ENGLISH MEDIEVAL POPULATION: RECONCILING TIME SERIES AND CROSS SECTIONAL EVIDENCE

Stephen Broadberry, University of Warwick, S.N.Broadberry@warwick.ac.uk
Bruce M. S. Campbell, The Queen's University of Belfast, b.m.campbell@qub.ac.uk
Bas van Leeuwen, University of Warwick, bas.vanleeuwen1@googlemail.com

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Abstract: A new time series for English medieval population is constructed from manor-level data using an index-number approach and a regional-weighting scheme. The absolute level of the medieval population is established with a benchmark for 1377, but using the need for consistency with other benchmarks for 1086, 1522 and 1541 as additional constraints. The amount of food required to support the peak medieval population is checked against a reconstruction of English agriculture at that time.

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I. INTRODUCTION

The pioneering work on English medieval population by Russell (1948) established benchmark levels of population for 1086 and 1377 and considered time-series evidence to link these to each other and to estimates for the early-modern period. Russell paid particular attention to the consistency of his estimates over this long sweep of history and arrived at the conclusion that the peak level of medieval population before the Black Death was around 3.7 million. This view was challenged by Postan (1966), who criticised both Russell's benchmarks as unrealistically low, thus resulting in a much higher level of population throughout the medieval period, and a peak level before the Black Death of around 6 million. Nevertheless, Postan did not consider the difficulties of reconciling his view of medieval population with the early-modern estimates, which have subsequently been established more firmly by Wrigley and Schofield (1989). Furthermore, it must be noted that Postan (1966: 561) viewed any such quantitative exercise with a high degree of scepticism, reflected in his phrase "the lure of aggregates".

Postan's view of medieval population has become the established orthodoxy, with Smith (1988: 191) concluding that "there is every reason to accept an English population in 1300 of over 6 million". Nevertheless, a number of quantitatively inclined scholars have continued to support Russell's view of a medieval population peak of the order of 4 million. Hollingsworth (1969: 375-388), for example, derives male replacement rates for medieval England from mortality data on the peerage included in Russell's (1948: 92-117) study, while Blanchard (1996) points to the lack of evidence offered by Postan (1966) and subsequent writers for their criticisms of Russell's main assumptions underpinning the 1086 and 1377 benchmarks. Campbell (2000) doubts the ability of the economy to provide enough food for 6 million people.

Here Russell's (1948) benchmark estimates are critically reviewed and a new time series for aggregate population derived from manor-level data on tenant numbers using an appropriate weighting scheme. The latter is essential when there are different trends in different parts of the country and information is primarily local, limited and discontinuous. The regression-based approach of Clark (2007) fails because of its high dependence on data for Essex, which, due to its proximity to London, was not demographically representative of the country as a whole. The absolute level of the population in the medieval period is pinned down by linking the estimated time series to the revised benchmark for 1377, with the need for consistency with the benchmarks for 1086, 1522 and 1541 limiting the degrees of freedom. Russell's benchmarks for 1086 and 1377 are shown to have been too low, but not by as much as suggested by Postan (1966), so that the medieval population at peak ends up at less than 5 million. That English agriculture could not have supported a much larger population at that time is demonstrated, as are how the national total was distributed across counties and how that distribution evolved over time.

II. THE BUILDING BLOCKS OF MEDIEVAL POPULATION ESTIMATES

To be convincing, estimates of English medieval population must be able to encompass both the cross-sectional evidence for a number of benchmark years, including most obviously the Domesday Book evidence for 1086 and the poll tax returns of 1377, as well as the time-series evidence amassed by scholars over the years from diverse sources. The time series must be able to link up the medieval benchmarks as well as connect to the more reliably grounded population estimates for the early modern period, starting in 1541. This study therefore begins with a review of the main cross-sectional and time-series evidence.

1. A benchmark for 1086

A benchmark estimate of population for 1086 can be derived from Domesday Book. The pioneering study was by Russell (1948) and his assumptions are set out in the first column of Table 1. The starting point is the total of rural households recorded in Domesday Book, to which must be added tenants-in-chief and under-tenants, as well as an allowance for the northern counties. Russell applied a multiplier of 3.5 to arrive at total rural population. Finally, he made an allowance for urban population. Darby (1977: 89) presented a number of alternative estimates. One issue is whether slaves should be included as household heads, as in Russell (1948), or individuals. Nevertheless, since there were only 28,100 slaves, this does not make a very large difference and is not pursued here. Of more significance is the effect of increasing the household multiplier. Darby (1977: 88) claimed that later medieval evidence suggests a multiplier of 4.5 to 5.0, and that the figure for 1086 is unlikely to have been much less. Using Russell's assumption results in a total population of 1.11 million, while Darby's approach yields a population of between 1.45 and 1.60 million.

Although Harvey (1988: 48-49) did not present any underlying calculations, she claimed that the Domesday population could well have approached 2 million. Rather than arguing for a higher household multiplier, Harvey (1988) argued for a much greater scale of omissions than the 5 per cent allowance made by Darby (1977), on the grounds that Domesday Book was more concerned with the landed wealth of the tenants-in-chief and their head tenants, and hence tended to under-record or omit the small-holding and landless elements. The final column of Table 1 presents an estimate of the English population in 1086 in the spirit of Harvey's assumptions. This involves increasing the rate of omissions from 5 per cent to 25 per cent — the maximal scale of omissions claimed by Postan (1966: 562) for the Poll Tax of 1377 — which results in a population of 1.87 million. Note that for the

population to exceed 2 million, which Harvey (1988: 49) claims should not be ruled out, would require an omissions rate of the order of 40 per cent.

2. A benchmark for 1377

It is also possible to obtain a benchmark estimate of population in 1377 from the poll tax returns. The key assumptions made by Russell (1948: 146) to derive a population total for England are the proportion of children in the population and the rate of under-enumeration. Russell's assumptions and results are set out in the first column of Table 2. Postan (1966: 562) suggested alternative assumptions, leading to the results set out in the second column of Table 2.

Whereas Russell assumed that children under the age of 15 accounted for 33.3 percent of the population, Postan suggested that the ratio may have been as high as 40 to 45 per cent. For the period after 1541, when reliable data become available, the percentage of under-15s in the population never rose above 40 percent, which surely represents the upper limit for 1377 (Wrigley and Schofield, 1989: Table A3.1). As Blanchard (1996) points out, such a high ratio tended to occur in periods of rapid population growth driven by high fertility. Since population was declining in the aftermath of the Black Death, a ratio as high as 40 to 45 per cent in the 1370s is improbable and a lower ratio more likely.

The second assumption of Russell that was challenged by Postan concerns the assumed rate of under-enumeration. Russell's figure of 5 per cent is based on an examination of the distribution of terminal numbers of local tax returns for evidence of excessive rounding, together with an allowance for "indigent and untaxed persons". Postan suggests a much higher rate of 25 per cent, which he justifies with reference to discrepancies between the poll tax returns and unspecified manorial sources. Poos (1991), however, supports Russell's ratio on the basis of a comparison of the poll tax returns and tithing evidence for a sample of Essex parishes. For a later period, Campbell (1981: 150) uses the discrepancy

between the tax returns of 1524-1525 and the muster rolls of 1522 to infer an evasion rate of males varying from a minimum of 5 per cent to a maximum of 20 per cent, arguing for an average figure of the order of 10 per cent. The poll taxes, of course, taxed both adult males and females, and although the latter may have been less visible to the taxers than the former Goldberg (1990: 200) concludes that "the underenumeration of women cannot have been a serious fault of the earlier [i.e. 1377] returns".

Russell's assumptions of a 33.3 per cent children's share and a 5 per cent under-enumeration rate result in a population total for 1377 of 2.23 million, while Postan's assumptions of a 45 per cent children's share and a 25 per cent under-enumeration rate lead to an estimate of 3.22 million. The third column of Table 2 also presents a "best estimate" of 2.50 million, based on a children's share of 37.5 per cent and an under-enumeration rate of 10 per cent, more in line with Wrigley and Schofield's demographic evidence and Poos and Campbell's tax-evasion evidence.

3. Population trends, 1086-1317

The next step is to establish population trends between the two benchmarks and link them up to the early-modern estimates of Wrigley and Schofield (1989), as amended in Wrigley *et al*., (1997). The starting point is the time-series evidence of tenant numbers assembled by Hallam (1988) for the period 1086-1317. Hallam's methodology was to find population estimates for individual manors at benchmark years from diverse sources and compare them with the population for the same manors given in Domesday Book. Index numbers of population were then constructed for up to eight regions and for the country as a whole, taking account of regional diversity. The composition of the eight regions used by Hallam is indicated in the notes to Table 3. To obtain a reliable index of population for England as a whole, it is important to ensure a balance between the relatively high density core regions to the south and east of a line running roughly from the Wash to the Severn Estuary, and the lower density

peripheral regions to the north and west of this line, including southwest England as well as the western and northern regions.

Hallam's (1988) estimates (Table 3) suggest that population in the country as a whole roughly tripled between 1086 and 1262, before stagnating to 1317. There are, however, a number of problems with these estimates, which become apparent upon close inspection of the data. First, dividing the dataset into eight regions means that the number of observations for any particular region is quite small, making it difficult to place much faith in the regional breakdown, even if the aggregate picture is reasonably plausible. Thus, for example, it seems inconceivable that the population of Northern England could have behaved in the wildly volatile fashion suggested by Table 3. Second, when the underlying data presented by Hallam (1988) are examined in more detail, it becomes apparent that although the estimates are presented for particular years, they often cover an extremely wide range of surrounding years. The most extreme case is 1149, which actually covers most of the twelfth century, spanning the period 1114-1193.

Hallam's (1988) dataset, augmented with additional material, has therefore been reworked to produce a revised set of population estimates for the period 1086-1315, and the same approach then extended to the period after 1315. Table 4A presents these estimates for the period 1086-1315 on a national basis only, since, although the data are sufficient to establish the national trend, they are too thinly spread to derive reliable trends for individual regions. Hallam's method of weighting individual manors by the importance of the counties in which they were based is nevertheless followed. A full listing of the manors is provided in Appendix 1, while the population of individual counties will be discussed later in the paper. Compared with Hallam (1988), a slightly smaller population increase is found between 1086 and the late thirteenth century, but a similar pattern of faster growth in the twelfth than in the thirteenth century. Note that the annual population growth rates presented in the table provide

a check on the credibility of the estimates by demonstrating that successive benchmark estimates do not require implausible rates of change. Significantly, during the periods of population expansion, the annual growth rates do not exceed the firmly established rates seen over sustained periods between the mid-fifteenth and early eighteenth centuries, and are well below the rates observed from the second half of the eighteenth century (Wrigley and Schofield, 1989).

4. Population trends, 1300-1377

Next, Hallam's (1988) methodology is extended to the period after 1315, again using estimates of manorial population from diverse sources. For this period, although the manorial sector was in decline, so that there are fewer manors with data on than for the pre-1315 period, there is a clear improvement in another dimension, since use can now be made of estimates for particular manors which contain a time-series element taken from a single source, rather than comparing one-off estimates from different sources. Figure 1, taken from Poos (1991), sets out the data for four Essex parishes charted by Smith (1988: 193). Again, as shall be seen, it is important to ensure as wide a geographic spread of manors as possible, weighted by the importance of the counties in which the manors were based.

To link up with the time series for the period 1086-1315 it is necessary to establish a benchmark for 1315. This exercise is started at 1300 so as to capture the growth of population to its peak in 1315 on the eve of the Great European Famine, which led to a substantial drop in the population. The estimates given in Table 4B confirm Russell's (1948) belief that the population bounced back strongly after 1325 and continued to rise until the first outbreak of plague in 1348-9. Note that this is in contrast to the continued decline during the second quarter of the fourteenth century which is apparent in the Essex parishes charted in Figure 1, possibly because of outward migration of young adult males to London. This is a further

reminder of the need to take account of divergent trends in different regions and between country and town.

The Black Death, which first struck in 1348-9 and was accompanied and reinforced by inclement weather and serious harvest failure, had a catastrophic effect, reducing the population by around 46 per cent within the space of just 3 years. This is consistent with recent estimates which reckon the excess mortality of these years at 40 per cent or greater (Hatcher, 1994: 8-9). Although such a catastrophic decline was almost certainly followed by an immediate rebound, further national outbreaks of plague in 1361-62, 1369 and 1375 progressively eroded the population's capacity to replace itself and ensured that by 1377 nearly half of the population had been wiped out (Hatcher, 1977: 25). Furthermore, it is widely accepted that the population decline was fairly evenly spread across the country, affecting both core and periphery alike.

5. Population trends, 1377-1541

Table 4C tracks the path of population from 1377 to 1541. The manorial evidence suggests that after the bounce-back between 1351 and 1377, the downward trend from the 1348 peak resumed at a substantial rate between 1377 and 1400, and continued at a reduced rate to the middle of the fifteenth century. One way of understanding this trend would be if the later plague outbreaks disproportionately affected younger age groups, thus making it difficult for the population to rebound through increased fertility (Hatcher, 1977: 58-62). After 1450 the manorial data become too thin to provide the basis for a regionally balanced population estimate, so it is necessary to rely on other less direct sources to track the movement of population between 1450 and 1541.

Although Smith (2009) argues that population continued to decline during the second half of the fifteenth century, there are some serious problems with this line of argument. First, population needed to recover at some point to reach the firmly grounded level of 2.83 million

by 1541. If population continued to decline during the second half of the fifteenth century, then the rate of population growth required in the first half of the sixteenth century becomes implausibly high. Second, real wages turned down from around 1450 after a long period of increase from the early fourteenth century and a rapid increase across the Black Death. The post-1450 downturn was already apparent in the real-wage series for unskilled building labourers produced by Phelps Brown and Hopkins (1981), and remains a feature of the series compiled by Clark (2005) and Allen (2001), plotted here in Figure 2. It is possible to acknowledge some trade-off between the level of the population and the real wage without accepting the strongest version of the Malthusian model, where the iron law of wages ensures that the real wage is quickly driven down by population growth to the minimum required for subsistence. It would certainly be difficult to explain the falling real wages at this time if population was continuing to trend downwards.

A third reason for believing that population began to recover from around 1450 is provided by the demographic data of Hollingsworth (1969). Quinquennial population growth rates derived from replacement rates in the *inquisitiones post mortem* were persistently negative until the early 1430s and became persistently positive from the early1460s, with positive growth clearly outweighing negative growth during the 1440s and 1450s. Of course, it may be claimed that tenants-in-chief were not representative of the population as a whole, and indeed there is clear evidence in favour of this during earlier years, when the landed classes clearly suffered less from the harsh conditions of the Great Famine. Nevertheless, it is difficult to interpret the upturn in replacement rates for tenants-in-chief as anything other than a clear signal that the downward demographic pressure of the plague period, which affected all classes, had come to an end. Combined with the evidence of real wages and the already high growth rates for population needed to hit the 1541 population level, the case for a population recovery from around 1450 is very strong. That recovery was, however, the net

outcome of the balance struck between regions of stagnant and even declining population (Figure 3C), such as eastern England and the east midlands, and those of most vigorous expansion, most notably the south-west, north-west and immediate environs of London.

III. NEW POPULATION ESTIMATES, 1086-1541

Having assembled the main building blocks, they are now put together to produce a new consistent series of English medieval population covering the period 1086-1541. The first step is to use the 1377 "best estimate" benchmark from Table 2 to calibrate the level of population between 1086 and 1450 using the time series from Table 4. The second step is then to check the 1086 population value thus obtained against the benchmark value from Table 1. The third step is to check the credibility of the implied population growth rate between 1450 and 1541, and the consistency with other benchmark population estimates for the early modern period, including those of Cornwall (1970) for the 1520s. This produces the population estimates of Table 6.

The "best estimate" of population in 1377 from Table 2 is 2.50 million. Projecting backwards with the time series from Table 4B produces a peak medieval population of 4.81 million in 1348, and a slightly lower value of 4.69 million in 1315. The Great Famine shows up as a notable negative shock with the population falling by 12 per cent to 4.12 million by 1325. The fall during and following the Black Death was even more catastrophic. The population declined from 4.81 million in 1348, to 2.60 million by 1351, and to 2.50 million by 1377: an aggregate reduction of 48 per cent.

Projecting back further in time by splicing the series from Table 4A to the 1315 benchmark from Table 4B yields a population level of 1.71 million in 1086 as shown in the first column of Table 6 and an aggregate increment of 2.74-fold by 1315, consistent with the growth of at most threefold over this period noted earlier. Note that the time-series projection

of 1.71 million for 1086 falls between the Darby II estimate of 1.60 million and the Harvey benchmark of 1.87 million given in Table 1, but is 54 per cent greater than the 1.112 million proposed by Russell (1948).

Projecting forwards from 1377 reveals a further fall in the population to a level of 1.90 million by 1450 (just 11 per cent greater than the estimated Domesday total). As noted earlier, a level of population lower than this would be difficult to square with the population level of 2.83 million in 1541 established by Wrigley *et al*. (1997). Also included in Table 6 is Cornwall's (1970: 39) benchmark for 1522 of 2.35 million, which is also broadly consistent with the figure of 1.90 million for 1450 and the Wrigley *et al*. estimate of 2.83 million for 1541. Cornwall's estimate was based on the 1522 Muster Rolls with additional information from the 1524 and 1525 Lay Subsidies. Although it is above Campbell's (1981) central figure of 1.84 million, it is well below his maximum figure of 2.92 million. Furthermore, Cornwall (1970: 33) also provided a benchmark figure for 1545 based on a comparison between the chantry certificates and the 1377 poll tax returns. The idea was taken from Russell (1948), and by disregarding the least reliable parish estimates, Cornwall arrived at a figure of 2.80 million in 1545, which is very close to the Wrigley *et al*. (1997) figure of 2.91 million.

IV. COULD THE PEAK POPULATION HAVE BEEN FED?

This section examines an issue raised by Campbell (2000): could the peak population have been fed, given what is known about English medieval agriculture? Broadberry *et al*. (2010) have reconstructed English agriculture for the period 1270-1870, which enables them to calculate the availability of kilocalories for consumption, reproduced here in Table 7 for the medieval period. Livi-Bacci (1991) believes that for a population to have been adequately fed required an average food intake of 2,000 kilocalories *per capita* per day. For a largely agrarian economy such as medieval England, home-raised vegetables and poultry, together

with wild nuts, berries, fish and game, would undoubtedly have contributed some of these kilocalories. A majority of at least 1,500 kilocalories per person per day would, however, need to have come from the main arable crops and pastoral products of the agricultural sector. These constitute the bare minimum for subsistence in a population which was successfully reproducing itself.

The estimates suggest that agricultural output was more than sufficient to meet society's needs after the Black Death, but was significantly less so in 1300/09. The picture that emerges from Table 7 of English society in the half-century before the Black Death is one of an economy under pressure with a *per capita* nutritional intake of 1,300 kcal. per day of arable and pastoral products that was barely sufficient to its needs. This means that it is hard to see how a population much above the peak level of 4.81 million could have been sustained, given the grain yields and the levels of land use underpinning the agricultural output estimates. Even allowing for 10 per cent higher arable productivity in the non-seigniorial-sector, as suggested by Stone (2006), would not change the picture dramatically, as can be seen in the final column.

V. DISTRIBUTION OF THE POPULATION BY COUNTY

An important issue when considering the path of medieval population concerns the changing regional distribution of the national total across counties. In particular, it is important to be able to link up the known distribution of the population across counties in the key benchmark years of 1086, 1290, 1377 and 1600, without requiring implausible growth rates at the county level. This can be checked using the data set out in Table 8. The county population shares derived from standard sources and given in Table 8A provide a starting point. These county shares are then applied to the corresponding benchmark estimates of the national population given in Table 6 to produce the county population levels given in Table 8B. Finally, from

these population levels are derived the county population annual growth rates given in Table 8C, from which Figure 3 is drawn. Looking first at the period 1086-1290, in Figure 3A, the population growth rate was slightly above 1.0 per cent for some northern counties, but this is not unreasonable during the recovery from the very low levels in the aftermath of the post-Conquest Norman reprisals in this region. Note that other parts of the periphery, particularly in the southwest, grew more slowly during this period. Turning to the period 1290-1377 in Figure 3B, population declined in all core counties and in all peripheral counties apart from Cornwall, which, even after allowance for the omission of tin miners in 1290, appears to have continued to expand its population. The northern counties, which had shown the fastest growth between 1086 and 1290, displayed the greatest rate of decline between 1290 and 1377. From 1377 to 1600, the periphery once again tended to show faster growth than the core, this time in the southwest as well as the north, as can be seen in Figure 3C. Partly as a result of the inverse relationship between growth rates in the periods 1086-1290 and 1290-1377, and partly as a result of the greater length of the period 1377-1600, the whole period 1086-1600 was characterised by generally higher growth rates in the periphery than in the core, as can be seen in Figure 3D.

VI. CONCLUSIONS

This paper provides new estimates of English medieval population, reconciling both time series and cross sectional evidence. After critically reviewing the benchmark estimates for 1086 and 1377 and time series based on manor-level data, a new index of English medieval population is constructed using a regional weighting scheme. The absolute level of the medieval population is then established with a benchmark for 1377, but using the need for consistency with the benchmark for 1086 as an additional constraint. A further constraint is provided by the need to link up with the Wrigley *et al*. (1997) estimates for the early-modern period, which sets limits to the population floor in the mid-fifteenth century. The downturn in

the real wage and the change from negative to positive replacement rate for male tenants-in-chief are also used as evidence of an upturn in population from 1450, along with the regional evidence of impressive of demographic dynamism in the north-west, west midlands, south-west, and immediate environs of London.

A further cross-check on these estimates is provided by an assessment of the food needs of the population, which can be measured against the reconstruction of medieval agriculture provided in Broadberry *et al*. (2010). This shows that given what is known about prevailing grain yields and patterns of land use, it would not have been possible to sustain a population much above the estimated peak level of 4.81 million. Certainly, Postan's (1966) suggestion of a peak population above 6 million, which has become the orthodox view, needs to be revised downwards substantially. Finally, a further cross-check on these estimates is provided by tracking the distribution of the population across counties in key benchmark years. This demonstrates the credibility of the implied county population growth rates required to link up these benchmarks.

TABLE 1: English population, 1086 (thousands except where otherwise specified)

	Russell	Darby (I)	Darby (II)	Harvey
Recorded rural households	268.3	268.3	268.3	268.3
Omissions rate (%)	0.0	5.0	5.0	25.0
Allowance for omissions	0.0	13.4	13.4	67.1
Tenants-in-chief	1.1	1.1	1.1	1.1
Under-tenants	6.0	6.0	6.0	6.0
Northern counties	6.8	6.8	6.8	6.8
Total rural households	282.2	295.6	295.6	349.3
Household multiplier (persons)	3.5	4.5	5.0	5.0
Total rural population	987.7	1,330.2	1,478.0	1,746.5
Urban population	117.4	120.0	120.0	120.0
Total population	1,105.1	1,450.2	1,598.0	1,866.5

Sources and notes: Derived from Russell (1948: 54); Darby (1977: 63, 89); Harvey (1988: 48-49). For ease of comparison, there are two very small adjustments to the original estimates. First, there is a slight discrepancy with Darby (I) because Darby did not allow his total for northern counties to vary with the household multiplier. Second, Russell's urban population includes clergy.

TABLE 2: English population, 1377

	Russell	Postan	"Best estimate"
Laity	1,355,555	1,355,555	1,355,555
Clergy	30,641	30,641	30,641
Allowance for Cheshire, Durham & mendicant friars	31,994	31,994	31,994
Adult total	1,417,380	1,417,380	1,417,380
Share of population under-15	33.3%	45.0%	37.5%
Allowance for children	708,690	1,159,675	850,428
Total including children	2,126,070	2,577,055	2,267,808
Assumed rate of under-enumeration	5%	25%	10%
Allowance for under-enumeration	106,303	644,264	226,781
Total population	2,232,373	3,221,319	2,494,589

Sources: Russell (1948: 146); Postan (1966: 562).

TABLE 3: Hallam's estimated English population trends, 1086-1317 (1086=100)

	1086	1149	1230	1262	1292	1317
Eastern England	100.0	165.7	299.3	368.3	416.2	433.7
Southeast England	100.0	—	—	259.5	260.3	382.0
East midlands	100.0	160.5	272.7	272.7	211.6	255.4
Southern England	100.0	168.8	218.5	255.1	316.2	305.7
West midlands	100.0	209.2	211.6	252.8	233.7	317.7
Southwest England	100.0	—	—	—	—	190.3
Northern England	100.0	—	—	781.1	1,380.8	575.9
The Marches	100.0	—	—	—	378.2	266.5
Total England	100.0	171.2	248.0	309.9	326.0	315.1

Sources and notes: Hallam (1988: 591-593). Regional groupings:

Eastern England: Lincs., Norfolk, Suffolk, Essex, Cambs.

Southeast England: Middx, Surrey, Sussex, Kent

East midlands: Notts., Leics., Rutland, Northants., Hunts., Beds., Herts., Bucks.

Southern England: Berks., Hants., Wilts., Dorset, Somerset

West midlands: Derby., Staffs., Warks., Worcs., Glos., Oxon.

Southwest England: Devon, Cornwall

Northern England: Yorks.

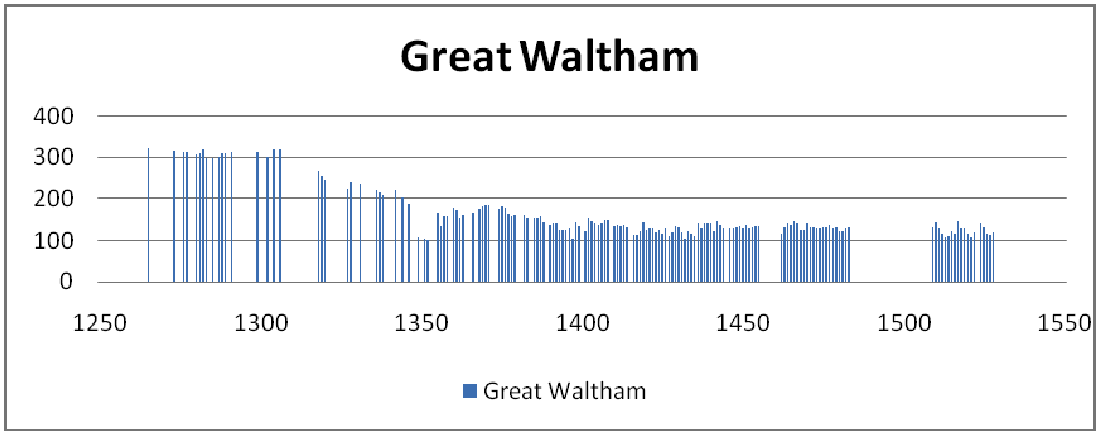
The Marches: Hereford, Salop., Cheshire

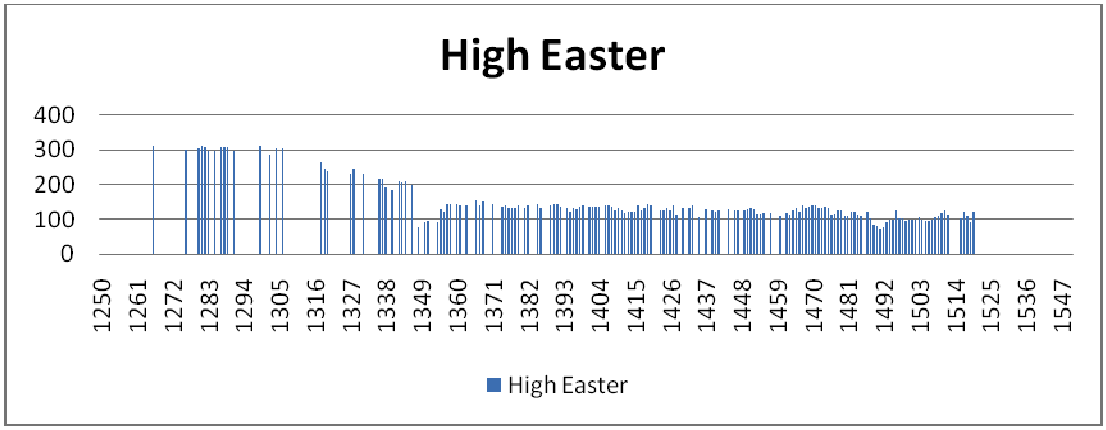
TABLE 4: English population trends, 1086-1450

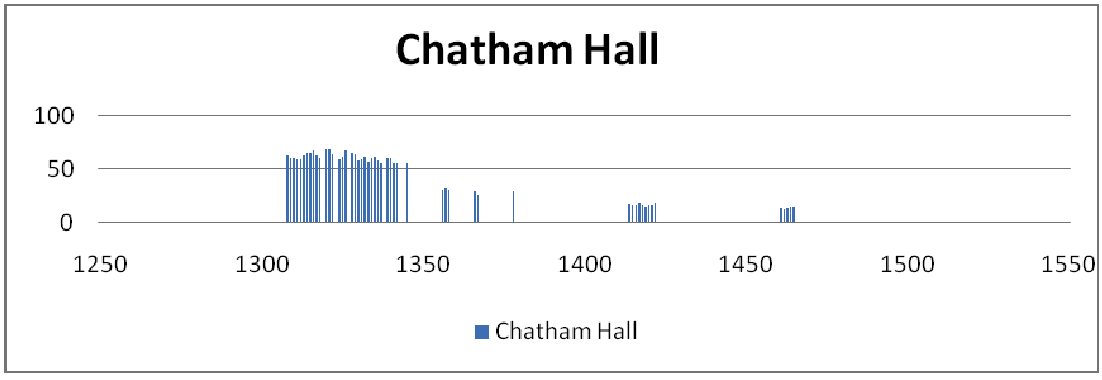
A. **1086-1315 (1086=100)**	Year	Population level (1086=100)	Period	Annual growth rate (%)
	1086	100.0		
	1190	181.6	1086-1190	0.58
	1220	232.7	1190-1220	0.83
	1250	247.9	1220-1250	0.21
	1279	259.4	1250-1279	0.16
	1290	278.5	1279-1290	0.65
	1315	274.8	1290-1315	-0.05
B. **1300-1377 (1300=100)**	Year	Population level (1300=100)	Period	Annual growth rate (%)
	1300	100.0		
	1315	108.1	1300-1315	0.52
	1325	94.9	1315-1325	-1.30
	1348	111.0	1325-1348	0.68
	1351	60.0	1348-1351	-18.53
	1377	57.5	1351-1377	-0.16
C. **1377-1541 (1377=100)**	Year	Population level (1377=100)	Period	Annual growth rate (%)
	1377	100.0		
	1400	83.3	1377-1400	-0.79
	1430	80.8	1400-1430	-0.10
	1450	76.2	1430-1450	-0.29
	1522	94.0	1450-1522	0.29
	1541	112.8	1522-1541	1.02

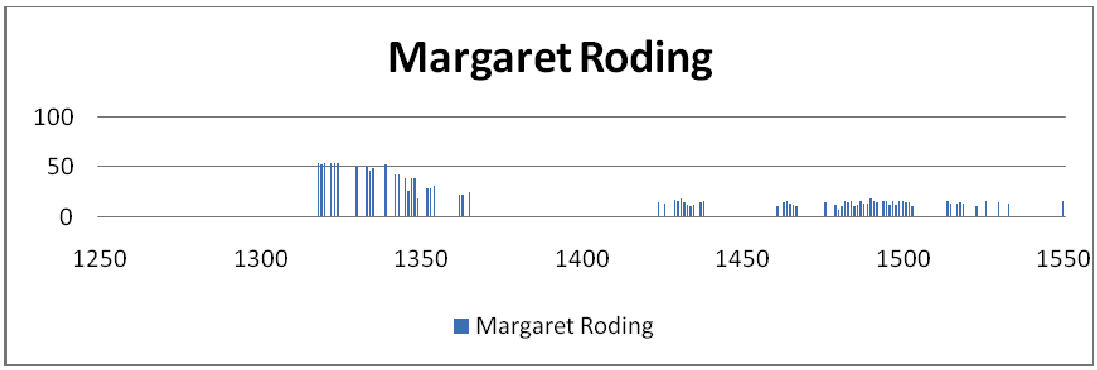
Sources: Estimates derived from data on manorial trends as described in the text, apart from estimates for 1522 from Cornwall (1970: 39) and for 1541 from Wrigley et al. (1997) with interpolation from Wrigley and Schofield (1989: 531).

FIGURE 1: Population trends on four Essex manors



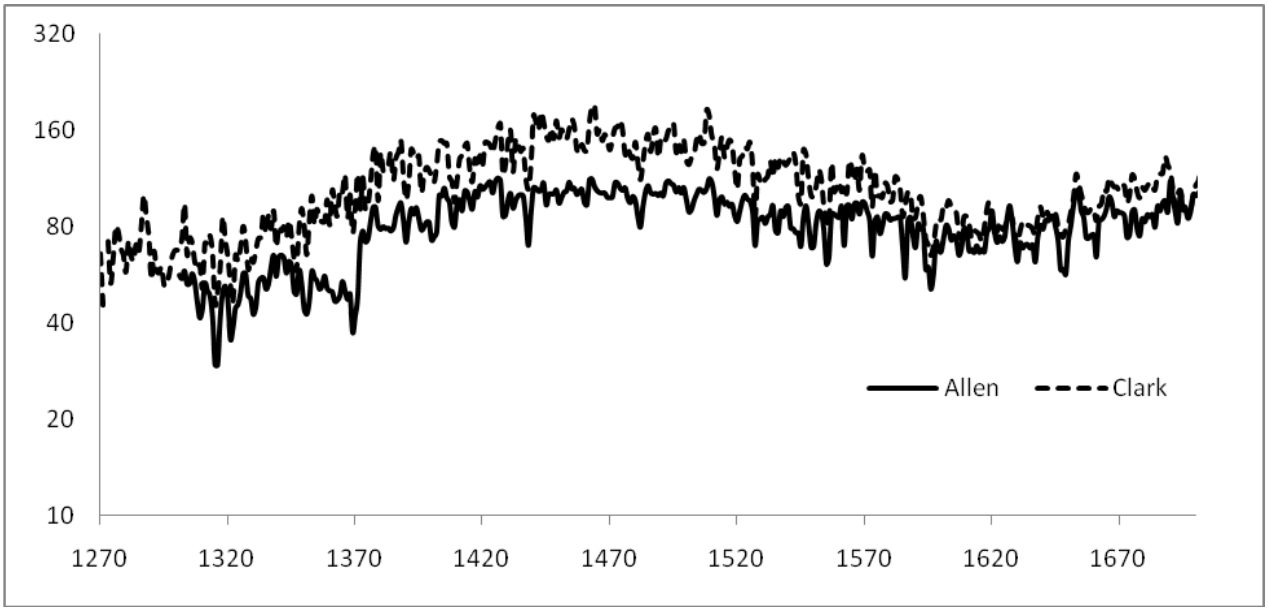






Source: derived from data underlying Poos (1991: 96-103).

FIGURE 2: Indexed daily real wage of an unskilled building worker (10-year moving averages, 1700=100, log scale)



Sources: Allen (2001); Clark (2005).

TABLE 5: Male replacement rates in fifteenth-century England

Period	Replacement rate	Period	% annual growth rate
1401-05	0.887	1385-89	-0.375
1406-10	0.869	1390-94	-0.439
1411-15	0.758	1395-99	-0.866
1416-20	0.805	1400-04	0.678
1421-25	0.697	1405-09	-11.28
1426-30	0.818	1410-14	-0.628
1431-35	0.832	1415-19	-0.575
1436-40	0.944	1420-24	-0.180
1441-45	0.986	1425-29	-0.044
1446-50	1.250	1430-34	0.697
1451-55	1.250	1435-39	0.697
1456-60	0.946	1440-44	-0.173
1461-65	1.118	1445-49	0.349
1466-70	1.418	1450-54	1.097
1471-75	0.958	1455-59	-0.134
1476-80	1.370	1460-64	0.984
1481-85	1.038	1465-69	0.117
1486-90	1.217	1470-74	0.614
1491-95	1.603	1475-79	1.475
1496-1500	1.423	1480-84	1.102

Sources and notes: Hollingsworth (1969: 379). The replacement rate is the ratio between the estimated number of sons and the deceased male tenants-in-chief recorded in the *inquisitiones post mortem* (IPM) preserved in the National Archives (formerly Public Record Office), London. The annual growth rate is calculated from the replacement rate by assuming that the increase took place over a generation lasting 32 years, with each observation lagged half a generation (Hollingsworth, 1969: 376).

TABLE 6: English population, 1086-1541 (millions)

Year:	Total population:	Year:	Total population:
1086	1.71	1348	4.81
1190	3.10	1351	2.60
1220	3.97	1377	2.50
1250	4.23	1400	2.08
1279	4.43	1430	2.02
1290	4.75	1450	1.90
1315	4.69	1522	2.35
1325	4.12	1541	2.83

Sources: benchmark years 1086-1450 from Table 4, with absolute level determined by the "best estimate" for 1377 from Table 2. Benchmarks for 1522 from Cornwall (1970: 39) and for 1541 from Wrigley et al. (1997) with interpolation of quinquennial data using Wrigley and Schofield (1989: 531).

TABLE 7: *Per capita* daily kilocalorie consumption of major arable crops and animal products in England

Years	Popul-ation (m.)	Animal Kcal.	Arable Kcal.			Total Kcal.	Total Kcal. if 10% higher arable productivity in non-seigniorial sector)
			Net of seed	Net of seed, losses, & fodder	% food-extraction rate		
1270/79	4.40	117	2,671	1,415	*53*	1,531	1,646
1300/09	4.72	139	2,256	1,242	*55*	1,381	1,481
1310/19	4.63	136	2,185	1,199	*55*	1,334	1,432
1380/89	2.36	242	3,603	1,801	*50*	2,042	2,188
1420/29	2.03	292	2,992	1,468	*49*	1,760	1,891
1450/59	1.93	312	3,038	1,512	*50*	1,823	1,958
1600/09	4.27	214	3,140	1,664	*53*	1,877	1,877

Sources and notes: kilocalories per bushel for the medieval period are taken from Campbell *et al.* (1993: 41). Following Overton and Campbell (1996: Table XIII), storage losses are assumed to have been 10%, with food conversion losses of 20% for wheat and rye, 22% for barley, and 44% for oats when processed into bread, and 70% for barley and oats when malted and brewed into ale/beer. For the post-Black-Death period (1380/89 to 1450/59) patterns of grain consumption are assumed to have been equivalent to those for 1600 given by Overton and Campbell (1996: Table XII): 98% of wheat and rye and all oats not fed to livestock eaten, but 50% of barley eaten and the remainder brewed. For the pre-Black-Death period it is assumed that 60% of barley was eaten and only 40% brewed. For 1600-1850 the estimates of Overton and Campbell (1996: Tables XII and XIII) were followed.

TABLE 8: Distribution of population by county

A. County population shares (%)

County	1086	1290	1377	1600
Bedfordshire	1.27	1.35	1.47	1.05
Berkshire	2.24	1.29	1.64	1.38
Buckinghamshire	1.77	1.87	1.78	1.36
Cambridgeshire	1.82	2.89	2.12	1.76
Cheshire	0.56	0.76	1.07	1.80
Cornwall	1.73	*0.73	2.48	2.50
Cumberland	0.54	1.27	0.91	1.84
Derbyshire	0.95	1.79	1.76	1.70
Devon	5.70	3.11	3.45	6.28
Dorset	2.72	2.06	2.48	1.82
Durham	0.45	1.59	0.98	1.86
Essex	5.10	3.53	3.68	3.76
Gloucestershire	3.08	3.20	3.28	2.46
Hampshire	3.85	1.98	2.83	2.53
Herefordshire	1.87	1.53	1.21	1.51
Hertfordshire	1.45	1.78	1.44	1.41
Huntingdonshire	0.94	1.39	1.02	0.67
Kent	4.42	3.44	4.30	3.69
Lancashire	0.67	1.28	1.73	4.41
Leicestershire	2.24	1.48	2.45	1.53
Lincolnshire	8.21	8.13	6.88	4.21
Middlesex	2.34	1.63	2.50	6.81
Norfolk	8.68	10.25	7.07	4.16
Northamptonshire	2.73	3.06	3.02	2.21
Northumberland	0.72	3.12	1.22	1.77
Nottinghamshire	1.84	1.48	2.09	1.90
Oxfordshire	2.29	1.91	1.98	1.63
Rutland	0.27	0.50	0.43	0.28
Shropshire	1.63	2.41	1.94	1.92
Somerset	4.57	3.18	4.06	4.11
Staffordshire	1.06	1.19	1.63	1.88
Suffolk	6.65	4.75	4.52	3.36
Surrey	1.45	1.72	1.30	2.06
Sussex	3.88	2.60	2.62	2.48
Warwickshire	2.17	1.83	2.19	1.59
Westmorland	0.28	0.71	0.53	1.03
Wiltshire	3.72	3.36	3.31	2.80
Worcestershire	1.55	1.27	1.16	1.59
Yorkshire, ER	—	2.44	3.07	1.62
Yorkshire, NR	—	3.44	2.92	2.47
Yorkshire, WR	—	2.68	3.48	4.80
Yorkshire	2.60	(8.56)	(9.47)	(8.89)
ENGLAND	100.00	100.00	100.00	100.00

* probably an under-estimate because stannary workers (i.e. tin miners) are excluded.

TABLE 8 (continued): Distribution of population by county

B. County population levels (persons)

County	1086	1290	1377	1600
Bedfordshire	21,695	64,194	36,771	43,059
Berkshire	38,232	61,498	41,081	56,889
Buckinghamshire	30,162	88,631	44,604	56,059
Cambridgeshire	31,123	137,373	52,885	72,492
Cheshire	9,589	36,035	26,757	73,896
Cornwall	29,532	*34,914	61,964	102,892
Cumberland	9,265	60,567	22,633	75,687
Derbyshire	16,249	84,852	43,912	69,791
Devon	97,221	147,860	86,239	258,587
Dorset	46,375	98,113	61,904	74,961
Durham	7,732	75,490	24,587	76,483
Essex	87,005	167,660	92,053	154,882
Gloucestershire	52,565	152,058	81,923	101,256
Hampshire	65,702	94,062	70,736	104,197
Herefordshire	31,861	72,502	30,230	62,054
Hertfordshire	24,742	84,529	36,113	58,104
Huntingdonshire	16,004	66,186	25,616	27,627
Kent	75,388	163,636	107,482	151,713
Lancashire	11,459	60,962	43,172	181,622
Leicestershire	38,167	70,356	61,163	63,140
Lincolnshire	140,176	386,202	171,965	173,199
Middlesex	39,851	77,399	62,476	280,063
Norfolk	148,085	486,920	176,844	171,163
Northamptonshire	46,611	145,582	75,393	91,075
Northumberland	12,300	148,084	30,389	72,923
Nottinghamshire	31,390	70,520	52,221	78,148
Oxfordshire	39,003	90,759	49,424	66,909
Rutland	4,642	23,655	10,837	11,371
Shropshire	27,895	114,640	48,502	78,958
Somerset	78,022	151,003	101,376	168,984
Staffordshire	18,030	56,715	40,658	77,559
Suffolk	113,452	225,770	113,106	138,295
Surrey	24,710	81,629	32,613	84,804
Sussex	66,135	123,415	65,437	102,003
Warwickshire	37,107	86,829	54,714	65,455
Westmorland	4,807	33,777	13,358	42,199
Wiltshire	63,470	159,857	82,847	115,163
Worcestershire	26,376	60,470	29,105	65,614
Yorkshire, ER	—	115,777	76,760	66,520
Yorkshire, NR	—	163,634	73,099	101,596
Yorkshire, WR	—	127,371	87,049	197,498
Yorkshire	44,304	(406,782)	(236,907)	(365,615)
ENGLAND	1,706,436	4,751,489	2,500,000	4,114,891

* probably an under-estimate because stannary workers (i.e. tin miners) are excluded.

TABLE 8 (continued): Distribution of population by county

C. County population annual growth rates (%)

County	1086-1290	1290-1377	1377-1600
Bedfordshire	0.53	-0.64	0.07
Berkshire	0.23	-0.46	0.15
Buckinghamshire	0.53	-0.79	0.10
Cambridgeshire	0.73	-1.09	0.14
Cheshire	0.65	-0.34	0.46
Cornwall	*0.08	**0.66	0.23
Cumberland	0.92	-1.13	0.54
Derbyshire	0.81	-0.75	0.21
Devon	0.21	-0.62	0.49
Dorset	0.37	-0.53	0.09
Durham	1.12	-1.28	0.51
Essex	0.32	-0.69	0.23
Gloucestershire	0.52	-0.71	0.10
Hampshire	0.18	-0.33	0.17
Herefordshire	0.40	-1.00	0.32
Hertfordshire	0.60	-0.97	0.21
Huntingdonshire	0.70	-1.09	0.03
Kent	0.38	-0.48	0.15
Lancashire	0.82	-0.40	0.65
Leicestershire	0.30	-0.16	0.01
Lincolnshire	0.50	-0.93	0.00
Middlesex	0.33	-0.25	0.68
Norfolk	0.59	-1.16	-0.01
Northamptonshire	0.56	-0.75	0.08
Northumberland	1.23	-1.80	0.39
Nottinghamshire	0.40	-0.34	0.18
Oxfordshire	0.41	-0.70	0.14
Rutland	0.80	-0.89	0.02
Shropshire	0.70	-0.98	0.22
Somerset	0.32	-0.46	0.23
Staffordshire	0.56	-0.38	0.29
Suffolk	0.34	-0.79	0.09
Surrey	0.59	-1.05	0.43
Sussex	0.31	-0.73	0.20
Warwickshire	0.42	-0.53	0.08
Westmorland	0.96	-1.06	0.52
Wiltshire	0.45	-0.75	0.15
Worcestershire	0.41	-0.84	0.37
Yorkshire, ER	—	-0.47	-0.06
Yorkshire, NR	—	-0.92	0.15
Yorkshire, WR	—	-0.44	0.37
Yorkshire	1.09	-0.62	0.19
ENGLAND	0.50	-0.74	0.22

Sources and notes: * probably an under-estimate because stannary workers (i.e. tin miners) are excluded in 1290; ** probably an over-estimate because stannary workers (i.e. tin miners) are excluded in 1290. County population shares for 1086 from Russell (1948: 53-54). Note that the shares from Darby ((1977: 336, 364-368)) would be the identical, since they are based on the same underlying data but with different household multipliers. County population shares for 1290 and 1377 from Campbell (2008: 926) and for 1600 from Wrigley (2009: 721). County population totals obtained by applying these shares to the national population totals. Growth rates calculated on a logarithmic basis.

FIGURE 3: County population annual growth rates (%)

A. 1086-1290

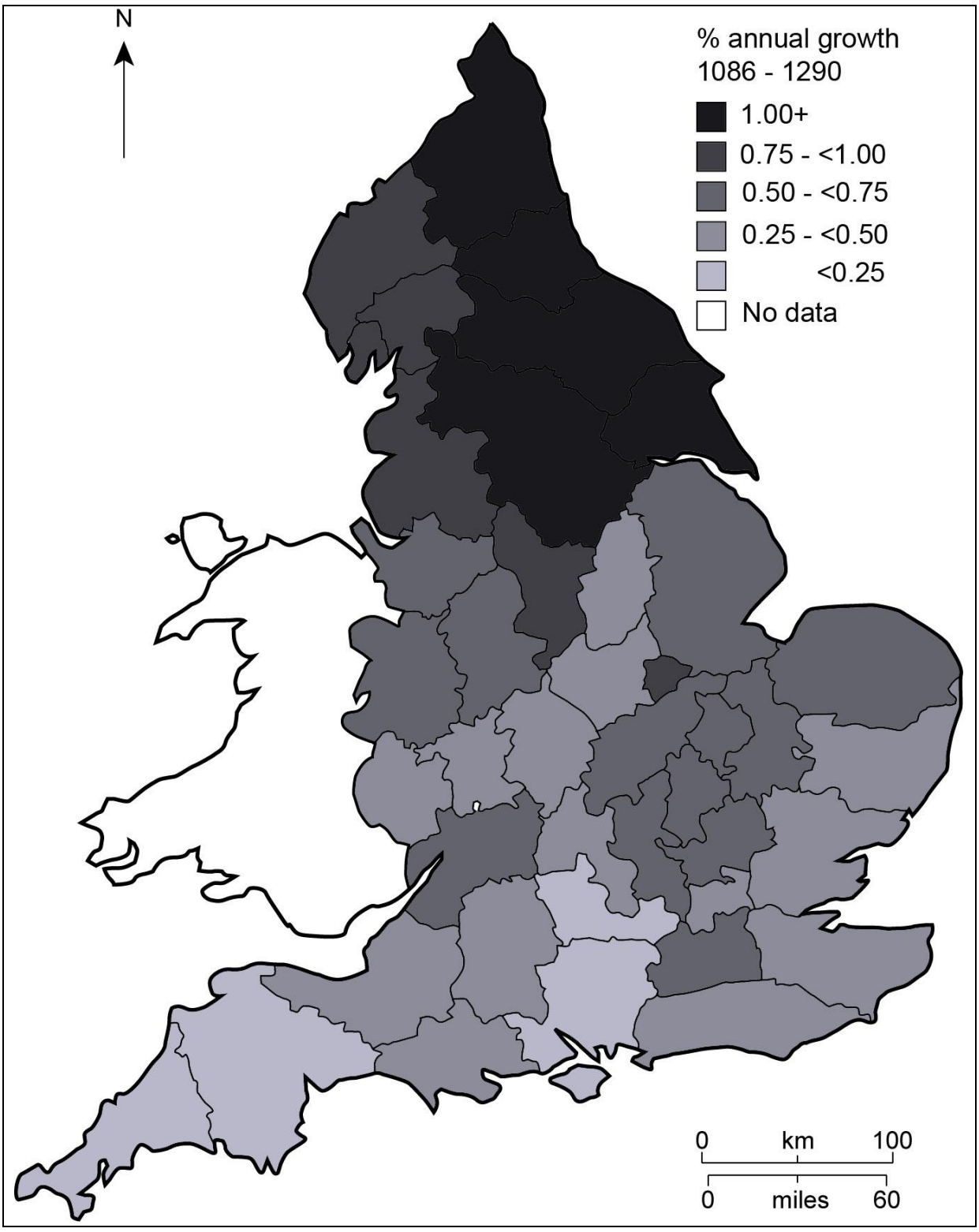


FIGURE 3 (continued): County population annual growth rates (%)

B. 1290-1377

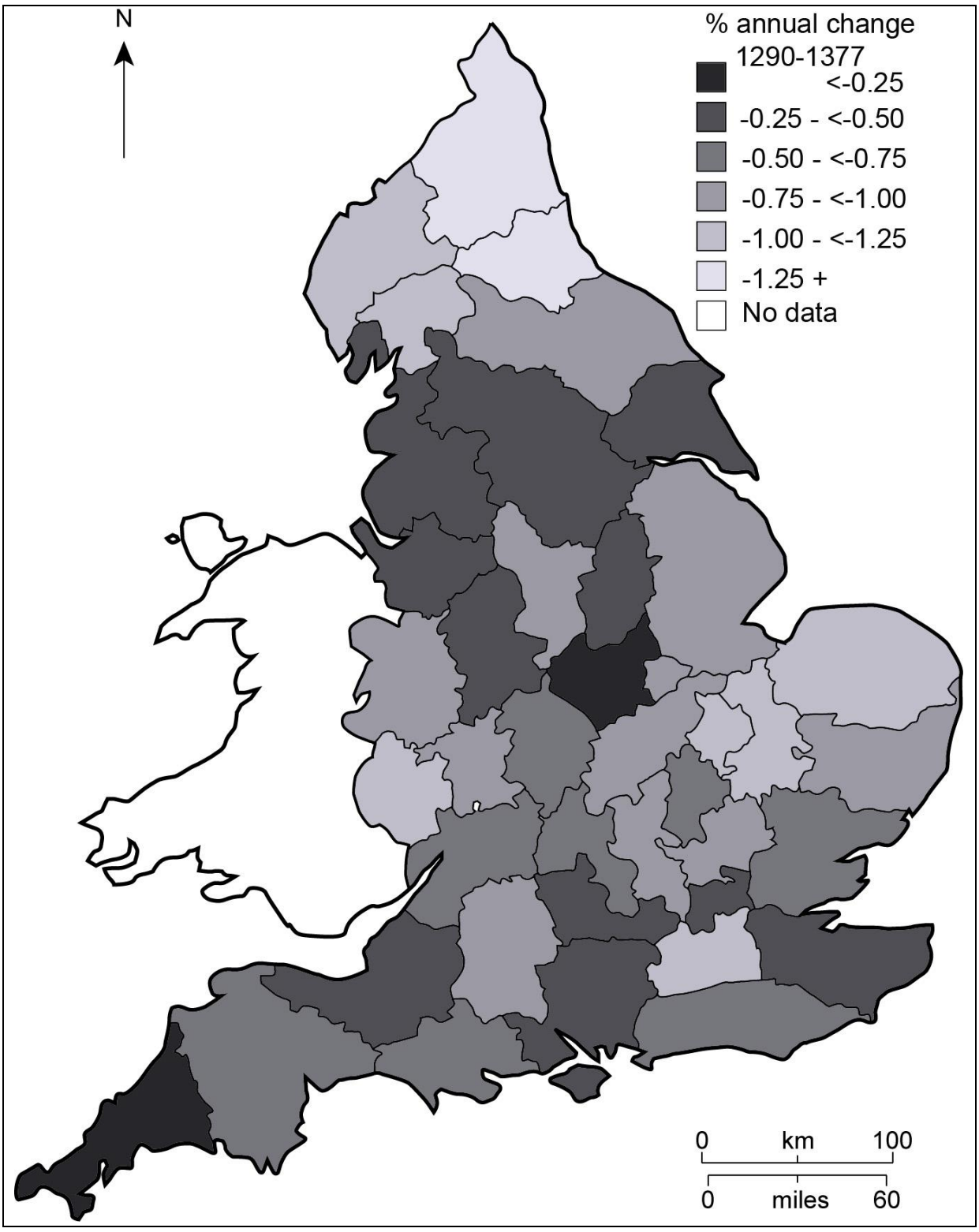


FIGURE 3 (continued): County population annual growth rates (%)

C. 1377-1600

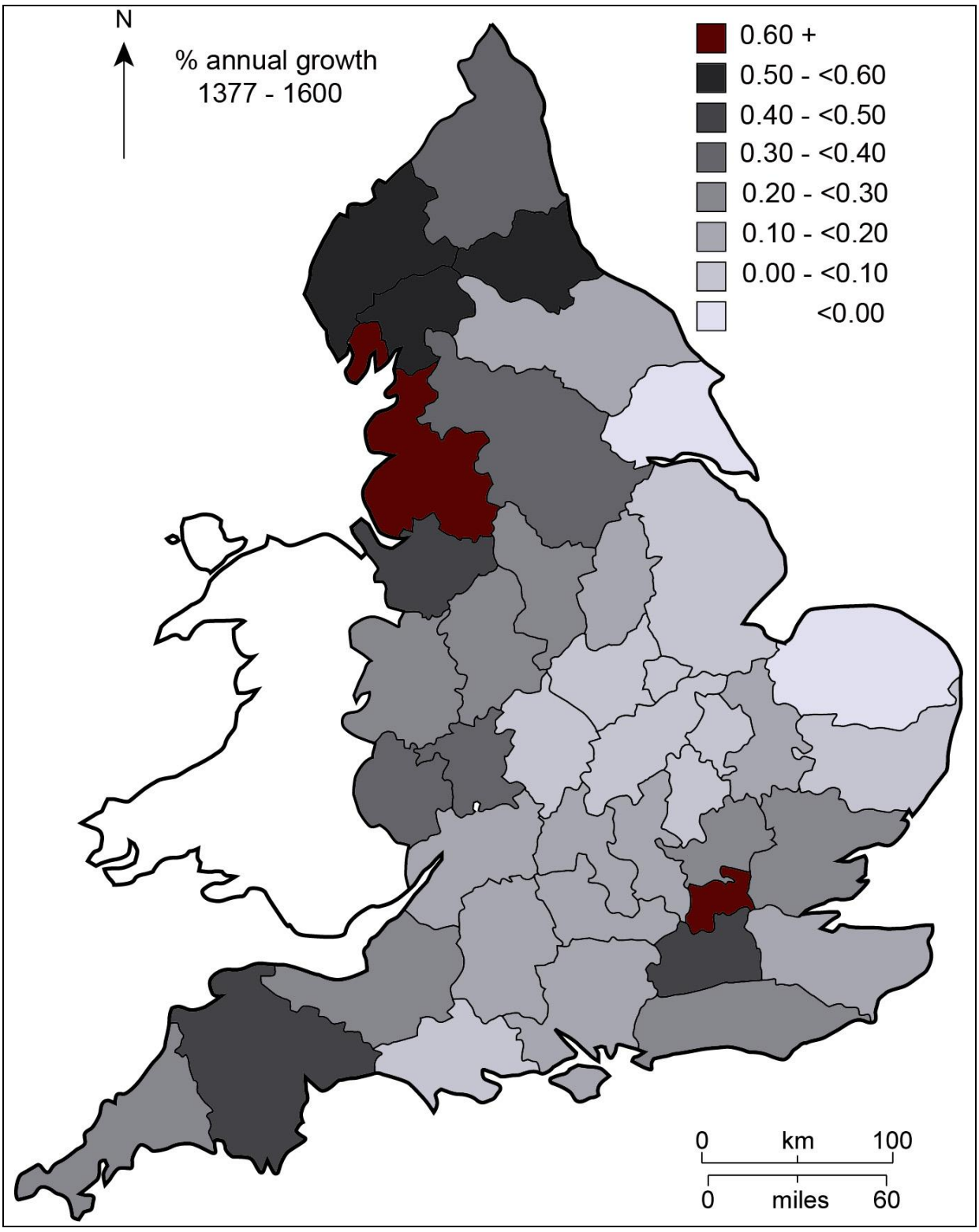
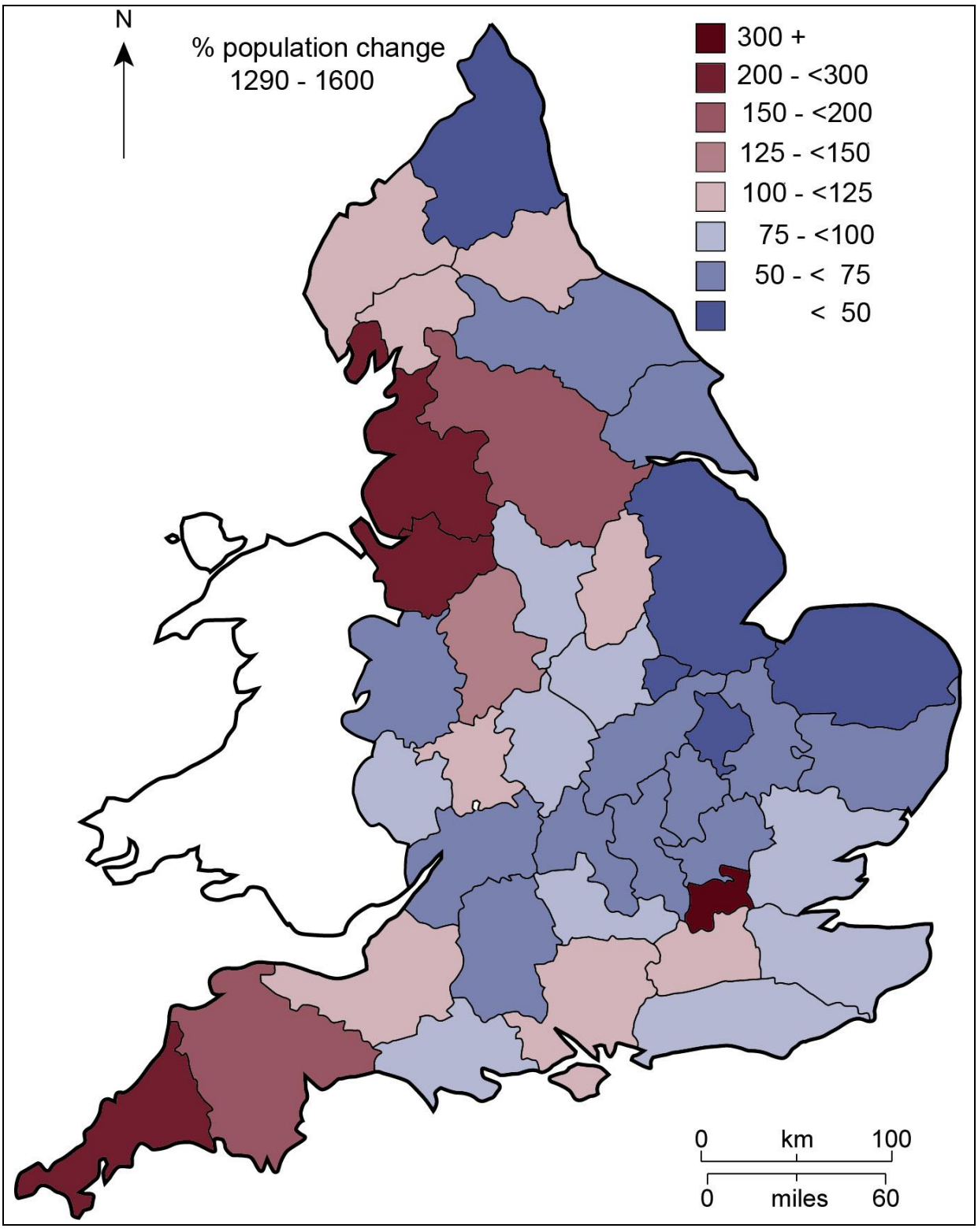


FIGURE 3 (continued): County population % aggregate change 1290 - 1600

D. 1290-1600



Source: derived from Table 8.

APPENDIX 1: List of manors included in the population estimates

A. 1086-1190 (17 manors)

County	Manors
Berkshire	Ashbury
Dorset	Sturminster Newton
Essex	Beauchamp
Gloucestershire	Adlestrop, Bishop's Cleve, Broadwell, Pucklechurch, Willersey
Northamptonshire	Badby
Warwickshire	Abbot's Salford, Sambourn
Wiltshire	Badbury, Christmalford, Grittleton, Doverham, Nettleton, Winterbourne Monkton

B. 1086-1220 (46 manors)

County	Manors
Bedfordshire	Caddington
Cambridgeshire	Balsham, Ditton (Horningsea), Doddington (March), Downham, Gransden, Hardwick, Linden End, Littleport, Shelford, Stretham, Thriplow, Wilburton, Wisbech
Essex	Barking, Beauchamp, Chingford, Hadstock, Littlebury, Runwell, Tidwoldingham, Tillingham, Wickam
Hertfordshire	Luffenhall, Sandon
Huntingdonshire	Bluntisham, Colne, Somersham
Middlesex	Drayton
Norfolk	Dereham, Feltwell, Northwold, Pulham, Shipdam, Upwell (Outwell), Walsoken, Walton
Northamptonshire	Harlestone
Suffolk	Barking, Brandon, Glemsford, Hartest, Hitcham, Rattlesden,Wetheringsett
Surrey	Barnes

APPENDIX 1 (continued): List of manors included in the population estimates

C. 1086-1250 (105 manors)

County	Manors
Bedfordshire	Barton, Cranfield, Shillington (Pegsdon)
Cambridgeshire	Balsham, Burwell, Chatteris, Ditton (Horningsea), Downham, Ely, Girton, Gransden, Hardwick, Linden End, Littleport, Shelford, Stretham, Thriplow, Wilburton, Willingham
Essex	Hadstock, Havering, Littlebury, Rettendon
Huntingdonshire	Bluntisham, Brington, Broughton, Colne, Hemingford Abbots, Holywell, Old Weston, Slepe, Somersham, Upwood, Warboys, Wistow
Lincolnshire	Spalding
Norfolk	Brancaster (Burnham, Depedale), Dereham, Feltwell, Northwold, Pulham, Ringstead (Holm), Upwell (Outwell), Walsoken, Walton
Oxfordshire	Adderburry, Baldon, Crowmarsh, Rousham, Salford
Somerset	Ashcott, Baltonsborough, Butleigh, Ditcheat, Doulting, East Pennard, High Ham, Marksbury, Mells, Mere, Othery, Pilton, Shapwick, Street, Walton, Wrington
Staffordshire	Alrewas
Suffolk	Barking, Bramford, Brandon, Glemsford, Hartest, Hitcham, Rattlesden, Wetheringsett
Sussex	Aldingbourne, Bishopstone, Boxgrove, Denton, Ferring, Mundham (Kipson Bank, Hunston), Preston, Selsey, Sidlesham, Walberton (Barnham, Abington)
Worcestershire	Alston and Packington, Blackwell, Cleeve, Cropthorne, Grimley (with Knightwick), Hallow, Harvington, Overbury, Phepson, Shipston, Stoke, Wolverley cum Eymore
Yorkshire	Asenby, Leeds, Linton, Pocklington, Rowley, Skirpenbeck, Spofforth, Tadcaster

APPENDIX 1 (continued): List of manors included in the population estimates

D. 1086-1279 (168 manors)

County	Manors
Bedfordshire	Biggleswade, Bletsoe, Clapham, Easton, Felmersham, Oakley, Odell, Pavenham, Podington, Stagsden, Stevington, Symington, Thurleigh, Woburn
Buckinghamshire	Dodford, Edgcott, Foxcott, Gayhurst, Haversham, Lamport, Lathbury, Leckhampstead Magna, Leckhampstead Parva, Maids Moreton, Marlow, Ravenstone, Stewkley, Thornborough, Thornton, Turweston, Water Stratford, Westbury, Weston Turville
Cambridgeshire	Bottisham, Chippenham, Comberton, Conington, Elsworth, Eversden, Gamlingay, Girton, Great (Little) Abington, Hildersham, Histon, Horseheath, Knapwell, Lolworth, Orwell, Rampton, Silverley, Swavesey, Thriplow, Waterbeach (Landbeach)
Devon	Axminster
Gloucestershire	Badgeworth, Brimpsfield, Campden, Hatherop, Prestbury, Sevenhampton, Bagworth
Hertfordshire	Little Hadham
Huntingdonshire	Barham, Broughton, Buckden, Bythorn, Catworth, Dillington, Ellington, Fleeton, Giddings, Hemingford Abbots, Hemingford Grey, Holywell, Horton cum Whitton, Old Weston, Sawtry, Slepe, Stukeley, Warboys
Leicestershire	Knighton, Leicester, Thurmaston
Lincolnshire	Dunholme, Howell, Louth, Marton, Nettleham, Normanby, Norton, Sleaford, Spalding, Stow St. Mary
Norfolk	Banham, Hindolveston
Northamptonshire	Kilsby
Nottinghamshire	Barnby-in-the-Willows, Coddington, Collingham, Newark-upon-Trent
Oxfordshire	Alwoldesberie, Baldon, Banbury, Begbrook, Bladon, Bucknell, Checkendon, Chinnor, Chislehampton, Cropredy, Crowmarsh Gifford, Cuddesdon, Dorchester-on-Thames, Draycott, Drayton, Easington, Fritwell, Fulbrook, Grafton, Heyford Warren, Horsepath, Ipsden, Lillingstone Lovell, Mapledurham Chauzy, Mixbury, Pyrton, Rousham, Salford, Taynton, Thame, Warpsgrove
Rutland	Liddington
Shropshire	Cheswardine
Staffordshire	Harbourne (Smethwick), Winnington
Warwickshire	Ashow, Brandon, Burton Dassett, Coundon, Honington, Kenilworth, Oxhill, Priors Hardwick, Ratley and Upton, Stoneleigh, Walsgrave on Sowe, Wormleighton
Wiltshire	Bishopstrow, Brigmerston, Calstone Wellington, Compton Chamberlayne, Stratton St Margaret, Sutton Mandeville, Swallowcliffe, Whadden, Widhill (Groundwell), Winterslow
Worcestershire	Fladbury, Hanbury, Hartlebury, Ripple
Yorkshire	Aldbrough, Barnby, Danby-in-Cleveland, Gilling, Hutton Mulgrave, Lythe, Skelton

APPENDIX 1 (continued): List of manors included in the population estimates

E. 1086-1290 (27 manors)

County	Manors
Essex	Feering, Kelvedon Churchall
Gloucestershire	Haresecombe
Huntingdonshire	Broughton
Lincolnshire	Digby, Frieston, Pinchbeck Town, Ruskington, Spalding Town, Stowe
Norfolk	Martham
Nottinghamshire,	Radcliffe upon Soar (Kingston), Tuxford
Somerset	Compton Dundon, Stoke under Hamdon
Staffordshire	Betley, Cradley
Sussex	East Lavant, Tangmere, West Tarring, Willingham
Warwickshire	Middleton
Wiltshire	Elcombe
Worcestershire	Halesowen
Yorkshire	Bridge Hewick, Danby, Garton on the Wolds, Gilling

F. 1086-1315 (59 manors)

County	Manors
Berkshire	Englefield, Swallowfield
Buckinghamshire	Ardington, Avington, Chilton, Ilsley, South Moreton, Speen
Cornwall	Braddock
Devon	Carswell Regis, Deptford, Sutton Walerland
Essex	Chickney
Gloucestershire	Chedworth, Dean, Dyrham, Hull and Nympfield, Thornbury
Hertfordshire	Ashwell
Huntingdonshire	Broughton
Middlesex	Hendon
Norfolk	Barney, Binham
Northamptonshire	Titchmarsh
Oxfordshire	Caversham, Ducklington, Emington, Garsington, Hardwick, Mapledurham Chauzy, Rutherford
Rutland	Ridlington
Shropshire	Acton Burnell, Euden Burnell
Somerset	Baltonsborough
Staffordshire	Wigginton
Sussex	Bignor
Warwickshire	Claverdon, Coldfield, Kingsbury, Middleton, Sherborne
Wiltshire	Grimstead, Newton Toney, Stourton, Stratford Toney, Wardour, Wilsford (Lake), Wootton Rivers
Worcestershire	Acton Beauchamp, Comberton, Elmley, Inkberrow, Naunton Beauchamp, Pirton, Salwarpe, Tenbury, Wadborough, Newynton

APPENDIX 1 (continued): List of manors included in the population estimates

G. 1300-1315 (11 manors)

County	Manors
Buckinghamshire	Great Horwood
Essex	Chatham, Great Waltham, High Easter
Huntingdonshire	Broughton, Godmanchester
Leicestershire	Kibworth Harcourt
Northamptonshire	Brigstock
Somerset	Taunton
Wiltshire	Cherhill
Worcestershire	Halesowen

H. 1300-1325 (12 manors)

County	Manors
Buckinghamshire	Great Horwood, Newton Longville
Essex	Chatham, High Easter
Huntingdonshire	Broughton, Godmanchester, Holywell, Warboys
Leicestershire	Kibworth Harcourt
Northamptonshire	Brigstock
Somerset	Taunton
Worcestershire	Halesowen

I. 1300-1348 (12 manors)

County	Manors
Buckinghamshire	Great Horwood, Newton Longville
Essex	Chatham, Great Waltham, High Easter
Huntingdonshire	Godmanchester, Holywell
Leicestershire	Kibworth Harcourt
Norfolk	Coltishall
Northamptonshire	Brigstock
Somerset	Taunton
Worcestershire	Halesowen

J. 1300-1351 (8 manors)

County	Manors
Buckinghamshire	Great Horwood, Newton Longville
Essex	Chatham, Great Waltham, High Easter
Huntingdonshire	Godmanchester
Leicestershire	Kibworth Harcourt
Worcestershire	Halesowen

APPENDIX 1 (continued): List of manors included in the population estimates

K. 1300-1377 (11 manors)

County	Manors
Buckinghamshire	Akeley, Great Horwood, Newton Longville
Essex	Chatham, Great Waltham, High Easter
Huntingdonshire	Godmanchester, Holywell, Warboys
Leicestershire	Kibworth Harcourt
Worcestershire	Halesowen

L. 1377-1400 (13 manors)

County	Manors
Buckinghamshire	Akeley, Great Horwood, Newton Longville
Essex	Berden, Chatham, Great Waltham, High Easter, Writtle
Huntingdonshire	Godmanchester, Holywell, Warboys
Leicestershire	Kibworth Harcourt
Worcestershire	Halesowen

M. 1377-1430 (8 manors)

County	Manors
Buckinghamshire	Great Horwood, Newton Longville
Essex	Great Waltham, Hatfield Broadoak, High Easter, Writtle
Huntingdonshire	Holywell, Warboys

N. 1377-1450 (7 manors)

County	Manors
Buckinghamshire	Great Horwood, Newton Longville
Essex	Great Waltham, High Easter, Writtle
Huntingdonshire	Holywell, Warboys

APPENDIX 2: List of sources for the manors included in the population estimates

Unless indicated otherwise, the source is Hallam (1988).

A. 1086-1250

County	Manor	Source
Essex	Havering	McIntosh (1986)
Oxfordshire	Adderburry	Russell (1948)

B. 1086-1279

County	Manor	Source
Devon	Axminster	Russell (1948)
Hertfordshire	Little Hadham	"
Nottinghamshire	Collingham	"
Oxfordshire	Crowmarsh Gifford, Drayton	"
Shropshire	Cheswardine	"

C. 1086-1290

County	Manor	Source
Lincolnshire	Stowe	Russell (1948)
Norfolk	Martham	Campbell (1980)
Warwickshire	Middleton	Russell (1948)

D. 1086-1315

County	Manor	Source
Berkshire	Englefield	Russell (1948)
Buckinghamshire	Ardington, Avington, Ilsley, Speen	"
Cornwall	Braddock	"
Devon	Carswell Regis, Deptford, Sutton Walerland	"
Gloucestershire	Dean, Thornbury	"
Oxfordshire	Mapledurham Chauzy, Rutherford	"
Shropshire	Acton Burnell, Euden Burnell	"
Warwickshire	Claverdon, Coldfield, Kingsbury, Middleton	"
Worcestershire	Newynton	"

E. 1300-1315

County	Manor	Source
Buckinghamshire	Great Horwood	Poos (1991)
Essex	Chatham, Great Waltham, High Easter	"
Huntingdonshire	Broughton	Britton (1977)
Huntingdomshire	Godmanchester	Raftis (1990)
Leicestershire	Kibworth Harcourt	"
Northamptonshire	Brigstock	Bennett (1987)
Somerset	Taunton	Titow (1961)

APPENDIX 2 (continued): List of sources for the manors included in the population estimates

Unless indicated otherwise, the source is Hallam (1988).

F. 1300-1325

County	Manor	Source
Buckinghamshire	Great Horwood, Newton Longville	Poos (1991)
Essex	Chatham, High Easter	"
Huntingdonshire	Broughton	Britton (1977)
Huntingdomshire	Godmanchester	Raftis (1990)
Huntingdonshire	Hollywell	DeWindt (1971)
Huntingdonshire	Warboys	Raftis (1974)
Leicestershire	Kibworth Harcourt	Poos (1991)
Northamptonshire	Brigstock	Bennett (1987)
Somerset	Taunton	Titow (1961)

G. 1300-1348

County	Manor	Source
Buckinghamshire	Great Horwood, Newton Longville	Poos (1991)
Essex	Chatham, Great Waltham, High Easter	"
Huntingdomshire	Godmanchester	Raftis (1990)
Huntingdonshire	Holywell	DeWindt (1971)
Leicestershire	Kibworth Harcourt	Poos (1991)
Norfolk	Coltishall	Campbell (1984)
Northamptonshire	Brigstock	Bennett (1987)
Somerset	Taunton	Poos (1991)

H. 1300-1351

County	Manor	Source
Buckinghamshire	Great Horwood, Newton Longville	Poos (1991)
Essex	Chatham, Great Waltham, High Easter	"
Leicestershire	Kibworth Harcourt	"
Huntingdomshire	Godmanchester	Raftis (1990)

I. 1300-1377

County	Manor	Source
Buckinghamshire	Akeley, Great Horwood, Newton Longville	Poos (1991)"
Essex	Chatham, Great Waltham, High Easter	"
Huntingdomshire	Godmanchester	Raftis (1990)
Huntingdonshire	Holywell	DeWindt (1971)
Huntingdonshire	Warboys	Raftis (1974)
Leicestershire	Kibworth Harcourt	Poos (1991)"

APPENDIX 2 (continued): List of sources for the manors included in the population estimates

Unless indicated otherwise, the source is Hallam (1988).

J. 1377-1400

County	Manor	Source
Buckinghamshire	Akeley, Great Horwood, Newton Longville	Poos (1991)
Essex	Berden, Chatham, Great Waltham, High Easter, Writtle	"
Huntingdomshire	Godmanchester	Raftis (1990)
Huntingdonshire	Holywell	DeWindt (1971)
Huntingdonshire	Warboys	Raftis (1974)
Leicestershire	Kibworth Harcourt	Poos (1991)"

K. 1377-1430

County	Manor	Source
Buckinghamshire	Great Horwood, Newton Longville	Poos (1991)
Essex	Great Waltham, Hatfield Broadoak, High Easter, Writtle	"
Huntingdonshire	Hollywell	DeWindt (1971)
Huntingdonshire	Warboys	Raftis (1974)

L. 1377-1450

County	Manor	Source
Buckinghamshire	Great Horwood, Newton Longville	Poos (1991)
Essex	Great Waltham, High Easter, Writtle	"
Huntingdonshire	Holywell	DeWindt (1971)
Huntingdonshire	Warboys	Raftis (1974)

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