Working Paper 32
Building Bridges: Some lessons from the Middle Ages on the long-term economic impact of bridges over the Thames

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Contents

Introduction

This paper has been motivated by the consideration of how to analyse the impact of the Thames Gateway Bridge. This proposal to build a road bridge between Beckton in Newham and Woolwich in Greenwich was examined at a Public Inquiry in 2005-6. The decision to build the bridge was based on the view that creating a new connection across the Thames would, by having a significant impact on accessibility, support increasing levels of activity and regeneration in the Thames Gateway.

The Thames Gateway, which runs from Docklands eastwards on both sides of the Thames, is the focus of major policy intervention to enable both more residential and economic investment, and the new bridge has been proposed as an important component of these policies, though by no means the only policy.

The Gateway is one of the largest regeneration areas in Europe. It is the focus of investment in skills, in housing, and in infrastructure. At issue for the Public Inquiry was whether a new bridge would support additional development and the extent to which it was a necessary component of the wide range of policies.

At the Inquiry, opponents argued that the creation of traffic nuisance and pollution by the bridge could not be outweighed by the benefits of economic development and some argued that no such benefits would exist because roads would not create such benefits. In the event, the Inspectors' report concluded that although there would be positive regeneration impacts they had not been proved to be substantial enough to outweigh the environmental disbenefits. This conclusion raises some important methodological issues which are worth further exploration.

These issues centre around how to analyse the consequences of one among many changes, in a system which includes much variability and feedback mechanisms which potentially operate over long time periods. This paper takes an historical approach to throw some light on these issues.

The description of the sort of changes which might be supported by the investment in the bridge has been described in various reports including those presented to the Planning Inquiry[1].

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[1] Symonds & Atis Real Weatherall

The mechanisms can be summarised as follows:

- Increased accessibility to wider labour markets enables wider job access and job search for residents, reducing unemployment and improving incomes
- Wider access encourages more people to want to live in the area and motivates residential building
- In turn, more residents create more spending and increase local employment and economic activity
- Increased accessibility encourages existing employers to find new clients in other markets and to expand
- Increased accessibility encourages new employers to locate both because of sourcing labour and accessing clients
- Increasing residential and employment investment, along with incomes in turn raises the quality of the location and the willingness to continue investment in all forms of activity.

It is clear from this brief description that a complete description of how these mechanisms might work would require an enormous amount of data. Moreover, different locations are likely to operate in different ways, depending on the history that they have previously experienced. A bridge connecting two fast growing locations with active communities might have a quite different impact to a bridge connecting two depressed locations. Since everywhere is different and comprehensive data is not available, a complete model of an individual location is not possible. Relevant comparators will be hard or impossible to find. The Humber bridge for example connected a city to a low density, largely agricultural location, which is quite different from connecting two parts of London, both of which are the focus of other regeneration policies such as skills investment and so on.

In addition, the mechanisms will exhibit feedback effects which could generate severe difficulties in establishing predictability. Feedbacks can generate what is sometimes called the butterfly effect so that small changes can have large impacts over time but in an unpredictable way. By examining a range of specific histories we can begin to evaluate the existence of such feedback effects and the range of potential outcomes. They show that there is indeed great variability in outcome and also that change takes considerable time. If the potential is to create the opportunity to rebuild communities and to reconstruct a built environment, this will take many years.

All of these considerations suggest that a much wider consideration of how we assess the benefits of individual investments and the extent to which broader judgements must be made needs to be undertaken. In particular, it is essential to consider:

- The period over which changes may occur in practice
- The extent to which one investment may interact with another
- The assessment of mechanisms where detailed data is likely to be missing
- The local variety and role of local histories.

This paper illustrates some of these issues by taking a wider historical perspective on the investment made in bridges across the Thames. An historical perspective offers the opportunity to bring together the approaches that historians take to such a question alongside the approach that an economist might take.

The investigation particularly focuses on the medieval period. This both enables us to focus on a period which can be observed at a distance, and also a period when there was substantial economic expansion. A comparable number of bridges were built across the Thames between 1200 and 1300 to those built in the nineteenth and twentieth centuries. And some things do not change.

For example, bridges have always been expensive. The Thames Gateway Bridge is estimated to cost around £400 million. This compares with the cost of Wembley Stadium. In the Middle Ages the cost of a stone bridge was equivalent to the cost of a substantial parish church (though less than the cathedral to which we might compare Wembley)[2]. There may be an economic equivalence here. Even churches specifically built to encourage pilgrim "tourism" cannot have broken even for centuries. In fact given the cost of maintenance it is unlikely that they ever did. Bridges too are dauntingly expensive to build and maintain, but both bridges and churches are rarely abandoned. It has been claimed that "medieval bridges were not white elephants"[3]. We test this theory and also explore what other factors might encourage bridge building and repair.

Moreover, the post-industrial city may resemble its medieval predecessor rather more than it does the industrial metropolis of the nineteenth and twentieth century. The medieval town combined manufacturing with a great deal of service industry. Both were comparatively mobile. It absorbed produce from the surrounding countryside and luxury goods from further afield. Despite the existence of city walls there was a considerable penumbra of men and women whose skills allowed them to make a living in both town and city. As regards the building and use of bridges, medieval transport infrastructure was surprisingly developed, especially in the south-east of England. It was also very flexible; nineteenth-century producers bringing goods to a city by rail had little choice in comparison with their medieval predecessors who could generally count on a choice of routes and bridges.

The kind of cost benefit analysis that is undertaken to look at the impact of infrastructure has generally assumed that the economy and population are independent of the investment, and it is then easy to conclude that the investment creates congestion or that a lack of population signifies failure of the investment rather than of planners. A long-term study puts some of this into perspective.

Parameters of the study

The Thames is particularly suited to this kind of study because it had a well-developed transport infrastructure from an early period. By 1500 there were no fewer than 18 bridges (see Appendix 1) over the river, most of which were in place by 1300. Only in the industrial age did the number of bridges substantially increase with the upgrading of the national transport infrastructure with canals and new roads. Research in the last 20 years has shown that a significant proportion of medieval goods travelled by road and that the road system

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[2] Harrison, pp.180–2.
[3] Harrison, p.224.

was dynamic and flexible[4]. Broadly speaking, Britain's road network has only been upgraded twice since the middle ages, first with the Industrial Revolution and then with the building of the motorways. Since neither wealth nor expertise were lacking during this period, it can only be concluded that the medieval road infrastructure was generally adequate for the nation's needs until the mid 1700s.

The Thames valley was the economic 'hotspot' of medieval Britain. Lying at the end of an arc of continental prosperity which ran from central Italy through eastern France and the Low Countries, London acted as an entrepôt for goods from the Continent to Britain and exported wool and cloth to be finished abroad. Raw wool and later cloth was mainly produced in the west of the country and this provided the bulk of the trade by both road and river along the Thames. London was by far the largest city in the British Isles, with a population of 80,000 or more by 1300 and it was a considerable centre of consumption[5]. Wine was not only imported direct from the Continent, but also delivered from ports such as Southampton and Bristol. Finally, maintaining the capital also stimulated trade along the Thames valley with a steady supply of timber crucial to maintain construction and a constant flow of grain necessary to feed its growing population.

Because of its crucial political and economic importance the south-east of England was exceptionally well documented. This does not mean that the economic history of bridges is anything like complete, but we have records of bridge construction and repair in monastic chronicles, charters and the Calendars of Patent and Close Rolls as well as archaeological and architectural evidence from surviving bridges. Two other accounts deserve mention; the sixteenth-century traveller, John Leland (c.1503-1552), recorded many of the bridges he traversed and it was in an early edition of Leland that a copy was published of the extraordinary poem stating the motivation for and construction of Abingdon bridge which was written on a memorial tablet in the town's Saint Helen's hospital. Otherwise this study has largely collated information from secondary sources, notably the Victoria County History (1899 ongoing).

In establishing the economic impact of a bridge various indicators can be used. There is some work on the wealth of towns mainly derived from medieval tax records (see Appendix 2). However, how much of such wealth is due to the presence of a bridge is difficult to determine. Secondly, there is the existence of the bridge itself. As stated, stone bridges were expensive and required regular maintenance. The cost of repairing a well made wooden bridge over 50 years was equivalent to it being rebuilt twice over[6]. The maintenance of a bridge over centuries is therefore an indication that it justified expense, but not, as might be thought, that it generated an income. Tolls were the exception rather than the rule in this period. Some bridges seem to have been mostly for the convenience of their wealthy owners with little reference to a conventional economic rationale.

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[4] D.F. Harrison, 'Bridges and economic development, 1300-1800', *Economic History Review*, 45 (1992); J. Masschaele, 'Transport costs in medieval England', *Economic History Review*, 46 (1993).
[5] R. Holt, 'Society and population 600-1300', *CUHB*, p.103.
[6] Harrison, p.180.

Therefore we have looked at a third indicator and that is the scale and condition of local parish churches. These were also major capital projects and were amended and improved according to a number of factors. Wealth of patrons and the church's status within an ecclesiastical administrative structure are possible distorting features, however, in most cases in England an area's economic success or failure through the centuries can be traced through the history of its parish churches.

Bridging the Thames

Before 1200

The persistent idea that the building and upkeep of bridges is the responsibility of central government is part of the legacy of the Roman Empire as well as a more modern phenomenon. This responsibility was often devolved to local government in the form of great estate holders in the post-Roman world and the foundations of the transport system of the Thames valley were laid in the centuries before 1000[7].

At this period, bridges were often constructed to extend political boundaries or for defensive reasons. In the early middle ages stretches of the Thames served as the border between Wessex and Mercia. It is therefore no surprise to see the state sponsored wooden London bridge in this early period as well as records of bridges at Wallingford which was one of Alfred's burhs, a royal mint and a key point on the road from London to Gloucestershire and at Oxford at the confluence of the Thames and the Cherwell on the important route between Winchester and the midlands[8]. The bridges were also justified in commercial terms since tolls were probably collected on Anglo-Saxon bridges and all three were kept in a relatively good state of repair, suggesting they were covering their costs even in times of political uncertainty. Their competitors were other means of crossing the Thames such as ford or ferry, but bridges had important advantages in personal safety and saving time on a poor road system.

The first century after the Conquest resulted in a few, important bridge links being constructed. The new regime took on bridges as prestige projects, but they were mainly built by local patrons.   At Oxford, Robert d'Oilly, a successful associate of the Conqueror, improved the existing bridge and causeway to the south of the city, probably with a view to facilitating the supply of his newly built castle. In the early twelfth century Henry I's daughter, Matilda bridged the Seine at Rouen and the bridge in stone and wood at Caversham may date from the same period built by Henry's newly founded Reading abbey. In each case the lord's actions thereby strengthened the existing local economic dominance of their respective towns but there is little suggestion of the bridges increasing competition between towns at this period. Mint output is a reliable economic indicator in the eleventh

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[7] N. Brooks, 'Medieval bridges: a window onto changing concepts of state power', *Haskins Society Journal*, 7 (1995), pp.11-29.

[8] D.Hill and A. Rumble eds., *The Defence of Wessex. The burghal hidage and anglo-saxon fortifications*, (Manchester University Press, 1996).

century and Southwark, Oxford and Wallingford are all prominent, though not outstanding in lists of leading towns[9].

A forerunner of a more speculative investment in a bridge may be seen at Godstow nunnery, near Wolvercote close to Oxford. Nunneries were always difficult institutions to endow and even royal involvement in the foundation of Godstow could not ensure its future. However, there was undoubtedly royal involvement in the package of buildings, fair and bridge which emerged between 1133 and 1142. How successful it was is not clear. Godstow remained a prominent institution in the Oxford area and the fair was still in existence in 1279, only disappearing around 1400[10].

In this early period bridges mainly represented political power. It is a plausible suggestion that they brought economic benefits and, particularly in the case of Godstow that contemporaries were aware of it, however because bridges were generally built in areas which were already economically successful their economic impact is suggestive rather than proven.

1200-1300

The period between 1200 and 1300 saw an increase in the number of bridges across the Thames. Besides the new London bridge there were no fewer than ten built at Kingston, Staines, Windsor, Maidenhead, Marlow, Henley, Oseney, Radcot, Newbridge and Lechlade. The bridge at Wallingford was upgraded to stone in the same period and Caversham's wood and stone structure may also be as late as the thirteenth century. To some extent an increase in the number of bridges might be expected given England's steadily growing population between 1100 and 1300. There also seems to have been a change in the character of bridge building. While the political and strategic aspects were still important, economic factors played a more prominent role. Thus bridge building takes its place alongside contemporary grants of fairs, markets and attempted town plantations[11] and is consistent with landlords' need for cash rather than produce during this period. This was despite the fact that private tolls could not normally be raised. Bridges were considered king's highway and passage was therefore free. The only circumstances in which tolls could be charged were on receipt of a royal grant of pontage which were issued in increasing numbers by the government from the beginning of the thirteenth century. The grants were specifically for the repair of the bridge and were usually time limited, typically between two and five years. Opinions vary whether the pitiful petitions for pontage represent reality, but there are suspicions of exaggeration since a truly broken down bridge would rapidly be abandoned, especially in an area so well supplied as the Thames valley, yet this rarely happened[12].

Undoubtedly the most commercially successful bridge across the Thames was London Bridge, financed in the late twelfth century out of royal taxation and 'bridge gilds', for which one must read associations of businessmen, and completed in 1208. Although there had been

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[9] D. Keene, 'The South-East of England', in *CUHB*, vol.1, pp.558-9.

[10] 'Wolvercote: Economic history', *VCH Oxford* 12, pp. 314-320. Harrison, p.21. *English register of Godstow nunnery*, ed. A. Clark, (1905-11) 3 vols. I, 29.

[11] A plantation was the term for the attempt to establish a new settlement.

[12] A. Cooper, *Bridges, Law and Power in Medieval England*, (Woodbridge, 2006), pp.127-47.

previous bridges on the site and the south bank suburb of Southwark was already in existence, the new stone bridge had an extraordinarily stimulating effect. The building of shops and dwellings on the bridge itself meant that there was in effect a fashionable retail and residential link between Southwark and Cheapside. Southwark prospered and expanded. Evidence for this is the rebuilding of St. Mary's Overie (now Southwark cathedral) on a grand scale by Peter des Roches, bishop of Winchester and leading member of Henry III's government and the borough becoming renowned in the thirteenth century for a number of houses (or 'inns') of great men attendant at court. The advantages of the suburb was not only its proximity to court, but also its place at the beginning of the road from London to Canterbury and the coast[13].

No other bridge across the Thames could emulate London's success. It is clear that there were attempts by royal government to develop Kingston-upon-Thames as a commercial centre. This village on royal lands was granted a charter in 1200, but the major investment came around 1170 when a wooden bridge was built across the Thames linking directly to the market place. Further investments were made with a stone bridge and causeway across the river Hogsmill and surrounding marshlands. There was a royal order to effect repairs to the Thames bridge in 1223, using the extensive endowment in place for that purpose. Kingston's success was founded on it being the first bridging point west of London and its ability to supply the city with its immediate needs, notably grain and timber. The short-term growth in prosperity is demonstrated in its 116 ft long thirteenth century parish church which is both longer and wider than its twelfth-century predecessor. It maintained its position and in the later part of the Middle Ages it remained consistently successful in regional terms as measured by the 1334 and 1524 subsidy returns[14].

The striking feature of the development of bridges west of London is its fluidity. The thirteenth-century bridge at Staines, which had been a traditional crossing point of the Thames since Roman times was rather upstaged by the success of Windsor, where the royal castle built in the eleventh century had stimulated the growth of a town. Windsor had an earlier wooden bridge, but a new one was built in the early thirteenth century and the court's frequent journeys to London meant that the road east was kept in good repair. Moreover, a new road was built in the thirteenth century heading west to Twyford and thence to the growing commercial centre of Reading. Finally, Windsor was on the route from the south coast to the midlands. By the middle of the century it in turn found itself rivalled by Maidenhead, an obscure development of two royal manors where a bridge had been built together with a new road to Reading along the present day route of the A4. New wharfs or hythes were constructed to provide a connection with river traffic which gave the town its name. Despite this Maidenhead remained only a modest success. A church was built in the thirteenth century, but the town failed to win parish status and it remained a modest chapel until its demolition in the nineteenth century. It may be that there was simply too much competition from nearby Henley, Marlow and Windsor. However, it is possible that what is being seen here is a very modern phenomenon where the transport infrastructure was so

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[13] *VCH Surrey* 4, pp. 125-35, 151-61. Harrison, p.204.
[14] C. Phillpotts, 'The Charter Quay site, Kingston, documentary research report', p.5
    http://www.wessexarch.co.uk/projects/london/charter_quay/spirit/documentary_research.pdf; (accessed 4 May 2008), Keene, 'South-East', *CUHB,* pp.558-9.

good that the main beneficiaries were the already established towns nearby, notably Reading.

West of Oxford there were also bridges built across the Thames in the first half of the thirteenth century. Here the competition was not so much about routes to London, but routes from Winchester and later Southampton, to the midlands. Radcot was on the site of a very ancient bridge, possibly going back to the tenth century. However, a new stone bridge was constructed in the early thirteenth century and in 1272 Matthias Bezill, described as the King's yeoman obtained a charter for a market there on Fridays. The bridge linked Bampton, Burford and the Cotswolds to Faringdon to the south. The market however does not seem to have been so successful because it was too close to those at Faringdon and Bampton, while Radcot never developed beyond a small settlement, again perhaps illustrating the point that a good bridge can export wealth[15].

The expansion of bridges demonstrates a number of features. Firstly their expense was enormous, not just because of the high quality stone or wood required, but because they required considerable further infrastructural development. The poor state of embankments meant that the river itself was broader and poorly defined, requiring a considerable causeway as at Oxford. Even better was to construct an entirely new road as at Maidenhead. The most successful bridges from this period harnessed royal and local capital in development. By contrast bridges which were under-capitalised did less well. Gilbert de Clare's attempt to add a bridge to his town at Great Marlow in the early thirteenth century may well have suffered from this. The church was near the river, hard by the bridge, suggesting a very short causeway. It suffered repeated flooding and finally collapsed in 1831. If this was intended to be a site of settlement it was unattractive. Such urban development as there was took place further up the hill. Marlow was one of the more modest crossing points on the Thames and in 1334 was assessed at a barely respectable £23.33. The real beneficiary of the bridge and access to the Thames may have been nearby High Wycombe assessed at £90. The inhabitants of Staines, another town with apparently only modest benefits from their bridge were aghast at the Privy Council's suggestion that it might be demolished to head off approaching rebels from the west in 1549, stating that it 'wilbe to thutter undoing and destruccon of the hoole towne and countrie thereaboute; and the bridge is yet staied…'[16]

1300 and after

The striking point about the pre-industrial network of bridges over the Thames is that it was largely complete by 1250. Only three bridges with contrasting fortunes were built in the later middle ages. They do however, give some idea of the motivation of bridge builders:

(i) safety
(ii) piety
(iii) civic pride

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[15] D.Postles, 'Markets for Rural produce in Oxfordshire', *Midland History*, 12, 1987, pp.14-26, Harrison, pp.22 and 97.

[16] *Calendar of State Papers; Domestic:1547-80*. ed. R.Lemon (London, 1856), p.19
cited in 'WhereThames Smooth Waters Glide', http://thames.me.uk/s00490.htm, River Thames Society, accessed Jan-May 2008.

(iv) economic opportunism

(v) fear of competitors

The shadowy records of a bridge at Shillingford, just upstream from Wallingford, display the limits of economic opportunism. It was traditionally the site of a ferry belonging to the castle, but there are two isolated records of a bridge there in 1300 and 1370.   However, there is no record of any infrastructural development around the area and no archaeological evidence of the bridge which it is assumed was timber. It seems to have been an attempt to divert traffic from the south onto the Wallingford-Oxford road, and the crossing was a source of revenue for the castle porter. However, his interests may have been better served by the ferry, which would have cost less to maintain and would have taken a steady revenue from local traffic[17]. The bridge looks to have been a late entry to an already developed network and was, besides, too close to Wallingford bridge.

A more successful late entrant was Newbridge, which lies six miles west of Oxford. The villages on the north bank of the Thames were already thriving thanks to the Cotswolds prominence in the late medieval wool trade. Northmoor completely rebuilt its church in the first half of the fourteenth century and Standlake's assessment of £161.63 in the 1334 subsidy put it just ahead of local rivals, Lechlade and some way in front of more established towns such as Windsor or Wallingford. If the worth of the ecclesiastical living of Northmoor is reliable, the area's wealth had been building steadily since the mid-thirteenth century and there was a riverside fair from around 1230 which suggests that there was already a crossing point at the site. However, in the early decades of the fifteenth century a stone bridge was built by John Golafre who also had a hand in the bridges at Abingdon. In contrast with Shillingford this was a successful project and Newbridge still stands today. The key was major investment in a causeway which covered the marshy ground on either side, maintained by a bridge guild of local businessmen[18].   However, the motive may have been fear: as the wool boom spread, competition between crossings would have increased. The local fair, cheekily timed to coincide with the Saint Giles' fair at Oxford may well have lapsed or been in decline by 1400.

The link with Abingdon may have been more than coincidence. Abingdon itself had bolstered its connections with the west by attracting the road to Gloucester away from Wallingford by means of a new causeway and bridges built around 1416. The bridge's late construction has left us an extraordinary record giving an indication as to why it was built. Some 40 years after its appearance a local ironmonger saw fit to put up a table in the hall of St. Helen's hospital on which were inscribed verses to commemorate. There is obvious civic pride in the gesture. Just down the road from Oxford's long 'Grand Pont' bridge and causeway Abingdon had an equally impressive project. The piece emphasises the high rates of pay earned by the craftsmen 'a penny a day'. It describes the participation of women who came to see how the work was progressing bringing white bread, cheese and chicken for the labourers. The piece also points to other motivations. Most obviously there is religious piety and public safety;

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[17] 'The borough of Wallingford: Honour and borough', *VCH Berks* 3, pp. 531-539.

[18] 'Northmoor: Church', VCH Oxford: 13: Bampton Hundred (Part One) (1996), pp. 166-170. Harrison, *op.cit.*, p.206. From: 'Oxfordshire' in S. Letters, *Gazetteer of markets and fairs in England and Wales to 1516* (2005). Online at "British History Online", http://www.british-history.ac.uk/source.aspx?pubid=272 accessed 25 April 2008.

> Of all Works in this World that ever were wrought
> Holy Church is chief, there children be cherished.
> For by baptism these Bairns to bliss have been brought,
> Through the grace of God, and fair refreshed.
> Another blessed business is bridges to make,
> There that the people may not pass after great showers.
> Dole it is to draw a dead body out of a lake,
> That was fulled [dipped] in a font stone and a fellow of ours

But the comparison with baptism reminds the reader that both children and bridges are investments in the future. Not only in this life through their economic effect were they a help, but both could save souls: children through prayers for their deceased parents, and bridges through their ability to save people from a watery grave.

The poet details the seeking of royal permission from Henry V and his instruction to build it as strong as they could with stone, lime or sand. However, the king provides no money or material: this comes from the local merchants who invested heavily in the bridge, despite the fact that costs seem to have overrun due to the strength of the stream which 'astonished them strong,' The poem does carefully state that the bridge was designed for horse and cart, that the cost of 'all the breakings of the bridge the town should bear'. The main benefit outlined is the fall in transport costs. There is no charge for the bridge crossing. In contrast, at Culham hithe (wharf) where there had presumably been a ferry the poet dwells on its iniquities

> Few folk there were could that way wend
> But they waged a weed or paid of their purse.

This was a reference to the poor having to give up clothing to pay the fare.

> Now…..Culham hithe has come to an end,
> And all the country the better and no man the worse[19].

To maintain the bridge a gild of the Holy Cross was set up at the nearby St Helen's church which was also responsible for a hospital. The church itself was undergoing a complete reconstruction contemporary with the bridge building which was to result in a substantially enlarged building, as wide as it was long. The bridge should be seen as a package of demonstrations of Abingdon's prosperity. Such was the popularity of the guild that it survived the Reformation. Its suppression in 1548 was reversed by Edward VI's government in 1553 under the more Protestant sounding name of Christ's hospital[20].

Important as it was, there was more to the bridge than civic pride. It is surely significant that one of the prime movers, Geoffrey Barbour, had made his money in Bristol before retiring to

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[19] *The Itinerary of John Leland in or about the years 1535-1543* ed. L. Toulmin-Smith, London 1910: appendix to pt.X, pp.116-18. I have updated the spelling.
[20] 'The borough of Abingdon', VCH Berks. 4, pp. 430-451. J. Scarisbrick, *The Reformation and the English people*. (Oxford, 1984), pp. 115,118. 'Hospitals- Abingdon' VCH Berks. 2 pp.92-3. Harrison, 215.

Abingdon. The bridge was a major improvement in east-west communications and diverted the road from Wallingford. However, Lechlade was also prospering and in 1472-73 a similar group of its own merchants were to pay for the enormous church of Saint Laurence in the town[21].

Abingdon is also symptomatic of a changing political relationship with national government in regard to building bridges. In the early period local lords built bridges as a reflection of royal power as happened at Reading, Wallingford and Oxford. In the thirteenth century assises were often held on a bridge. Its position as a natural stopping point on the king's highway, often symbolically running over demarcations of local boundaries made it a natural point where royal justice could be seen to be done[22]. By the later period the limited power of central government meant that kings were content to encourage local enterprises. Abingdon received little more than warm words from Henry V, while his son Henry VI did what he could by incorporating the guild in a charter of 1442.

There is even the suggestion that kings felt their own reputations were bolstered by association with successful local enterprises. Shortly after his seizure of power in 1483, the Yorkist king Richard III reincorporated the guild devoted to caring for the poor and maintaining the bridges at Abingdon. There was an element of insurance on the part of the town in a period of renewed instability, but why Richard favoured Abingdon is also interesting. His power base was in the north, where he had served his brother, so association with a newly prosperous town controlling routes to the south and west was useful. Moreover, the guild's association with Saint Helen's church meant that Richard had a link with the most famous ruler to have come to power from the north of England, the Roman emperor Constantine who was inspired to convert to Christianity by his mother, Saint Helen[23]. In both 1483 and 1553 central government was bolstering itself as much as aiding the local economy and illustrates the symbiotic relationship of central and local government concerning bridges in the long run.

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[21] Leland ed. Toulmin-Smith v, p.114.

[22] D.M. Stenton, *English Society in the Early Middle Ages*, (London, 1952), pp.152-4; M. Beresford, *New Towns of the Middle Ages*, 2nd edn., (Gloucester, 1988), p.137.

[23] We are grateful to Dr Jo Wilkinson for this point. Her biography of Richard III is forthcoming.

The Bridges as a System

The map shows the bridges across the Thames which existed at this period.

**Map 1: Bridges across the Thames by the fifteenth century**
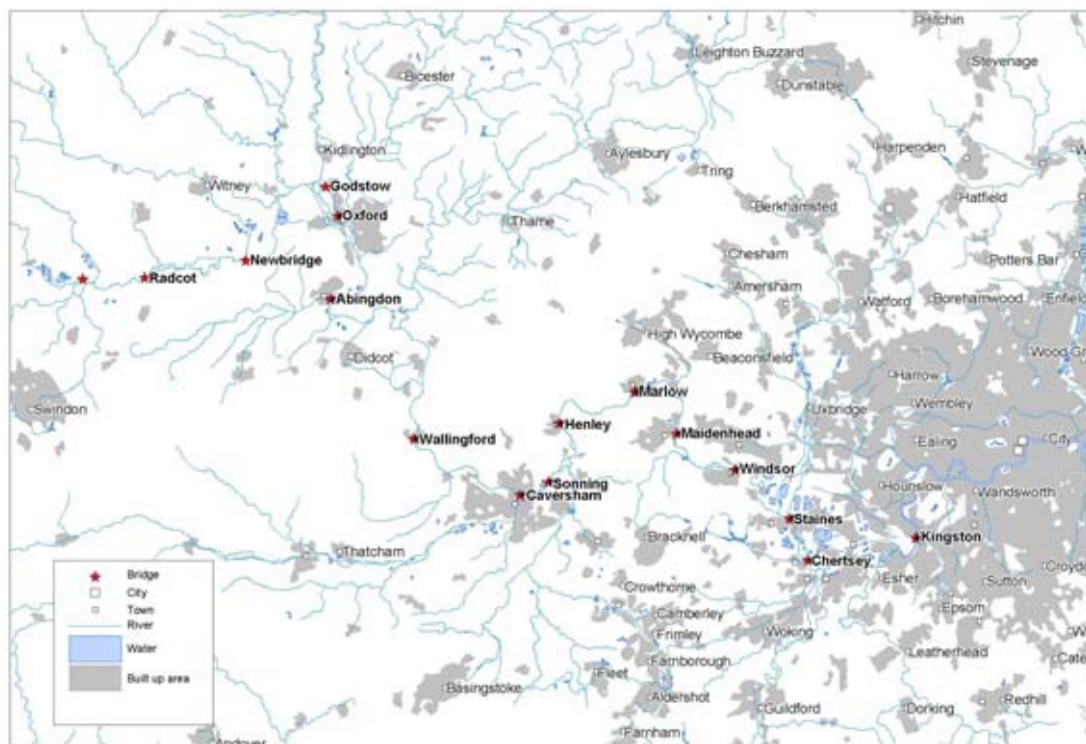
Source: Digital Map Data © Collins Bartholomew Ltd (2007)
Crown Copyright © Overview Mapping (2007)

The pre-industrial bridge crossings of the Thames were more or less complete by 1300, although Abingdon and Newbridge represent notable additions in the fifteenth century. Arranged graphically, certain characteristics stand out. In the first place it seems strange that there is no bridge between Kingston and London. The engineering challenge would have been no greater than London bridge itself and the commercial success of that structure should have provided incentives. The most likely explanation is political and military. With a bridge too close to London an army advancing from the west could outflank London's defenders. It is likely that the government was content to let upstream crossings rely on ferries; fording the Thames below Kingston was hazardous. By 1750 (just five years after the last unsuccessful army to march on the capital from the north) there were 27 ferry crossings of the Thames between London and Westminster alone[24].

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[24] *'Times' London History Atlas*, ed. H. Clout, (London, 1991), p.81.

Figure 1: The distance of bridges to London[25]

Distances to London - miles
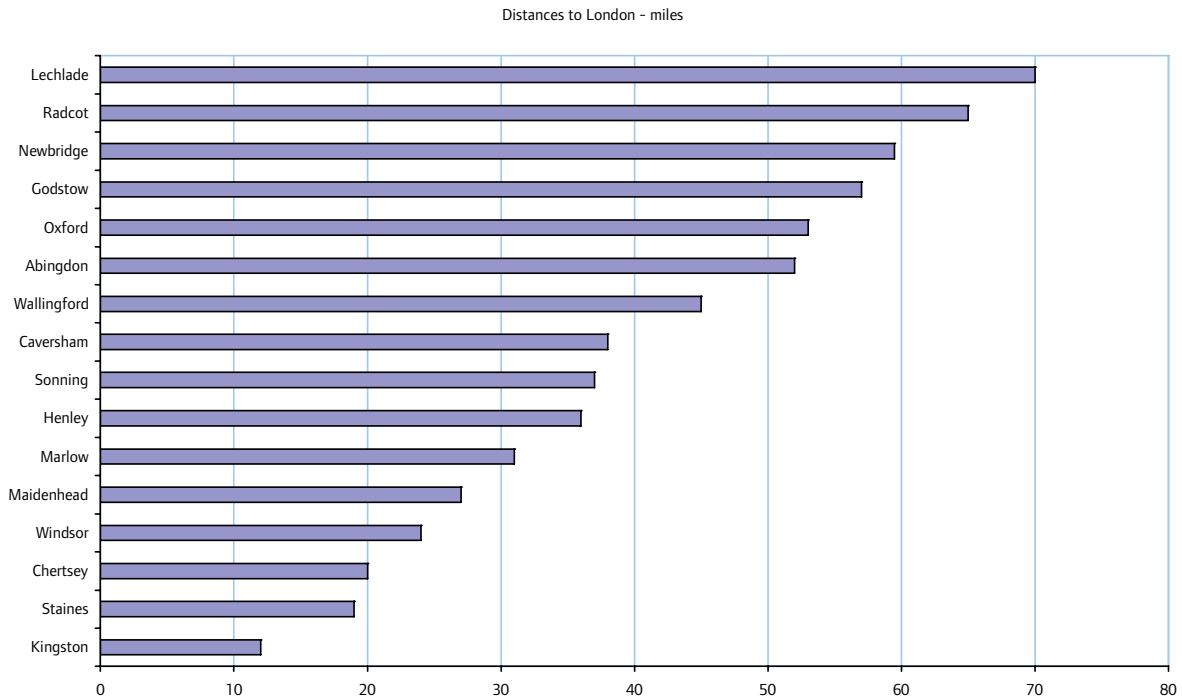
Source: GLA Economics

The second characteristic is a noticeable grouping of crossings between 25 and 40 miles from London (see Figure 1). This is even more striking in Figure 2 which displays distances between bridges as the crow flies. The upstream and downstream estimates of distance have been averaged for a better sense of where they fit to each other. Lechlade only has an upstream measure. Figure 2 shows how close the bridge at Sonning was to its rivals; Henley, Marlow, Maidenhead and Windsor, all built in the first half of the thirteenth century. It also suggests, if there is any reliability in the 1334 subsidy valuations, that none of these parvenu bridges could rival the crossing at already prosperous Reading (see Appendix 2). There are many reasons for bridge building, as outlined above, but such a clustering is symptomatic of attempts to steal trade from rivals or a fear of being marginalised. The clearest example of bridges being too close is the failed bridge at Shillingford: less than two miles from the stone bridge at Wallingford. This alone may explain its failure to thrive. If it was still in existence by the early fifteenth century the construction of stone bridges upstream at Abingdon, giving it an average distance of just 4.25 from the nearest crossing, would have placed it under further pressure.

More difficult to explain are the varying performances of the two bridges with very little competition in their immediate vicinity, Kingston and Wallingford. In the case of the former it was in fact a prosperous market town, paying over £200 in the 1334 tax assessment. If it was not more so it may be because its geographical position on the south-east corner of a large meander meant that most travellers to London from the north and west could either cross the Thames further upstream or bypass the river altogether. From the south it may have

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[25] In the following section Folly Bridge and Oseney bridge have been counted as one as they both give access to Oxford from the south and west respectively.

been easier to make straight for London bridge. The case of Wallingford is rather different. It was allegedly damaged by the new bridge at Abingdon. The sixteenth-century traveller, Leland wrote, 'when John de Saint Helen's built Abingdon's great stone bridge people from Gloucestershire began to travel via Abingdon instead of Wallingford, to Wallingford's great detriment.' In fact Wallingford had been in decline well before this. Leland himself refers to the effects of the Black Death in the fourteenth century. Competition from Oxford and Reading and an inferior road infrastructure meant that the town was already at a disadvantage from the end of the twelfth century[26].

Figure 2: The distances between bridges

Average distance to neighbour bridges upstream and downstream
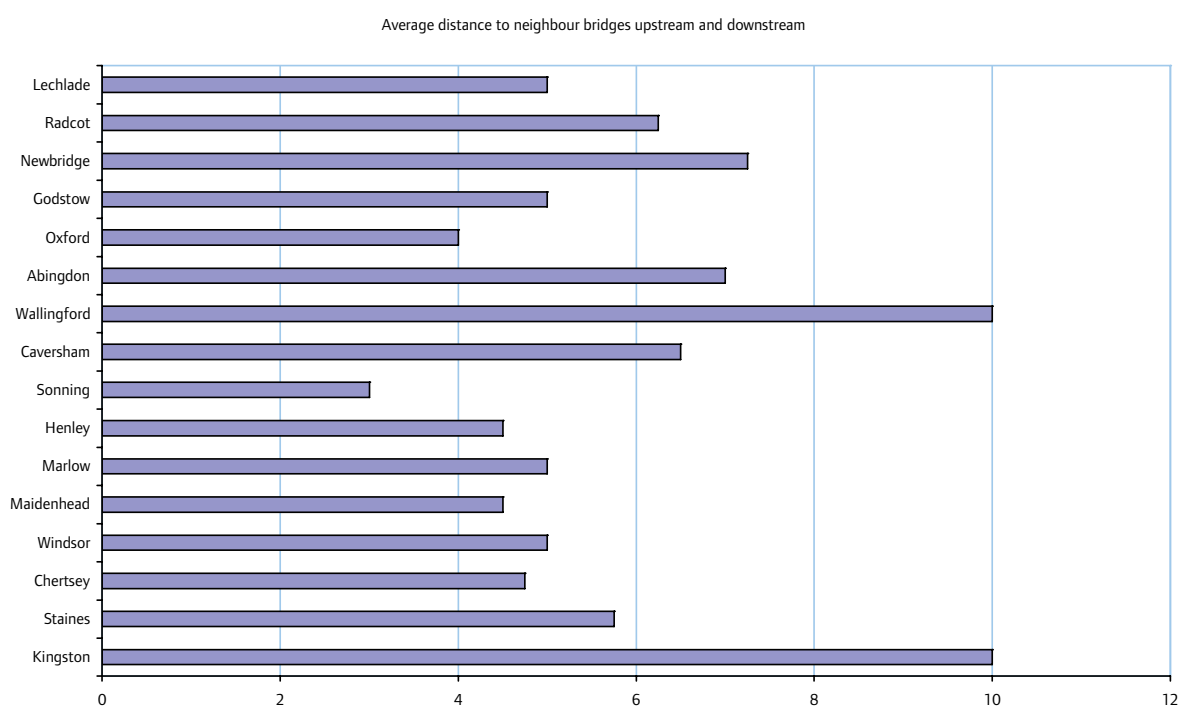
Source: GLA Economics

Figure 3 shows the distribution of bridges – or how many bridges are what distance apart. As can be seen the majority of the bridges are between four and six miles from each other. The mean distance between them of just over six miles (6.12) is reminiscent of the statutory distance between markets of 6 2/3 miles, representing the reasonable distance someone could be expected to transport goods on foot to and from market in a day. It is therefore difficult to avoid the conclusion that these bridges were intimately bound up with the commercial life of the area. It would also seem that one of the most advanced bridging systems in Europe at this time thrived because there were a number of competing bridges relatively close together.

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[26] *John Leland's Itinerary: travels in Tudor England*, (Stroud, 1993), ed. J.Chandler, p.35; D.A. Hinton, 'The Large Towns, 600-1300',CUHB, p.243.

Figure 3: The distribution of bridges

Numbers of bridges by distance from neighbours
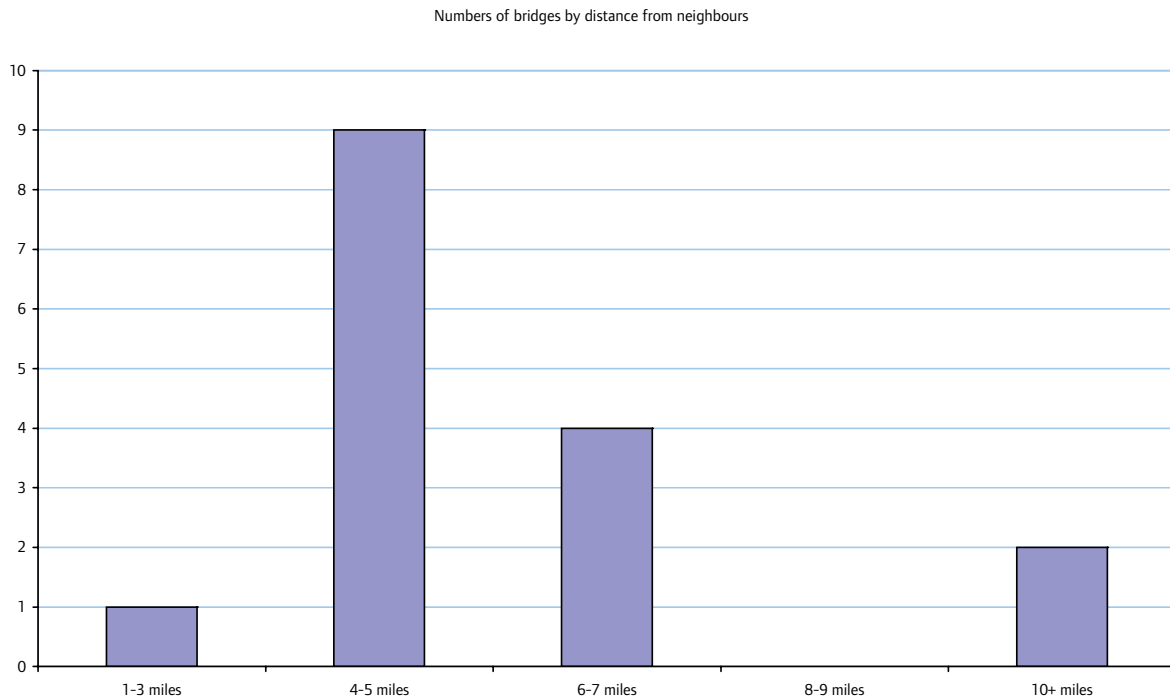
Source: GLA Economics

Conclusion

The bridges over the Thames represent an astonishingly successful transport network, which once in place (by about 1400) was to meet the economic needs of the area until the Industrial Revolution nearly four centuries later. Moreover, the Thames valley was one of the most prosperous and developed economies in northern Europe in the later middle ages. Yet contemporaries had a deep ambivalence to the network. The number of bridges and the many records dealing with their repair and maintenance are a testimony to the priority placed upon them. Communities made sacrifices to build and maintain them. Moreover, bridges were one of the few local economic issues with which central government was prepared to concern itself. However, the constant complaints about the state of bridges, to say nothing of the travellers' tales of the peril of long journeys demonstrate that the expense of time and money in maintaining crossings were a burden to communities.

As ever, there is no simple relationship between the construction of a bridge and the economic outcome which it represented. The cost of upkeep generated complaints and one bridge (Shillingford) seems to have disappeared for a period. However, in the remaining cases the grumbles were not so severe as to allow the bridge to fall into disrepair which implies that the benefits were greater than the costs. The clearest examples of bridges supporting and indeed helping to create settlements are at Kingston and Abingdon, where records show how the river crossing enabled markets and merchants to prosper.

In other cases, competition between different locations seems to have spread the benefits more thinly, with Staines competing with Windsor, competing with Maidenhead. Nonetheless, the settlements in these locations survived with their bridges and prospered into the modern age. The precise form that prosperity took depended inevitably on local circumstances and proximity to London is clearly a major benefit. The more distant bridges at Radcot and Lechlade remain backwaters and seem to have facilitated longer distance trade rather than maximising local growth. They have survived in their original form rather than being rebuilt in later centuries to carry heavier traffic.

It seems to be clear that investing in bridges across the Thames has had benefits which outweighed the costs both in the shorter and certainly in the longer run when we take several centuries. These investments supported and helped maintain continuing settlements which remain prosperous. At the same time, these bridges show that the crossing was only part of a larger and more complex story. To unpick the details of any individual story requires a detailed case study of the timing, circumstances and other policies in place both at a local and national level.

Perhaps this helps to drive home the point that in history and social science the nature of proof is more difficult to pin down than in engineering science. We can show that bridges were built and maintained and had effects in the context of their particular time and place. To generalise to say that these bridges would always have an effect of a given size is however impossible.

In the end only one bridge in the network was allowed to fail and some are present still. As investments they were undoubtedly considered worthwhile but long term and exacting; the Abingdon poet's analogy with children may well be the best description.

Appendix 1: Bridges

1. London Bridge. Late Anglo-Saxon wooden bridge. New bridge constructed in stone 1176-1209) running from west of Pudding Lane to Southwark. Replaced in 1831 and subsequently in 1973. (*VCH Surrey* 4, pp.125-35, 151-61)

2. Kingston Bridge. Wooden bridge built c.1170. Replaced in stone 1828. C. Phillpotts, 'The Charter Quay site, Kingston, documentary research report', p..5 http://www.wessexarch.co.uk/projects/london/charter_quay/spirit/documentary_research. pdf; *CUHB*, pp.558-9, (*VCH Surrey* vol.3, pp.487-501)

3. Chertsey Bridge. Small wooden bridge built between 1300 and 1327 by monks of Benedictine abbey. Henry IV insists on its repair and commemoration of his own name early fifteenth century. Replaced with stone bridge 1785. (*VCH Surrey* 3, pp.403-13. *VCH Middlesex* 3, pp.1-12.)

4. Staines Bridge. Bridged by the Romans on main route west of London. Wooden bridge in first half of thirteenth century, probably struggled against contemporary bridge at Windsor which drew traffic to Reading. (Harrison, p.55). 1228 pontage granted to bridge warden for a year. Tolls initially on goods coming across bridge, but by 1376 on goods going under also, suggesting possible decline. Demolished in Civil war, but back in 1669. Demolished 1791, but decent stone bridge does not emerge until 1832 (*VCH Middlesex* 3, pp.13-18).

5. Windsor Bridge. Mainspring for the town is the eleventh century castle. Possibly a wooden bridge at same time. Building of new wooden bridge in early thirteenth century. Replaced with iron bridge 1824. (*VCH Berks* 3, pp.56-66).

6. Maidenhead bridge. Wooden and probably built just before 1250, assuming c.50 year lifespan, because broken down in 1297. Name comes from new 'hythe' or wharf built there in late thirteenth century, but this was itself probably the result of the success of the new bridge and road. (VCH Berks 3, pp. 93-107; Harrison, p.56). Bridge supported by hermit in fourteenth century and later chantry guild in mid-fifteenth century. Suppressed by Crown in 1547, but petitioned to be re-founded in 1582. Replaced by stone bridge 1772.

7. Marlow bridge. Wooden, built early in thirteenth century. Bridge warden around by 1227 (VCH Bucks, 3, pp.65-77) and market first recorded in same year. Repairs needed by 1300 and chantry, possibly for bridge repair founded 1394. New suspension bridge 1832. (http://www.allsaintsmarlow.org/history.asp accessed 18 Dec. 2007, A. H. Cocks, 'The parish church of All Saints, Great Marlow', *Records of Buckinghamshire*, 6 (1890), pp.326-40).

8. Henley bridge. Trace of wooden bridge from 1232. 'Bridge and church estate ' in existence by fourteenth century. (Harrison, p.204). New stone bridge 1786-7.

9. Sonning bridge. Sonning site of Saxon bishopric and possibly early wooden bridge. Palace of bishop of Salisbury and near the road from Maidenhead to Reading. (*VCH Berks*. 3, pp.210-25). Local pilgrimage shrine of 'saint Sarik' (Cyricus) cured madness. Replaced with cheap brick bridge 1775-80 (Harrison, p.172).

10. Caversham bridge. Stone and wood. Ancient crossing place; Bridge with chapel dedicated to St. Anne exists by 1231 when chapel is subject of dispute between abbot of Reading and heirs of William the Marshal who hold lands on either bank. Therefore bridge possibly built by abbey and William which would date it to before 1219 when William died. However, possibly earlier as Reading abbey (founded 1121) is major pilgrimage centre in twelfth century, having relic of the hand of St. James. Abbey allowing Franciscan friars to settle by bridge in 1233 again suggests that the area is just starting to develop as friars tended to settle in suburbs and on edges of towns. Franciscans first of all want to enlarge facilities, later to move. Reading abbey hedges them with restrictions, but they are also allegedly being flooded out, suggesting only limited development is possible in the area. (*VCH Berks*. 2, pp. 62-73, 89-91). Bridge rebuilt 1826. Iron bridge 1870. Concrete bridge 1926.

11. Wallingford bridge. Wallingford bridge may be the oldest bridge on Thames if reference in 957 charter to 'brycwege' refers to it. But by eleventh century was a ford (Cooper, op. cit. p.19) 'The high road to Gloucestershire and South Wales passed through Wallingford until 1415, when the bridges at Culhamford and Burford by Abingdon were built, and the road was diverted from a point near Nuffield in Oxfordshire, about three miles above Wallingford.' (*VCH Berks*. 3, pp. 517-531)

Wallingford was a prominent Saxon town with a royal mint. Following the construction of a Norman castle it became an important royal residence. Granted to Richard of Cornwall (d.1272) in the last days of John's reign (1199-1216), he built a stone bridge and presumably a causeway. However, there was a wooden bridge in 1141 (*VCH Berks*. 3, pp.517-31) when Stephen besieged the castle. Early bridge helped by the charter of liberties granted by Henry II in 1155.

By the fourteenth century the bridge was looked after by two wardens, stewards or bridgemen, and grants of pontage were made to ensure its upkeep, which seems to indicate a decline even before the Black Death. In 1344 pontage was granted on behalf of the bridge which 'threatened to become a ruin' (Harrison, p.211). By 1429 the bridge was described as so ruinous as to be causing accidents. Repairs were carried out in 1507 and again in 1528-30 when half the material of the recently dissolved priory church was purchased for bridge repair. Castle ceased to be a royal residence soon after 1518. By 1571 both town and bridge were in serious decline. The bridge was 'in such ruin and decay that the inhabitants of the borough (by means of their great poverty) cannot support and repair' it. Tolls granted to mayor, burgesses and commonalty for bridge maintenance in 1576, but apparently to no effect (*VCH Berks*.3, pp. 517-531). Bridge rebuilt 1809 and strengthened 1934. (Harrison, 219-20).

11A. Shillingford Bridge. The profits of Shillingford Ferry belonged to the castle of Wallingford. It extended from the king's mill under the castle to the stream coming from Sildenebrigg or Yeldenbrigge (now Elm Birch), and was worth 12s. 6d. in 1300. In the fourteenth century it became customary for the porter of the castle to receive a grant of these profits for life. Shillingford Bridge is mentioned in 1300 and 1370, but it is not mentioned after the fourteenth century. In the eighteenth century the ferry gave place to a bridge, a wooden structure, superseded by the present bridge in 1827. (*VCH Berks*.3 pp. 531-9; Harrison p.60)

12. Abingdon/Burford Bridge. Built 1416 of stone replacing ferry. Really two bridges; Abingdon bridge to the north and Burford (borough ford) to the south. Town is westward development of ancient Benedictine abbey. No real development south of river. Major benefactor was Geoffrey Barbour (d.1417), a Bristol merchant who had retired to Abingdon. Gave 1000 marks which probably paid for 300 men working in summer 1416. Sir Peter Bessils gave stone from his quarries (Harrison, 175) John of St Helens endowed bridges and hospital. 1430 William and Maud Hales add here three more arches to south end of Burford bridge. (*VCH Berks*..4, pp.430-51). Individual merchants important, but also 'Guild of Holy Cross' now Christ's Hospital. This was an older organisation associated with the parish church of Saint Helen's. In 1442 it received a royal charter and was incorporated to look after the bridge and 13 poor.   (VCH Berks. 4, 92-3). Guild repaired road between Abingdon-Dorchester via Burford and Culhamford. (Harrison, 206). Original income £40 p.a. Re-incorporated by Richard III in 1483. Guild suppressed in 1548., but restored five years later as Christ's Hospital by Edward VI's government. Endowment worth £65 p.a. (J. Scarisbrick, *Reformation and the English People*. 115,118 VCH Berks. 2, 93, Harrison 215).

13. Folly/South Bridge. Oxford. Built late eleventh century of stone, but possibly on site of late Saxon timber bridge (Cooper, pp.13-14). Folly Bridge formed part of Grandpont, a great causeway crossing the river Thames on the south side of Oxford, built in the Anglo-Saxon period, and rebuilt in the late eleventh century by Norman castellan, Robert d'Oilly. John Leper given responsibility for its upkeep, paid rent of 12d a year for lease of land 1377. From thirteenth century bridge supported by hermits and pontage grants. In 1360 the town bought land on the east side of the causeway for the hermits. A chapel of St Nicholas collected alms for the bridge. Hermits appointed until fifteenth century. Bridge demolished 1826 and replaced. (*VCH Oxford*, 4, pp.3-73, 284-95 esp.286-9).

14. Oseney Bridge. Originally built in stone by Oseney abbey which was founded in 1129 by Robert d'Oilly the younger as Augustinian canons. Bridge may have come soon after or early thirteenth century. Development minimal to west of Oxford despite good road system from early thirteenth century. Widened 1777. Partial collapse 1885. Replaced with iron bridge 1889. (*VCH Oxford* 4, pp.284-9).

15. Godstow Bridge. Godstow nunnery, near Wolvercote was founded in 1133 on an island, so a bridge may well have dated from then. The road from Wolvercote to Wytham crossed the Wolvercote mill stream and the main stream of the Thames by bridges across split streams (*VCH Oxford*,12, pp.304-11). Replaced 1792. Partially rebuilt 1892.

16. Newbridge. Probably built in fifteenth century, possibly by John Golafre who was also involved in the Abingdon Guild of the Holy Cross. (M.R. Toynbee, 'Radcot Bridge and Newbridge', *Oxoniensia*, 14 (1949), pp. 46-52; Harrison, p.206). Long causeway (Leland, Chandler ed., p.372) now A415. Near villages of Standlake and Northmoor.

17. Radcot Old Bridge. Possibly wooden Saxon bridge. Stone built early thirteenth century possibly by monks of Cistercian Beaulieu abbey (f.1203) as lords of Faringdon. In 1272 Matthias Bezill, described as 'the King's yeoman' obtained a charter for a market there on Fridays. (Harrison, pp. 25,97; *VCH, Berks*. 4, p.489, *VCH Hampshire* 2, pp.140-6) Pontage granted for repair 1312. 1387 Battle of Radcot Bridge damages bridge.

18. St. John's Bridge. Lechlade. Stone bridge built early thirteeth century by monks of Beaulieu abbey, but bridge granted to St. John's Hospital (f. 1246). 5 day St John's fair started in 1234 (end of August). Maintenance a charge on the hospital in 1338 so pontage granted. (*VCH Gloucs*. 2, pp.125-6) Completely rebuilt 1879.

Appendix 2: The 1334 subsidy assessment

Medieval taxation was liable to widespread evasion and avoidance and assessments regularly throw up wild anomalies, the reasons for which historians can only guess at. Moreover at a distance of 700 years records may not have survived. However, England was more systematic than most of Europe and used with caution, tax assessment can be used as an economic indicator. The basic lay taxation was the 'subsidy' based on an assessment of movable property, generally household goods in towns. In 1334 the government abandoned this time-consuming and expensive practice and negotiated block quotas with every community. In practice these seem to have still had a strong relationship with the value of movable property at the time. However, resembling the modern experience of revaluations for rates and council tax, they were to remain the basis for tax assessment for the next two hundred years![27] For those in the in the top 100 a ranking is given.

1.	London	£11000
8.	Oxford	£914
40.	Reading	£293
46.	Abingdon	£269
73.	Kingston-on-Thames	£211
94?	Southwark	£171
	Standlake (Newbridge)	£162
	Lechlade	£156
	Staines	£125
	Windsor	£114
	Wallingford	£96
	Radcot	£72
	Henley-on-Thames	£60
	Chertsey	£40
	Great Marlow	£23

Sources: A. Dyer, 'Ranking lists of English medieval towns' in *Cambridge Urban history of Britain*, vol.1, 600-1540, ed. D. M. Palliser, (Cambridge, 2000), pp.755-57. S. Letters, *Gazetteer of markets and fairs in England and Wales to 1516* (2005). Online at "British History Online", http://www.british-history.ac.uk/source.aspx?pubid=272 accessed 25 April 2008.

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[27] M. Ormrod, 'The Politics of Pestilence. Government in England after the Black Death' in *The Black Death in England*, eds. Ormrod and P. Lindley (Stamford, 1996), p.161.

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'VCH'.   See abbreviations.

Abbreviations

CUHB	Cambridge Urban History of Britain, vol. 1, 600–1540, ed. D. M. Palliser, (Cambridge, 2000).
Harrison	David Harrison, Bridges of Medieval England (Oxford, 2007).
VCH	The Victoria History of the Counties of England (London) accessed online at http://www.british-history.ac.uk/ January–May 2008
Berks. 2	Berkshire vol. 2: eds. P.H. Ditchfield and W. Page (1907).
Berks. 3	Berkshire vol. 3: eds. P.H. Ditchfield and W. Page (1923).
Berks. 4	Berkshire vol.4: eds. W. Page and P.H. Ditchfield, (1924).
Bucks. 3	Buckinghamshire vol.3: ed. W. Page, (1925).
Gloucs. 2	Gloucestershire vol.2: ed. W. Page, (1907).
Hants. 2	Hampshire vol. 2: eds. H. A. Doubleday and W. Page, (1973).
Middlesex 3	vol. 3: ed. S. Reynolds (1962).
Oxford 4	Oxfordshire vol. 4: The City of Oxford, eds. A. Crossley, C.R. Elrington, (1979).
Oxford 12	Oxfordshire vol. 12: Wootton hundred south including Woodstock, eds. A. Crossley, C.R. Elrington, (1990).
Oxford 13	Oxfordshire vol.13: Bampton hundred (part one), eds. A. Crossley and C.R.J. Currie, (1996).
Surrey 3	vol. 3: ed. H. E. Malden (1911).
Surrey 4	vol. 4: ed. H. Malden (1912).

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Vietnamese

Nếu bạn muốn có văn bản tài liệu
này bằng ngôn ngữ của mình, hãy
liên hệ theo số điện thoại hoặc địa
chỉ dưới đây.

Greek

Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος
εγγράφου στη δική σας γλώσσα, παρακαλείστε να
επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυ-
δρομικά στην παρακάτω διεύθυνση.

Turkish

Bu belgenin kendi dilinizde
hazırlanmış bir nüshasını
edinmek için, lütfen aşağıdaki
telefon numarasını arayınız
veya adrese başvurunuz.

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ
ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ
ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Hindi

यदि आप इस दस्तावेज की प्रति अपनी
भाषा में चाहते हैं, तो कृपया निम्नलिखित
नंबर पर फोन करें अथवा नीचे दिये गये
पते पर संपर्क करें

Bengali

আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি
(কপি) চান, তা হলে নীচের ফোন্ নম্বরে
বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Urdu

اگر آپ اِس دستاویز کی نقل اپنی زبان میں
چاہتے ہیں، تو براہ کرم نیچے دئے گئے نمبر
پر فون کریں یا دیئے گئے پتے پر رابطه کریں

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى
الاتصال برقم الهاتف أو مراسلة العنوان
أدناه

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં
જોઇતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર
ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

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