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Wool and cloth production in late medieval and early Tudor England[1]

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Estimates of wool production based on the exports of wool and cloth, and an assumption that domestic cloth consumption was, optimistically, constant, suggest that wool production fell by almost a third from the early fourteenth to the mid-fifteenth century, and had not fully recovered even by the mid-sixteenth century. However, after the Black Death, much of England's arable was converted to pasture, mainly for sheep, and this process accelerated after 1470. These two observations are contradictory. This article provides new numbers of adult sheep based on estimates of domestic cloth consumption, cloth exports, the changing weight of cloth, and fleece yields. The conclusion is that the adult sheep population only declined by around 13 per cent from 1310 to 1440, and had risen dramatically by the mid-sixteenth century.

There is an apparent paradox between Power's assertion that the numbers of sheep in late medieval England fell by almost a third between the early fourteenth and the mid-fifteenth century; and the considerable research by agricultural historians on the conversion from arable to pasture following the demographic collapse after the Black Death, which may have maintained, or even increased, sheep population.[2] This article concludes that sheep numbers may have fallen only by around 13 per cent, and then may have risen dramatically from 1450 to the mid-sixteenth century. Power argued that wool production numbers must have fallen substantially because wool exports fell far faster than any possible offsetting increase in cloth exports, and domestic demand for cloth:

> If we want to find out the amount of wool represented by English exports of wool and cloth we have to make a series of elaborate calculations of the number of cloths to a sack of wool and the relation between broadcloths and worsteds. The figures give this result (taking two fairly normal years): 1310–11: Exports 35,509 sacks all in wool (cloth negligible); 1447–8: Exports 21,079 sacks (of which 13,425 are in cloth), that is a drop of 14,500.[3] This is the foreign market. To gauge the home market is very difficult because of the unreliability of the returns of taxation of home-produced cloth, the so-called 'aulnage accounts'. But let us make one more small calculation. In 1310–11 foreign cloth equivalent to 3,302 sacks had been imported; in 1447–8 the amount imported was negligible because English cloth was meeting the home demand. If we add

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[1] This article has been significantly revised as a result of referee comments. I appreciate their detailed and incisive comments which have produced a far better article.

[2] Lloyd, *Wool prices*, pp. 27–8; Barker, 'Changes'; Overton and Campbell, 'Norfolk livestock'; Campbell, *English seigniorial agriculture*, pp. 157–65.

[3] Power did not state the number of cloths that can be made from a sack of wool, but we have assumed that it is 4.33 cloths, taken from her edited Tudor documents; see Tawney and Power, eds., *Tudor economic documents*, vol. 1, p. 180.

> these 3,302 sacks now made up at home to the 1447–8 figure we still get only 24,381 sacks, as against the 35,509 of 1310–11. Moreover, the calculation is highly favourable to 1447–8 because it assumes that the home market was constant, whereas the population in 1310–11 (after a long period of growth) was certainly higher and probably more prosperous than it was in 1447–8, a century after the Black Death. The production of wool must therefore have dropped considerably, and it is a remarkable fact that in 1481–2, when, according to Henry VII's legislation, the enclosure movement had already begun, the same calculations give us only 29,100 sacks, still well below the level of the beginning of the fourteenth century.[4]

There has been acceptance of Power's logic, even if some have questioned her conclusions. Trow-Smith, based on her assumptions, estimated that there were 12 million sheep, excluding lambs, in 1310/11.[5] Bowden forecasted that there were only 9,717,459 adult sheep in the 1540s, well below the numbers for the early fourteenth century.[6] More recently, Britnell concluded that it was very unlikely that per capita domestic consumption would have made up for the decline in the export of wool between the 1320s and the 1520s.[7] Agricultural historians have remained sceptical about any dramatic reduction in the sheep population. Arable output steadily declined on both seigniorial and peasant land from 1370 to 1450.[8] While there was equal arable and grassland in 1300, this had perhaps shifted to two-thirds grassland by 1500, although some of that additional pasture was used to feed cattle rather than sheep.[9] Recent research suggests that, in the transition from demesne to tenant farming, tenants and peasants continued to use arable land in much the same way, but more intensively and productively.[10] The pressure to produce arable crops at the end of the thirteenth century may have limited the ability to maintain enough pasture, and therefore sheep, to keep the arable fertile. This may have justified continued investment in flocks after 1350. Revenue from sheep's milk on some of the bishop of Winchester's manors in the early thirteenth century was as much as 66–100 per cent of that from wool.[11] The importance of milk declined, but mutton came to be part of the household diet in the fifteenth century, replacing pork in aristocratic households.[12]

Although population and real incomes probably declined after the Black Death, which should have reduced demand for cloth, there is still evidence of investment in sheep flocks.[13] In Norfolk, on the greatest estates, flocks grew from an average of 400 to almost 500 during the century.[14] The bishop of Winchester increased his flocks from less than 20,000 before the Black Death to over 30,000 from 1350 to 1385.[15] Sheep farming in the first half of the fifteenth century is more difficult to

[4] Power, *Wool trade*, pp. 36–7.
[5] Trow-Smith, *British livestock*, p. 140.
[6] Bowden, *Wool trade*, p. 38.
[7] Britnell, *Britain and Ireland*, pp. 416–18.
[8] Dodds, 'Estimating arable output'; idem, 'Patterns of decline', p. 116.
[9] Campbell, 'Land', p. 187.
[10] Dodds, 'Demesne and tithe', pp. 131–5; idem, 'Output and productivity', pp. 79–87; Hare, 'Lord', pp. 140–3.
[11] Biddick, 'Agrarian productivity', p. 116.
[12] Fisher and Juřica, eds., *Documents*, pp. 30–1; Mate, 'Pastoral farming', p. 529; Allison, 'Flock management', p. 108.
[13] Overton and Campbell, 'Norfolk livestock', p. 387; Campbell, *English seigniorial agriculture*, p. 162; Mate, 'Pastoral farming', p. 526; Britnell, 'Agricultural output', pp. 26–31.
[14] Campbell, *English seigniorial agriculture*, p. 157.
[15] Stephenson, 'Wool yields', p. 386.

assess, as demesne farming dwindled, and we have so little information on peasant sheep farming during this period.[16] Demesne sheep numbers tended to fall with prices but this was not always the case. The bishop of Worcester's Cotswolds flocks, around 2,000 sheep in 1412, were still between 2,215 and 2,927 in 1448–50.[17] It had been thought that livestock stocking density was lower on small farms than on the demesnes, yet in Norfolk stocking density increased dramatically as farm size shrank; this trend was clearly visible from 1250 to 1349, and also from 1350 to 1449.[18] It has been suggested that breeding sheep became more profitable than arable, and peasants became more interested in sheep farming as the demand for mutton increased.[19] There were around 5,000 successful peasant farmers who benefited from the leasing of demesnes, and they invested some of their limited capital in sheep, optimized their labour inputs, and increased the productivity of their farms.[20] Sheep population probably declined during the fifteenth century depression from 1450 to 1475, as both export and domestic demand fell, and tight credit would have reduced capital investment. Yet wool prices rose during the 1460s which may have cushioned some sheep farmers, and a few landlords prospered even in these difficult times. The Catesbys, gentry with estates in Warwickshire and Northamptonshire, increased their sheep flocks on their Radbourne manor from 1,643 sheep in 1448/9 to 2,742 in 1475/6, as they enclosed their lands, increasing revenue from £45 to £107 through specialization in sheep farming.[21] It may have been that tenant farmers had to farm more productively to pay the rent as wool prices fell, and that this led to an increase in the number of sheep on any given acreage.[22]

If sheep numbers did decline it was concentrated in the north and midlands, as wool exports fell, cloth production stalled, and the economy remained stagnant.[23] In the fifteenth century Italian merchants replaced Lincolnshire wools with those from the Cotswolds.[24] In the north it took greater care and capital to maintain sheep quality, and there was less mixed farming that required sheep to manure the land.[25] Many northern landlords turned to rearing cattle.[26] Also in the east midlands sheep farming only appeared with the emergence of enclosures at the end of the fifteenth century.[27] It is also possible that, in some cases, peasants and lesser tenants lacked the capital to increase their flocks and to recover from setbacks such as murrain.[28]

Evidence for a remarkable increase in sheep flocks at the end of the fifteenth century is overwhelming. Some improvement in the overall economy, rising cloth exports, and an improvement in wool prices in the 1480s unleashed considerable investment in sheep flocks. Tenant farmers and richer peasantry reorganized their

[16] Britnell, 'Agricultural output', pp. 31–5.
[17] Dyer, *Lords and peasants*, p. 150.
[18] Postan, 'Village livestock'; Overton and Campbell, 'Norfolk livestock', p. 388.
[19] Stone, *Decision-making*, p. 127; Britnell, 'Postan's fifteenth century', p. 57.
[20] Dyer, 'Capitalists', p. 17; Lloyd, *Wool prices*, p. 28.
[21] Taylor, 'Catesby', pp. 25, 36.
[22] Fryde, *Peasants*, pp. 11–12.
[23] Dodds, *Peasants*, pp. 101–21.
[24] Fryde, *Peasants*, pp. 89–90.
[25] Munro, 'Yorkshire', p. 218.
[26] Campbell, *English seigniorial agriculture*, pp. 163–4.
[27] Beresford and Hurst, *Deserted medieval villages*, pp. 11–19.
[28] Hatcher, 'Slump', pp. 261–3; Miller, 'Introduction', pp. 25–6.

estates, and some evicted the few remaining poorer peasants to enclose lands, mainly between 1450 and 1475, but continuing through to 1520.[29] Pasture was more valuable than arable land in many parts of the country, with some rising pasture rents.[30] In Norfolk, so profitable was sheep rearing that large landlords farmed their own lands. Norwich Priory increased its flocks from 1,225 in 1475 to 7,163 in 1495, and the Townshend estates from 7,911 in 1479 to 9,335 10 years later.[31] Sheep were extremely profitable on the duke of Lancaster's estates in Derbyshire.[32] Dyer has traced the experience of one Warwickshire tenant farming family. By 1480 Thomas Heritage farmed 500 acres under lease for £20, raising 800 sheep when he died in 1495: his great-nephew in the mid-sixteenth century also leased 65 acres of enclosed pasture, paid £100 in rent, and pastured over 2,000 sheep.[33] Bowden argues that wool versus wheat price trends were favourable to sheep farming in the first half of the sixteenth century, continuing the trend for conversion of arable to pasture.[34] In the mid-fifteenth century there are records that some of the wool clip remained unsold, but at no other time did this appear to be a problem. In the early sixteenth century there was considerable overstocking of the commons.[35] Sheep may not have been very profitable but they were often preferable to growing grain.

I

New sheep population projections, presented in table 1, are based on determining the number of sacks of wool required to produce cloth for both the export and domestic markets based on the amount of wool required to produce a broadcloth; and then combining it with the sacks of wool exported. The adult sheep population is then calculated by multiplying total sacks by the number of fleeces in a woolsack. At the end of the fourteenth century sheep population declined as domestic consumption fell, and cloth exports could not make up for the significant loss in wool exports. But in the first half of the fifteenth century sheep numbers rebounded as both rising domestic cloth consumption and exports more than offset any further decline in wool exports.[36] Sheep population dramatically increased from 1450 to 1550 to exceed the numbers at the beginning of the fourteenth century by well over a million. The number of adult sheep may have been around 13.7 million in 1300, rising to around 15 million by the mid-sixteenth century. The first period, 1311–15, was selected to coincide with the starting point for Power's analysis. The 1390s reflected recent growth in cloth exports, inclusion of kerseys and straits in the export figures, and the beginning of the decline in wool exports. The 1441–5 period immediately precedes the collapse of agricultural prices, profits, and cloth exports during the generation-long, mid-century depression. Sheep numbers undoubtedly fell during the depression as both domestic and

[29] Leadam, ed., *Domesday*, vol. 1, p. 40; Beresford, *Lost villages*, p. 210; Fryde, 'Peasant rebellion', pp. 810–13.
[30] Beresford, *Lost villages*, pp. 166–7; Fox, 'Chronology'; Britnell, 'Postan's fifteenth century', pp. 54–5; Blanchard, 'Population', p. 434; Mate, 'Pastoral farming', p. 533.
[31] Allison, 'Flock management', p. 100.
[32] Blanchard, *Duchy of Lancaster's estates*, p. 446.
[33] Dyer, 'Capitalists', pp. 10–14.
[34] Bowden, 'Wool prices'; Beresford, 'Poll tax', p. 13.
[35] Lloyd, *Wool prices*, pp. 272–8.
[36] Britnell, 'Agricultural output', pp. 30–5.

Table 1. *Woollen cloth production, wool exports, and sheep numbers, 1311–15, 1391–5, 1441–5, 1491–5, and 1541–5*

	1311–15	*1391–5*	*1441–5*	*1491–5*	*1541–5*
Weight of a wool sack	364 lbs	364 lbs	364 lbs	364 lbs	364 lbs
Wool required to make a broadcloth or its equivalent	50 lbs	54 lbs	60 lbs	80 lbs	84 lbs
Finished cloth weight	38 lbs	41 lbs	46 lbs	61 lbs	64 lbs
No. of cloths per sack	7.28	6.74	6.07	4.55	4.33
Size of domestic cloth market (cloths)	160,000	120,000	140,000	150,000	190,000
Domestic market in sacks	21,978	17,804	23,064	32,967	43,879
Wool exports in sacks	35,328	18,514	8,029[a]	6,755	4,576
Cloth imports using English wools, in sacks	1,374				
Petty custom cloth exports	3,879[b]	39,525	56,456	56,945	118,056[c]
Adjusted cloth exports			59,279 (+5%)	59,792 (+5%)	129,862 (+10%)
Cloth exports in sacks	533	5,864	9,766	13,141	29,893
Total sacks produced	56,465	42,182	40,859	52,863	78,348
Weight of average fleece	1.50	1.35	1.25	1.50	1.90
Fleeces per sack	243	270	291	243	192
Adult sheep	13,720,995	11,389,140	11,889,969	12,845,709	15,042,816

Notes: a There may have been an increase in smuggling as wool duties, as a percentage of purchase price, increased, but it is impossible to determine its extent.
b Miller and Hatcher, *Medieval England*, p. 213.
c Exports rose to 135,752 cloths in 1447–51, peaked at 150,560 in 1553/4, and then fell back for the remainder of the century; see Gould, *Great Debasement*, p. 136.
Source: Munro, 'Medieval woollens: the western European woollen industries', pp. 304–5.

export cloth markets declined, although they are estimated to have risen well above the levels of the 1440s by the end of the century.[37] The five years 1541–5 are the last period for which we have complete cloth export figures, the next six years reflecting a short-term boom after which exports returned to the levels of the early 1540s. In the early fourteenth century luxury cloth imports using English wool were around 10,000 cloths, equivalent to 1,374 sacks, which have to be subtracted from the wool exports, as these sacks, theoretically, were part of the domestic cloth market.[38] By the end of the fourteenth century there were no woollen cloth imports.

II

The remainder of the article explains the rationale that lies behind these projections, recognizing that, because of many assumptions, the figures are speculative. The primary flaw in Power's argument was her contention that the weight of woollen cloth remained constant throughout the period. This was clearly not the case as the market moved from light worsteds to heavier broadcloths, and then continued to increase as wool prices fell and quality expectations rose, and as English merchants leveraged their cost advantage in wools to capture continental markets. The estimated increase was dramatic, from 50 lbs of wool to make a broadcloth or its equivalent in 1300 to 84 lbs in the mid-sixteenth century. The weight of the woolsack was not always exactly the same, but it seems to have been very close to 364 lbs throughout the period.[39] In the mid-sixteenth century, a 364-lb sack of wool produced around 4.33 whole broadcloths (84 lbs a cloth), based on a 1548 petition to Parliament to place a tax on wool.[40] The 1552 cloth act set weight standards for all major cloths, which was modified for a few cloths in 1556/7.[41] The standard white or coloured West Country short broadcloth, that by statute in 1552 weighed 64 lbs, used around 84 lbs of wool.[42] This meant that there was a 23.8 per cent reduction in weight during the production process, mostly from degreasing the wool, and from the combing and spinning processes, but also there was some waste during weaving and shearing. This was close to the 25 per cent wastage in the early nineteenth century, but more than the 16 per cent estimated for late sixteenth-century Armentières luxury broadcloth.[43] In the sixteenth-century cloth partnership of the Medicis, just washing the wools reduced weight, on average, by 18.5 per cent.[44] In the late sixteenth-century Italian

[37] Hatcher, 'Slump', p. 241; Nightingale, 'England', p. 631; Britnell, 'Agricultural output', pp. 35–7.

[38] TNA, E 101/359/18, 366/4; Miller and Hatcher, *Medieval England*, p. 213. Imports have been estimated by Miller and Hatcher to have been 17,684 cloths. However, some of these cloths would not have used English wools. Power estimated imports using English wools to have been 14,300 cloths, equivalent to 3,302 sacks. Great Wardrobe accounts from 1300–4 show the purchase of considerable quantities of lower priced *stamfort* cloth much of which was imported, and probably made from lower quality continental wools.

[39] Postles, 'Fleece weights', p. 97; Bridbury, 'Black Death', p. 398.

[40] Tawney and Power, eds., *Tudor economic documents*, vol. 1, pp. 178–84.

[41] 5&6 Edward VI, c. 6 (in *Statutes of the Realm*, vol. 4, pt. 1, pp. 135–41); 4–5 Philip & Mary, c. 5 (in ibid., vol. 5, pp. 135).

[42] 5&6 Edward VI, c. 6 (in *Statutes of the Realm*, vol. 4, part 1, pp. 136–41); De Lacy Mann, *Cloth industry*, p. 312; Muldrew, ' "Th'ancient distaff" ', p. 504. The 1558 Book of Rates assumed four cloths from a sack of wool; see Willan, *Book of rates*, p. 71. At four cloths to a sack, 90 lbs of wool would have been needed to make a 64-lb cloth, resulting in a loss of weight in the production process of 29%.

[43] De Lacy Mann, *Cloth industry*, p. 281; Endrei, 'Manufacturing', p. 15.

[44] De Roover, 'Florentine firm', p. 12.

woollen *rascie* industry, weight was reduced by 18.3 per cent for washing, a further 6.3 per cent for spinning the warp, and 4 per cent for the weft.[45] There was no statute or national regulation that specified the average weight of broadcloth, or the wool required to produce broadcloth, prior to the mid-sixteenth century. In England broadcloth was subject to an assize for width, and usually length, from 1196 onwards, presumably because any cloth tax was based on size, and it was relatively easy to check fraud by measuring the cloth, but weight remained largely unregulated.

Historians have tended to assume that cloth weight was a constant. Yet the fragmentary evidence on cloth weights suggests that the amount of wool required for broadcloth, or its equivalents, increased significantly over time. In the thirteenth century a broad range of inexpensive worsteds (says), semi-worsteds (serges), as well as luxury broadcloths were all traded in international markets, with all wools combed and spun by hand with a distaff and spindle. Worsteds as well as semi-worsteds were often fulled, as, of course, were woollens.[46] All these cloths may have been similar in weight. What distinguished expensive, coloured woollens from all other cloths, in addition to using more expensive wools and more carefully carrying out each production process to a higher standard, was that the wools were thoroughly washed and then greased to produce a 'finer and more uniform yarn, and also a cloth that could be more perfectly scoured'.[47] Strong, brilliant colours may also have been a hallmark of these luxury cloths. This 'greased' drapery was the smaller part of the international woollens trade in terms of volume, so less expensive worsteds, semi-worsteds, and ungreased 'dry' woollens, made from wools that were combed and spun in their natural oils, were still dominant. Most English cloths, purchased at the eastern lowland fairs by Flemish and Brabançon wool and cloth merchants in the thirteenth century, and sold at the Champagne Fairs, were probably serges, worth 40–60 per cent the price of lower quality greased broadcloth. We have no weight information for these cloths.[48]

It is probable that there was little difference in the average weight of says, serges, and 'dry' or 'greased' broadcloth at the turn of the fourteenth century. Excavations at London revealed as many worsteds and serges as broadcloths from the first half of the fourteenth century, and thread counts were almost identical between twilled worsteds, serges, and tabby broadcloth, usually around 10 to 11 threads per centimetre for both warp and weft, suggesting that all these fabrics may have been close in weight.[49] Munro has calculated the weights for thirteenth-century light draperies at Ypres, Bruges, Arras, Saint-Omer, and other towns: all of them between 0.65 lbs and 0.92 lbs per square yard, far lighter than mid-sixteenth-century western white broadcloth that weighed 1.32 lbs per square yard.[50] Chorley has noted that many biffes and stanforts were made from coarse, loosely woven warps, and fewer warps even than 'coloured' woollens, so the yarn must have been very similar to that used for woollens, rather than worsteds. Valenciennes biffes, a mid-priced, quality cloth that was heavily fulled, as its length shrank by a quarter,

[45] Goldthwaite, 'Florentine wool', pp. 552–3.
[46] Chorley, 'Cloth exports of Flanders', p. 372.
[47] Ibid., pp. 374–5.
[48] Ibid., p. 360; idem, 'English cloth exports'.
[49] Crowfoot, Pritchard, and Staniland, *Textiles and clothing*, pp. 27, 30, 36, 45.
[50] De Poerck, *Draperie*, vol. 1, p. 285; Munro, ' "New draperies" ', pp. 89–90; idem, 'Medieval woollens: the western European woollen industries', pp. 312–13.

was 29.45 yards long by 1.34 yards wide finished with a weight of 30 pounds, giving a weight per square yard of 0.76 lb, similar to says.[51]

We know the weight for two late thirteenth-century English woollen broadcloths: Cistercian cloth made at Beaulieu Abbey (Hampshire) in 1279/80, and cloth made at Laleham (Middlesex) in 1294/5, both of which were heavier than says and serges.[52] Cistercian coarse winter cloth was unusually heavy because no undergarments were worn, and they did not have to worry about the cost of wool. It is therefore unlikely that this cloth was comparable to commercially produced broadcloth that was traded internationally. It was 25 yards long and two yards wide finished, using 90 lbs of wool, 36 lbs of warp and 54 lbs of weft. While most of the cloth produced during the year was winter cloth, some summer white and grey worsteds weighing 27 lbs were woven, 32 yards long on the loom and 30 yards finished, suggesting only light fulling. We are not given the width, but based on items of clothing made from both summer and winter cloth, it seems that finished summer cloth was only three-quarters of a yard wide.[53] If we assume a 25 per cent weight loss during manufacture, finished weights would have been 67½ lbs for winter cloth, not much different from a mid-sixteenth-century short broadcloth, and 20.8 lbs for summer cloth. Summer cloth was a third lighter by area than winter cloth; winter cloth weighed around 1.35 lbs per square yard, and summer cloth 0.92 lbs. Laleham cloth was considerably lighter. Although the weight is not specifically mentioned, and the terminology unclear, it is most likely that 64 lbs of wool was required for each cloth.[54]

Indicative of the low quality of much ordinary English cloth in the early fourteenth century was Candlewick cloth made by London's burellers. Their ordinances of 1300 established that Candlewick cloth was 24 yards long and one-and-a-half yards in width, made from Spanish and English wools, and weighed only 11 lbs, even lighter than most worsted; and that it took only three to four days to weave compared with 130 man hours, or about 12 days, to weave a high quality sixteenth-century broadcloth.[55] The estimate for cloth weight, used in the calculations for the early fourteenth century, has been based on the average of known weights for continental says and serges, assuming that any increased weight for luxury woollens was offset by even cheaper, lighter cloths produced for local consumption.

In the first half of the fourteenth century the average weight of English woollen cloth rose as fulled woollens largely replaced worsteds and semi-worsteds for lower priced clothing, probably as a direct result of the rapid diffusion of carded, wheel-spun wools for wefts, which reduced the cost of preparing weft thread by as much as 50 per cent.[56] This was a catalyst for raising the ratio of weft to warp wools. Higher quality woollens continued to use combed, hand-spun wefts.[57] Most late medieval draperies produced a range of broadcloth, usually from cheap and light, to heavy and expensive. The higher the quality of cloth, the more finely spun

[51] Espinas, ed., *Documents*, pp. 182–3.
[52] Hockey, ed., *Beaulieu Abbey*, pp. 214–24; Oldland, 'Cistercian clothing', p. 88.
[53] This assumes that the size of tunics and hoods was the same in summer and winter.
[54] Lloyd, 'Cloth manufacturing'. It seems that 383 lbs of wool was carded to make six cloths.
[55] Riley, ed., *Munimenta*, vol. 1, pp. 121–6; vol. 2, pp. 547–50; Munro, 'Industrial transformations', p. 134, n. 187; Endrei, 'Manufacturing', p. 18.
[56] Chorley, 'Evolution', p. 10.
[57] Munro, 'Medieval woollens: textiles', pp. 201–2.

was the warp thread, and the greater number of warp threads per yard. Heavier cloth was warmer, more durable, and water-repellent; and could handle additional nappings and shearings required for the finest finishing. Evidence for the range of warps per yard is only available from the mid-fifteenth century onwards. At London in 1456 weaving costs were set from 600 to 2,000 warps a yard of broadcloth on the loom; for narrow cloths the standards were 600–1,000 warps for kerseys, 500–700 for frieze, and 400–900 for osettes, another cheap cloth.[58] Dixsmude made a range of seven cloths from 670 to 1,131 warps per yard in 1486.[59] Their finest cloth, *grooten claus*, had 1,210 warps per yard in 1546.[60] At Cuenca in Spain in 1500, broadcloth ranged from 1,568 warp threads using 52 lbs of wool (18 lbs of warp, 34 lbs of weft) to 3,000 warp threads using 84 lbs of wool (32 lbs of warp, 52 lbs of weft).[61] Norwich woollen weavers were producing cloths with between 700 and 1,200 warps per yard in 1500.[62] At Coventry in 1518 weavers were paid different rates for cloths from 800 to 1,100 warps.[63] Wiltshire short broadcloth ranged from 700 to 1,000 warp threads, and long cloths from 1,200 to 1,400 warps per yard at the turn of the seventeenth century.[64]

The few continental references to cloth weights suggest that cloths gradually gained weight over the period. At Provins in 1370 coloured broadcloth weighed 20 *grands livres* compared with biffes of the same length at 17, but we do not know the difference in the cloths' dimensions.[65] The next reference to weight for a 'greased drapery' was at Douai in 1394, when greased '*drapz diquedunez*', 40 Flemish ells by nine-and-a-half quarters, weighed only 36 lbs, no cloths exceeded 40 lbs (equivalent to 0.73 lbs per square yard), and some cheaper broadcloths (*draps de molés*) were between 18 lbs and 25 lbs.[66] But by then Douai had become a minor factor in the luxury woollens industry, and their cloths may have been lighter than the finer cloths made by Ypres, Ghent, and Bruges draperies. In 1442, it took 63 lbs less waste of English Lindsey wool to make one 'fine black' cloth at Leuven, and in 1434, a fine black cloth for municipal aldermen used 67 lbs less waste of English staple wools.[67] The weight of the finished Ghent *dickedinnen* in 1456 was 51 lbs, and this remained unchanged through to 1546.[68] In 1519 Leuven first seal cloth, using Cotswolds, Middle March, and Berkshire wools, used 2.48 lbs of wool per square metre (2.07 lbs per square yard), around a 25 per cent weight increase over the 1434 Leuven cloth.[69]

English evidence also seems to indicate that late fourteenth-century cloths were far lighter than they were to become in the sixteenth. Typical of the quality of late fourteenth-century English exported cloths was the Colchester broad decena or dozen, 12 or 13 yards in length and two yards in width, which found markets in

[58] Consitt, *London Weavers' Company*, pp. 204–5.
[59] De Sagher, ed., *Recueil*, vol. 2, p. 105.
[60] Ibid., p. 46.
[61] Murugarren, *Evolución*, p. 199.
[62] Hudson and Tingey, eds., *Norwich*, vol. 2, p. 105.
[63] Dormer Harris, ed., *Coventry*, p. 660.
[64] Bland, Brown, and Tawney, eds., *English economic history*, pp. 341–2.
[65] Bourquelet, *Études*, pp. 233, 242.
[66] Espinas and Pirenne, eds., *Recueil de documents*, vol. 2, pp. 305–8; De Poerck, *Draperie*, vol. 1, pp. 257–67.
[67] Munro, 'Industrial protectionism', p. 256, tab. 13.2.
[68] Boone, 'Gand', p. 32.
[69] Munro, ' "New draperies" ', p. 49.

Gascony, the Baltic, and the Mediterranean.[70] It has been estimated that, in 1386, 26 lbs of wool was required for a decena, equivalent to 52 lbs for broadcloth.[71] At Coventry in 1451 cloth had to contain not less than 30 lbs of yarn to make a dozen (60 lbs a broadcloth), and there would have been some weight loss in the weaving and finishing processes.[72] This was a lighter cloth than was made a century later. The only reference to cloth weights in the fifteenth-century statutes was in 1468, when Norfolk, Suffolk, and Essex set cloths (vesses) had to weigh 38 lbs, probably using around 50 lbs of wool, similar to the weight of Colchester's late fourteenth-century broadcloth.[73] Set cloths were inexpensive, dyed broadcloths, using local wools and poorly finished, so they were liable to shrink.[74] These examples seem to indicate that many cloths were still lightweight in the mid-fifteenth century.

It is possible to determine approximate weight from the knowledge of cloth prices, an estimated price for wool, and the assumption that wool was, on average, 35 per cent of manufacturing cost. In 1386 wool was 36 per cent of the cost of a finished tawny at Colchester, similar to the 37.8 per cent at Prato in 1392/3.[75] At Cuenca in the fifteenth century wool was typically 34 to 37 per cent of total cost for good quality, coloured woollens.[76] In the mid-sixteenth century, Spanish wools used in the Medici drapery made up only 33 per cent of total manufacturing cost.[77] Zell estimated that wool accounted for 36 per cent of manufacturing cost for dyed Kentish coarse cloth in the 1560s.[78]

For cloth produced for the domestic market we can turn to the price series for Oxford and Cambridge colleges from 1380 to 1469, and Winchester College from 1400 to 1469, when prices were remarkably constant.[79] The analysis has not been extended to the late fifteenth century because Lloyd's wool-price series are less reliable, as his sample becomes too small and is weighted towards cheaper wools. The amount of wool required to make Oxford and Cambridge colleges' second quality cloths would have been around 57 lbs and Winchester College first quality cloth around 62 lbs (table 2). It seems that most ordinary broadcloth was made from 50–60 lbs of wool from 1350 to 1450, and that narrow cloths were even lighter.[80]

English exports in the second half of the fourteenth and first half of the fifteenth century were largely low-priced broadcloths, straits, and kerseys. Among the cheapest cloths in international trade at the end of the fourteenth century were narrow Suffolk/Essex straits or kerseys (12–13 yards in length and a yard wide), selling for around 4s. 3d., and Devon narrow straits selling for around 4s.[81] Assuming a manufacturing cost of 46d. for a strait, that wool accounted for

[70] Britnell, *Colchester*, pp. 60–6.
[71] Ibid., pp. 61–2.
[72] Dormer Harris, ed., *Coventry*, pp. 262, 689.
[73] 8 Edward IV, c. 1 (in *Statutes of the Realm*, vol. 2, pp. 424–6).
[74] 14&15 Henry VIII, c. 11 (in ibid., vol. 3, p. 217).
[75] Britnell, *Colchester*, p. 62.
[76] Murugarren, *Evolución*, pp. 220–1.
[77] Munro, 'Medieval woollens: the western European woollen industries', p. 317.
[78] Zell, *Industry in the countryside*, p. 208.
[79] Thorold Rogers, *History*, vol. 1, pp. 588–93; vol. 4, pp. 583–7; Beveridge, *Prices and wages*, pp. 45–7, 85–6; Lloyd, *Wool prices*, pp. 41–4.
[80] Using the same methodology around the time of the 1552 cloth act for Oxford and Cambridge colleges, and using Bowden's series of cloth prices, the wool required for second quality broadcloth in 1541–50 was 87.9 lbs, and in 1551–60, 75.9 lbs; see Bowden, 'Wool prices', pp. 114–15.
[81] TNA, E 122/ 71/13, 40/23; Gras, *Customs system*, pp. 526–53.

Table 2. *Estimated cloth weights for Oxford & Cambridge, and Winchester Colleges, 1380–1469*

College	*Cloth price in shillings*	*35% of cloth price in shillings*	*Price of 1 lb of wool in shillings*	*Estimated amount of wool in cloth*
Oxford & Cambridge, 1380–1469				
2nd quality	39.38	13.78	0.240[a]	57.4 lb
Winchester, 1400–69				
1st quality	46.84	16.39	0.264[b]	62.1 lb

Notes: a This is a composite national cloth price.
b This is an average of Berkshire and Wiltshire wool prices.
Sources: Thorold Rogers, *History*, vol. 1, pp. 588–93; vol. 4, pp. 583–7; Beveridge, *Prices and wages*, pp. 45–7, 85–6; Lloyd, *Wool prices*, pp. 41–4.

35 per cent of manufacturing cost (16.1d.), and wool costs of 2.60s. per stone (2.23d. per lb), the wool required to manufacture the strait would have been just 7.21 lbs, equivalent to around 30 lbs for broadcloth.[82] Much exported broadcloth was of low quality. At London in 1390 broadcloth prices recorded in the poundage accounts ranged from 20s. to 120s., with 62 per cent worth less than 40s. In addition other named cloths, from Coventry and Guilford, were worth on average 25s. each.[83] The Venetians from 1439 to 1944 were mostly buying Western bastards worth around 38s. and Westerns at 26s. a cloth, for sale in the Levant, whose merchants were looking to buy low-priced cloth. Again, with wool accounting for 35 per cent of manufacturing cost, wool costing 3.50s. a stone nationally in the 1390s, a cloth worth 30s. would likely use 52 lbs of wool, the same weight as the Colchester dozen.

III

Weight increased in the fifteenth century for two reasons: it made practical sense to buy better quality cloth as living standards rose and wool prices declined, and English overseas merchants concluded that their competitive position improved as cloth became heavier. Particular Accounts clearly show that the price of most exported English woollens rose in the second half of the fifteenth century as Antwerp replaced Bruges as the primary northern cloth mart.[84] English broadcloth became more competitive now that it was finished and dyed in Antwerp. At the same time continental luxury draperies had declined.[85] English wool came to account for up to 70 per cent of their pre-finishing manufacturing cost, as duties were fixed and English wool prices had declined, giving English clothmakers a 30 per cent cost advantage.[86] Continental draperies also suffered from the impact of the Calais Staple Bullion and Partition Ordinances between 1429 and 1473 that placed credit restrictions on the purchase of wool. As continental draperies became less competitive, wool exports fell around 50 per cent from the end of the

[82] The price of 2.6s. for a stone for wool was the average price of Norfolk, Suffolk, and Cambridge wools in the 1390s; see Lloyd, *Wool prices*, p. 43.
[83] Oldland, 'Variety and quality', pp. 219, 246.
[84] Ibid., p. 249; Munro, 'Three centuries', p. 40.
[85] Munro, 'Late medieval decline', pp. 330–2.
[86] Munro, ' "Industrial crisis" ', p. 140.

fourteenth to the mid-fifteenth century.[87] Many Flemish *nouvelles draperies*, as of 1420, started to replace English wools with Irish, Scottish, and Spanish wools, lowering the quality of their cloth but keeping their prices low.[88] Flemish cloth became even less competitive after 1464 when Edward IV devalued the pound sterling by 25 per cent. Most continental draperies declined in the face of the English onslaught. A few Low Countries' draperies, notably Mechelen and Leiden, that remained dependent on English wools, had found new markets for their ultra-luxury cloths in the later fifteenth century, but they eventually succumbed to English competition by the second quarter of the sixteenth century.[89] At Leiden around 1530 the cost of wool required to make their ultra-luxury *voorwollen* cloth was comparable to the price of standard finished English broadcloth.[90]

As English merchants began to dominate northern and eastern European cloth markets, English draperies restructured, as had the Flemish draperies 150 years previously, by focusing on higher-priced, heavier cloths, although the positive impact of this change was not easy to see until trade revived in the 1480s. For English clothiers and merchants competitive advantage widened the more wool that was used to make broadcloth. It should also be noted that, as weight increased, English clothiers gained further advantage from cheaper fulling, as all but the finest cloth was mechanically fulled in England, whereas Flemish quality cloth was foot-fulled. Mill-fulling cost 70 per cent less than foot-fulling, and reduced the hours needed to produce broadcloth by over 10 per cent.[91] As a result inexpensive broadcloths, Guildfords, Westerns, and bastards, declined in importance, and demand for cheap straits fell. Suffolk made the transition from weaving straits to good quality broadcloth, as is clear from a comparison of the aulnage subsidy particulars in the 1390s and 1460s.[92] Non-Hanseatic aliens paid, on average, 30–40s. for coloured broadcloth in the 1390s based on prices in the poundage subsidy accounts, but this had risen to a standardized price of 60s. at London and Bristol in the 1480s.[93] Colchester's cloth steadily improved in quality over the fifteenth century. The price of broadcloth, mostly russets, was 51s. in the late fourteenth century, if we consider two decenas equivalent to broadcloth. Colchester replaced these cheap russets with mostly new grey and murrey-grey full broadcloth in the first half of the fifteenth century at around 60s. a broadcloth. Between 1470 and 1529 merchants were selling russets for 77s. and blues for 78s.[94]

Kersey price and quality also rose. Kersey had been a very cheap cloth 12 yards in length by a yard in width, priced the same as straits in the fourteenth century. By 1464 it had become a much higher quality cloth that was now 18 yards in

[87] Munro, 'Medieval woollens: the western European woollen industries', p. 304.
[88] Munro, 'Spanish *merino* wools', pp. 457–61. Prices for *nouvelles draperies* cloths from Werwik, Kortrijk, and Niewkerke traded at Bruges were remarkably stable throughout the fifteenth century, rising about 10% over the century; see John Munro's Home Page, under 'My research data online', then 'My statistical tables for textile prices in the late medieval, early modern Low Countries and England' (www.economics.utoronto.ca/munro5/StatResources.htm).
[89] Brand, 'Medieval industry'; Mertens, 'Mechelen'.
[90] Brand, 'Medieval industry', p. 130.
[91] Munro, 'Medieval woollens: textiles', p. 207; Endrei, 'Manufacturing', p. 21.
[92] Britnell, 'Suffolk'.
[93] Oldland, 'Variety and quality', p. 249.
[94] Britnell, *Colchester*, pp. 59, 164, 166, 178.

length by a yard in width.[95] In the later fifteenth century coloured kerseys were usually valued at 13s. 4d. a cloth; and in 1505 the standard customs price of 20s. was set, equivalent to 60s. for broadcloth.[96] In a London dispute over the production of 20 blue kerseys in July 1478, each kersey, 20 yards by a yard and half a quarter fulled, was using 36 lbs of wool, almost as heavy, by area, as broadcloth.[97] Therefore, the rising quality of broadcloth, the heavier longer kersey, and the declining demand for cheaper, lighter straits all contributed to the growing price and weight of exported cloth in the second half of the fifteenth century.

This increase in price of standard broadcloth exports was a result of increased weight, and perhaps improving production standards, rather than any sudden rise in the quality of wools. The overall trend in the quality of the wool supply from the mid-fourteenth to the late fifteenth century must have been downwards.[98] Demesne farming geared specifically to the production of high quality, high priced wools in the late thirteenth century had been replaced in the fifteenth by tenant and peasant farmers who were raising sheep using low cost management practices in the face of falling prices, and finding an enlarged revenue stream from selling more mutton. There is evidence for some improvement in Cotswolds wools, and the quality of Berkshire wools undoubtedly rose.[99] Some higher quality cloths, like Castlecombes, Coggeshalls, and Winchcombe kerseys, were made from superior wools and commanded higher prices. But there was an offsetting decline in the quality of midlands and Yorkshire wools.[100]

It seems that, by 1500, most cloths had reached weights close to those set in the 1552 act. Unfortunately, even in the early sixteenth century there are few indications of broadcloth weight before the 1552 act. In 1522 Worcester cloths required 84 lbs of wool for the old assize, and 90 lbs for the new assize.[101] In 1525 Coventry cloth had to use 88–96 lbs of wool for each cloth.[102] Inexpensive Devonshire russet straits (15 yards long by a yard and half a quarter in width on the loom) had to weigh 14 lbs in 1514, equivalent on an area basis to a 54-lb broadcloth, a lighter weight cloth than in the 1552 act.[103] Woollens had become uniformly heavy by mid-century. In 1552 only ordinary kerseys (1.11 lbs per square yard), Devonshire dozens (1.09 lbs per square yard), and cottons (1.21–1.28 lbs per square yard) were lighter than the standard West Country short broadcloth (1.32 lbs per square yard). Frieze (1.73 lbs per square yard) and 'long' superior woollens (1.53–1.88 lbs per square yard) were much heavier. In a reversal of competitive positioning, many continental draperies were forced to increase the weight of their cloth to match standard English broadcloth, now increasingly using Spanish merino wools which were almost as good as English wools.[104]

[95] 4 Edward IV, c. 1 (in *Statutes of the Realm*, vol. 2, pp. 424–6).

[96] Oldland, 'Variety and quality', pp. 231–3, 250.

[97] London Metropolitan Archives, Corporation of London, Common Council Journal 8, COL/CC/01/01/010, fo. 181. Assuming a 25% loss of wool in the production process, the weight per square yard would have been 1.2 lbs, as heavy as the average kersey in 1552, and just below that of the standard broadcloth.

[98] Campbell, *English seigniorial agriculture*, pp. 160–2.

[99] Munro, 'Wool price schedules', p. 140; idem, 'Yorkshire', pp. 215–17.

[100] Munro, 'Yorkshire', pp. 211–19.

[101] Taylor, 'Cloth', p. 285.

[102] Dormer Harris, ed., *Coventry*, p. 689.

[103] 6 Henry VIII, c. 8 (in *Statutes of the Realm*, vol. 3, p. 129).

[104] De Sagher, ed., *Recueil*, vol. 2, pp. 146, 151; Munro, ' "New draperies" ', pp. 49–51; idem, 'Spanish *merino* wools', pp. 469–75.

The revitalization of the luxury 'long' cloth market was one further example of merchant adventurers' ability to sell even heavier, higher quality cloths at Antwerp. These fine cloths can be traced back to the early fourteenth century when the Great Wardrobe was buying expensive, imported, long, coloured broadcloths, accounting for 40 per cent of cloth expenditures in 1331/2, rising to 56 per cent in 1347/9, and they were still responsible for 38 per cent of expenditures on woollen cloth in 1392/5.[105] Long cloths became less important in the fifteenth century as Great Wardrobe purchases fell, London clothmaking declined, and there was no export market. Exports grew rapidly in the second quarter of the sixteenth century. They now came mainly from Worcester which made whites, and dyed cloths from Reading and around Cranbrook, in the Kentish Weald.[106] In 1519 Reading cloths used 113 lbs of wool to make their fine, long cloths, and in 1529 Thomas Kitson was exporting fine Kentish coloured cloths each weighing 100 lbs.[107] From May 1549 to April 1550, 8,787 long cloths were sold at Antwerp, compared with 49,667 short cloths.[108] Long cloths were only 7 per cent of the number of cloths, but since Thomas Gresham paid over twice the price for long Worcesters than short Worcesters, the value of long cloths may have been as much as 14 per cent of the total value of English cloth exports to Antwerp.[109] These cloths therefore might be considered a new category, using the best English wools, heavier than most, if not all, continental woollens, that fetched very high prices.

It was unsurprising that the thickening of broadcloth created demand for alternative, lighter, worsted cloths, destined initially for southern European markets, as English broadcloth was now far heavier than today's heavy woollen overcoat. The revival of says was led by Hondschoote in western Flanders, where production had risen from around 4,500 says early in the fifteenth century to 15,300 in 1473. By the mid-sixteenth century 50,000 says were exported.[110] Many draperies in northern France had revived their sayetteries by the end of the fifteenth century. In England, Norwich's expensive double worsted was exported in large quantities towards the end of the fifteenth century.[111] Flemish light draperies were imported into England in significant numbers for the first time in the 1540s.[112]

IV

Power ignored the domestic market, assuming that, even with the most optimistic estimate, overall demand could not have increased as population declined. These revised estimates have settled upon a domestic market of 160,000 cloths in the early fourteenth century, falling to 120,000 by the end of the century, recovering to 150,000 by the 1440s and then rising to 190,000 by the early 1540s (table 3 and table 1). Domestic cloth consumption accounted for only 39 per cent of wool production in the early fourteenth century, but had risen to an estimated

[105] TNA, E 101/402/13; Staniland, 'Court of Edward III', p. 230; Oldland, 'London clothmaking', p. 48.
[106] Zell, *Industry in the countryside*, pp. 154–61.
[107] Jackson, 'Berkshire', pp. 124–5; Cambridge University Library, Cambridge, Hengrave Deposit, 78/2, fos. 19v, 25, 30, 33.
[108] De Smedt, *De engelse natie*, pp. 433–4.
[109] Mercers' Hall, London, Thomas Gresham day book.
[110] Coornaert, *Hondschoote*, pp. 11, 17, 28–9.
[111] Oldland, ' "Fyne worsted" ', pp. 188–90.
[112] TNA, E 122/81/31a.

Table 3. *Per capita domestic consumption of woollen cloth, 1311–15, 1391–5, 1441–5, 1491–5, and 1541–5*

	1311–15	*1391–5*	*1441–5*	*1491–5*	*1541–5*
Population (millions)	5.53	2.96	2.42	2.41	2.99
Domestic cloths	160,000	120,000	140,000	150,000	190,000
Yards of cloth (24 per cloth)	3,840,000	2,880,000	3,360,000	3,600,000	4,560,000
Yards per capita	0.69	0.973	1.39	1.49	1.53

Source: Clark, 'Long march', p. 120.

56 per cent by the 1540s. There are two questions to be answered. Can the size of the domestic market be defended, and is it possible that it could be maintained, and even increased, in the face of declining population?

Several historians have estimated market size, and come up with a wide range of figures. Trow-Smith estimated the domestic market to have been only 50,700 cloths (equivalent to one-third the size of wool exports) in the early fourteenth century, and Bowden 62,375 cloths in the mid-sixteenth century (equivalent to one-half the wool exported as either wool or cloth), both of which seem to be considerable underestimates.[113] Campbell, on the other hand, came to the conclusion that domestic consumption must have been at least as great as wool exported in the early fourteenth century, given the importance of peasant wool production.[114] Miller and Hatcher thought that home demand in the early fourteenth century might have been equal to 150,000 to 200,000 broadcloths.[115] Dyer suggested that if, in 1500, 1,250,000 million adults were buying three yards of cloth annually, this would amount to 160,000 cloths, double cloth exports.[116] Looking at the number of weavers and their likely production in the Babergh Hundred of Suffolk in 1522, where the county's clothmaking was concentrated, and then projecting this nationally, he felt that cloth production cannot have been any less than 200,000 cloths.[117] Muldrew has recently estimated the domestic market in 1590 to have been 25,166,538 pounds of wool, or 299,602 cloths assuming 84 lbs of wool to make broadcloth, a much higher estimate than used here for the 1540s.[118]

The estimated sizes of the domestic market used in these projections are probably conservative, as they assume very low levels of per capita cloth consumption. It took around 2.25–2.5 yards of cloth to produce a tunic, three yards for a coat and possibly twice that if it was lined, and four yards to make a lined doublet.[119] A pair of hose took a yard of kersey, equivalent to a third of a yard of broadcloth. A 1444–5 statute stipulated the maximum stipend for a shepherd or carter was 20s. a year and 4s. in clothing together with food or drink, while the common servant might receive 15s. and 3s. 4d. in clothing. This would have only bought a coat.[120] A fifteenth-century Suffolk tenant farmer, Robert Parman, enjoyed an annual livery of 10s. which was appropriate for a yeoman.[121] This

[113] Trow-Smith, *British livestock*, p. 140; Bowden, *Wool trade*, p. 37.
[114] Campbell, *English seigniorial agriculture*, pp. 158–9.
[115] Miller and Hatcher, *Medieval England*, p. 126.
[116] Dyer, *Age of transition?*, p. 159.
[117] Ibid., p. 148–9.
[118] Muldrew, ' "Th'ancient distaff" ', p. 518.
[119] Dyer, *Standards of living*, p. 78.
[120] Farmer, 'Prices and wages', p. 487; 23 Henry VI, c. 12 (in *Statutes of the Realm*, vol. 2, p. 338).
[121] Dyer, 'Suffolk farmer', p. 9.

would have been equivalent to a third of a quality broadcloth, or eight yards. It took 20–25 yards of cloth of various kinds to provide a complete wardrobe for a monk at Westminster Abbey.[122] In 1269/70 Beaulieu Abbey produced an average of nine yards of cloth for each of its monks, novices, and lay brothers.[123] The demand for soldiers' clothing during the Hundred Years' War would have raised cloth consumption, as would internal strife during the Wars of the Roses.[124] Much cloth was given away as alms, provided as liveries, and purchased by merchants for their ceremonial garments. In addition there were industrial and home furnishing uses, among them bed coverings, wall hangings, cushions, cloth to cover horses, and for kitchen use to strain foods. Gregory King estimated in 1688 that consumption of woollens, other than for clothing, was a third that used for clothing.[125]

The estimate that consumption per capita doubled from before the Black Death to the mid-fifteenth century is more controversial since some historians have thought this unlikely.[126] Ideally we would need accurate figures for population, changes in household income, and good evidence for the elasticity of demand for woollen textiles to make totally convincing arguments, and these we do not have. It seems probable that population declined by well over 50 per cent from 1300 to 1450, and then slowly rose so that by the mid-sixteenth century it was approximately half the 1300 peak.[127] There is no consensus on the rate of rise in household incomes and therefore changes in the standard of living among peasant farmers, or skilled and unskilled wage earners. The standard of living was extremely low in 1300, with 46 per cent of peasant holdings finding it very difficult to survive.[128] Household income must have risen significantly after the Black Death, especially after 1380, as prices fell and wages continued to rise. But there is no consensus by how much. It was certainly well below the recently estimated threefold increase in harvest wages from 1300 to 1450 because wage earners only enjoyed this level of prosperity for a few weeks a year, but probably far higher than the 10 per cent increase in the difference between revenues and expenditures recently estimated for farmers of 18–20 acres between 1348/9 and 1450–75.[129]

Clothing consumption rises as a percentage of income when societies become richer, and then falls once basic needs have been met.[130] Evidence from aristocratic and institutional accounts presented by Dyer indicates that expenditures on clothing ranged from 1 to 16 per cent for the fourteenth and fifteenth centuries. The London wool stapler George Cely spent 18 per cent of his household expenditures on clothing between 1486 and 1488.[131] With increased household income in the fifteenth century both tenant farmers and wage earners could purchase better and more cloth. By 1688 Gregory King estimated that clothing had risen to 25 per cent of the average household budget, with woollen garments still accounting for half

[122] Harvey, *Monastic dress*, p. 17.
[123] Oldland, 'Cistercian clothing', p. 84.
[124] Carus-Wilson, 'Evidences', pp. 198–9; Mate, 'Pastoral farming', p. 524.
[125] Postan, *Medieval economy*, pp. 203–5; Muldrew, ' "Th'ancient distaff" ', p. 514.
[126] Britnell, *Britain and Ireland*, pp. 416–18.
[127] Clark, 'Long march', pp. 118–24; Britnell, 'Postan's fifteenth century', pp. 60–5. Demographic literature is extensive. These references are from recent research and commentary on the subject.
[128] Kitsikopoulos, 'Standards of living', pp. 248–54.
[129] Clark, 'Long march', p. 109; Hatcher, 'Unreal wages', p. 19.
[130] Harte, 'Economics', p. 291.
[131] Hanham, *Celys*, p. 328.

the expenditure.[132] The poorest spent 18 per cent on clothing, the better-off 28 per cent, and the richest 15 per cent.[133] The main driver, apart from household income, was undoubtedly fashion and status, especially since the standard of living for the mass of the population may not have risen significantly from the fifteenth to the eighteenth centuries. Starting in the 1340s, inner garments began to hug the contours of the body rather than simply drape from the shoulders to the ankle, and this opened up an age of increasingly rapid change in fashion.[134] In 1363 yeomen and handicraftsmen were restricted to wearing broadcloth under 40s., and grooms and servants under 26s. 8d.[135] By the end of the fourteenth century there was widespread criticism of fancy peasant dress.[136] The preamble to the 1463 sumptuary law complained that 'The commyns of this youre seid reame, as well men as women, have used, and daily usen excessive and inordynat arrayes and apparel to the grete displeasure of God, enpoveryshing of this youre seid reame'.[137] Agricultural labourers and servants could now buy broadcloth worth 2s. or less a yard, equivalent to 48s. a broadcloth, a much higher price and better quality than a century before.[138] More cloth was required to be fashionable. Outer garments lengthened, sleeves widened, more clothing was lined, and doublet and hose required more cloth than the tunic it replaced.[139] Fewer restrictions were placed on women's dress by the end of the fifteenth century.[140] A good example of increased textile usage was for linen, nearly all of which was imported. Linen imports increased from an estimated £6–7,000 in 1390 to £66,666 in 1530, a tenfold increase.[141] In 1559/60 linen imports were valued at £61,673 13s. 4d., and fustians (a flax and cotton mixture) at £23,349 10s. for a total of £85,023 3s. 4d.[142]

Further, it seems likely that a larger percentage of households purchased rather than made their clothes, particularly in southern England where most commercial cloth was produced and wealth was increasing.[143] Before the Black Death underemployment meant that there was plenty of time to make homespun. In the fifteenth century the peasant household was more productively employed, the rural cloth industry far more efficient, and the quality difference between homespun and commercially produced woollens had widened. As more households turned to the market for cloth, it was inevitable that they would seek to be more fashionably dressed.

V

Wool yields generally fell from the late fourteenth until the mid-fifteenth century, as a result of more economical farming practices, which increased the number of sheep required to produce a woolsack. This was then reversed as

[132] Harte, 'Economics', pp. 289–90; Spufford, 'Cost of apparel', pp. 681, 697–8.
[133] Harte, 'Economics', p. 291.
[134] Piponnier and Mane, *Dress*, pp. 65–9.
[135] Baldwin, *Sumptuary*, p. 47.
[136] Ibid., pp. 67–9.
[137] Ibid., p. 101.
[138] Ibid., p. 106.
[139] Ibid., pp. 62–3, 68–9, 107; Dyer, *Standards of living*, p. 177.
[140] Baldwin, *Sumptuary*, p. 116.
[141] Van Uytven, 'La Flandre', p. 296. Linen was used extensively for napery and sheets as well as clothing.
[142] Dietz, *Port and trade*, pp. 152–6.
[143] Schofield, 'Geographical distribution'.

pasture sheep with longer fleeces became more widespread. Wool yields are difficult to estimate because so many factors affect them and they change over time, but considerable research has been conducted for the subject, most of it on large demesnes. Trow-Smith's estimate of 1.5 lbs for a fleece came from collating a number of small studies in the fourteenth century.[144] Bischoff, analysing 35 manors of the De Lacy family across England, found the average yield to have been 2 lbs at the turn of the fourteenth century.[145] The median fleece weight between 1321 and 1340 was 1.6 lbs on Oxfordshire and Buckinghamshire manors, and as high as 2.3–2.4 lbs at Wisbech Barton in the early fourteenth century.[146] Stephenson has conducted the most comprehensive study, on the bishop of Winchester's estates across southern England from 1210 to 1454.[147] Yield from 1310 to 1314 was around 1.50 lbs, by chance the same as Trow-Smith's average figure. It peaked at 1.77 lbs in the early 1320s and remained at high levels until 1375, at which point it fell, reaching a low point of 1.04 lbs in the late 1440s. Over the whole period the average was 1.35 lbs. Stephenson's estimate has been used for the early fourteenth century.

Although not the case for all studies, research in other areas of the country has corroborated yield decline.[148] Falling yield was a result of cost-saving management practices in the face of falling wool prices and higher labour costs after 1375.[149] Landlords and tenants cut costs by reducing the number of shepherds for a given number of sheep, feeding animals less hay and moving them around more, and relying more extensively on breeding rather than purchasing sheep to maintain flocks, all of which reduced yields. The problem with yield statistics is that they reflect landlord rather than peasant farming. Peasant flocks were always important and became much more dominant over the period. It has been suggested that 'smaller flocks must have been easier to observe and keep in reasonable health, and peasant and village shepherds probably had more incentive to manage their sheep with care in the later Middle Ages than many of their seigniorial counterparts'.[150] With this in mind 1.25 lbs for a fleece in the 1450s has been used in the calculations, rather than Stephenson's lower weight. This may still be too low as contemporary estimates for the later fifteenth century were between 1.5 lbs and 2 lbs per fleece for Cotswolds wool.[151] For the 1540s Bowden's estimate of 1.9 lbs has been accepted. It appears realistic, as it reflected the rapid increase in pasture flocks, especially in the midlands, where fatter sheep produced longer, coarser wools, and produced more meat. It is the only yield estimate for the period and comes from the same document recommending a sheep tax, which included the calculation referred to earlier that 4.33 cloths could be made from a single woolsack.[152]

[144] Trow-Smith, *British livestock*, pp. 139, 166–8.
[145] Bischoff, 'Fleece weights', p. 155.
[146] Postles, 'Fleece weights', pp. 100–1; Stone, *Decision-making*, p. 74.
[147] Stephenson, 'Wool yields'.
[148] Miller, ed., *Agrarian history*, pp. 192, 209, 220, 235, 281, 296–7, 320; Campbell, *English seigniorial agriculture*, pp. 155–6; Stone, *Decision-making*, pp. 117, 151–2.
[149] Stone, 'Productivity and management'.
[150] Ibid., p. 21.
[151] Hanham, *Celys*, p. 112.
[152] Tawney and Power, eds., *Tudor Economic documents*, vol. 1, pp. 178–84.

VI

The Enrolled Petty Custom accounts, customarily used by historians to measure cloth exports, underestimated the amount of cloth leaving the country, particularly in the sixteenth century. The accounts record the number of cloths of statute length which, for broadcloth, was 24 yards. Kerseys were treated as a third of broadcloth, and straits as a quarter until 1536 and less after that. We do not know for certain how higher quality 'long' broadcloths were treated, although it is likely that customs officials made some adjustment for their longer length.[153] Clothiers increased the average length of their cloth when it became apparent to them that customs officials were not fully adjusting their rates if they produced longer cloths.[154] This was particularly true of 'long' broadcloths, which were 28 to 31 yards in length according to the 1552 statute, but often as long as 40 yards.[155] The leading West Country broadcloths were also three yards longer (26–8 yards) than the statute length (23–5 yards). Kerseys, considered to be equivalent to a third of broadcloth, and accounting for around 20–5 per cent of exports in the 1540s, were also underestimated. The finest kerseys, Newbury and Hampshire ordinary and sorting kerseys, were 24–8 yards long compared to 18 yards for cheaper kerseys.[156] The area of three 18-foot kerseys was, in fact, 10 per cent greater than the standard Western broadcloth. Two important cloths, cottons and frieze, were not subject to Petty Custom, but aliens, except Hansards, paid poundage on them. Poundage particulars show that they were exported in large quantities, especially by Italians. These inexpensive narrow cloths may have accounted for as much as 10 per cent of other alien exports in some years.[157] In addition worsteds were not included in the export figures assembled by Carus-Wilson and Coleman, and cloths used to wrap cloths were not taxed.[158] Smuggling was not a great problem because tax rates on cloth were relatively low, but there was some fraud by the 1530s in the West Country, as some Devon cloths were claimed to be Cornish cloth, which avoided custom.[159] From 1537 the duty on many narrow cloths was reduced in line with their value, which again would have understated exports from then on.[160] There is no accurate way to determine by how much woollen cloth exports in the enrolled customs accounts were underestimated, but it must have been significant and growing. The number of exported cloths has been revised upwards by 5 per cent for the fifteenth century, rising to 10 per cent in the 1540s.

This article argues that the reduction in sheep numbers in late medieval England was far less from 1300 to 1500, and the numbers in 1550 far greater, than previously estimated. Further, the estimates may be conservative as the domestic

[153] Customs officials may have treated long broadcloths differently. The aulnage placed a subsidy of 5d. for a long broadcloth compared with 4d. for a short broadcloth, but this increase was probably a reflection of its greater value rather than its length.

[154] Ramsey, 'Overseas trade', pp. 177–8; Carus-Wilson and Coleman, *England's export trade*, p. 14.

[155] De Smedt, *De engelse natie*, pp. 433–4.

[156] Edler, 'Winchcombe kerseys', p. 58; Endrei, 'English kersey', p. 90. For a list of clothiers making long kerseys in the 1540s, see TNA, E 101/347/17.

[157] Oldland, 'Variety and quality', pp. 235–7.

[158] Oldland, ' "Fyne worsted" ', p. 190. There were over 5,000 double worsteds, 10 yards long and five quarters wide (30% of the area of a broadcloth) exported in the first two decades of the sixteenth century, but then there was a rapid decline.

[159] TNA, SP1/113, fos. 129–40.

[160] Ibid. Straits had always been customed at four to a broadcloth. Now coloured straits were five to a broadcloth, white straits six, white kerseys 12–13 feet in length were five, Totnes plains seven, and Tavistocks eight.

market might well have been larger than has been projected. These revisions accord with the agricultural evidence: the steady conversion of arable to pasture, and what we now know about productivity and land usage of peasant farmers. The primary reason for the increase in sheep numbers is that cloth weight dramatically changed over 250 years, requiring more sheep to produce broadcloth. Broadcloth had uniformly become so heavy by the mid-sixteenth century that lighter, worsted cloths revived, and fashion changed once again. The evidence on cloth weights is persuasive but, by itself, is neither overwhelming nor conclusive. Weights were rarely fixed by regulation, and it is obvious from the fifteenth-century records on warp thread counts that most draperies made a range of cloths from coarse to fine, and that was undoubtedly the same to some extent for the thirteenth century. There is no definitive weight information for fine, greased woollens before the late fourteenth century, and the coarse, ungreased heavy Beaulieu cloth shows that some woollens were heavy, even in the thirteenth century. Nevertheless, the combination of the agricultural record, the shifts in consumer demand, rising exports, and the evidence of heavier cloth and wool yields strongly suggests that wool production remained remarkably strong in the face of demographic decline and the reduction in wool exports after the Black Death, and then rose to far higher levels as cloth exports soared and the demand for more fashionable clothing continued to grow.

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