. Only in 1697 when William and Louis XIV made a peace treaty wherein Louis recognized William as king of England did it become clear that the new political settlement was secure.<sup>14</sup>

The Jacobite cause did not die immediately, though most historians give little importance to it after 1695, and it was the popular rallying point for various groups of disaffected from the 1690s until the 1740s. In 1715 and in 1745-6 there were Jacobite rebellions in Scotland. In the latter case the rebels got as far south as Derby, and there was a brief panic in London.

The new political regime ushered in a host of political and administrative changes. In 1692 a Land Tax was imposed which was to be collected at varying rates from then on. The Land Tax provided a large new source of funds for the Government, and formed a relatively predictable exaction on property owners. Since reassessments were rare there was no disincentive in the Land Tax to investments in land improvement. Also in 1694 the Bank of England was formed as the principal lender to the government ushering in a host of financial developments now called “The Financial Revolution.”

Did any of the supposedly important political events of the sixteenth and seventeenth century effect rates of return in the private capital market? Figures 3 and 4 show the annual average rates of return on farmland and on rent charges from 1540 to 1770. A rent charge was a fixed perpetual nominal obligation secured by a house or a piece of land. It could only be redeemed if the owner of the rent charge agreed to accept a capital sum for it. As can be seen the private rates of return move slowly over time. There is clearly no dramatic upwards movement in rates of return in any of the periods of political uncertainty identified above: the last years

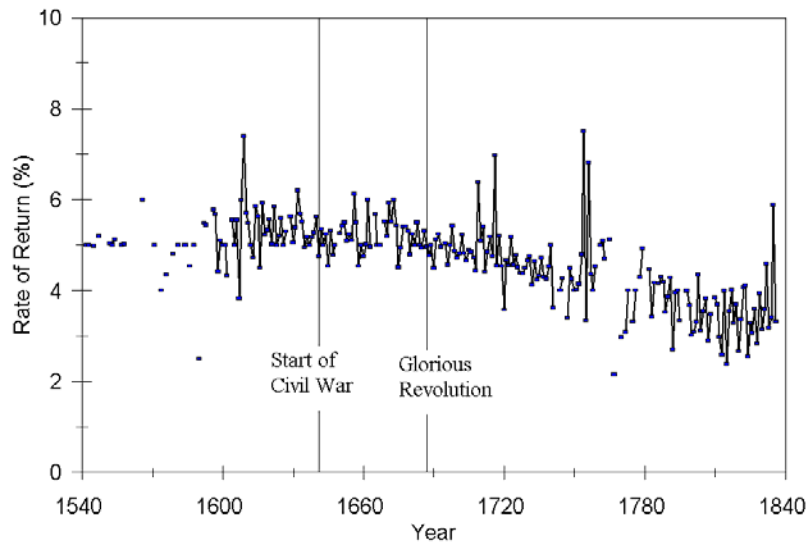
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<sup>14</sup> See Szechi (1994), pp. 41-58, Jones (1978), pp. 256-278,

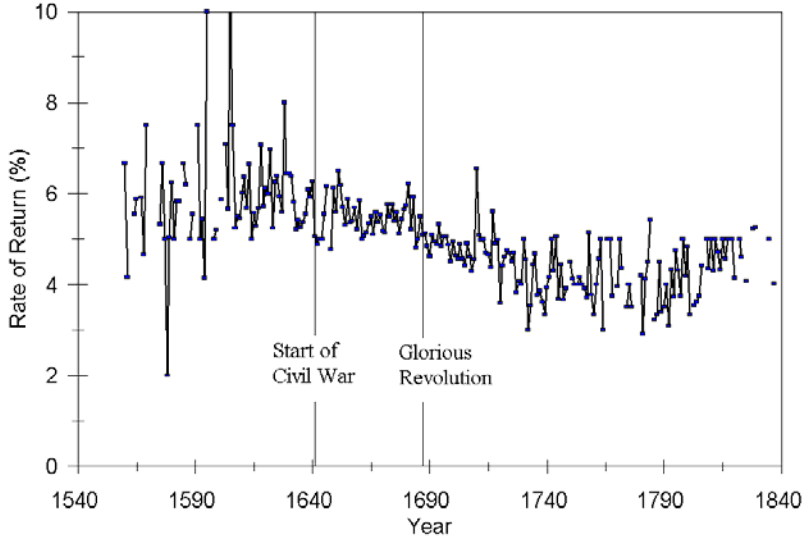
of Elizabeth's reign (1578-1603), the period of turmoil just before the Civil War and the War itself (1639-1648), the interregnum (1649-1659), the final years of the Stuart dynasty (1670-1688), and the difficult years of the new regime (1689-1696). Instead we get much longer and smoother trends in returns on both land and rent charges. Both seem to have increased slowly and by a small amount from the 1550s to the 1620s, and then begun a long gradual decline that continued for more than 100 years. The Glorious Revolution leaves no trace on the path of rates of return in the English economy between 1660 and 1730. Rates of return were falling in the years 1660 to 1696, and they continued to fall at the same rate once the new regime was established.

In contrast to the lack of movement of English and Welsh rates of return in this period in response to regime changes we can look at the experience in the Netherlands over the same period. De Wever (1978) reports the rate of return implied by land purchases in Zele in Flanders now in modern day Belgium between 1550 and 1795. The countryside there was subject to two long and destructive military campaigns between 1550 and 1750. In the years 1581-92 the struggle for Dutch independence was taking place mainly in Flanders. Zele lies between Ghent and Antwerp. Ghent was recaptured from the rebels in 1584 and Antwerp in 1585 after fierce fighting. There was also warfare in Flanders in the period 1674-98 during the wars of the Habsburgs against Louis XIV (the War of the Spanish Succession). Figure 5 shows the rate of return in Zele over this period. As can be seen both military convulsions drive up the rate of return on land sharply, particularly the War of Independence. The estimated increase in the rate of return for the years of the Spanish reconquest of Flanders was 2.7%, on a base rate of 3.4%. Thus this warfare seems to have driven up the rate of return to capital either by destruction of the capital stock making capital scarcer, or by increasing the risks attached to investments in land. The second long period of warfare from 1674 to 1698 (the conflict between the Dutch and Louis XIV) produced an increase in rates of return of 0.74% from a base rate of 4% which indicates a much less profound economic effect. In both episodes the effects of warfare seem to have been much greater than any effect we observe from civil strife or changes in regime that occurred in England in the same period.

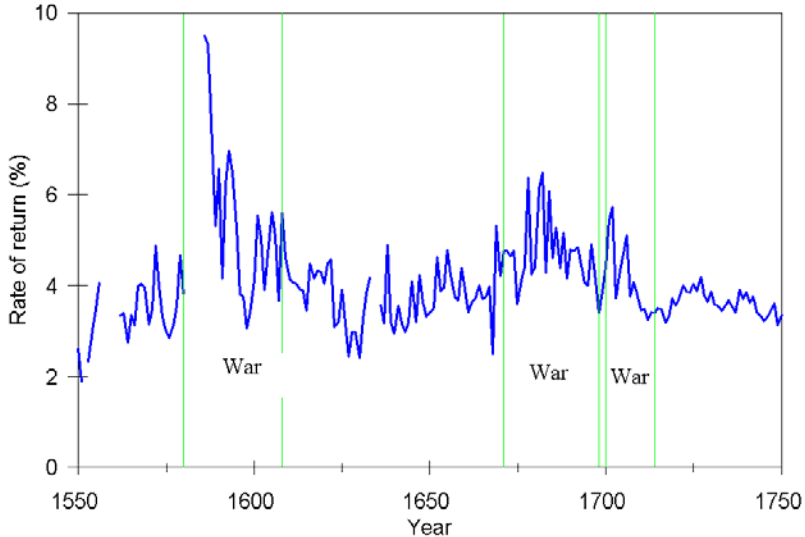
**FIGURE 3: RETURN ON FARMLAND, 1540-1837**



**FIGURE 4: RETURN ON RENT CHARGES, 1560-1837**



**FIGURE 5: RETURN ON LAND HOLDING, ZELE 1550-1750**



Another way we can measure the effect of politics on capital markets is to look at asset values, and in particular on the value of land. This is because both in England and in Zele in Flanders I have many more observations on land prices than on the return to land. Asset values should rise sharply in stable periods and decline in unstable. This effect appears even more strongly than the effect on returns on land in the case of land in Zele.<sup>15</sup> Figure 6 shows the average annual price of arable land in Zele between 1550 and 1749, deflated by the price of wheat to control for the effects on land values of movements in the price of output.<sup>16</sup> While there are long run movements in land values, it is very clear from figure 6 that in both war periods land prices fell sharply. In some years in the war of independence from 1581 to 1592 real land prices fell to less than 6% of their value at the outset of the war. In the later war with Louis XIV land prices fell by more than 50% at their minimum. The average fall in prices in the first war was an 84% decline, and in the second war a 28% decline. Interestingly in both cases the depression of prices seemed to continue for about 20 years after the end of the war, since prices only gradually returned to their pre-war levels. One possible explanation of this persistent effect would be that the wars caused a decline in the rural population in Zele, which reduced the rental value of land even after the war. In England land values were highly correlated with the population densities of the parish the land lay in.

Did land prices fall in England in periods of political instability, and did they rise after the Glorious Revolution? As in Zele another factor that will cause movements in land prices is movements in the price of agricultural output, so I first deflate all prices by an index of the price of agricultural output. average to avoid spurious variation caused by harvest failures and successes. Figure 7 shows the average annual price of land in England and Wales from 1600 to 1749 controlling for these factors, constructed as a centered 3-year moving average.

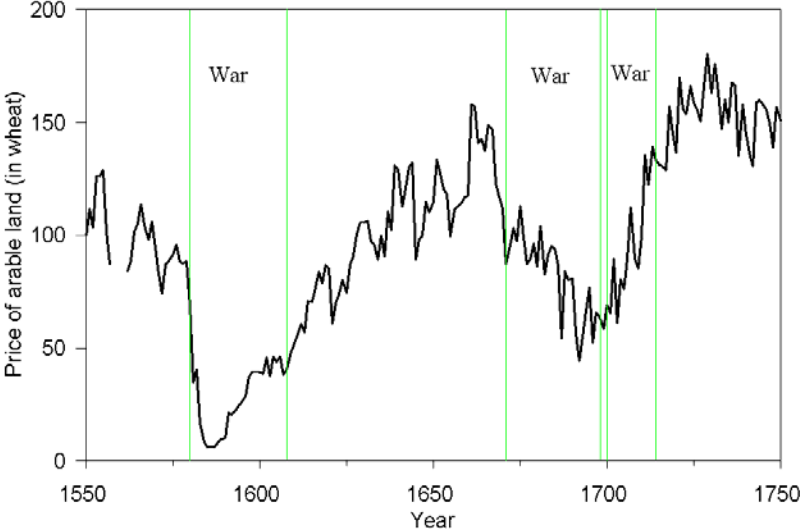
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<sup>15</sup>Thus both land rents and land values fell in the war periods, but land values fell more than rents.

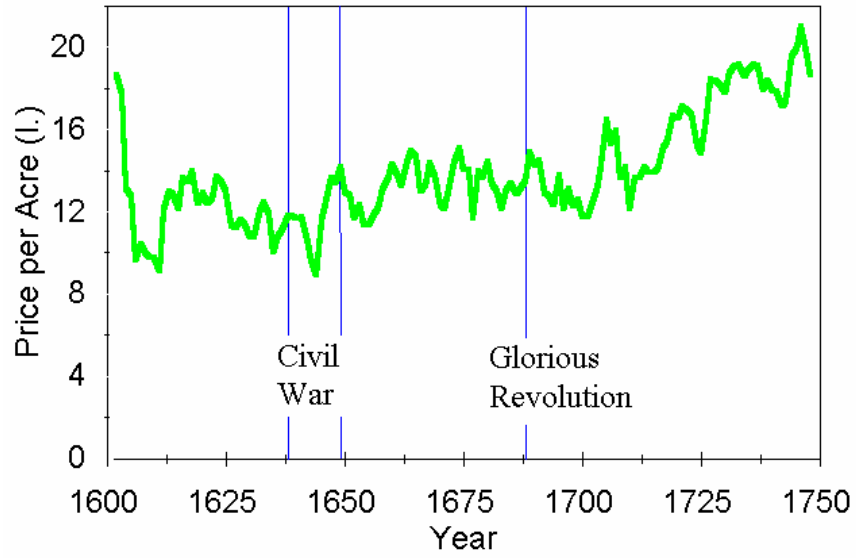
<sup>16</sup>The price of wheat is from Abel (1980), pp. 432-3, which gives the average wheat price in silver in Bruges, Dixmude, Nieuport, Anvers, and Brussels measured in terms of silver. This was converted into nominal values using van der Wee (1963), pp. 128-9.



**FIGURE 6: REAL FARMLAND PRICES, ZELE, 1550-1749**



**FIGURE 7: REAL FARMLAND PRICES, ENGLAND AND WALES, 1600-1749**



As can be seen in the figure the two major events of the period, the Civil War of 1639-1648 and the Glorious Revolution of 1688 have no obvious effect on land prices. The contrast with Zele is even more marked for land prices than for rates of return. Political events have little effect on land prices in England all the way from 1600 to 1749. It may be objected that charities might not be the most aware purchasers of land. But even if they generally paid more than they needed to for land this there is no reason to suppose that their purchasing abilities got better or worse as a result of changes in political regimes in this period.

What we see above is that as far back as the reign of Henry VIII we seem to have essentially secure capital markets. The private economy in England after 1540 seems to have been largely insulated from political events, and even from the strife of the Civil War. Thus to read the Glorious Revolution as ushering in a stable regime of taxes and property rights that laid the foundation for the Industrial Revolution is to write Whig history of the most egregious sort. Rates of return on capital did fall in the hundred years prior to the Industrial Revolution, but they fell in such a way that shows there was no connection between this and political events. Within the pre-1688 regime rates of return on capital moved slowly up to peak about 1625 and then back down again. Within the post 1688 regime rates of return on capital again moved. But there is no evidence that the change in regime itself had any effect on rates of return. Similarly land values show little or no response to the political convulsions of the era. Farmland values are estimated to have fallen as a result of the Glorious Revolution. Given the sampling errors in the data we can conclude that the chances that land values actually rose by as much as 6% as a result of the Glorious Revolution is only 1 in 20. There is simply no evidence from return on capital that had James II remained on the throne and been succeeded by his son James III that the economic history of England in the eighteenth century would be any different.

Stable property rights may have been a *necessary* condition for the Industrial Revolution, but since they existed in England and Wales for more than 200 years prior to the Industrial Revolution they were certainly not a *sufficient* condition. In looking for an explanation of the Industrial Revolution we must look for factors other than the emergence of stable private property rights.

The second type of risk is that the lender will not survive to enjoy the fruits of their abstinence. The higher the risk of death of

the lender in any year the higher will be the rate of return required. A high risk of death will cause people to "eat, drink, and be merry" now.<sup>17</sup> Because of the lower life expectancy the chances of dying in any year for someone in the middle ages would be greater than for a modern person. They would not, however, be much higher than the risks of death in any year for people in the seventeenth century, or the eighteenth century. Life expectancy at birth in 1650 was only about 35. By 1800 it had crept up to about 37. This is much lower than modern life expectancies yet in England by 1650 the real rate of return was as low as 5%, and by 1750 it was 3.5%. Thus at maximum 0.5% - 2% of the higher interest rate of the pre-industrial period could be accounted for by the risks of death.

The difference in interest rates between 1300 and 1650 is about 5%. Yet while life expectancy was probably low in 1300, it is unlikely to have been much below 30 or 25 in 1300. At a life expectancy of 37 at birth the chance of someone in the 15-50 age group dying in any year is 1.2%. At a life expectancy of 23.5 years at birth this risk of death increases to 1.9% per year. Thus the risk of death in any year for an adult in 1300 would be much less than 1% higher than in 1650.<sup>18</sup>

## **Income Growth**

Three other factors might explain the high medieval interest rates. First there is the rate of economic growth measured as increases in income per person. Also there is the level of income in the society, and the income distribution.

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<sup>17</sup>This effect will only work in the absence of a financial instrument called an "annuity." An Annuity is a fixed income paid to someone every year in return for a capital sum paid now, which payment ceases at the death of the purchaser. The higher the risk of death the higher will be the rate of return paid on the annuity, since the expected payment in each future year will be lower. The higher return on annuities when life is riskier will compensate the lender for the risk, and induce the same amount of lending as would occur with no death risk.

<sup>18</sup>The reason that this difference is small is because when life expectancy declines it is mostly because of increases in infant mortality.

First consider why there is a positive real interest rate of about 3% in most modern developed economies? The existence of a positive interest rate implies that if we are prepared to delay consuming then we could all consume much more. Why are people not all persuaded to wait to consume at a 3% interest rate so that they could consume much more? If everyone did this it would increase the supply of capital and drive down the rate of return. Several things cause people to postpone consumption even given a positive real interest rate. The first is the expectation that income will grow. If I expect a higher income in future then \$1 now can be worth more to me than \$2.4 in 30 years. One type of society in which we would expect a high rate of return thus would be a society which was experiencing rapid economic growth so that real incomes were increasing year by year.

Interest rates in the Central Valley in California in the 1850s, for example, were in the order of 50% per year, even though interest rates at that time in England were about 2.5%. At this stage California was remote from other capital markets and was experiencing rapid economic growth. Many settlers were arriving and investing large amounts of resources in forming farms. Their current consumption was low because of the large investment effort they were making. But they expected much higher incomes in a few years. Thus even a 50% interest rate could not persuade people to save more and consume less. Even though at this interest rate every \$1 they saved would be worth \$2 in less than two years.

Conversely, we would then expect that in a static society with no income growth the rate of interest would be lower because this force would not be operating to push up interest rates. Interest rates could not be high because people would expect their future income to be the same as their current income. This would argue for low interest rates in the medieval period.

## **Poverty**

The third objective circumstance we have to consider is that people were poor in medieval society. Would this depress the interest rate, by making people less prepared to wait for future consumption because the needs of the present are so great? There is plenty of evidence in modern America that poorer people have what is called a "higher rate of time preference." What is meant by this is that they are willing to pay higher interest rates to borrow

than richer people, and need to be paid more to defer consumption than richer people. A survey of people's rate of time preference conducted in 1972 found the following result:

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Earnings of "head" of family	of 8 years or less of education	of 16 years or more of education
\$2,000	58%	41%
\$15,000	35%	18%

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The rate of time preference was determined by asking people questions such as "If you could have \$100 today or \$120 in one year's time which would you prefer?" Clearly poorer and less educated people reveal higher rates of time preference, though the rates revealed by everyone are high. There is a problem of causation in interpreting these results though. Those with the highest rates of time preference are the least likely to get education and to invest in job training that will later yield them higher incomes. Thus the connection of time preference rates with income and education in cross section in society may not come because income levels determine the rate of time preference.<sup>19</sup> \

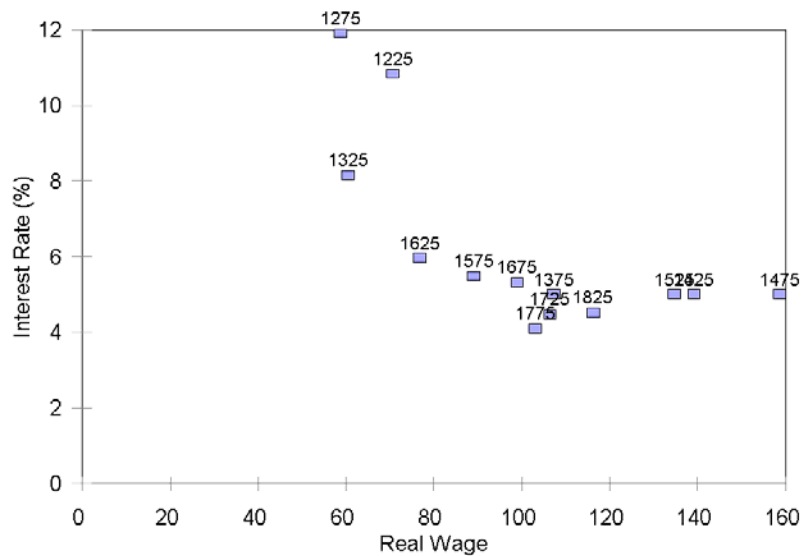
There is no reason in economic theory to expect that people at lower incomes would have higher time preference rates. If you are poor, and know that you are going to remain so, then even though the needs of the present are pressing so are the needs of the future, so that your relative valuation of consumption now and in the future should not change.

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<sup>19</sup>There is also a problem that some of those with low incomes will have those incomes only temporarily (for example, because they are students, or have lost a job), and consequently expect higher incomes later. In this case they will have a higher rate of time preference because they will want to borrow against some of that future income to smooth out their consumption over time.

If income was a major determinant of time preference then if we graph real wages in England against the rate of return from 1200 to 1850 by half centuries we should see a correlation between the two. Figure 8 shows the one graphed against the other. As can be seen the figure is largely ambiguous on this issue. If we exclude the earliest years from 1200-1349 there is no sign of any connection between interest rates and wage levels. But it turns out real incomes were at their lowest in the years before the plague. And here we observe very high real interest rates. So one possible explanation of the very high interest rates in early Europe which we cannot rule out is the very low level of real incomes before 1349.

**FIGURE 8: THE RATE OF RETURN IN ENGLAND VERSUS THE REAL WAGE**



## INEQUALITY AND THE RATE OF RETURN ON CAPITAL

The last possible "objective" source of differences in the rate of return over time would be the degree of inequality in income. It is well known that the savings rate of people varies by level of income. Poor people typically have very low savings rates. They consume almost all their current income. In the nineteenth century laborers in England typically had just such a 0 savings rate, so that when they got too old to work they had to be supported by their children or by "Poor Relief" from the local parish. Richer people have much higher savings rates. Cipolla gives many examples of their higher savings rates in the pre-industrial period. The richest families in Italy in the late 16th and early 17th century were saving 70-80% of their income annually. One of the richest merchants in Amsterdam in the late 17th century similarly saved 50-70% of his income. In this case a crucial determinant of the supply of capital will be the distribution of income in the society. The more equal the income distribution at a given level of average income per capita, the less will be the supply of savings, and the higher will be the rate of return. What happened to income inequality over time in a country such as England? This question is hard to answer because in part of the paucity of data, but also because of the important role of the Church up till 1535 and the Dissolution of the Monasteries by Henry VIII, where much of the land of the church was claimed by the crown. How should we classify the income of the Church in the distribution of income?

Table 5 shows the information we have on the distribution of income in England circa 1300. As can be seen the King received a very high income relative to an unskilled worker. But the King spent much of his income for government functions such as the interminable small scale wars of the medieval period. The King's income at about 24,000 times the unskilled wage would correspond in the USA now to an income of about \$240 m per year, and to a fortune of about \$3 b (about the wealth of Ross Perot). Since Bill Gates has a fortune of 50-80 billion the English King was thus relatively poorer than some of the richest people now. The top 1% of the secular population seemed to earn about 13% of all secular income (the income of the Church which was enjoyed by a small group of priests and nuns would have to be added to this to get an idea of the overall share enjoyed by the top 1 or 2%).



**TABLE 5: INDICATIONS OF INCOME INEQUALITY IN ENGLAND, 1300**

Group	N	Income	Multiple of Laborer's Income
King	1	£30,000	24,000
Earls	18	£400-11,000	320-9,000
Barons	136	£200-500	160-400
Knights	1,100	£40-200	32-160
'Lesser Gentry'	10,000	£5-40	4-32
Peasants, Craftsmen	750,000	£1.25-5	1-4
Laborers	350,000	£1.25	1

Source: Dyer (1989), pp. 29-30.

The next benchmark for which we get an estimate of the degree of inequality in income is 1436. In 1436 an income tax was levied which gives some idea of the distribution of income again. Table 6 shows the distribution of incomes at this time. Now the top 1.4% of the secular population enjoys about 14% of secular income, which implies a slight move towards equality since 1300. We have information on church incomes by this period (extrapolating back from the valuations made at the Dissolution of the Monasteries in 1535) which suggests that the Church income would exceed that of the rich secular society. Thus counting both the nobles and the Church, about 2% of the population in 1436 enjoyed about 25% of income. But there is no reason to believe that this percentage was any less in 1300. Thus the dramatic decline in rates of return from 1350 to 1450 seemingly took place without any fundamental shift in the distribution of income.

We get another benchmark on income inequality from the tables constructed by the Political Arithmetician Gregory King for England in 1688. According to King's estimates the top 2% of families would earn about 21% of income in 1688. Thus there was a narrowing of income inequality at the top from 1436 to 1688. We can compare the degree of income inequality in these distributions by considering what share of income the top few percent of the population earned compared to the modern economy. These figures suggest the following:

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Period	Share Earned by Top 2%	Share Earned by Top 1%	Share Earned by Top 1% (Secular)
1300	-	-	13%
1436	25%	-	12%
1688	21%	13%	-

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These figures suggest that the degree of income equality was fairly stable in England from 1300 to 1688. The big decline in rates of return between these periods cannot then have been caused by any change in the income distribution.

**TABLE 6: INDICATIONS OF INCOME INEQUALITY IN ENGLAND, 1436**

Group	N	Income	Multiple of Laborer's Income
Secular			
King	1	?	
Earls	18	< £4,000	< 1,600
Barons	70	£300-2,500	120-1000
Knights	933	£20-400	8-160
'Gentlemen'	6,000	£10-40	4-16
Peasants, Craftsmen	340,000	£2.5-10	1-4
Laborer	160,000	£2.5	1
Clergy			
Bishops	17	£400-3,500	160-1400
Rich Priests	850	> £40	> 16
Rich Monasteries	126	£300-2,500	120-1000
Poor Monasteries	700	< £300	< 120
Poor Priests	7,650	£5-40	2-16

Source: Dyer (1989), pp. 30-33.

## The Causes of High Interest Rates

The above discussion finds only one possible source of the high interest rates in early Europe, and that is the poverty of the society. But even here the evidence is ambiguous. It is thus possible that the high rates of return before 1349 may have resulted from myopic preferences by medieval consumers. People's views about the future may have changed over time.

A mechanism that might attain this, as we saw in Chapter 8 above, is that people with lower rates of time preference might survive better in the Malthusian economy, given that they save more and endow their children with more goods when they die. The puzzle that remains, however, is why that mechanism had not operated before 1300? Believers in evolutionary mechanisms would have to argue that somehow in earlier societies the possibilities of capital accumulation were not present, and so low rates of time preference were not being selected for.

An alternative approach is that of Max Weber in his famous work, *The Protestant Ethic and the Spirit of Capitalism*, argued that the Reformation in Europe, in which the Catholic Church was supplanted in northern Europe by various Protestant denominations created a new economic climate. In particular Calvin, the Swiss preacher, developed a form of Protestantism which emphasized both the need for hard work and the avoidance of conspicuous consumption. Calvinism was influential in Switzerland, Scotland, northern England and the Netherlands. Since Calvinists were enjoined to labor hard, they earned high incomes, but they could not under the second injunction spend the money. Instead they had to invest it. Thus the supply of savings was increased, driving down the rate of return on capital. One country where Calvinism was influential, the Netherlands, certainly had very low interest rates in the late sixteenth and in the seventeenth century. But the timing of the Reformation is too late to explain most of the decline of interest rates.

### Chapter Problems

1. Suppose for medieval France you have the following data:

Asset	Units	Price	Annual Income
Land	Acre	40 livres	4 livres
Houses	-	100 livres	13 livres
Rent Charges	-	50 livres	6 livres
Life Annuities	1 life	50 livres	10 livres
Crown Loans		100 livres	25 livres

Suppose also the inflation rate in general is 1%, and the prices of land and houses are increasing at 3% per year.

- (a) Calculate the gross nominal rate of return on each asset?
- (b) Calculate the gross real rate of return on each asset.
- (c) What is the best indicator of the risk free long term real interest rate?
2. Suppose the interest rate is 10% and a piece of land rents for £10 a year.
- (a) How much would you pay for the land outright assuming no inflation in general prices or land prices?
- (b) How much would the land sell for if the owner gets it back in 100 years?

- (c) How much would the land sell for if the owner gets it back in 21 years?
3. Suppose land rents for £10 a year. Suppose also a full grown crop of timber on the land will fetch £300, but takes 25 years to mature. Will land be used for timber at
- (a) A 10% interest rate?
  - (b) A 5% interest rate?
  - (c) A 0% interest rate?
  - (d) Calculate the interest rate at which the land will be equally profitably employed for timber or for farmland.
  - (e) Suppose the interest rate is 10%. At what price for timber will any timber start to be grown.
  - (f) Explain what will happen in the marketplace to ensure that timber sells for this price.
4. In 1650 the estates of the King, who had been executed in 1649 were sold off to raise revenue. Included in the sales were rights to receive rent charges in perpetuity. At this time in England private rent charges sold for a 5.5% rate of return. Thus a £5 rent charge would sell for £90.91. But a £5 rent charge belonging to the crown typically sold for only £44.64.
- (a) What was the rate of return on the crown rent charges?
  - (b) Why was it different from the rate of return on private rent charges?
  - (c) The crown rent charges were confiscated from the purchasers in 1660 when the son of the King was restored to the throne. Did the people who bought crown rent charges in 1660 make a profit or loss from their purchase, and what was the amount of the profit or loss in 1650 money?