

# Harvest Fluctuations and English Economic History, 1480-1619

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IT IS incredible how little attention has been devoted by English economic historians to the importance of the annual fluctuations in harvest yields, and their bearing upon demography, upon mortality and disease, upon agrarian legislation and social unrest, and indeed perhaps upon the fundamental process of economic growth, particularly during the critical generations of the sixteenth and seventeenth centuries.<sup>1</sup> Such historians of the Tudor period as Bindoff and Mackie, for example, seem quite unaware of the problem of food-supply in an economy which could never be certain from year to year of being able to feed itself adequately.

Bindoff's *Tudor England* nowhere makes reference to the subject that was of vital importance to the great majority of the people of Britain; while Mackie speaks of Edward VI's reign as marked by an "inexplicable" economic stringency. "The harvests, in the main, were good. How could there be dearth in the midst of plenty?"<sup>2</sup> In actual fact, of the six harvests of Edward's reign, the first two were good to abundant (1547, 1548), but the next three ranged from deficient to disastrous (1549, 1550, 1551), and the final harvest (1552) was average to good. Thus half the harvests of this reign left the mass of people short of basic food and drink. Moreover, they were three bad years in a row, something infinitely worse than alternate good and bad years. Then, too, inflation really got under way in the late 1540's. The twelve years from 1545 to 1557 saw a rocketing of the price-index of consumables from 191 to 409.<sup>3</sup> Much of this catastrophic rise in the price of foodstuffs was due directly to the successive debasements of the coinage from 1542 to 1547, in 1549, and again in 1551; but a considerable part of it reflects the generally deficient harvests of these critical years.<sup>4</sup> In the light of these basic facts, much of the history and legislation of this troubled reign, with its repeated crises, is no longer hard to explain.

The annual harvest was the perennial subject of conversation in town and

<sup>1</sup> The only sustained discussion of the harvest as a primary factor in the national economy is that by T. S. Ashton, *Economic Fluctuations 1700-1800*, ch. 2: The Influence of the Harvests.

<sup>2</sup> J. D. Mackie, *The Earlier Tudors*, p. 503.

<sup>3</sup> I am using the Phelps-Brown index, as tabulated in *Essays in Economic History*, II, p. 194.

<sup>4</sup> See the table of Annual Harvests classified by Quality, at the end of this paper (Appendix II).

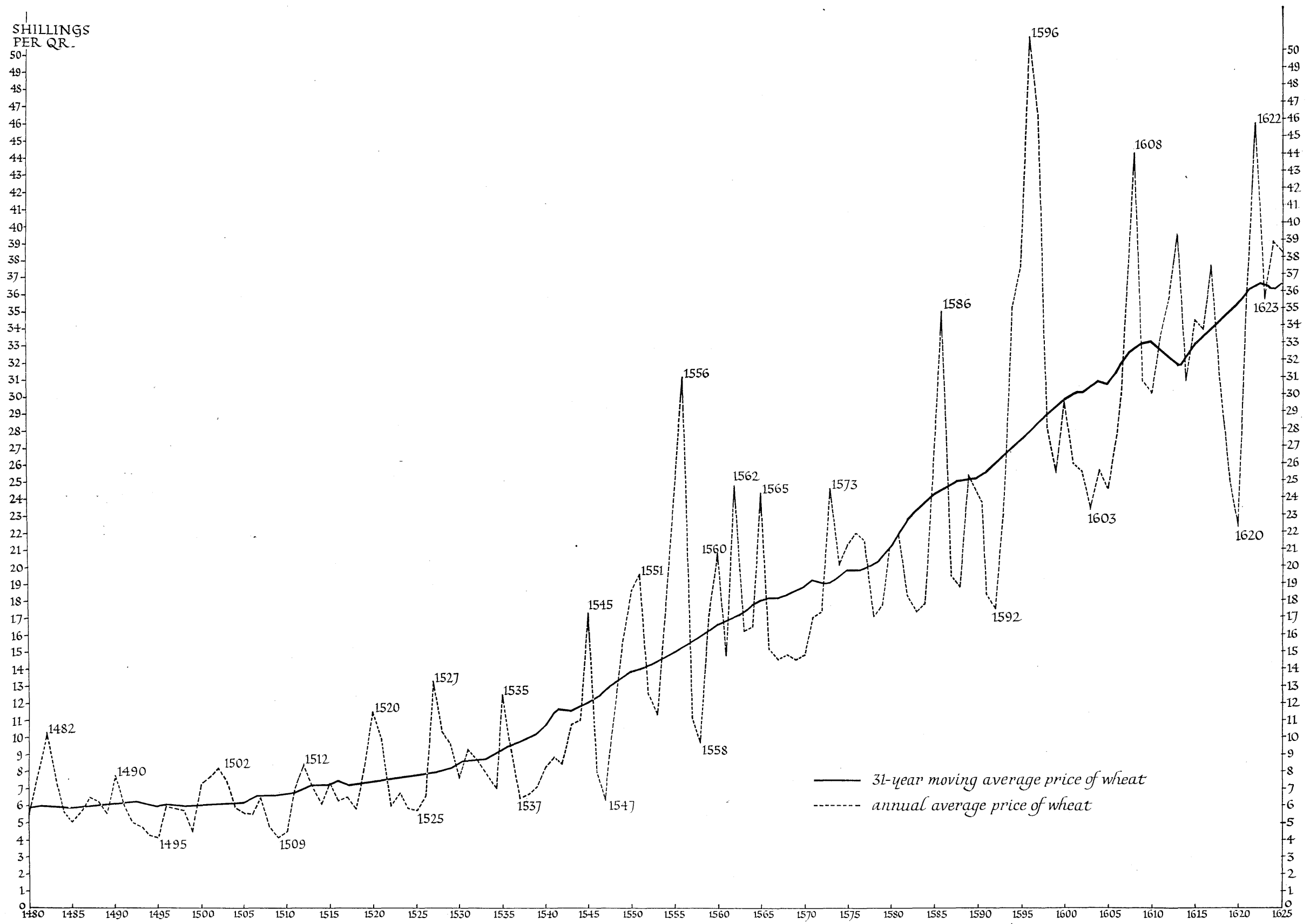


FIG. I  
 ENGLISH HARVEST FLUCTUATIONS 1480-1625

country, from the landowner down to the cottager.<sup>1</sup> In a country in which between one-half and two-thirds of the population were wage-earners, and a considerable proportion of the remainder subsistence farmers; in which about one-third of the population lived below the poverty-line and another third lived on or barely above it;<sup>2</sup> in which the working-class spent fully 80 to 90 per cent of their incomes upon food and drink; in such a country the harvest was the fundamental fact of economic life, even for the urban textile workers of towns like Norwich and Colchester. The disastrous harvest of 1551, following as it did upon two other bad harvests, was of infinitely greater moment for the great mass of English people than the commercial crisis of 1551-2, on which so much has been written. English economic historians have greatly over-rated the importance of the cloth industry in medieval and Tudor England, and even more so the cloth export trade and its vicissitudes, with a consequent serious distortion of economic history and a total neglect of some fundamental problems.<sup>3</sup>

The sources for this paper are given in an appendix. So, too, is a table of annual wheat harvests, classified by quality ranging from abundant on the one hand to dearth on the other. If we use the data for the whole of the period, we can begin by establishing the 'normal' variation of harvests in each decade, and then proceed to examine each decade between 1480 and 1619 (140 harvests in all) with a view to ascertaining whether there are any noticeable trends in the quality of harvests.

Out of the total of 140 harvests, 35 may be regarded as failures to some degree or other, a failure ranging all the way from deficiency to famine.<sup>4</sup> So in a 'normal' decade one harvest in every four could be reckoned as a failure

<sup>1</sup> Professor W. O. Ault, who was born in Kansas, tells me that even in Kansas City, a town of a quarter of a million people in the 1920's, the quality of the harvest was the staple subject of conversation in his youth, even among people apparently far removed from the land (e.g. lawyers). How much more so, then, in sixteenth-century England, where people could still die of starvation or of diseases accentuated by it.

<sup>2</sup> W. G. Hoskins, *Provincial England*, p. 84. "Fully two-thirds of the urban population in the 1520's lived below or very near the poverty line." Life was somewhat easier in the rural areas for a variety of reasons, but even here some 40 to 50 per cent of the population were wage-earners, and many others were small peasant farmers entirely at the mercy of Nature.

<sup>3</sup> Thus Bindoff, in an unguarded moment perhaps, says of the critical years 1547-58 that "the manufacture of cloth [had] expanded until it overshadowed all else in the national economy. . ." (*op. cit.*, p. 146). This is quite untenable: the annual harvest was a hundred times more important from both the consumers' and the producers' standpoint.

<sup>4</sup> In the classified table, I define 'deficient' as existing where the average price of wheat in a particular year is between 10 and 25 per cent above the 31-year moving average for that year, which I call the *norm* for that year. 'Bad' is defined as an annual average which is 25 to 50 per cent above the norm; and 'dearth' where the annual average is more than 50 per cent above the norm.

in some degree. Of these, the really 'bad harvests' numbered 24, or slightly more than one in six. This, incidentally, agrees closely with the popular belief in the sixteenth century, as expressed by the Doctor in John Hales's *The Commonweal of this Realm of England*, that a bad harvest came once every seven years.<sup>1</sup>

At the other end of the scale, 58 harvests out of the 140 in this period could be classed as good to abundant.<sup>2</sup> This amounts almost exactly to two harvests in every five ( $41\frac{1}{2}$  per cent). 'Average' harvests—where the average price for the year was within  $\pm 10$  per cent of the norm—amounted to one harvest in every three.

The view has been expressed<sup>3</sup> that there may have been a fundamental climatic change in the mid-sixteenth century over most of north-west Europe which adversely affected the quality of harvests during the second half of the century. A preliminary calculation suggests that this hypothesis is untenable for England. Thus if we take 1550 as the dividing-line, there were 29 good harvests out of 70 between 1480 and 1549; and there were exactly the same number in the seventy years from 1550 to 1619.

Nor does the pattern of bad harvests ('deficient to dearth') suggest any real difference between the two halves of this long period. In the years 1480–1549 there were 18 failures out of 70 harvests; in the period 1550–1619 there were 17. Utterström refers to the spectacular crop-failures of the 1590's in England, which were paralleled in other parts of Europe; but a close analysis of every harvest reveals that the 1520's, in England at least, were almost if not quite as bad. The difference lies in the greater efficiency of government in the later sixteenth century, and perhaps the more effective publicity given to agrarian troubles at the same time; probably also the much greater population of the 1590's caused more governmental unease than the comparative under-population of the 1520's.

The harvest pattern of an average decade was therefore as follows:

|                     |                                         |
|---------------------|-----------------------------------------|
| Good to abundant    | $41\frac{1}{2}$ per cent (2 in every 5) |
| Average             | $33\frac{1}{2}$ per cent (1 in every 3) |
| Deficient to dearth | 25 per cent (1 in every 4)              |

<sup>1</sup> *Op. cit.* (ed. Elizabeth Lamond), p. 59. The doctor says: "if an unfruitful year should happen amongst us, as commonly doth once in seven year, we should then not only have dearth [i.e. dearth] but also such scarceness of corn, that we should be driven to seek it from outwards parts, and pay dear for it."

<sup>2</sup> I classify a harvest as 'good' where the average price for that year was 10 to 30 per cent below the norm (as defined above) and 'abundant' when the average for the year was more than 30 per cent below the norm.

<sup>3</sup> Utterström, 'Climatic Fluctuations and Population Problems', in *Scandinavian Economic History Review*, III, 1955, pp. 3–47.

Let us now see what pattern, if any, can be established from a chronological examination of the quality of harvests throughout the five generations from 1480 to 1619.<sup>1</sup> Of the last twenty harvests of the fifteenth century—1480 to 1499—six were good to abundant, ten were average, and four were bad, ranging from deficiency to absolute dearth.

There was, however, a very marked contrast between the two decades. The 1480's were, on the whole, hard going. There were three bad years in a row (1481-2-3), including the dearth of 1482. Thorold Rogers says that the scarcity was especially marked in the eastern counties, and this is in fact so, for the average wheat-prices at Exeter, which we may take as representative of western England, were appreciably lower than the national average in both 1481 and 1482.<sup>2</sup> On the other hand, the harvest picture of the 1490's was a bountiful one, not to be repeated for plenty until the 1530's. After a bad start in 1490 itself, with a considerable deficiency all over England and the highest average price at Exeter since the famine of 1438-9, the decade opened out into a succession of four fine harvests in a row—good harvests in 1492 and 1493, and abundant in 1494 and 1495, ending in 1499 with another good harvest. Five out of ten harvests were plentiful; only one was deficient. It was indeed a golden decade. In general, the harvests of the west broadly followed the pattern of the eastern and midland counties, the most noticeable differences being that 1491 and 1492 were distinctly better in the west than in the rest of the country, while the harvest of 1497 was markedly deficient in the west as against an average harvest elsewhere. Again, the good harvest of 1499 was only an average one in the west.

What is perhaps more important is the marked tendency for good or bad harvests to run in series, a tendency which one detects throughout the entire period and one which calls for discussion at this point. The three bad years of 1481, 1482, 1483, were paralleled by the four good years of 1492, 1493, 1494, and 1495. Then we get the four successive bad years of 1500, 1501, 1502, and 1503. In the following decade there is no such succession of good or bad; but between 1519 and 1529 we get a remarkable pattern of three bad harvests in a row (1519, 1520, and 1521), then five good harvests in a row (1522 to 1526 inclusive), followed immediately by three more bad harvests (1527, 1528, 1529).

<sup>1</sup> Neither of these dates has any special significance. They were chosen because they give an equal period of seventy years on either side of 1550, to test the Utterström thesis, and also so as to give a long 'run-in' to the sixteenth century and an equal 'run-off' at the other end.

<sup>2</sup> The Exeter series of wheat-prices, almost unbroken from 1316 to 1820, is probably unparalleled in any other city in Europe. They were studied by W. H. (later Lord) Beveridge in 'A Statistical Crime of the Seventeenth Century', *Journal of Economic and Business History*, 1, pp. 503-33. Wherever I cite the Exeter prices, they are taken from Beveridge's tables in that article.

Whatever we may make of these facts from a climatic standpoint (and one is deeply sceptical of all theories of a climatic rhythm), the impact especially of successive bad harvests must have been appalling for the majority of the population, living as they did with little or no reserves of food or money. Death must have been as common a sight as on a battlefield. It helps to explain the (to us) horrible popular taste for cruelty and the sadistic delight in barbarous executions in the sixteenth century, a taste which the odious Henry VIII shared to the full with his subjects.

Henry, indeed, was fortunate in his harvests, for the 1530's-40's saw another remarkable abundance. From 1537 to 1542 there were six good to abundant harvests in a row; and his reign ended with the beginning of another good run (1546, 1547, 1548).

Then followed three successive bad harvests—1549, 1550, and 1551. After that a mixed pattern, often with two good or two very bad harvests in succession, until another remarkable sequence of six good harvests from 1566 to 1571 inclusive. In the 1580's there were three good harvests in a row (1582-4). The 1590's present an interesting picture. Here harvests are the key to much of the important legislation and the social unrest of these years. Three good harvests in a row (1591, 1592, 1593) were followed by a series of four very bad years, amounting at times to famine, from 1594 to 1597 inclusive, perhaps the worst sequence of the entire century.

The seventeenth century opened (1601 to 1606) with six good harvests successively, that of 1603 being especially good, though none was abundant; and our period ends again with three good harvests—1618, 1619, and 1620, which was an abundant year.

This examination of harvest sequences has established no discoverable rhythm. Short-term climatic fluctuations may well have had much to do with it, but even more important in all probability was the basic fact of yield ratios.<sup>1</sup> Slicher van Bath observes that "meagre yield ratios of 1 : 3.0 or 4.0 . . . were the rule in the middle ages and even in many countries till the eighteenth century." This meant that a large part of the arable had to be kept for growing the next year's seed. It also meant that a bad harvest, by reducing the yield ratio to a dangerously low level, almost automatically ensured another bad harvest from a sheer deficiency of seed. In very bad

<sup>1</sup> For a comprehensive collection of statistics on this subject, see B. H. Slicher van Bath's recent volume *Yield Ratios, 810-1820* (Wageningen, 1963). Unfortunately, though the medieval evidence from England is reasonably full, that for the sixteenth and seventeenth centuries is almost non-existent. There is a very short series for a west Devon manor in the early sixteenth century by H. P. R. Finberg, and two short series for Gloucestershire and Berkshire manors in the early seventeenth century by J. P. Cooper, G. E. Fussell, and B. H. Slicher van Bath. Nevertheless, even these meagre figures are instructive.

years the rural population must have staved off the worst of their hunger by consuming part of next year's seed-corn, a terrible dilemma which was apparent in China in the 1950's. So one bad harvest tended to generate others, possibly cumulatively, and the sequence could only be broken by a year in which the weather came to the rescue and doubled the yield, so restoring the 'normal' balance between bread-corn and seed-corn.

Conversely, of course, one good harvest tended automatically to produce another through the abundance of seed-corn, and so on for three or four (or even more) years, until prolonged rain or some other climatic catastrophe broke the lucky chain and produced an average or a bad harvest as a consequence. So harvest fluctuations do not necessarily reflect climatic variations (though they often do, to judge by literary references) but more probably the fundamental fact of yield ratios in an agrarian economy that worked normally on a very fine margin between sufficiency and shortage.

The sixteenth century began badly. The harvest of 1500 was generally very deficient, while in the west it was very bad, with an average price at Exeter well over 50 per cent above the norm for that year. Both 1501 and 1502 were bad generally. 1503 was seriously deficient, and again worse in the west. In 1506 came the first really good harvest for seven years; 1507 was an average yield. Then came three marvellous years in succession. 1508 was very good; and the first harvest of Henry VIII's reign was abundant with an average price nearly 38 per cent below the norm. Rogers says that the price of wheat in 1509-10 was the lowest for more than two hundred years, the harvest of 1510 being nearly as good as that of the year before.

The decade from 1510 to 1519 was slightly better than the average, with four good harvests (1510, 1514, 1516, and 1518) and only two deficient to bad harvests. The harvest of 1512, bad generally, was an average one in the west; that of 1519 was generally deficient but not bitterly so.

The 1520's have already been referred to. They present the extraordinary pattern of five good harvests in a row (1522-26) which must have helped Henry VIII and Wolsey materially in their acrimonious struggles to raise war-finance by unparalleled heavy taxation and 'loans'. The decade had begun with a dearth, with an average price for the country as a whole fully 54 per cent above the norm. At Exeter, the average price for the harvest-year 1520-1 was the highest recorded since the terrible famine of 1315-17. At Coventry that autumn (1520) the mayor counted the people ward by ward, men, women, and children, and caused a complete return to be made of all stocks of malt, rye, wheat, barley, oats, and peas.<sup>1</sup> At Leicester, in mid-

<sup>1</sup> *Tudor Economic Documents* (hereafter referred to as *T.E.D.*), ed. R. H. Tawney and E. Power, I, pp. 141-3.

November, the governing body ordered that "all that bake rye bred for pore people" were to make it good and wholesome, and "that it stand the more parte be rye and the bran of wheat according to the statute." At the same time, ale for the poor was to be sold at a half-penny a gallon, whereas the best ale was 2½d. a gallon.<sup>1</sup> The harvest of 1521 was also bad (average price 30 per cent above the norm) and noticeably worse in the west. Then came the five good years, followed by the great dearth of 1527, with an average price for the harvest year fully two-thirds above the norm.<sup>2</sup>

In the west the harvest was not so disastrous as elsewhere (see Table, Appendix II) but at Norwich the mayor viewed a situation bordering on revolution. The Mayor's Register for this year records that "there was so great scarsenes of corne that abowte Christmas the comons of the cyttye were ready to ryse upon the ryche men." There was indeed a rising in the county shortly afterwards, and in the city itself where the leader (one Young) tried to persuade the hungry crowd to take the corn by force from the sellers. They sensibly desisted on the ground that if those who brought corn openly into the city to sell should be injured then no further supplies would arrive and they would indeed starve.<sup>3</sup>

The harvest of 1528 was also a bad one, not so great a failure as that of 1527 but coming after that disaster it aggravated the misery. Excessive rain seems to have been the cause of these two bad years. Blomefield records that the housewives of Norwich rose in anger and despair; so, too, did the men of Yarmouth—"not with intent to injure anyone at first, but only to hinder [the] exportation of corn. But it went so far that divers young men that joined them were executed for it." Among the many abominable crimes of the brutish Henry, men were hanged for refusing to starve to death.<sup>4</sup>

The slender food reserve on which Tudor England ultimately depended is brought home to us in the petition of the men of the Huntingdonshire village of Yaxley in the court of Star Chamber. They recalled the Great Hunger of 1527 when a merchant of Lynn appeared with his boat at the end of November in the following year in order to load it with peas for export. After an altercation, one of the Yaxley men exclaimed: "You men of Lynn did carry

<sup>1</sup> *Leicester Borough Records*, ed. M. Bateson, II, p. 16.

<sup>2</sup> Only two other years (1556 and 1596) exceeded 1527 for scarcity throughout the entire sixteenth century.

<sup>3</sup> Blomefield, *History of Norwich*, I, p. 178.

<sup>4</sup> See *T.E.D.*, I, pp. 143-4, for information relating to the dearth in Staffordshire in 1527. Here the commissioners had been enjoined to search all barns, garners, stacks, ricks, and mows "and other suspicious places in the same to have hid corn." They reported no hidden corn, and recommended that other counties should not be restrained from selling to them "for their necessary sustenance and living."

our peas into Scotland last year, and pined us for hunger here, for lack of sustenance. And if we knew you would carry these peas into Scotland, as you did our peas last year, we would hold them until we knew further of the king's pleasure therein. For as we do think, that you do against the king's commandment in that behalf."<sup>1</sup>

The year 1529, too, was a poor one, the third bad harvest in succession; but the 1530's opened well with a very mild spring. So forward was the season that the Leicester borough records remark upon the gift of early flowers for the mayor: on 27 March he was presented with hawthorn in bud, bean-flowers, and a columbine in flower;<sup>2</sup> and the summer fulfilled this promise. It was a good harvest, though Rogers records that it was better in the east than in the west and south of England.

Taken as a whole, the 1530's were a bountiful decade, the best since the 1490's. There was only one bad harvest out of ten, four were of average quality,<sup>3</sup> and no fewer than five were good. Of these, three successive harvests (1537, 1538, 1539) could be called abundant, with long, glorious summers.

The 1540's began in like fashion, the spring of 1540 being very early. Cherries were ripe by the end of May, grapes by July, the harvest was half over by 25 June, and there was a general abundance of corn and fruit. The next two seasons were equally blessed; then came two average years (1543, 1544), and then the great dearth which men had learnt to expect about every seventh year. In this instance, ten years had passed since a similar failure, but whereas the failure of 1535 had been less severe in the west, that of 1545 was quite disastrous. The average price for the harvest-year 1545-6 at Exeter was the highest that had ever been known.<sup>4</sup>

The hard year of 1545-6, with its hunger and pestilence, was succeeded by three abundant harvests in a row (1546, 1547, 1548), good years which are referred to several times in *The Commonweal of this Realm of England*, wherein it is stated that the yield of corn was twice the average.<sup>5</sup> Then came the seriously deficient harvest of 1549 which may be said to usher in the

<sup>1</sup> *T.E.D.*, I, pp. 144-6. Petition dated 1529: Inhabitants of Yaxley v. Thomas Aylward and Christopher Branston.

<sup>2</sup> *Leic. Bor. Rec.*, III, pp. 28-9.

<sup>3</sup> The harvest of 1532 was an average one generally in price, but evidently bad in the west as the Exeter average was nearly 20 per cent above the norm. On the other hand, the generally bad harvest of 1535 was less disastrous in the west (national average 12.67 sh. per. qr., Exeter 10.87 sh.).

<sup>4</sup> The national average was 17.31 sh. per qr., against the norm of 12.13 sh., but the Exeter figure was 19.10 sh. for the year. Conversely, the generally abundant harvest of 1546 was even more plentiful in the west and the average price fell to a level not known for twenty-one years.

<sup>5</sup> *op. cit.*, esp. p. 52.

dreadful 'fifties, culminating in the famine of 1555-6. The harvest of 1550 was very bad, that of '51 even worse. These three bad harvests in a row were of infinitely greater moment to the mass of English people than the commercial crisis of 1551-2.

The years 1552-4 offered a respite with two harvests of average yield. That of 1553, the first of Mary's reign, was good, with an average price throughout the year about 23 per cent below the norm. But the harvests of 1555 and 1556 were disastrous by reason of continual rain, that of '56 being by far the worst within living memory: "all the corn was choked and blasted, the Harvest excessive wet and rainy." It was a year of famine over most of northern and western Europe. In Holland the poor ate ox- and pig-dung. In England, certain towns, such as Norwich and Great Yarmouth, established a permanent grain stock, with officials to administer the funds, in place of the *ad hoc* actions of previous years of hunger.

There was a great mortality all over England in 1556-8, thought to have been due to influenza.<sup>1</sup> In Leicestershire the death-rate was about double the normal in 1556, quadruple by 1557, and seven times the normal in 1558. For the three years 1556-8 it was just about four times the normal number.<sup>2</sup> In the diocese of Worcester the average number of wills proved was about 135 a year from 1551 to 1555; for 1556-8 the average was about 530 a year, again about four times the normal. At Colyton, in east Devon, an examination of the parish registers shows that the burials in 1557-8 were  $3\frac{1}{2}$  times the normal.<sup>3</sup> There is no means of knowing the exact cause of death in this prolonged visitation, but it was certainly not plague, and the two appalling harvests of 1555-6, accompanied as they were by prolonged rains, must have been mainly responsible. There is room for some fundamental research on mortality figures in sixteenth-century England especially in conjunction with the now-known facts about harvests; though much remains to be discovered about the incidence of foot-rot and 'murrains' amongst meat-animals before we can generalize safely about the precise relationship between failures of food-supplies, epidemics, and mortality-rates. The harvest of 1558 was abundant: it is odd (but entirely accidental) how each of the Tudors came to the throne in a good harvest year—1485, 1509, 1547, 1553, and 1558. It may not have mattered greatly whether or not the populace had

<sup>1</sup> Creighton, *History of Epidemics*, 1, pp. 401-5.

<sup>2</sup> These figures are based upon a count of wills and administrations proved in the arch-deaconry of Leicester, and therefore cover only the will-making population. It is probably a very representative sample.

<sup>3</sup> For the Worcester data, see the *Calendar of Wills and Administrations in the consistory court of the Bishop of Worcester, 1451-1600*. For Colyton, see the *Register of baptisms, marriages and burials of . . . Colyton, 1538-1837*, published by the Devon and Cornwall Record Society.

full bellies at these change-overs, but it doubtless helped the new régime to settle in without any fear of famine at the very outset.

The bad harvest record of the 1550's seems at first sight to lend credence to the theory of a fundamental climatic change about the middle of the century; and the record of the 1560's, though somewhat better, seems to add a little further credibility. There were three bad harvests in the 1560's—1560, 1562, 1565—and the harvests of 1563 and 1564, though of average quality generally, were certainly bad in the west, judging by the Exeter figures. Again, presumably, excessive rain at the wrong season was the chief cause. But the decade saw no fewer than five good harvests (1561, 1566, 1567, 1568, 1569), and indeed there were six good harvests in a row between 1566 and 1571 inclusive. So though the 1550's were generally a bad time, the 1560's were noticeably better than the average when all the factors are taken into account; and the next two decades were on the whole better still.

The 1570's had rather fewer deficient harvests than the average, and rather more good harvests. Only 1573 was a really bad harvest,<sup>1</sup> and 1576 was deficient; but the generally below-average harvest of 1575 was very bad in the west where the average price for the year was nearly 50 per cent above the norm.

Both 1570 and 1571 were tolerably good harvests; so too were 1578 and 1579.<sup>2</sup> The 1580's were even better, with only a single bad harvest throughout the decade; though that was the general dearth of 1586. As the harvest in the west was even worse than the national average,<sup>3</sup> the failure was probably due to excessive rainfall. But there were no fewer than five good harvests during the decade, including three in a row (1582, 1583, 1584); and both 1587 and the Armada year saw very good harvests.

The 1590's saw no fewer than four good harvests, including three in succession—1591, 1592, 1593—that of 1592 being particularly abundant in the eastern counties. Even so acute an observer as Bacon expressed the view in this year that England was now in a position to feed other nations instead

<sup>1</sup> It was the bad harvest of 1573 that induced the enquiry by the Privy Council concerning the grain stocks of the city of London in the following March. The poor of London were obviously the most dangerous flash-point in the kingdom at times of scarcity. For the Council's questions and the Lord Mayor's answers, see *T.E.D.*, I, pp. 156–61.

<sup>2</sup> That the grain supplies of the western counties were not negligible in the national economy is shown by the letter of the Privy Council (11 October 1579) releasing 300 qrs. of wheat for export to Spain and Portugal because of "the great plenty of grain this year within [the] county of Devon, not only sufficient for the inhabitants but . . . able to spare a convenient quantity for others. . ." *T.E.D.*, I, p. 161.

<sup>3</sup> The west had a bad harvest in 1585, with an average price at Exeter about one-third above the norm. For 1586, the norm was 24.50 sh. per qr.; the actual average was 34.79 sh. (a difference of 42 per cent) and the Exeter average was as high as 40.57 sh. (a difference of some 60 per cent).

of being fed by them. And in 1593, the government, encouraged by yet another bountiful harvest, repealed the anti-enclosure act of 1563 which had in turn confirmed the legislation of Henry VII and Henry VIII on the subject. The export of wheat was also permitted, so long as the home price was not above 20s. a quarter.

But then followed no fewer than four terrible years in a row. The rains fell incessantly all over Europe from Ireland to Silesia. The 1594 harvest was bad (average price nearly 30 per cent above the norm); 1595 was even worse (average nearly 36 per cent above the norm); and 1596 was a disaster, with an average price of 83 per cent above the norm. Even so, it was far worse in the west, where the Exeter average of 62·94s. per qr was the highest ever recorded, and stood at well over twice the norm. But at this point statistics cease to have any meaning in terms of human misery. The Great Famine extended over nearly all Europe, lasting for some three years. In Hungary it was said that the Tartar women ate their own children. In Italy and Germany poor people ate whatever was edible—fungi, cats, dogs, and even snakes. In England there were food-riots in many counties, the most serious perhaps being that in Oxfordshire.<sup>1</sup>

One should note, too, that a failure of the wheat harvest drove up all the other food-prices, whether or not there was cattle-plague or sheep-rot (as there seems to have been in 1594).<sup>2</sup>

With such widespread near-starvation and a real threat of popular rebellion in various parts, it is no wonder we find two pieces of panic legislation passed in 1597–8. One was the great act codifying a mass of scattered legislation and local experiments for the relief of poverty. The other was the act for the maintenance of husbandry and tillage, which restored many of the restrictions on enclosure and conversion to pasture that had been rashly repealed four years earlier.<sup>3</sup>

<sup>1</sup> *State Papers Domestic*, 1595–7, pp. 316–20, 323, 325, 342–5. There were disturbances in western Norfolk also (*ibid.*, p. 401) and in the west country. The depositions make it clear that they arose from simple hunger.

<sup>2</sup> The deputy lieutenants for Hertfordshire reported in October 1595 on the small yield of the recent harvest, “which succeeding a dear year, wherein all former stores were spent, upheld the high prices. Wheat is better in quality this year, but the quantity is small, whereby barley, which was but thin, carries a higher price, as the poor who were wont to feed upon wheat and rye are driven to it. These things being dear, all other victuals bear higher prices. White meats are high, through the great loss last year of milch beasts, and those which escaped were so poor as to yield little profit, whereby the store of butter and cheese failed.”—*State Papers Domestic*, 1595–7, p. 107.

<sup>3</sup> There were in fact two acts against depopulation and enclosure in this session. For a recent discussion of this legislation, see Maurice Beresford, ‘Habitation versus Improvement’, in *Essays in the Economic and Social History of Tudor and Stuart England*, pp. 40–69.

Mercifully, the year 1598 saw at least an average harvest (and a good one in the west), and that of 1599 was good generally. The new century opened with another average wheat-harvest; and then came six good years in a row (1601-6). 1607 was average to poor; and 1608 was bad. Finally, the decade from 1610 to 1619 was about average as a whole: two deficient harvests (1613, 1617) but nothing disastrous; and two good harvests to end the decade

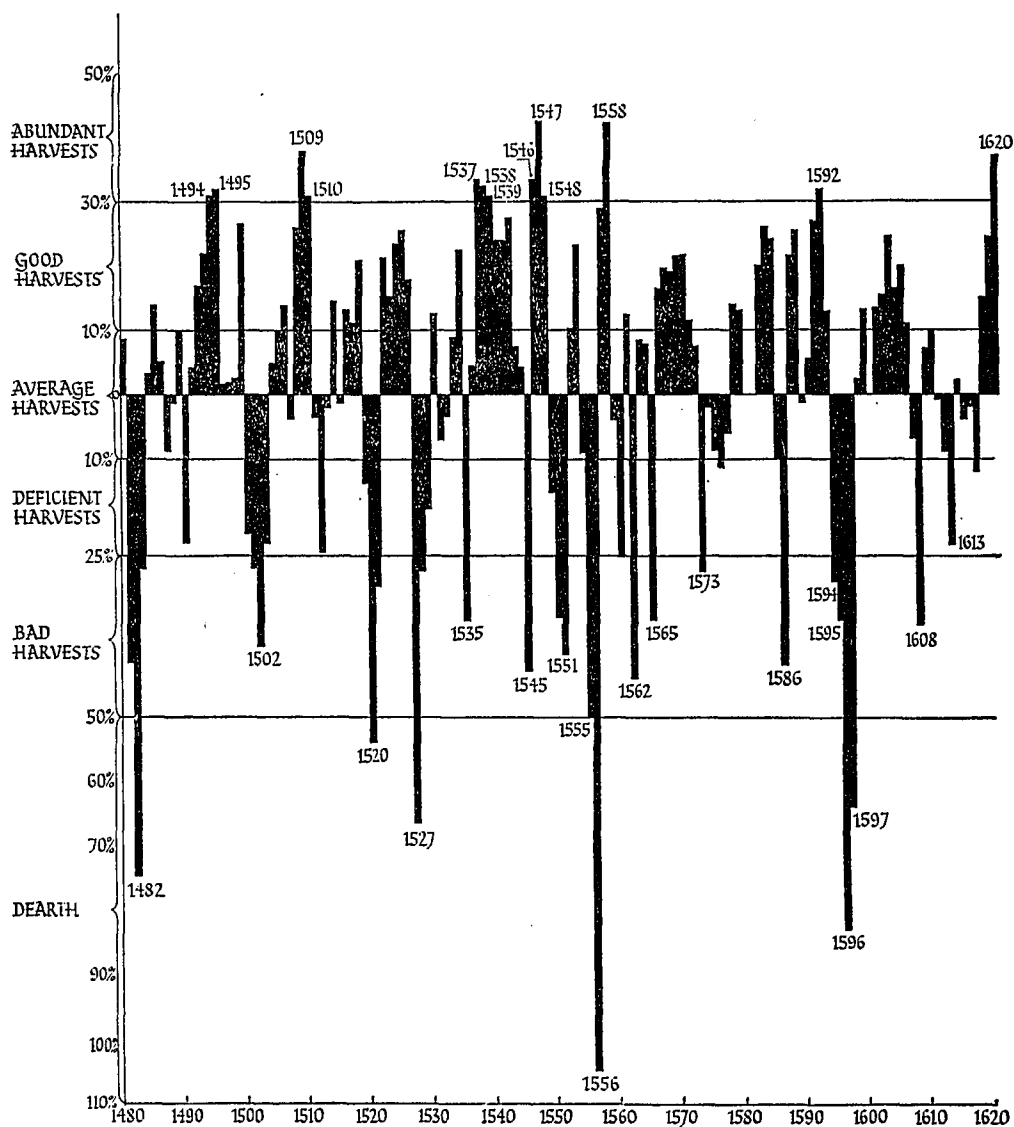


FIG. II

THE QUALITY OF ENGLISH HARVESTS 1480-1620

The percentage figures in the left-hand margin represent the deviation of the annual average price from the thirty-one-year moving average for that year.

(1618, 1619). The next really bad harvest came in 1622 and is reflected, for example, in the petition of the textile workers of Wiltshire to the justices of the county that they should fix wages "now especially in this great dearth of corn."<sup>1</sup>

The yield of the harvest was the most fundamental fact of economic life in England as in all other countries. When we look at the graph of the fluctuations in the average price of wheat from year to year (see Fig. I) we are looking at an electro-cardiogram of a living organism. These are the heart-beats of the whole economy of England through five generations. The health and well-being of the entire country depended upon the quality of this heart-beat more than upon any other organ and activity. This is not to say that the heart is the only organ of any real significance in the body politic; but its rhythm governed all else. If the corn harvest represented the heart, the textile industry represented perhaps the liver: a major organ whose derangements could cause much unease and misery. But the derangements of the heart could bring the body politic near to total breakdown; and its healthy beat could stimulate the entire economy.

It may be said that we attach too much importance to a single crop which was not of universal consumption. But the movements of wheat-prices reflected fairly closely the movements of other food-prices. The Hertfordshire authorities already quoted showed a full awareness of the interaction of a scarcity of corn upon all other foodstuffs; and the graph of the prices of wheat, beans and peas, and oats at Lincoln (Fig. III) shows these commodities moving in close sympathy with each other.<sup>2</sup>

Much basic research remains to be done before one can speak confidently of English food supplies in general throughout this period, above all in the difficult field of meat supplies of all kinds. According to foreign observers, the English were big meat-eaters, but these impressionistic observations are of little value. It all depended on what class of people the foreign visitor most frequented, and on the circumstances of the particular year. Data about meat-prices, certainly anything resembling a price-series, are particularly difficult to obtain, before the late sixteenth century.

One cannot necessarily assume that a wet year which adversely affected the grain harvest would be good for the grasslands of the western half of the country, and so for meat supplies in general, as a kind of rough compensation for a dearth of breadstuffs. Excessive rain, which seems to have been the

<sup>1</sup> *English Economic History: Select Documents*, ed. by Bland, Brown, and Tawney, pp. 356-7.

<sup>2</sup> The Lincoln figures (not a perfect series) for the period 1513-1712 are given in J. W. F. Hill, *Tudor and Stuart Lincoln*, appendix III, pp. 222-6. They form a reasonably continuous series only from 1543 and my graph has been drawn accordingly.

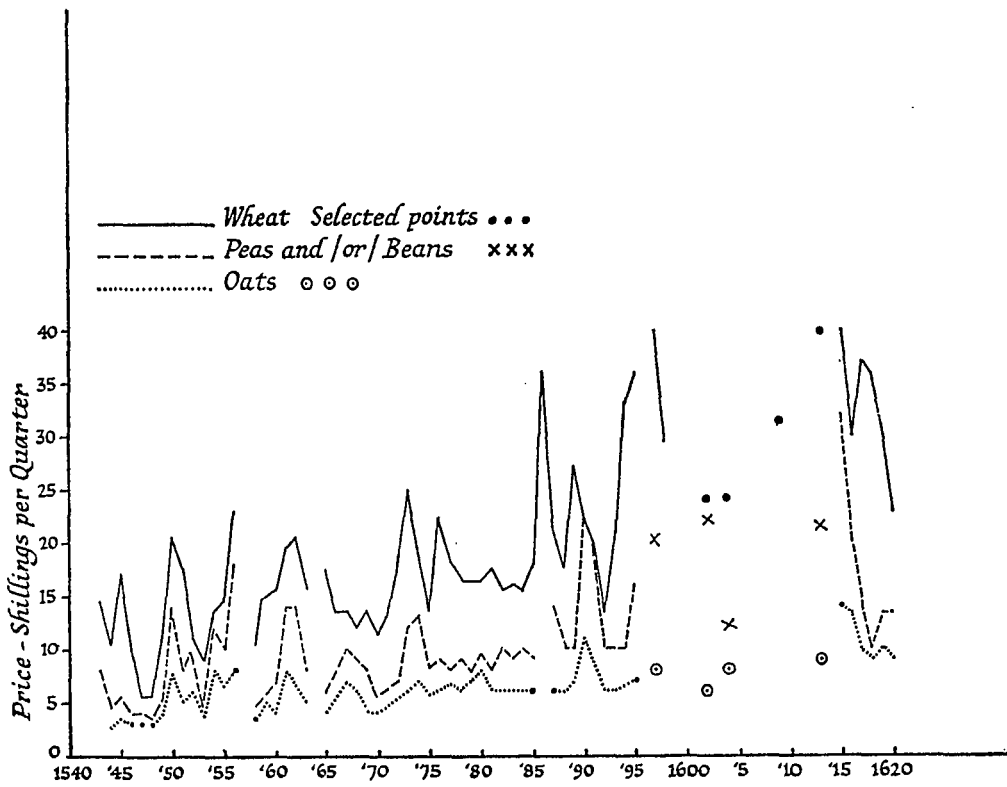


FIG. III  
LINCOLN PRICES 1543-1620

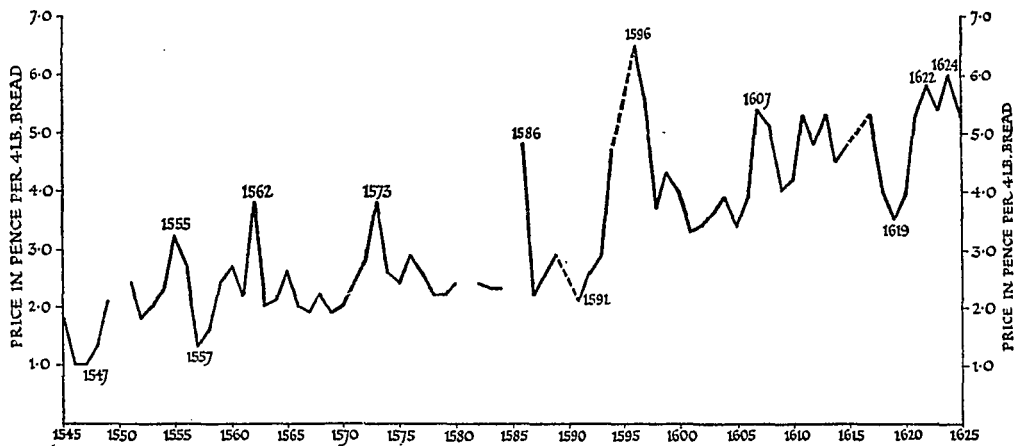


FIG. IV  
LONDON BREAD PRICES 1545-1625  
(after Beveridge)

commonest cause of harvest failures during the period under review, could also lead to widespread diseases among farm animals. Thus the rain-spoiled harvest of 1594 seems to have been accompanied by great losses of milch-kine from some cause, and hence a scarcity of butter and cheese. The below-average harvest of 1543 (again probably due to excessive rain) was accompanied or followed by "a great death among cattle," so that meat prices rose excessively by the spring of 1544.<sup>1</sup> One's general impression is that compensations of breadstuffs and meat supplies were not the rule. General shortages of foodstuffs seem to have been more common, not always because supplies failed simultaneously but because a failure of one supply increased the pressure of demand upon all other foodstuffs. And for most of the population such a 'dearth'—to use the contemporary term for dearthness—was the same thing as a shortage or a failure of supply.

Finally, I have not taken into account the current and unfinished argument about the amplitude of fluctuations in average grain prices in this period, and the significance of variations in amplitude, if any.<sup>2</sup> What has been established in this essay is the detailed pattern of harvests, year by year from the late fifteenth century to the early seventeenth, as the inescapable basis for further argument about demographic questions, economic growth (e.g. savings and investment), and legislative and administrative activity in the social field.

## APPENDIX I

### NOTE ON SOURCES AND METHOD OF CLASSIFICATION OF HARVESTS

The basic material for this essay came from the Beveridge price-data now in the custody of the London School of Economics, supplemented by enquiries among many borough records up and down the country. I am indebted to the Librarian of the School of Economics for access

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<sup>1</sup> T. H. Baker, *Records of Seasons, Prices, and Phenomena*, p. 119, apparently quoting Holinshed. A proclamation of 7 January 1544 prohibited all exports of corn and victuals "for a season" notwithstanding any licence already granted. Another proclamation of 21 May 1544 fixed the prices of all kinds of meat, game, wildfowl, eggs, and butter. Yet another proclamation of 6 November 1544 prohibited the export of any cheese or butter without special licence.

<sup>2</sup> See J. D. Gould, 'Y. S. Brenner on Prices: a Comment', in *Economic History Review*, Second Series, xvii, pp. 351-61. Gould's article appeared too late for consideration here, but it may be noted that he rightly gives a high place in Elizabethan economic and social policy to the fear of civil disorder arising *inter alia* from "violent changes in real incomes induced by rising and fluctuating prices for the staple foodstuffs." True: but sheer hunger was an even sharper cause of actual or potential civil disorder.

Brenner's two articles on price-inflation in sixteenth-century England appeared in *Economic History Review*, Second Series, xiv and xv.

to the Beveridge papers. Most of the material used here comes from Box J. 35. This gave me the general average wheat-prices for each year, based upon all the known local price-series, and also the 31-year moving average figures. The Beveridge MSS also yielded the London wheat prices for the period 1500 to 1614; and Dr P. J. Bowden kindly sent me his transcript of London wheat prices (London Assize) for the period 1511-1620.

The magnificent series of Exeter wheat prices (1316 to 1820, with few gaps) was used by Lord Beveridge in 'A Statistical Crime of the Seventeenth Century' in the *Journal of Economic and Business History*, 1, 1929, pp. 503-33. My Exeter figures (see Appendix II) are derived from that article.

The Lincoln figures for wheat, oats, beans, and peas are printed in J. W. F. (now Sir Francis) Hill, *Tudor and Stuart Lincoln*, Appendix III, pp. 222-6. Norwich figures are contained in a MS. volume among the city records (Assize of Bread, 1552-1627), but in general series of wheat prices are disappointingly rare among local records. Thus Bristol has a complete series of the Assize of Bread only from 1677 to 1825. London bread prices exist, however, from 1545, and have recently been printed in B. R. Mitchell, *Abstract of British Historical Statistics*, p. 497.

The method of classifying the quality of each harvest was as follows. I adopted Beveridge's 31-year moving average, on the assumption that this was based upon the average length of a human generation (30 years) adjusted slightly so as to give a middle term in the series. I assumed that such a long-term average eliminated two important influences on harvest-prices, namely the effect of monetary changes and that of a rising population. Testing the alternative results to be obtained by using a 10-year moving average, I found it too distorted by short-term price-movements and therefore quite unsatisfactory as a base. I satisfied myself that a long term such as 31 years was necessary in order to eliminate monetary and population factors completely. The moving-average value for any particular year I regarded as the *norm* for that year, the price at which wheat would have sold after a harvest of average quantity and after eliminating non-harvest factors in this way.

Where the average price for any given year was 30 per cent or more below the norm for that year, I classified the harvest as 'abundant'. Where it was between 10 and 30 per cent below the norm I termed it 'good'. Where the average price for the harvest-year was within  $\pm 10$  per cent of the norm, the harvest was classed as 'average'. Average prices between 10 and 25 per cent above the norm were taken to indicate a 'deficient' harvest; between 25 and 50 per cent above the norm were called 'bad'; and an average of 50 per cent and more above the norm was termed a 'dearth'.

Obviously, any classification like this is open to detailed theoretical objections. A 25-year moving average would doubtless have been as satisfactory as one of 31 years; and a harvest of which the average price was 20 per cent above the norm might equally well have been called 'bad' as 'deficient'. What I am quite clear about, however, is that the classification of harvests produced by using these statistical categories agrees at every point with all the literary references in this period to dearths, to bad, good, and abundant harvests. More than that one cannot reasonably ask of any statistical method.

I have to thank Mr Bernard Foster of Exeter cordially for his considerable help with the statistical calculations and the graphs.

## APPENDIX II

TABLE OF ANNUAL HARVESTS FROM 1480 TO 1619 CLASSIFIED BY QUALITY  
(Prices are given in shillings per quarter)

| Year | 1<br><i>General<br/>average<br/>for year</i> | 2<br><i>Exeter<br/>average<br/>for year</i> | 3<br><i>31-year<br/>moving<br/>average<br/>(norm)</i> | 4<br><i>Deviation<br/>of general<br/>average<br/>from norm<br/>(percentage)</i> | 5<br><i>General<br/>quality<br/>of harvest</i> | 6<br><i>Comments</i>                                |
|------|----------------------------------------------|---------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------|
| 1480 | 5.36                                         | 5.46                                        | 5.87                                                  | — 8.6                                                                           | Average                                        |                                                     |
| 1481 | 7.78                                         | 6.15                                        | 5.91                                                  | + 31.6                                                                          | Bad                                            | Average in West                                     |
| 1482 | 10.36                                        | 8.55                                        | 5.93                                                  | + 74.7                                                                          | Dearth                                         | Less bad in West                                    |
| 1483 | 7.54                                         | 9.00                                        | 5.93                                                  | + 27.2                                                                          | Bad                                            | Dearth in West                                      |
| 1484 | 5.67                                         | 7.28                                        | 5.87                                                  | — 3.4                                                                           | Average                                        | Deficient in West                                   |
| 1485 | 5.07                                         | 5.84                                        | 5.90                                                  | — 14.1                                                                          | Good                                           | Average in West                                     |
| 1486 | 5.61                                         | 6.22                                        | 5.92                                                  | — 5.2                                                                           | Average                                        |                                                     |
| 1487 | 6.51                                         | 7.76                                        | 5.99                                                  | + 8.7                                                                           | Average                                        | Bad in West                                         |
| 1488 | 6.16                                         | 6.40                                        | 6.09                                                  | + 1.2                                                                           | Average                                        |                                                     |
| 1489 | 5.53                                         | 6.31                                        | 6.13                                                  | — 9.8                                                                           | Average                                        |                                                     |
| 1490 | 7.58                                         | 8.83                                        | 6.17                                                  | + 22.8                                                                          | Deficient                                      | Bad in West                                         |
| 1491 | 5.91                                         | 5.44                                        | 6.18                                                  | — 4.4                                                                           | Average                                        | Better in West                                      |
| 1492 | 5.17                                         | 4.34                                        | 6.23                                                  | — 17.0                                                                          | Good                                           | Better in West                                      |
| 1493 | 4.79                                         | 4.97                                        | 6.16                                                  | — 22.2                                                                          | Good                                           |                                                     |
| 1494 | 4.20                                         | 5.42                                        | 6.06                                                  | — 30.7                                                                          | Abundant                                       | Good but not abundant in West                       |
| 1495 | 4.10                                         | 4.86                                        | 6.04                                                  | — 32.1                                                                          | Abundant                                       | Good but not abundant in West                       |
| 1496 | 6.03                                         | 6.07                                        | 6.09                                                  | — 1.0                                                                           | Average                                        |                                                     |
| 1497 | 5.99                                         | 7.51                                        | 6.11                                                  | — 2.0                                                                           | Average                                        | Deficient in West                                   |
| 1498 | 5.85                                         | 6.10                                        | 6.00                                                  | — 2.5                                                                           | Average                                        |                                                     |
| 1499 | 4.37                                         | 6.10                                        | 5.96                                                  | — 26.7                                                                          | Good                                           | Average in West                                     |
| 1500 | 7.30                                         | 9.38                                        | 6.01                                                  | + 21.5                                                                          | Deficient                                      | Dearth in West                                      |
| 1501 | 7.67                                         | 7.39                                        | 6.05                                                  | + 26.8                                                                          | Bad                                            |                                                     |
| 1502 | 8.46                                         | —                                           | 6.08                                                  | + 39.1                                                                          | Bad                                            |                                                     |
| 1503 | 7.46                                         | 7.98                                        | 6.05                                                  | + 23.3                                                                          | Deficient                                      | Worse in West                                       |
| 1504 | 5.81                                         | 7.98                                        | 6.12                                                  | — 5.1                                                                           | Average                                        | Bad in West                                         |
| 1505 | 5.67                                         | 5.87                                        | 6.31                                                  | — 10.1                                                                          | Average                                        |                                                     |
| 1506 | 5.50                                         | —                                           | 6.38                                                  | — 13.8                                                                          | Good                                           |                                                     |
| 1507 | 6.56                                         | 7.14                                        | 6.39                                                  | + 2.7                                                                           | Average                                        | Below average in West                               |
| 1508 | 4.76                                         | —                                           | 6.43                                                  | — 26.0                                                                          | Good                                           |                                                     |
| 1509 | 4.01                                         | 5.02                                        | 6.46                                                  | — 37.9                                                                          | Abundant                                       | Good but not abundant in West                       |
| 1510 | 4.50                                         | —                                           | 6.51                                                  | — 30.9                                                                          | Abundant                                       |                                                     |
| 1511 | 6.74                                         | 6.70                                        | 6.59                                                  | + 2.3                                                                           | Average                                        |                                                     |
| 1512 | 8.49                                         | 6.83                                        | 6.83                                                  | + 24.6                                                                          | Deficient                                      | Average in West                                     |
| 1513 | 7.10                                         | 6.68                                        | 6.97                                                  | + 1.9                                                                           | Average                                        |                                                     |
| 1514 | 6.05                                         | 5.57                                        | 7.09                                                  | — 14.7                                                                          | Good                                           | Better in West                                      |
| 1515 | 7.30                                         | 9.14                                        | 7.19                                                  | + 1.4                                                                           | Average                                        | Bad in West                                         |
| 1516 | 6.30                                         | 6.06                                        | 7.25                                                  | — 13.1                                                                          | Good                                           | Better in West                                      |
| 1517 | 6.52                                         | 5.51                                        | 7.29                                                  | — 10.6                                                                          | Good                                           | Better in West                                      |
| 1518 | 5.74                                         | 5.68                                        | 7.27                                                  | — 21.0                                                                          | Good                                           |                                                     |
| 1519 | 8.25                                         | 8.54                                        | 7.26                                                  | + 13.6                                                                          | Deficient                                      |                                                     |
| 1520 | 11.51                                        | 12.94                                       | 7.48                                                  | + 53.9                                                                          | Dearth                                         | Worse in West: highest average at Exeter since 1316 |
| 1521 | 9.83                                         | 10.14                                       | 7.59                                                  | + 29.5                                                                          | Bad                                            | Worse in West (dearth)                              |
| 1522 | 5.98                                         | 6.40                                        | 7.62                                                  | — 21.5                                                                          | Good                                           |                                                     |

## HARVEST FLUCTUATIONS

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| Year | 1<br><i>General<br/>average<br/>for year</i> | 2<br><i>Exeter<br/>average<br/>for year</i> | 3<br><i>31-year<br/>moving<br/>average<br/>(norm)</i> | 4<br><i>Deviation<br/>of general<br/>average<br/>from norm<br/>(percentage)</i> | 5<br><i>General<br/>quality<br/>of harvest</i> | 6<br><i>Comments</i>                                                    |
|------|----------------------------------------------|---------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------|
| 1523 | 6.44                                         | 6.94                                        | 7.63                                                  | - 15.6                                                                          | Good                                           | Less good in West                                                       |
| 1524 | 5.89                                         | 5.52                                        | 7.70                                                  | - 23.5                                                                          | Good                                           | Better in West                                                          |
| 1525 | 5.73                                         | 6.46                                        | 7.83                                                  | - 25.5                                                                          | Good                                           |                                                                         |
| 1526 | 6.53                                         | 7.04                                        | 7.97                                                  | - 18.1                                                                          | Good                                           |                                                                         |
| 1527 | 13.37                                        | 10.56                                       | 8.03                                                  | + 66.5                                                                          | Dearth                                         | Not such severe dearth in West                                          |
| 1528 | 10.32                                        | 11.21                                       | 8.10                                                  | + 27.4                                                                          | Bad                                            | Worse in West                                                           |
| 1529 | 9.64                                         | —                                           | 8.23                                                  | + 17.7                                                                          | Deficient                                      |                                                                         |
| 1530 | 7.52                                         | —                                           | 8.59                                                  | - 12.5                                                                          | Good                                           | Thorold Rogers says prices were low in East, but high in West and South |
| 1531 | 9.23                                         | —                                           | 8.62                                                  | + 7.1                                                                           | Average                                        |                                                                         |
| 1532 | 8.82                                         | 10.30                                       | 8.62                                                  | + 2.3                                                                           | Average                                        | Deficient in West                                                       |
| 1533 | 7.91                                         | 8.43                                        | 8.70                                                  | - 9.1                                                                           | Average                                        |                                                                         |
| 1534 | 6.97                                         | 6.58                                        | 9.01                                                  | - 22.6                                                                          | Good                                           |                                                                         |
| 1535 | 12.67                                        | 10.87                                       | 9.34                                                  | + 35.7                                                                          | Bad                                            | Deficient in West but not bad                                           |
| 1536 | 9.17                                         | 8.43                                        | 9.61                                                  | - 4.6                                                                           | Average                                        | Much better in West                                                     |
| 1537 | 6.44                                         | 6.64                                        | 9.70                                                  | - 33.6                                                                          | Abundant                                       |                                                                         |
| 1538 | 6.69                                         | 7.56                                        | 9.86                                                  | - 32.2                                                                          | Abundant                                       | Good but not abundant in West                                           |
| 1539 | 7.03                                         | 8.70                                        | 10.17                                                 | - 30.8                                                                          | Abundant                                       | Less abundant in West                                                   |
| 1540 | 8.14                                         | 7.78                                        | 10.70                                                 | - 23.9                                                                          | Good                                           | Better in West                                                          |
| 1541 | 8.78                                         | 8.27                                        | 11.52                                                 | - 23.8                                                                          | Good                                           | Better in West                                                          |
| 1542 | 8.46                                         | 7.66                                        | 11.67                                                 | - 27.5                                                                          | Good                                           | Abundant in West                                                        |
| 1543 | 10.71                                        | 9.65                                        | 11.55                                                 | - 7.3                                                                           | Average                                        | Good in West                                                            |
| 1544 | 11.26                                        | 12.70                                       | 11.76                                                 | - 4.3                                                                           | Average                                        |                                                                         |
| 1545 | 17.31                                        | 19.10                                       | 12.13                                                 | + 42.7                                                                          | Bad                                            | Disastrous in West: highest average ever known                          |
| 1546 | 8.19                                         | 6.46                                        | 12.36                                                 | - 33.7                                                                          | Abundant                                       | Great abundance in West                                                 |
| 1547 | 6.11                                         | 6.67                                        | 12.86                                                 | - 52.5                                                                          | Abundant                                       |                                                                         |
| 1548 | 9.01                                         | 9.33                                        | 13.09                                                 | - 31.2                                                                          | Abundant                                       |                                                                         |
| 1549 | 15.44                                        | 15.06                                       | 13.37                                                 | + 15.5                                                                          | Deficient                                      |                                                                         |
| 1550 | 18.48                                        | 15.79                                       | 13.92                                                 | + 32.6                                                                          | Bad                                            | Deficient in West but not bad                                           |
| 1551 | 19.72                                        | 20.20                                       | 14.01                                                 | + 40.7                                                                          | Bad                                            |                                                                         |
| 1552 | 12.66                                        | 12.66                                       | 14.18                                                 | - 10.7                                                                          | Good                                           |                                                                         |
| 1553 | 11.14                                        | 10.03                                       | 14.44                                                 | - 22.9                                                                          | Good                                           |                                                                         |
| 1554 | 16.01                                        | 14.51                                       | 14.70                                                 | + 8.9                                                                           | Average                                        | Better in West                                                          |
| 1555 | 22.47                                        | 24.77                                       | 14.95                                                 | + 50.3                                                                          | Dearth                                         | Worse in West                                                           |
| 1556 | 31.15                                        | 32.41                                       | 15.23                                                 | + 104.5                                                                         | Dearth                                         | Worse in West                                                           |
| 1557 | 11.06                                        | 11.47                                       | 15.51                                                 | - 28.7                                                                          | Good                                           |                                                                         |
| 1558 | 9.49                                         | —                                           | 16.03                                                 | - 40.8                                                                          | Abundant                                       |                                                                         |
| 1559 | 17.02                                        | 20.64                                       | 16.33                                                 | + 4.2                                                                           | Average                                        | Bad in West                                                             |
| 1560 | 20.93                                        | 22.62                                       | 16.66                                                 | + 25.6                                                                          | Bad                                            |                                                                         |
| 1561 | 14.66                                        | 15.50                                       | 16.81                                                 | - 12.8                                                                          | Good                                           | Less good in West                                                       |
| 1562 | 24.76                                        | 26.96                                       | 17.22                                                 | + 43.8                                                                          | Bad                                            | Dearth in West                                                          |
| 1563 | 16.08                                        | 20.32                                       | 17.57                                                 | - 8.5                                                                           | Average                                        | Deficient in West                                                       |
| 1564 | 16.53                                        | 21.84                                       | 17.85                                                 | - 8.0                                                                           | Average                                        | Deficient in West                                                       |
| 1565 | 24.21                                        | 27.03                                       | 18.04                                                 | + 34.2                                                                          | Bad                                            | Worse in West                                                           |
| 1566 | 15.15                                        | 12.84                                       | 18.14                                                 | - 16.5                                                                          | Good                                           | Much better in West                                                     |
| 1567 | 14.45                                        | 14.06                                       | 18.09                                                 | - 19.6                                                                          | Good                                           |                                                                         |
| 1568 | 14.70                                        | 17.06                                       | 18.24                                                 | - 19.4                                                                          | Good                                           | Average in West                                                         |
| 1569 | 14.58                                        | 18.88                                       | 18.46                                                 | - 21.0                                                                          | Good                                           | Average in West                                                         |

| Year | 1<br><i>General<br/>average<br/>for year</i> | 2<br><i>Exeter<br/>average<br/>for year</i> | 3<br><i>31-year<br/>moving<br/>average<br/>(norm)</i> | 4<br><i>Deviation<br/>of general<br/>average<br/>from norm<br/>(percentage)</i> | 5<br><i>General<br/>quality<br/>of harvest</i> | 6<br><i>Comments</i>                                 |
|------|----------------------------------------------|---------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------------|
| 1570 | 14.76                                        | —                                           | 18.79                                                 | — 21.4                                                                          | Good                                           |                                                      |
| 1571 | 16.92                                        | 17.38                                       | 19.19                                                 | — 11.8                                                                          | Good                                           | Less good in West                                    |
| 1572 | 17.43                                        | 18.21                                       | 18.82                                                 | — 7.4                                                                           | Average                                        |                                                      |
| 1573 | 24.45                                        | 20.47                                       | 19.06                                                 | + 28.3                                                                          | Bad                                            | Average in West                                      |
| 1574 | 19.99                                        | 21.21                                       | 19.56                                                 | + 2.2                                                                           | Average                                        | Below average in West                                |
| 1575 | 21.52                                        | 29.16                                       | 19.78                                                 | + 8.8                                                                           | Average                                        | Very bad in West: good in East                       |
| 1576 | 21.97                                        | —                                           | 19.70                                                 | + 11.5                                                                          | Deficient                                      |                                                      |
| 1577 | 21.04                                        | 22.40                                       | 19.79                                                 | + 6.3                                                                           | Average                                        |                                                      |
| 1578 | 17.02                                        | —                                           | 19.73                                                 | — 13.7                                                                          | Good                                           |                                                      |
| 1579 | 17.66                                        | —                                           | 20.34                                                 | — 13.1                                                                          | Good                                           |                                                      |
| 1580 | 21.01                                        | —                                           | 21.01                                                 | 0                                                                               | Average                                        |                                                      |
| 1581 | 21.83                                        | 24.38                                       | 21.86                                                 | — 0.1                                                                           | Average                                        | Deficient in West                                    |
| 1582 | 18.23                                        | 21.25                                       | 22.86                                                 | — 20.2                                                                          | Good                                           | Average in West                                      |
| 1583 | 17.21                                        | —                                           | 23.30                                                 | — 26.1                                                                          | Good                                           |                                                      |
| 1584 | 17.80                                        | 21.21                                       | 23.64                                                 | — 24.7                                                                          | Good                                           | Average in West                                      |
| 1585 | 26.48                                        | 32.02                                       | 24.14                                                 | + 9.7                                                                           | Average                                        | Bad in West                                          |
| 1586 | 34.79                                        | 40.57                                       | 24.50                                                 | + 42.0                                                                          | Bad                                            | Dearth in West                                       |
| 1587 | 19.43                                        | 22.32                                       | 24.76                                                 | — 21.5                                                                          | Good                                           | Average in West                                      |
| 1588 | 18.61                                        | 19.60                                       | 24.95                                                 | — 25.4                                                                          | Good                                           |                                                      |
| 1589 | 25.22                                        | 26.66                                       | 24.99                                                 | + 0.9                                                                           | Average                                        |                                                      |
| 1590 | 23.75                                        | 20.88                                       | 25.14                                                 | — 5.5                                                                           | Average                                        | Better in West                                       |
| 1591 | 18.41                                        | 17.76                                       | 25.34                                                 | — 27.3                                                                          | Good                                           | Better in West                                       |
| 1592 | 17.52                                        | 22.41                                       | 25.75                                                 | — 32.0                                                                          | Abundant                                       | Less good in West                                    |
| 1593 | 23.00                                        | 28.63                                       | 26.50                                                 | — 13.2                                                                          | Good                                           | Below average in West                                |
| 1594 | 34.87                                        | 38.88                                       | 26.92                                                 | + 29.5                                                                          | Bad                                            | Worse in West                                        |
| 1595 | 37.09                                        | 32.00                                       | 27.73                                                 | + 35.7                                                                          | Bad                                            | Less bad in West                                     |
| 1596 | 50.70                                        | 62.94                                       | 27.72                                                 | + 82.9                                                                          | Dearth                                         | Disastrous in West: highest<br>average ever recorded |
| 1597 | 46.18                                        | 39.92                                       | 28.15                                                 | + 64.0                                                                          | Dearth                                         | Less bad in West                                     |
| 1598 | 28.03                                        | 19.76                                       | 28.84                                                 | — 2.8                                                                           | Average                                        | Abundant in West                                     |
| 1599 | 25.39                                        | 20.55                                       | 29.29                                                 | — 13.3                                                                          | Good                                           | Very good in West                                    |
| 1600 | 29.71                                        | 23.83                                       | 29.82                                                 | — 0.4                                                                           | Average                                        | Good in West                                         |
| 1601 | 25.91                                        | 24.54                                       | 30.05                                                 | — 13.8                                                                          | Good                                           |                                                      |
| 1602 | 25.64                                        | —                                           | 30.15                                                 | — 14.9                                                                          | Good                                           |                                                      |
| 1603 | 23.14                                        | —                                           | 30.51                                                 | — 24.1                                                                          | Good                                           |                                                      |
| 1604 | 25.68                                        | —                                           | 30.77                                                 | — 16.5                                                                          | Good                                           |                                                      |
| 1605 | 24.55                                        | 27.98                                       | 30.67                                                 | — 19.9                                                                          | Good                                           | Average in West                                      |
| 1606 | 27.62                                        | 25.46                                       | 31.06                                                 | — 11.1                                                                          | Good                                           | Better in West                                       |
| 1607 | 34.61                                        | 42.61                                       | 31.94                                                 | + 8.4                                                                           | Average                                        | Bad in West                                          |
| 1608 | 44.03                                        | 45.58                                       | 32.52                                                 | + 35.4                                                                          | Bad                                            |                                                      |
| 1609 | 30.74                                        | 28.59                                       | 33.03                                                 | — 6.9                                                                           | Average                                        | Much better in West                                  |
| 1610 | 29.93                                        | 28.80                                       | 33.15                                                 | — 9.7                                                                           | Average                                        | Better in West                                       |
| 1611 | 33.11                                        | 30.13                                       | 32.96                                                 | + 0.5                                                                           | Average                                        |                                                      |
| 1612 | 35.53                                        | —                                           | 32.18                                                 | + 9.4                                                                           | Average                                        |                                                      |
| 1613 | 39.20                                        | —                                           | 31.70                                                 | + 23.7                                                                          | Deficient                                      |                                                      |
| 1614 | 31.25                                        | 31.46                                       | 32.01                                                 | — 2.4                                                                           | Average                                        |                                                      |
| 1615 | 34.21                                        | 33.08                                       | 32.95                                                 | + 3.8                                                                           | Average                                        |                                                      |
| 1616 | 33.87                                        | —                                           | 33.21                                                 | + 2.0                                                                           | Average                                        |                                                      |
| 1617 | 37.65                                        | —                                           | 33.72                                                 | + 11.7                                                                          | Deficient                                      |                                                      |
| 1618 | 30.68                                        | 37.31                                       | 34.28                                                 | — 15.0                                                                          | Good                                           | Below average in West                                |
| 1619 | 26.30                                        | —                                           | 34.83                                                 | — 24.5                                                                          | Good                                           |                                                      |