

8 Malthus's Model of a Pre-industrial Economy

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When Malthus wrote his first *Essay on the Principle of Population* one of his chief aims was to refute the views expressed by Condorcet and Godwin about the perfectibility of man and of human society. Another was to demonstrate the unfortunate effects of the English Poor Law, not least on those who were intended to benefit most from its operation. About half of the book is taken up with these matters. His general purpose in writing the *First Essay* is well captured by its full title, *An Essay on the Principle of Population as it Affects the Future Improvement of Society*. Since his arguments were powerful and their influence was very widely felt, it is scarcely surprising that he should have been so frequently discussed and judged as a social prophet. Even in this context he has often failed to receive well-informed or charitable treatment. It was recently remarked of him, indeed, that "in the whole development of the social sciences, there has probably never been anyone attacked and defended with so little regard for what he had written as Malthus".¹

The trenchant prose of the *First Essay* and its polemical purpose, however, tended to obscure the analytical strength of the brief sections of the book in which Malthus first set out his understanding of what he termed the Principle of Population. In the later editions of the *Essay* the balance changed. They are heavier reading, containing long passages consisting largely of empirical observations, distinguished neither by wit nor elegance of prose. The emphasis becomes more scholarly, the discussion more historical and the title changes to reflect the new emphasis. The second edition, for example, published in 1803, is entitled, *An Essay on the Principle of Population; or, a View of its Past and*

Present Effects on Human Happiness; with an Inquiry into our Prospects Respecting the Future Removal or Mitigation of the Evils which it Occasions.

It is to Malthus's discussion of population history that I wish to draw attention. The passage of time has shown that his forebodings about the limits of future economic growth (and hence real income for the mass of the population) were not justified. In this, however, he was in excellent company since the most penetrating of his near contemporaries, such as Adam Smith and Ricardo, shared the same view. All rejected the possibility of general exponential economic growth because the supply of cultivable land was limited and increasing its productivity tended to require large and larger inputs of other production factors to secure a unit increase in output.²

The reason for the general failure to appreciate the possibility of what would now be called an industrial revolution (defined to include comparable parallel changes in agriculture) may be simply expressed. There was no warrant in past experience for the belief that such a radical break could occur, and abundant evidence of the extreme difficulty of securing it. As Malthus put it, when arguing against Godwin's facile belief in overcoming all current obstacles to progress by an appropriate improvement in material technology:

"I expect that great discoveries are yet to take place in all the branches of human science, particularly in physics; but the moment we leave past experience as the foundation of our conjectures concerning the future; and still more, if our conjectures absolutely contradict past experience, we are thrown upon a wide field of uncertainty, and any one supposition is then just as good as another."³

As it happened, it was Malthus's fate to frame an analysis of the relationship between population, economy and society during the last generation to which it was applicable. Once the world had changed, the very cogency and clarity of his argument, now that it could be seen to miss the mark, made him an easy prey to those who disliked his conclusions. But the reputation of all social analysts is contingent only. As the world changes, the relevance of their remarks tends to decline *pari passu*.

It is important to judge them, in part at least, on the basis of the evidence available to them when they wrote, for it was on this evidence that they formed their theories and drew their conclusions.⁴ Malthus spent much effort in the years following the publication of the *First Essay* in assembling historical evidence, and modified the argument of the *First Essay* substantially as a result. It is, therefore, especially

apposite in his case to consider how far his model of population behaviour holds true for early modern Europe, and for England in particular.

The essence of Malthus's analytic framework can be grasped by considering Fig. 1. Malthus held that population would tend to grow exponentially in the absence of the checks imposed by the fixed supply of agricultural land, noting that in North America the population of the British colonies and of the youthful United States had consistently doubled every quarter-century since the early years of settlement there.⁵ But at some stage, however favourable the initial circumstances, growth must be arrested as the land becomes fully occupied. Once this stage is reached, any further growth in population necessarily causes the price of food to rise and real incomes to fall.⁶ The diagram in Fig. 1, therefore, shows a positive relationship between population size and food prices and a negative one between food prices and real incomes. At this point the negative feedback system may take one of two routes (or, of course, may follow both either alternately or simultaneously). The outer path (the positive check) shows that falling real incomes may cause mortality to rise, thus restoring once more a balance between population and available resources. Or the same result may be achieved by following the inner path (the preventive check). In this case, the effect of falling real incomes is to discourage marriage (either by causing individuals to marry later or to refrain from marriage entirely), which reduces fertility and so again reverses

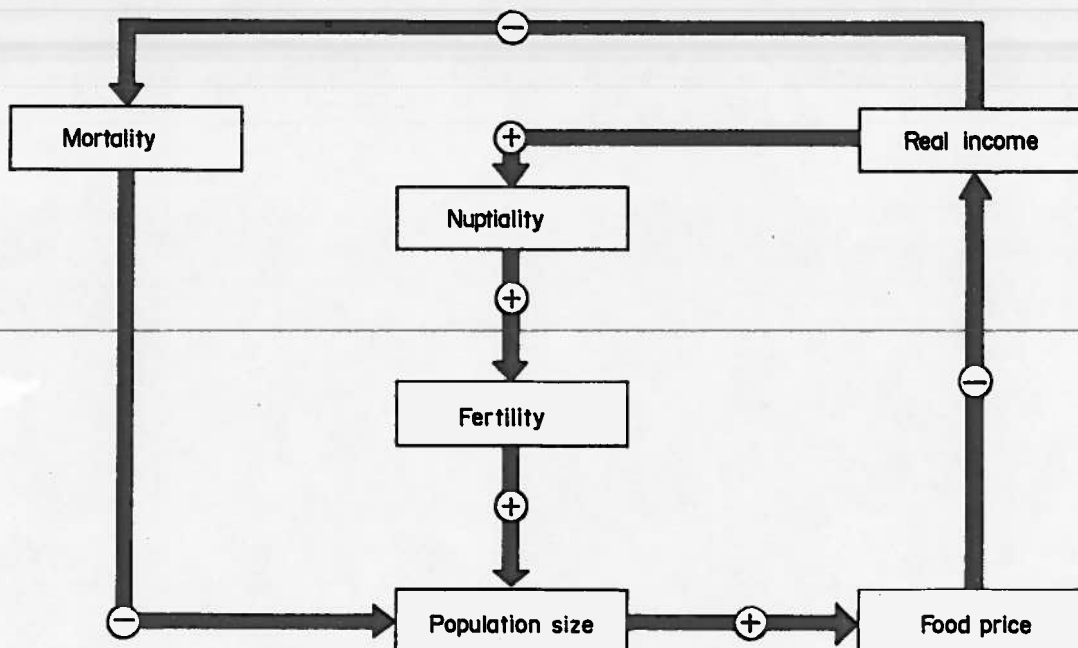


FIG. 1. A diagrammatic representation of Malthus's argument.

the population trend. Equally, of course, an initial fall in population by lowering food prices and thus causing an improvement in real incomes will also be corrected. Population will thus oscillate round some equilibrium level, or, assuming a slow growth in agricultural production (Malthus's arithmetic increase), round a secular trend line.⁷

Malthus set out this model clearly in the *First Essay* and did not thereafter change his view of its logical composition, but he did substantially modify and amplify his discussion of its application to the history of the countries best known to him. In this essay, for brevity's sake, I shall concentrate on his discussion of English history, taking advantage of the fact that it has recently become possible to measure much more fully and accurately trends in fertility and mortality in England from the mid-sixteenth century onwards as a result of work recently completed at the S.S.R.C. Cambridge Group for the History of Population and Social Structure.⁸

The most important change of emphasis made by Malthus between the first and later editions of the *Essay* was a much increased emphasis upon the operation of the preventive as opposed to the positive check in recent English history (or in terms of Fig. 1, on the inner rather than the outer path around the diagram). Between the publication of the first and second editions, the first English census was taken, and, as part of the same operation, Rickman, the organizer of the first four English censuses, secured a vast mass of empirical data about totals of baptisms, burials and marriages during the eighteenth century.⁹ When Malthus wrote the first edition he was ignorant even of the most elementary facts about the English population. He supposed, for example, that the population of Britain was about seven million.¹⁰ Three years later the census showed the true total to be 10.9 million, or 56 per cent larger than he had supposed. Once the Census of 1801 had been published he had available to him the bulk of the data which have been used since then, for the parish register returns collected by Rickman have been the empirical foundation of most subsequent work.

Reflection upon the newly available census and parish register data, combined with a much more extensive acquaintance with comparable information from other countries, convinced Malthus that in the English case the preventive check played the predominant role in restraining population growth. In the first edition he laid stress upon the evidence of malnutrition visible among the labouring classes,¹¹ and displayed great concern about their ability to withstand the temptation of an imprudently early marriage, given the way in which the Poor Laws operated, though he noted that "a spirit of independence still remains

among the peasantry",¹² which helped them to resist such temptation. The nature of the problem he expressed in the following passage:

"Every obstacle in the way of marriage must undoubtedly be considered as a species of unhappiness. But as from the laws of our nature some check to population must exist, it is better that it should be checked from a foresight of the difficulties attending a family, and the fear of dependent poverty, than that it should be encouraged, only to be repressed afterwards by want and sickness."¹³

He was not, however, very optimistic that foresight would prevail.

Later Malthus came to see matters in a different light. The positive check was relegated to a comparatively minor role in his analysis of recent English experience, and more generally that of Europe, compared with other parts of the world. As he put it, "... in modern Europe the positive checks to population growth prevail less, and the preventive checks more than in past times, and in the more uncivilized parts of the world",¹⁴ or again, "... an infrequency of the marriage union from the fear of a family ... may be considered ... as the most powerful of the checks, which in modern Europe, keep down the population to the level of the means of subsistence."¹⁵ In his discussion of mortality Malthus laid increasing stress upon its wayward and unpredictable impact and tended to promote overcrowding above malnutrition as the prime agent in increasing the death rate amongst the poor. A typical passage from the later edition of the *Essay* runs as follows when discussing the effects of famine and death:

How far these "terrible correctives to the redundance of mankind" have been occasioned by the too rapid increase of population, is a point which it would be very difficult to determine with any degree of precision. The causes of most of our diseases appear to us to be so mysterious, and probably are really so various, that it would be rashness to lay too much stress on any single one; but it will not perhaps be too much to say, that *among* these causes we ought certainly to rank crowded houses, and insufficient or unwholesome food, which are the natural consequences of an increase of population faster than the accommodation of a country with respect to habitations and food will allow.¹⁶

Reverting to the representation of the logic of Malthus's argument as set out in Fig. 1, therefore, it may be said that the later Malthus, while continuing to stress the closeness of the links between population growth, changes in food prices, and fluctuations in real income, favoured the inner track rather than the outer, or marriage rather than

mortality, as the factor primarily responsible for keeping population and economic resources in balance so far as early modern England is concerned. How far does modern scholarship substantiate this interpretation?

Fortunately, it is now possible to plot changes in population size, nuptiality, fertility and mortality in England from 1541 onwards, and the work of Phelps Brown and Hopkins has made available indices of changes in the price of a basket of consumables and in real wages over the same period, though there is a greater margin of uncertainty about the accuracy of these measures, especially in the case of real wage trends. The strength of each link in the feedback loops shown in Fig. 1 can, therefore, be tested for early modern English history.

In Fig. 2 the relationship between rates of population growth and changes in the consumables' price index is shown (the index weights of the food components were as follows: farinaceous food, 20, meat and fish 25, butter and cheese $12\frac{1}{2}$, drink $22\frac{1}{2}$; making a total of 80 for food items out of the total of 100 for the consumables index as a whole).¹⁷ The rates of population growth are those prevailing between each date indicated and a date 25 years later, while the rates of growth in the price index are taken from a 25-year moving average of the individual annual figures over identical periods (a 25-year moving average was used to remove the effect of the very sharp annual fluctuation in food prices). In both cases compound annual rates are shown. Thus, the first point in the figure shows that between 1541 and 1566 the compound annual rate of growth in population was 0.48 per cent while that of the price index was 1.85 per cent.¹⁸ Figure 2 leaves little room for doubt that the growth rates of population and food prices were closely related until the end of the eighteenth century, and it is reasonable to suppose that the former largely determined the latter. The relationship between the two series was surprisingly tight. Periods of rapid growth in the later sixteenth and eighteenth centuries were accompanied by accelerating rises in the price index, while during the later seventeenth century, when for a time population declined, the index fell in sympathy. A line epitomizing the relationship between 1550 and 1800 would pass through the origin of the graph and then rise or fall at an angle reflecting the fact that the price index was more volatile than population growth approximately in the ratio 3:2. When Malthus wrote the *Essay* it was entirely rational for him, on the basis of recent history, to detect a strong link between the population growth rate and food price rises and to fear the effect of rapid population growth. He stood approximately at the point marked 1781 in the figure (covering the period 1781-1806), and his retrospect was, therefore, the long

sweep of years in which the relationship between the two variables was uniformly close, and by implication forbidding for any period of rapid population increase.

Figure 2, however, also shows with equal clarity that this fundamental aspect of the functioning of the economic-demographic system was about to change with astonishing rapidity. Secular food price

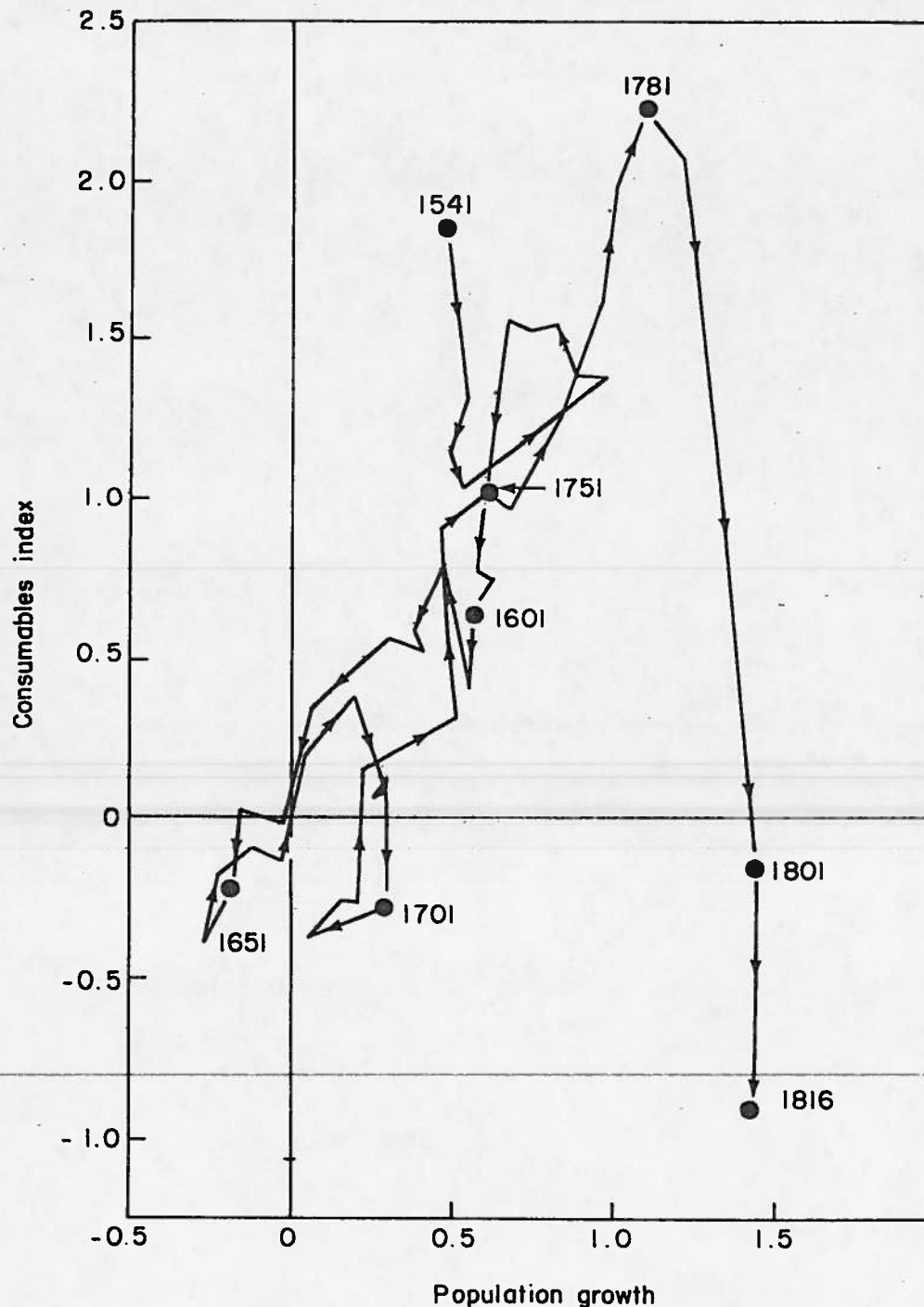


FIG. 2. Compound annual growth rates of population and an index of the price of consumables (per cent per annum). See text for fuller explanation.

trends lost all connection with those of population. Previous experience in this instance was a fallible guide to further behaviour.

The second link in the feedback loop takes us from food prices to real incomes. It need not detain us long, for in any society in which the bulk of all consumer expenditure is devoted to food, any change in its price is almost certain to be mirrored by an opposite change in real incomes. In Fig. 3 the same method as in Fig. 2 is used to set out the

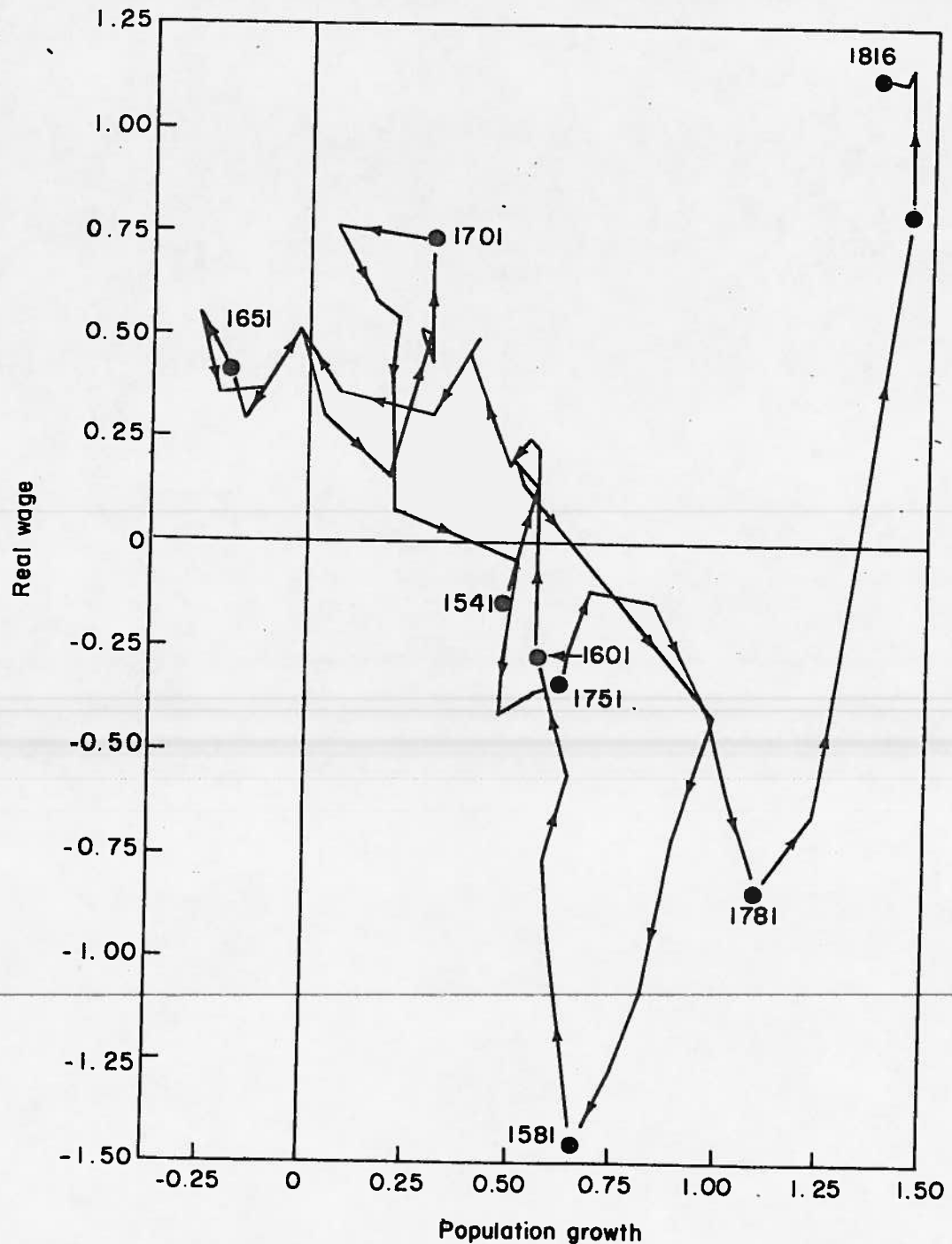


FIG. 3. Compound annual growth rates of population and an index of real wages (per cent per annum). See text for fuller explanation.

relations between population growth and real wage changes. It is so closely similar to Fig. 2 that it calls for little comment in this context. The trend in the cluster of points representing growth trends before 1800 does not, in this case, pass through the origin of the graph. Instead, it implies that there was a secular rise in productivity in early modern England at a rate of between one-quarter and one-half of one per cent annually, since real wages rose at about this rate when population was stationary, or, alternatively, a population growth rate of this order or magnitude could be sustained without provoking a fall in real wages. At higher rates of population growth, on the other hand, real wages fell increasingly sharply. Once again it is clear that very soon after Malthus turned his mind to this question, the pattern which he detected, and which he thought to be permanently imprinted on the socio-economic system, abruptly disappeared. Exceptionally high population growth rates proved consonant with rising real wages after 1800.

At this point the two negative feedback paths in Fig. 1 diverge. Either the falling real incomes must induce a rise in mortality to check population growth, or marriage behaviour must change in a way which reduces fertility sufficiently to secure the same outcome by a different route, or perhaps some combination of the two may occur. As we have seen, Malthus, while never disclaiming the potential significance of the positive check, tended to discount its importance compared with the preventive check in recent English history. He probably had chiefly in

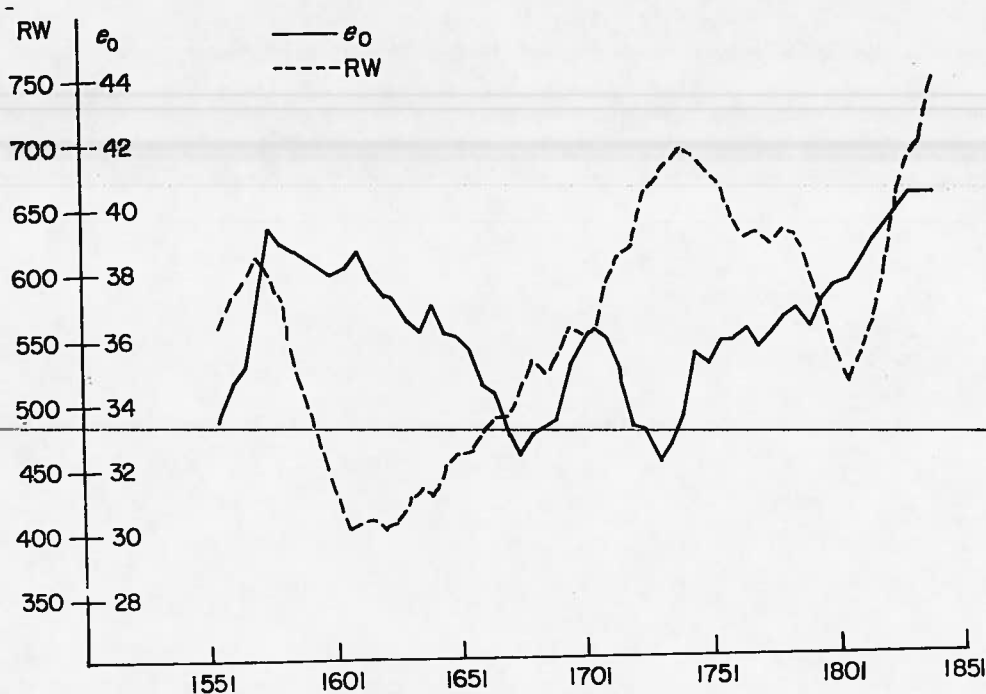


FIG. 4. Secular trends in real wages and expectation of life at birth (25-year moving averages centred on years shown).

mind the eighteenth century, since this was nearest to him in time and was the period covered by the returns made to Rickman in 1801, but, as with prices and wages, it is convenient to survey a longer period in this discussion.

The secular relationship between real wages and mortality in early modern England is shown in Fig. 4.¹⁹ Once again, in order to simplify the consideration of very long-term trends, the data refer to 25-year periods centred on the dates shown. Thus, the impact of even the most severe mortality crises, such as those of 1557-1559 and 1727-1729, is limited. If mortality levels had been strongly affected by the level and trend of real wages, the two lines in the figure would have moved in sympathy. Low real wages and a low expectation of life at birth would have been closely associated with one another, while in periods of improved wages the reduced level of mortality would have caused expectation of life to improve. There is little evidence of this relationship in Fig. 4. During the late sixteenth and early seventeenth centuries there was a similar tendency in the two curves. Expectation of life was falling slightly as real wages plunged to extremely low levels. But apart from this brief period, the lack of evidence for the "expected" relationship is striking. Mortality worsened steadily for half a century

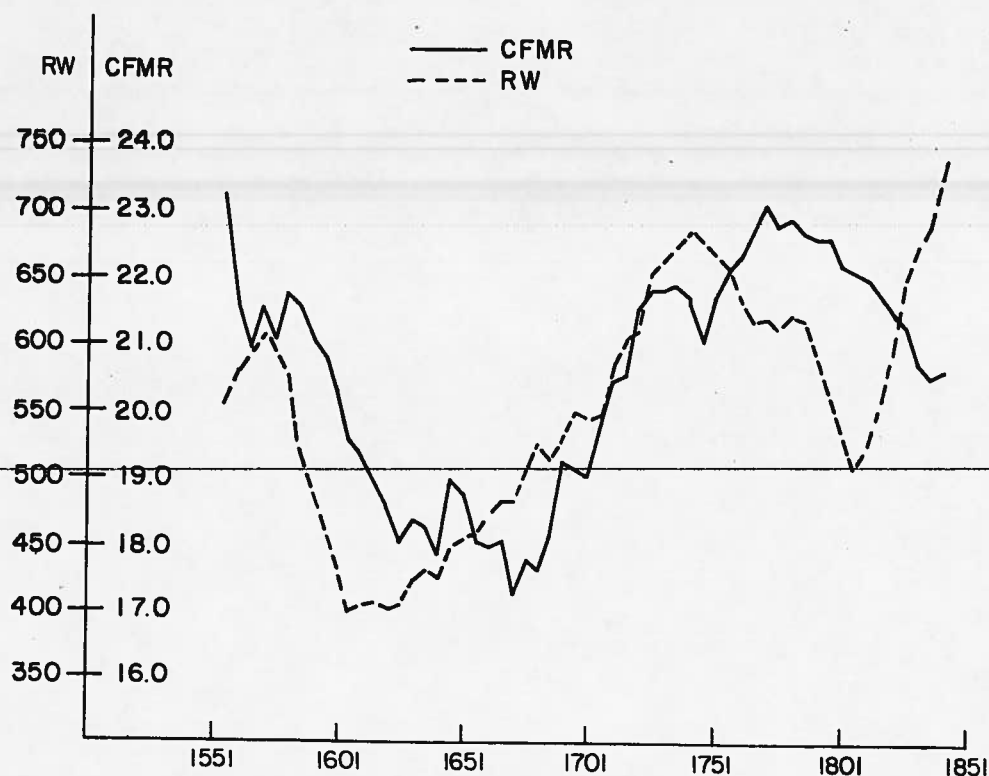


FIG. 5. Secular trends in real wages and the crude first marriage rate (25-year moving average centred on years shown: see text for method of calculating the marriage rate).

after real wages had begun to recover in the seventeenth century, improved sharply but then again worsened between *c.* 1680 and *c.* 1730 while real wages rose without interruption, and in the next three-quarters of a century down to Malthus's day improved steadily, though real wages fell sharply towards the end of the eighteenth century. Clearly mortality in early modern England did not act as an equilibrating mechanism preserving the balance between population and resources.

We may turn finally, therefore, to nuptiality and fertility as the presumptive agents in achieving the balance. Figure 5 repeats once more the real wage graph shown in the last figure, but also shows a measure of nuptiality rather than mortality. The latter takes the form of a 25-year moving average of a modified crude marriage rate, representing the number of first marriages per 1000 persons aged 15-34.²⁰ Fluctuations in the rate reflect the combined impact of changes in marriage age and proportions who never married. While the "fit" of the two graphs is not perfect, it strongly suggests that nuptiality responded to changes in the trend of real wages with a lag of about 30 years.²¹ The extent of the change in nuptiality was very considerable. It can be shown that age at

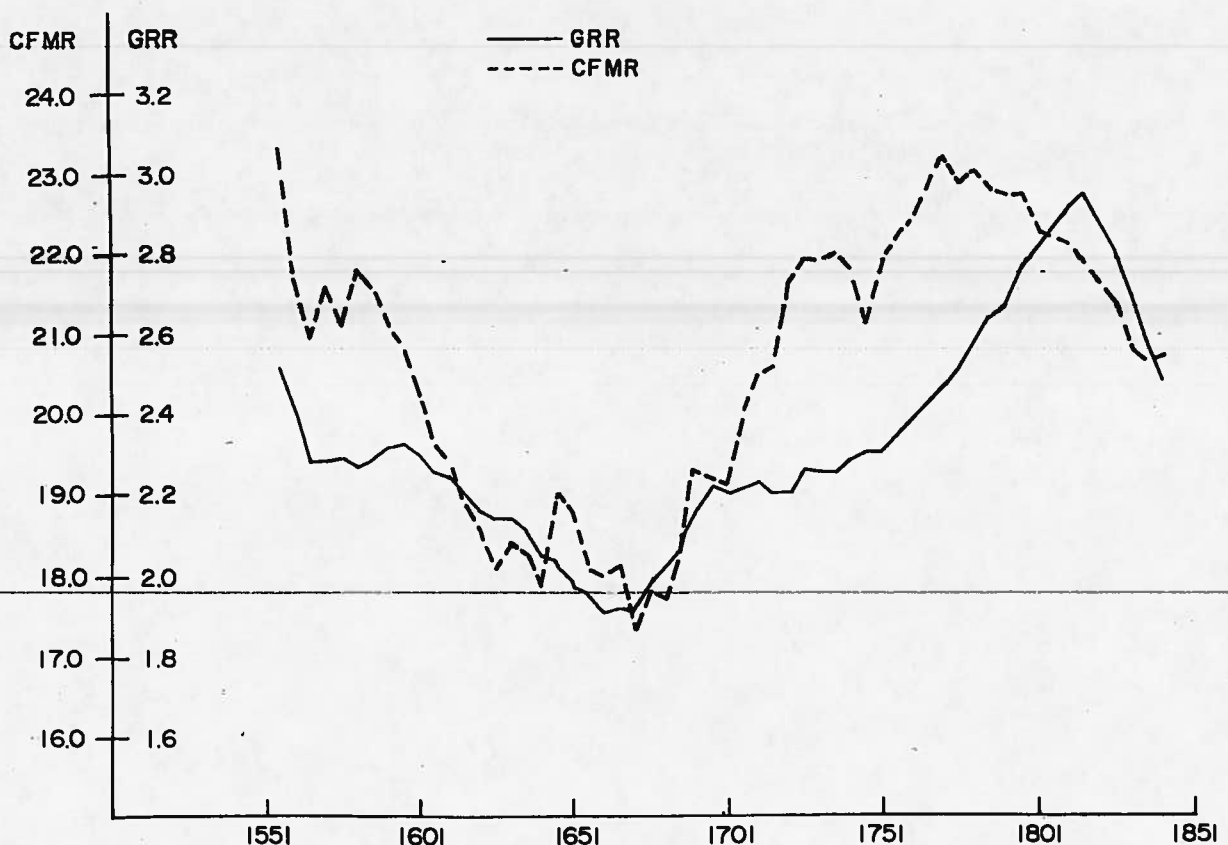


FIG. 6. Secular trends in the crude first marriage rate and the gross reproduction ratio (25-year moving averages centred on years shown).

first marriage for women probably varied by about $3\frac{1}{2}$ years from *c.* 23 to *c.* $26\frac{1}{2}$ years between its minimum and maximum, and that the proportions who never married (both sexes combined) may have ranged from *c.* 5-8 per cent to *c.* 16-20 per cent.²² The timing of the changes in these two nuptiality variables were such as to reinforce one another in their effect on fertility.

Back projection allows the calculation of the gross reproduction ratio. In Fig. 6 its fluctuations are compared with those in the marriage rate already shown in Fig. 5. It appears that the secular changes in trend of the gross reproduction ratio accord closely with those in the marriage rate, though changes in fertility tend to lag slightly behind those in nuptiality. In a fuller discussion there would be much to be said about the detailed behaviour of the two graphs and their relation to each other, but constraints of space prohibit an extended treatment in this short paper. Nor is such a discussion necessary in order to establish the strength of this final link in the chain of negative feedback which restrained population growth in early modern England through the preventive check. It may, however, be noted that analysis of fertility and mortality produced by back projection demonstrates that changes in fertility exercised a substantially greater influence than changes in mortality on population growth rates throughout most of the early modern period. It was not simply the case, therefore, that fertility moved in sympathy with economic trends whereas mortality did not: the fertility changes were also decisive in changing population growth rates. The fluctuations in fertility were in turn almost solely a function of changes in the timing and incidence of marriage since age-specific marital fertility rates varied only trivially. Marriage commanded the demographic stage in early modern England.²³

There is, of course, far more to be said about the operation of the positive and preventive checks in the centuries immediately before the *First Essay* than is contained in the six figures which have been used here as a means of summarizing a mass of data. Nothing has been said, for example, of short-term variations in prices, nuptiality, fertility, and mortality. Nor have changes in relationships over time been discussed; nor regional variation. Only a gross and summary picture has been attempted. But perhaps this is broadly appropriate. Malthus did not attempt a rigorous and comprehensive treatment of his subject. He contented himself in the main with an examination of its chief, strategic features. And in this respect his judgement has been proved remarkably sound, especially as he expressed it in the later editions of the *Essay*. As an historian he emerges largely unscathed from the tests made possible by the subsequent accumulation of greater knowledge

of early modern England, though, in common with his contemporaries, he clearly failed to foresee the effects of the changes which were already in train in his day.²⁴ Unless, therefore, the stature of an historian and social scientist is to be judged by his success in predicting the future, rather than by the accuracy of his analysis of the present and the past, Malthus's standing deserves to be high.

Notes

1. W. Petersen (1969). *Population*, 2nd Edition, p.151. London.
2. The issue was given its classical formulation by Ricardo, but Smith held similar views. The relevance of Smith's views on economic growth generally to this point is discussed in E. A. Wrigley (1972). The process of modernization and the industrial revolution in England. *Journal of Interdisciplinary History* 3, 225-259.
3. T. R. Malthus (1798). *First Essay*, p.232.
4. In this light H. L. Beales's dismissal of Malthus is not only ungenerous but oddly grounded for an historian. "The historian's estimate of the *Essay on Population*", he wrote, "is usually far this side of idolatry. He sees it in relation to contemporary fact and to *post-Malthusian development* (my italics), and to his pragmatic sight it appears largely irrelevant to both". H. L. Beales (1953). The historical content of the *Essay on population*. In *Introduction to Malthus* (Ed. D. V. Glass), pp. 21-22. London.
5. T. R. Malthus, op. cit. in note 3, pp.105-107.
6. *ibid.* pp.29-30.
7. This process is very clearly set out by Malthus in op. cit. in note 3, pp.29-31.
8. The demographic data used in Figures 2 to 6 were drawn from this work (population totals, age structure, gross reproduction ratios, expectations of life, etc.). Their derivation is described in E. A. Wrigley and R. S. Schofield (1981). *The Population History of England 1541-1871: A Reconstruction*. London.
9. Rickman secured returns from each parish of the annual totals of baptisms and burials for every tenth year from 1700 to 1770, and for each year 1780 to 1800; and of marriages for each year from 1780 to 1800. Their characteristics are discussed at length in E. A. Wrigley and R. S. Schofield, op. cit. in note 8, Appendix 7.
10. T. R. Malthus, op. cit. in note 3, p.23.
11. See, for example, his remarks about the sons of labourers: T. R. Malthus, op. cit. in note 3, p.73.
12. T. R. Malthus, op. cit. in note 3, p.84.
13. *ibid.* pp.89-90.
14. T. R. Malthus (1807). *Essay*, 4th Edition, vol. 1, p.579. London.

15. *ibid.* vol. 1. p.580.
16. *ibid.* vol. 1. p.565.
17. E. H. Phelps Brown and Sheila V. Hopkins (1962). Seven centuries of the prices of consumables, compared with builders' wage-rates. In *Essays in Economic History* (Ed. Eleanora M. Carus-Wilson), vol. ii, p.180. London. The data taken from Phelps Brown and Hopkins's work used in Figs. 2 and 3 are discussed and the operations carried out on them are described in E. A. Wrigley and R. S. Schofield, *op. cit.* in note 8, Appendix 9.
18. Malthus died in 1834. The last point in the diagram is for 1816 and, therefore, relates to the quarter-century 1816-1841; it may be regarded as covering the latest period of which Malthus could have had personal knowledge.
19. In Figs 4 and 6 the graphs are taken to 1841 for the reason given in note 18.
20. English parish registers very seldom record the marital status of all brides and grooms consistently and from an early date. The evidence enabling the proportion of first marriages within total marriages to be identified is discussed in E. A. Wrigley and R. S. Schofield, *op. cit.* in note 8, chapter 7.
21. There is a much fuller discussion of the lag and of the imperfections in the data which make its measurement difficult in E. A. Wrigley and R. S. Schofield, *op. cit.* in note 8, Chapter 10.
22. See Table 7.26 and Fig. 7.15 in E. A. Wrigley and R. S. Schofield, *op. cit.* in note 8.
23. The evidence to substantiate the brief epitome of English population history given in this paragraph may be found in E. A. Wrigley and R. S. Schofield, *op. cit.* in note 8, especially Chapters 7 and 10.
24. Malthus's historical judgement was not, however, infallible. For example, his assumption that population invariably reacts to an opportunity for increase by a rapid rise in numbers does not square well with English population history in the century and a half following the Black Death.