The Demography of Victorian England and Wales

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Bricks without straw, bones without flesh

Demographers are more akin to hedgehogs than foxes. They possess a particular unifying principle and relate everything to a single central vision. The foxes, on the other hand, think in a diffuse fashion: they move on many levels collecting objects and experiences without seeking to fit them into any form of all-embracing scheme.[1] Demographers are like hedgehogs in another sense: they tend to rely on one highly effective strategy for survival against which the cunning of foxes will usually fail. The unifying principle is the notion of the demographic system and transition, while the survival strategy involves quantification within an empiricist-positivist methodology.

Although this caricature cannot do justice to the contributions of demographers, it nonetheless highlights certain important characteristics about the way questions are asked and answers attempted. Philosophical introspection is rarely indulged in and thoughts on what might be an appropriate epistemology for demography are not aired. Even among historical demographers, at least some of whom have been drawn from the ranks of history and geography where disciplinary self-doubt has been rife,[2] there is a quiet contentment with very specific lines of enquiry in which the first step invariably involves the measurement and description of a certain set of events: birth, marriage, death, migration. This is usually followed by the search for some form of demographic order, pattern recognition and modelling. Finally, explanation or interpretation is attempted although this may take many forms varying from formal hypothesis testing to 'thick description'. Whatever the finer points of the approach there is always a sense in which it is better to practise, to engage with the materials of demography, than to

[1] Berlin (1953). Of course Berlin was not thinking of demographers as such when he drew this distinction. [2] See, for example, Evans (1997).

enter the methodological and ideological debates.[3] This account of the demography of Victorian England and Wales will be no exception. It follows the lead given by *The Population of India and Pakistan*, *The Population of Japan* and *The Demography of Tropical Africa*[4] in that it will provide a detailed description via demographic measures of changes and especially variations in nuptiality, fertility and mortality. It will also offer some lines of interpretation based, as far as is possible, on the available empirical evidence. There will be a place for speculation and conjecture where, as often happens, the evidence appears unsound or there simply is none. The approach adopted is also multi-disciplinary; no single perspective dominates although in places there are contributions which statisticians, economists, sociologists, geographers and epidemiologists, as well as several branches of history, would certainly recognise as their own. It is true that our understanding of nineteenth-century demography is still in a state of flux. There are many unanswered questions especially relating to the causes of change whether economic and technological, social and cultural; the extent to which Victorians gained more control of their everyday lives must be set against the increasing role of the state, both national and local, and its power to intervene and regulate, to initiate change through public policy. Similar tensions and confusions exist in attempts to set the forces for integration and conformity against those which encouraged diversity and variation – for example, those that exacerbated inequalities among social groups and between places in terms of poverty, health and mortality.

Before returning to a discussion of that unifying principle in demography, the notion of system and transition, two further points must be made. First, it is tempting to view England and Wales in isolation and the reconstruction of its demography as an end in itself. But England and Wales was part of several far larger spheres in terms of the so-called European marriage pattern; the Western system of applied scientific knowledge, engineering and medical science included; and the international flows of capital, goods and people, to give three obvious examples. There are two other senses in which neither the place nor the period will be treated in isolation in this study. The demographic experience of other societies will be used to plug gaps in our knowledge when direct evidence is lacking. This is a device well known among historical demographers who often have resort especially to the Scandinavian model of demographic change, occasionally with unfortunate consequences. Further, there are even today populations in

[3] This tradition is now subject to healthy criticism and challenge, for example, Kertzer and Fricke (1997).

[4] Respectively, Davis (1951), Taeuber (1958) and Brass *et al*. (1968).

Africa and Asia with relatively high fertility and mortality. Studies of their characteristics may prove of value in our attempt to understand Victorian society just as the 'lessons from the past' argument has been used to draw analogies between the historical experience of the West, but mainly western Europe, and the way in which matters are likely to progress among non-European populations. Secondly, Victorian scientists, especially the medical statisticians, knew a great deal about the demography of their society both from the published tabulations and surveys, and from first-hand experience. Sir Edwin Chadwick, William Farr, Sir Arthur Newsholme, Seebohm Rowntree and Charles Booth established the British tradition of empirical social enquiry. Their findings, even their surmises, must not be overlooked otherwise they are likely merely to be discovered again.

One unifying principle with two distinct parts has tended to dominate the thinking of scholars working especially on the demography of past societies: the Malthusian demographic system and the demographic transition model. These will be considered in their turn as frameworks for our present account of the Victorian period. But first we must say a little by way of introduction about the empirical nature of these enquiries.

True facts

English historical demographers have been justly applauded for their ability to make bricks without straw whilst at the same time being criticised for failing to put sufficient flesh on their statistical skeletons.[5] Although it sometimes appears that social historians are energetic in showing us the flesh and blood of real people whilst eschewing the deeper demographic structures and generalities that give the behaviour of their subjects some wider meaning, no one could accuse the nineteenth-century statisticians and actuaries in this regard. For them the search for 'true facts' was of prime importance and without them their work would be meaningless, just theory. Those who campaigned for legislation to establish a regular population census and an accurate system for the registration of births, deaths and marriages had several motives, but the need to keep human accounts for the sake of efficient

[5] J. D. Chambers took 'Bricks without straw: the course of population change in the eighteenth century' as the title of one of his chapters in *Population, Economy, and Society in Pre-industrial England* (Chambers, 1972), while Wrigley *et al.* (1997) have used an alternative analogy to 'bones without flesh' when they talk about 'laying the foundations and erecting the main fabric of a house, but leaving its finishing and furnishing to another day' (p. 5).

administration would surely have been one of their foremost concerns. Another would have been rather more intellectual: to determine the true course of population growth in the eighteenth century.[6] With the establishment of the regular decennial census in 1801 and the introduction of civil registration in 1837 it might be supposed that the controversy that fuelled their campaign would have come to an end, but it has not been until recent decades that we have finally secured reliable estimates of the size of England's population before 1801 and of trends in the major demographic indices prior to 1837. With these materials we are now in a position to place the nineteenth century and especially the Victorian age in context.[7]

Figure 1.1 helps us to see at a glance why the Victorian period was so important as a turning point in England's longer population history.[8] It shows that life expectancy at birth in years (e_0), perhaps the best single number measure of mortality, varied between 30 and 40 in the seventeenth and eighteenth centuries. It was around 40 years early in the nineteenth century and stayed at about that level until the third quarter of the century when the secular decline of mortality began. Life expectancy at birth has doubled in the past 150 years. In figure 1.1 fertility has been measured by the total fertility rate (TFR), that is, the number of children a woman might expect to have had on passing through the reproductive ages 15–49. Until the middle of the eighteenth century,

[6] See Glass (1973).

[7] Wrigley and Schofield (1981), Wrigley *et al.* (1997) and Wrigley (1997, 1998) summarise the Cambridge Group for the History of Population and Social Structure's project to fully analyse Anglican parish registers for the period 1538–1837. The 1989 reprint of Wrigley and Schofield (1981) also contains a chapter entitled 'The debate about *The population history of England*: an introductory note' (pp. viii–xxxiv) which offers a reply to some criticisms, including the standing of the back projection estimates, and a useful list of reviews and reactions. Although these estimates are obviously not above criticism, they not only provide measures far superior in quality and detail to any previously available, but also ones that are unlikely to be bettered. See especially Wrigley *et al.* (1997), pp. 515–44, on 'Reconstitution and inverse projection', but also Levine (1998) and Razzell (1998).

[8] The measures used to construct figures 1.1 and 1.2 have been derived from Wrigley *et al.* (1997), table A9.1, pp. 614–15, up to 1840 and from the Registrar General's *Annual Reports, Decennial Supplements* and *Annual Statistical Reviews* thereafter. The 31 decades 1581–90 to 1981–90 are shown for England and Wales. Although, strictly speaking, the estimates for the decades prior to 1841 are for England, it has been assumed that they can reasonably stand for England and Wales as a whole. The reported gross reproduction rate (GRR) has been inflated by 2.05 to give the total fertility rate (TFR). For the 1840s to the 1930s TFR has been estimated; see Office of Population Censuses and Surveys, *Birth Statistics: Historical Series of Statistics from Registrations of Births in England and Wales, 1837–1983*, Series FM1 No. 13 (London: HMSO, 1987), table 1.4, and also table 4.2 below. The quality of Victorian civil registration is considered in chapter 2, and life expectancy at birth and the childhood mortality rate are reported and further discussed in table 9.3.

TFR varied from about 3.75 to 4.50; thereafter it rose substantially to peak at 5.75 in the early decades of the nineteenth century. A long decline then set in, although this appears to have been temporarily halted during the 1850s and 1860s. From the fourth quarter of the nineteenth century fertility was apparently in free fall, only ending its decline in the 1940s. Clearly the Victorian era was above all one of demographic change in which the secular declines of both mortality and fertility began, and by 1901 new, lower than previously experienced levels had been reached. Figure 1.2 captures this sense that the people of England and Wales were entering a new demographic age during Victoria's reign in an even more striking fashion. It shows the timepath for fertility–mortality again for the 31 decades used in figure 1.1. It also indicates, using Model West, the levels of TFR-e_0 that would be necessary to generate rates of natural population growth of 0 and 2 per cent per year.[9] Before the middle of the nineteenth century, population growth in England and Wales was largely the result of fluctuations in fertility; variation along the vertical axis of figure 1.2 is substantially greater than along the horizontal, but in or by the 1870s fertility and mortality set off together on a new, joint downward course into previously uncharted demographic territory.

The Model West, referred to above, comes from Coale and Demeny's *Regional Model Life Tables and Stable Populations*, first published in 1966.[10] This single work more than any other symbolises efforts to utilise to the full demographic data from the nineteenth century and to draw parallels between that largely European experience of high mortality and conditions in much of Africa, Asia and Latin America today. Coale and Demeny's models have established a framework within which the quality of historical European mortality statistics may be evaluated as well as allowing the estimation of vital rates for populations which, while regularly enumerated, lacked effective registration systems. Of the 326 life tables selected for analysis, 113 related to periods prior to 1918 and of these 86 were European in origin. From the set of 326 empirical life tables, Coale and Demeny identified four distinct age patterns of mortality which they labelled North, South, East and West thereby signifying the regions of Europe from which the constituent tables were principally drawn. For example, the life tables underlying the North model were: Sweden, 1851–90 (4 tables); Norway, 1856–80 and 1946–55

[9] Model life tables, of which West is one, will be used at various points throughout this book. They offer a convenient device for representing the various age profiles of mortality in terms of life expectancy at birth and of illustrating what population age structures will look like given certain levels of mortality and fertility.

[10] Coale and Demeny (1966).

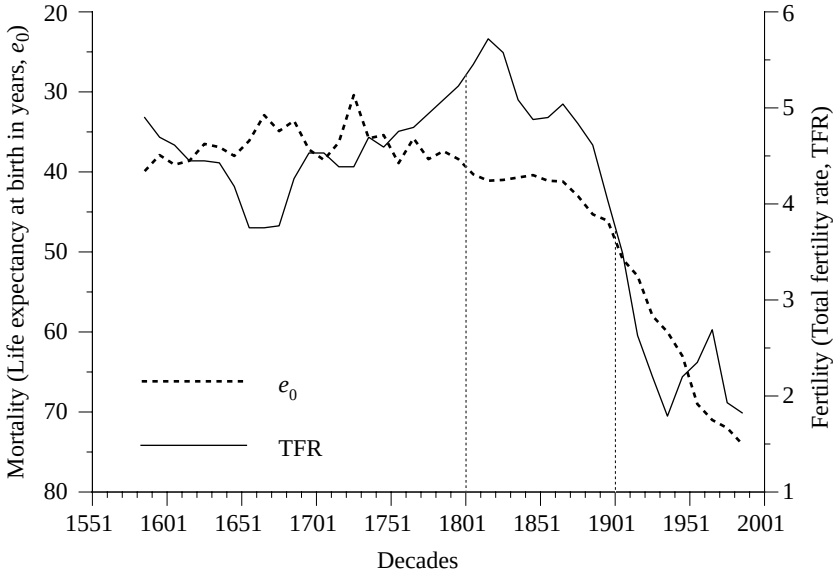

Figure 1.1. Long-run trends in mortality and fertility in England and Wales
Note: The axis showing life expectancy at birth has been reversed to illustrate the decline of mortality.
Source: See text for explanation.

(4); and Iceland, 1941–50 (1). Model West, on the other hand, represented a residual category once the North, South and East patterns had been removed. Here the underlying tables were drawn mainly from England and Wales, France, the Netherlands, Denmark, Canada, the USA, Australia and New Zealand.[11] Model life tables were estimated for each of the four families using life expectancy at birth as the reference for defining levels of mortality, and these in turn became the basis for stable population models with various constant rates of population change.

These regional model life tables have been used extensively by English historical demographers as devices for checking the quality of data, for estimating mortality rates for which empirical data are entirely missing, and as a general reference tool, providing co-ordinates in demographic space. As such, they have proved of exceptional value. However, in recent years there has come to be an uncritical over-

[11] In passing, it is interesting to note that Coale and Demeny (1966), p. 12, excluded from further consideration life tables for periods prior to 1870 for England and Wales, France and the Netherlands because they had 'irregular patterns that appeared to arise from faulty data', although 11 for England and Wales 1871–1959 were used.

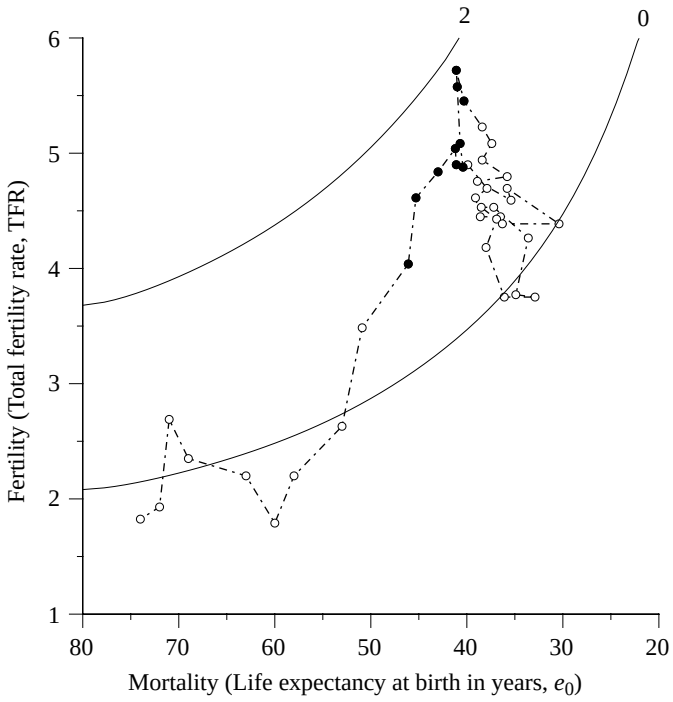

Figure 1.2. Timepath for fertility and mortality change in England and Wales, decades 1580s to 1980s

Note: The axis showing life expectancy at birth has been reversed to illustrate the decline of mortality. The curves labelled 0 and 2 indicate 0 and 2 per cent per year natural growth rates in Model West. The decades of the nineteenth century have been emphasised.

dependence on the reliability and comprehensive nature of these models which their creators could not have envisaged. Where they are perhaps at their most vulnerable is when one section of the age-specific mortality curve, usually adult mortality, is to be inferred from another, infant and child mortality.[12] There has also been the tacit assumption, for example, that because the third English Life Table for 1838–54 matches rather closely level 10 of Model North, England's historical mortality experience can, in broad terms, be represented by the North pattern.[13] However, Coale and Demeny also comment on the 'unusual

[12] See Woods (1993).

[13] Wrigley and Schofield (1981), p. 110 and appendix 14. Naturally, they are sensitive to the problems this is likely to cause for their back projection. See Wrigley *et al.* (1997), pp. 515–44.

incidence of tuberculosis' in North and that 'Model tables incorporating this experience would be suitable only for populations with a high endemicity of tuberculosis.'[14] If this assertion did indeed prove to be valid it would have important implications for epidemiological studies of the early modern period. But more detailed recent work with a larger number of family reconstitution studies has tended to cast doubt on the wisdom of making such broad generalisations linking mortality experience to one family over such a long period. Wrigley *et al.* have confirmed that as far as infancy and early childhood are concerned:

> mortality in the early modern period did not conform either to model West or to model North, though edging closer to model North pattern in the late eighteenth and early nineteenth centuries. Indeed, mortality in infancy and childhood in the English historical past does not appear to have resembled the patterns found in any of the families of tables which were extrapolated from more recent data in the Princeton tables.[15]

Presumably Model West is still appropriate for England and Wales post-1871.

The use of the Princeton model life tables epitomises the problems faced by historical demographers, even those working on the nineteenth century. Bricks may be created without straw, but they are bricks of perhaps uncertain quality which will not necessarily make the soundest foundations for a new residence.

A variation on the same theme can also be illustrated by the Princeton European Fertility Project of which Ansley J. Coale was the guiding spirit. In order to chart the progress of fertility decline among the provinces of nineteenth- and early twentieth-century Europe it was necessary to develop a set of indices that not only captured the general level of fertility, but also made it possible to differentiate the contributions of legitimate and illegitimate fertility as well as the effects of fertility within marriage compared with the influence of nuptiality itself. In normal circumstances this problem would have been solved by using the total period fertility rate and the total marital fertility rate or some modification of the gross and net reproduction rates. But many countries, including Great Britain, whilst possessing a system for civil registration lacked data on the age of mother at the birth of her children. Age-specific total or marital fertility rates could not be calculated, therefore. Coale's solution to this problem involved the development of a set of four indirectly standardised measures: *If*, the index of overall fertility; *Ig*, the index of marital fertility; *Ih*, the index of illegitimate or non-

[14] Coale and Demeny (1966), p. 12. Figure 8.2 illustrates what this means especially for mortality in the age group 15–34. [15] Wrigley *at al.* (1997), p. 263.

marital fertility; and *Im*, the index of proportion married.[16] These measures have several characteristics which make them especially important. First, they require relatively little empirical data: at minimum the numbers of legitimate and illegitimate live births, and the numbers of currently married and single women distinguished by five-year age groups 15–19 to 45–49. The births could be found from civil registration and marital condition from population censuses.[17] This usually meant that local and regional as well as national patterns could be charted. Secondly, the four measures are age-standardised and therefore avoid the problems of distortion associated with the use of the crude birth rate or even the general fertility rate. Thirdly, the indices are related one to another in a way that has certain useful properties for representing changes and variations in the joint effects of marital fertility and nuptiality on overall fertility. Since

$$If = Ig \bullet Im + Ih(1 - Im) \tag{1.1}$$

if *Ih* is zero, or at least very low, then overall fertility can be said to be the product of marital fertility and proportion married ($If = Ig \bullet Im$).[18] Fourthly, and of particular significance, in choosing a standard age-specific marital fertility schedule Coale was careful to select a population with what has come to be known as natural fertility, that is fertility that was not being limited in a parity-specific way. His choice of the especially well-documented Hutterite population and, in particular, the fertility experienced by the 1921–30 first marriage cohort meant that *Ig* not only measured marital fertility, but it also set the level of fertility against that achieved by the Hutterites for whom *Ig* was by definition 1.0.[19] Further analysis of a range of *Ig* values suggested to Coale that if the index was found to be greater than 0.6 it was likely to indicate the presence of natural fertility and thus the absence of deliberate family limitation behaviour.[20]

[16] Coale (1967).

[17] In fact Wilson and Woods (1991) offer a method for deriving these measures based on Wrigley and Schofield's (1981) back projection results for England in the parish register era before 1837.

[18] This property has been used extensively in several figures in chapters 3 and 4. For example, figure 3.6 shows the *Ig-Im* timepath for England and Wales, while figure 4.18 illustrates the changing pattern of variation among districts.

[19] Eaton and Mayer (1954), table 1, p. 84. The Hutterites were, of course, a most unusual population. The total marital fertility rate for those women married in the 1920s was 12 and only 3.4 per cent of all marriages were childless representing an exceptionally low level of natural sterility. Eaton and Mayer also speculate that whilst contraception was not used, coital frequency may have declined rapidly once a woman reached her late thirties (p. 24).

[20] The matter of identifying the presence or absence of certain forms of family limitation behaviour has proved to be far more complicated in practice, see pp. 124–40.

In reality, however, our account of demographic change and variation, even for England and Wales in the second half of the nineteenth century, cannot be made out of true facts as the Victorian actuaries might have wished. Rather, it has to employ estimates and approximations, use subjective judgement, and be selective and at times partial. This point may be illustrated just as effectively when we turn to the unifying principle of demography which has guided our understanding of population history: the concepts of demographic system and demographic transition.

Systems

The concluding chapter of *The Population History of England, 1541–1871* outlines a systems model designed to capture the dynamic relationship between population and environment in early modern England.[21] At its centre the model contains a diagrammatic representation of the ways in which the two checks to population outlined by T. R. Malthus in his *An Essay on the Principle of Population* are capable of exerting regulatory influences on the size of a population. The model is illustrated here in figure 1.3. In the outer circuit we have the positive check which works by raising mortality if and when real incomes are depressed because food prices have increased as a consequence of too rapid population growth. The preventive check occupies the inner circuit. Here the effect of falling real incomes will be to reduce nuptiality which will consequently lead to lower fertility and a reduced rate of population growth. These two routes, the first emphasised by Malthus in his 1798 *Essay* in terms of famine, disease and war, and the second in the 1803 and subsequent editions of the *Essay*, particularly as moral restraint operating via prudential and especially delayed marriage, offer alternative paths. If the preventive check is firmly in place and working effectively then there may be no need for the positive check, misery and vice may be avoided to a large extent, and there may even be positive economic benefits in terms of higher real incomes and higher living standards in general.[22] On to this essentially Malthusian, self-regulating negative feedback system, dominated by what the biologists term 'homeostasis', Wrigley and Schofield have bolted a number of additional sub-systems, endogenous and exogenous factors.[23] The first of these involves what

[21] Wrigley and Schofield (1981), pp. 454–84.
[22] Wrigley (1988) provides a more elaborate statement of some of the economic–demographic arguments.
[23] Wilson and Airey (1999) offer an interesting discussion of the application of homeostatic arguments in demography.

they call the system of ecological niches. Now mortality is not only negatively linked to population size to represent the positive check, but it is also positively linked to nuptiality. In certain forms of largely agrarian society, access to a secure livelihood on the land will require the inheritance of property. If for some reason mortality increases this may free up access to land which will in turn remove the need for marriage to be delayed. By this means a population suddenly affected by an exogenous mortality shock will be able to recover quite rapidly through increased fertility. The second inserts the effect of net migration linking real income with population size in a positive fashion. If real incomes increase, people will be drawn in, but if they decline then emigration will be a possible response with the same effects as the positive and preventive checks. Finally, an additional economic sub-system dominated by positive feedback is associated with real incomes to allow for the effects that rising incomes will have on the demand for consumer products and services, and in turn the demand for labour which will produce wage inflation. This sub-system is also linked via urbanisation to mortality. Assuming the presence of a sharp urban–rural mortality gradient, the demand for manufactured goods and services which will stimulate urban growth and urbanisation is likely to increase average mortality levels as more people crowd into the unhealthy towns. The completed model, with the addition of exogenous influences affecting the demand for labour and mortality, is shown as the top panel of figure 1.3.

The model works rather well until the beginning of the nineteenth century when the positive link between population size and food price ceases to have an influence, with population growth continuing apace without adversely affecting the price of food and thus real income. Representations of the model for England in both the seventeenth and sixteenth centuries give special emphasis to this link and the preventive check circuit in general, whilst relegating to negligible significance the role of the positive check and the negative link between real income and mortality. This new emphasis has led to a radical revision of our understanding of the demography of the early modern period in England.[24] It has diverted attention away from mortality and towards fertility as the prime initiator of long-run population growth and has been especially damaging to the arguments of those who see the stabilisation and eventual disappearance of demographic crises as the initiating factor in mortality decline. It has also encouraged considerable discussion of the possibility that, in England in particular and western Europe in general,

[24] See Wrigley and Schofield (1989), pp. xiii–xxxiv.

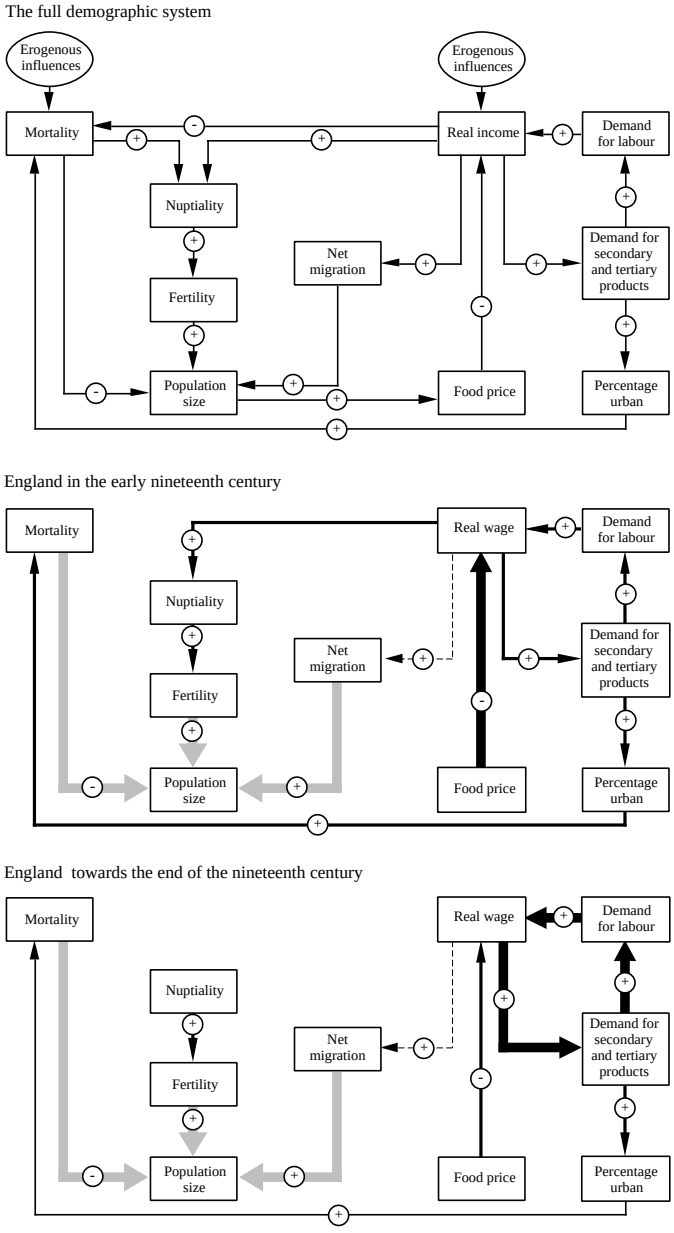

Figure 1.3. Examples of demographic systems models for England and Wales
Source: Redrawn from Wrigley and Schofield (1981), figures 11.5, 11.8 and 11.9.

the lower level of fertility together with its capacity to adjust to economic circumstances via the preventive check gave the region some initial demographically inspired economic advantage – an advantage that encouraged consumer-led economic growth and laid favourable preconditions for industrialisation. England could take advantage of its beneficial low-pressure demographic system, while China, to use an example popular with Malthus, was locked into a high-pressure system at the mercy of the positive check.[25]

The debate about *The Population History of England* has tended to focus on the following issues: the reliability of the demographic estimates and especially back projection; the mechanism of economic–demographic change, but particularly the absence of an endogenous positive check in England, the lagged response of nuptiality to real wages (including the credibility of the real wage series used), and the need to decompose nuptiality into proportion marrying and age at marriage; and, in general, whether 'dilatory homeostasis' is an appropriate device for modelling the early modern experience. On all of these matters a good deal of progress has been made.[26] But there are two further points which, although occasionally mentioned, have failed to attract sustained attention. The first is the matter of regional and local variations, and the second relates to the question of how demographic change in the nineteenth century might be modelled when homeostasis was no longer even dilatory.

> Finally, the functioning of the national aggregate will never be well understood unless analyses or relations that appear to characterise the national entity are paralleled by similar work on a local scale. Only in this way can those aspects of English demographic and economic history in which there was homogeneity of behaviour throughout the country be distinguished from those where the national aggregate reflects an average condition that may prove to have been true of few individual communities, and that may therefore tend to lead to misguided conclusions about the relations between demographic and economic behaviour in the past.[27]

[25] There are frequent references to misery and vice in China in Malthus's first *Essay* (1798) while the second *Essay* (1803) has chapter 12 of book 1 devoted to the subject. See also Wrigley and Schofield (1989), p. xxiv, and Wrigley *et al.* (1997), p. 549. We shall return to a comparison of the demographic regimes of England and China in chapter 10.

[26] Much of this has been summarised by the contributors to Rotberg and Rabb (1986), but see also Wrigley and Schofield (1989), pp. xiii–xxxiv, and Schofield (1989) which brings the role of welfare policy, especially the Poor Law, into the equation particularly in the late eighteenth century. The nuptiality question is considered again in chapter 3 (pp. 107–9).

[27] Wrigley and Schofield (1981), p. 482. Wrigley *et al.* (1997) do not, in general, take this point further; indeed, it would be difficult to do so with family reconstitutions for at maximum 26 parishes and for some periods as few as eight (see chapter 3, 'Representativeness'). As Wrigley and Schofield point out, they come closest to taking up their own challenge in the analysis of crisis mortality among the 404 parishes in appendix 10.

The problem is one of level, trend and variation. It may well be that as far as nuptiality is concerned most parishes trended together, but that the variation between parishes was not insubstantial and that it increased over time. In the case of mortality there was certainly a wide difference between the urban and rural parishes, but also among the latter between those in the marshes and fens, and those located in more salubrious regions. And what of real wages? These would certainly have had strong regional and local components in their trends and, like mortality, their distributions would probably have become more skewed as time progressed, although not necessarily in the same way.

As far as the nineteenth century is concerned, even weak homeostasis appears to offer little potential as the basis for modelling demographic change and variation. Figure 1.3 also shows Wrigley and Schofield's models for the early and late nineteenth century. The three logical demographic links between mortality, fertility, net migration and population size are illustrated in grey while the other significant links are represented by lines of varying thickness. In the model for the early nineteenth century there is still a strong positive link between real wages and nuptiality, but by the end of the century this has all but disappeared. The positive link between percentage urban and mortality has weakened, but not disappeared, although links between the consumer demand and demand for labour sub-systems which drive urbanisation have strengthened.[28] In neither nineteenth-century model are there links between population size and food price, and between real wages and mortality. The former is regarded as having become redundant in or about 1806 while the latter only appears as a weak negative link in the model for the sixteenth century. Similarly, the ecological niche link between mortality and nuptiality is only shown in its weakest form in the models for the sixteenth and late seventeenth centuries. Had the model been taken on a further hundred years from the 1870s to, say, the 1970s virtually all of its non-logical links would have disappeared. Nuptiality would no longer be linked to fertility, except via divorce; the demand for secondary and tertiary products would not be linked to percentage urban or even the demand for labour; and the link from food prices to real wages would have become much weaker.

Clearly, all would agree that a dynamic systems model founded on the principle of homeostasis is not the best way to represent the demo-

[28] Wrigley and Schofield (1981) remark of the late nineteenth century that 'Even the link between urban growth and mortality was of much reduced importance. The gap between urban and rural death rates had begun to close, and in the early decades of the twentieth century disappeared entirely.' (p. 476) As we shall see in chapter 5, matters were in fact not quite so simple.

graphic experience of nineteenth-century England and Wales.[29] How, then, should we proceed? Let us take four steps. First, it must be appreciated that demographic change, and especially the secular decline of mortality and fertility, cannot be understood simply in terms of the relationship between population and resources, population and the economy. Many other factors are involved including the application of scientific knowledge in public policy and the often only boundedly rational behaviour of individuals with respect to their own reproduction. Secondly, population growth and redistribution can be seen to act as a stimulus to economic development, social and cultural change; it need not always be taken as a red light, a warning to rein back. Thirdly, whilst there is much to be learned by modelling the processes that regulate animal numbers, especially as this may be assisted by laboratory experiment and is sufficiently simple to allow considerable mathematical sophistication, there are many dangers in its application to even the least developed human societies.[30] Fourthly, there is the need to recognise the importance of chance, fortuitous coincidences and unforeseen consequences in both their temporal and spatial senses. Jenner and cowpox, the Irish potato famine and the Bradlaugh–Besant trial each had important, although very different, effects on demographic change in the nineteenth century, as also did the reform of Parliamentary democracy and the demands it placed on politicians to concern themselves with public opinion and its management.

Transitions

It might be argued that the 'ideal type' model proposed by Wrigley and Schofield can offer a new and superior way of envisioning the first

[29] Wilson and Airey (1999) ask the key question without answering it in respect to demographic transition theory.

[30] The story of the development of the models proposed by Wrigley and Schofield is of interest in its own right. The influences of Malthus, Darwin, Wynne-Edwards and Lee are clear and often mentioned, but the way in which their ideas were combined, applied and especially represented in diagrammatic form is of fundamental importance. The following appear to mark significant points in the course of the story: Wrigley (1967, 1969), Schofield (1976, 1986) and Lee (1986, 1987). Bideau (1980) offers a sceptical review of the early work by historical demographers. In anthropology, Wynne-Edwards's thesis was not taken up thanks, undoubtedly, to a critique delivered in 1966 by Mary Douglas (1966). The central idea of V. C. Wynne-Edwards's *Animal Dispersion in Relation to Social Behaviour* (1962) is that in certain cases special forms of animal behaviour have evolved that give information on population density, thereby helping to make territoriality a more effective demographic regulator, and that, in general, group self-regulation of population size developed through the course of evolution. These views were always controversial among zoologists and were ultimately also rejected by their originator.

pre-industrial stage in the classic demographic transition model, that second part of demography's central unifying principle. But this could prove damaging to the model as a whole because it would raise nuptiality to the key position and would undermine the role of mortality decline as the initiator of rapid population growth. It would also require the model and its accompanying theory to be made more flexible so that a number of different routes to low mortality and fertility could be accommodated. These substantial revisions could easily be justified, however. Before attempting such a major revision, it is necessary to consider the origins of the demographic transition model and theory in rather more detail.

Figure 1.4 illustrates three early versions of the demographic transition diagram for England and Wales. The top panel shows C. P. Blacker and D. V. Glass's representation of John Brownlee's figures for the crude birth and death rates.[31] It is probably the first attempt to give diagrammatic expression to the now familiar time-series. The middle panel shows the same graph, but now it is in a form so much simplified that it can for the first time be called a model.[32] Although the Political and Economic Planning Report was published anonymously, it seems likely that the identification of the four stages in the model owed much to C. P. Blacker's influence.[33] Finally, the bottom panel of figure 1.4 reproduces a version of the model from a medical textbook of the 1960s.[34] This appears to have been the only occasion on which Thomas McKeown ventured to render the long-run population history of England and Wales in diagrammatic form.

It is now generally accepted that Brownlee's estimates of the crude birth and death rates for decades before the 1800s are seriously flawed.[35]

[31] Blacker and Glass (1936), figure 1, p. 7, cite as the source of their data Brownlee (1916), table XI, p. 232. Blacker and Glass note in their figure caption that 'The figures after 1876 are accurate.'

[32] Political and Economic Planning (1955), figure III, p. 108. The Blacker and Glass diagram is also reproduced as figure II, but no reference is made to Brownlee's original estimates.

[33] Blacker (1947).

[34] McKeown and Lowe (1966), figure 2, p. 6. Again, no mention is made of Brownlee, although McKeown and Brown (1955) do refer to his estimates with approval (pp. 134–35).

[35] See Wrigley and Schofield (1981), especially pp. 144–52 and 577–86. Brownlee based his estimates on data drawn from the Parish Register Abstracts compiled and published by John Rickman in the early nineteenth century. All their users, including William Farr, have appreciated their shortcomings, but until the new collection of parish register material (co-ordinated by members of the Cambridge Group) and the development of back projection these could not be overcome. The following table gives a very simple summary of the differences between Brownlee's estimates and those by Wrigley *et al.* (1997), table A9.1.

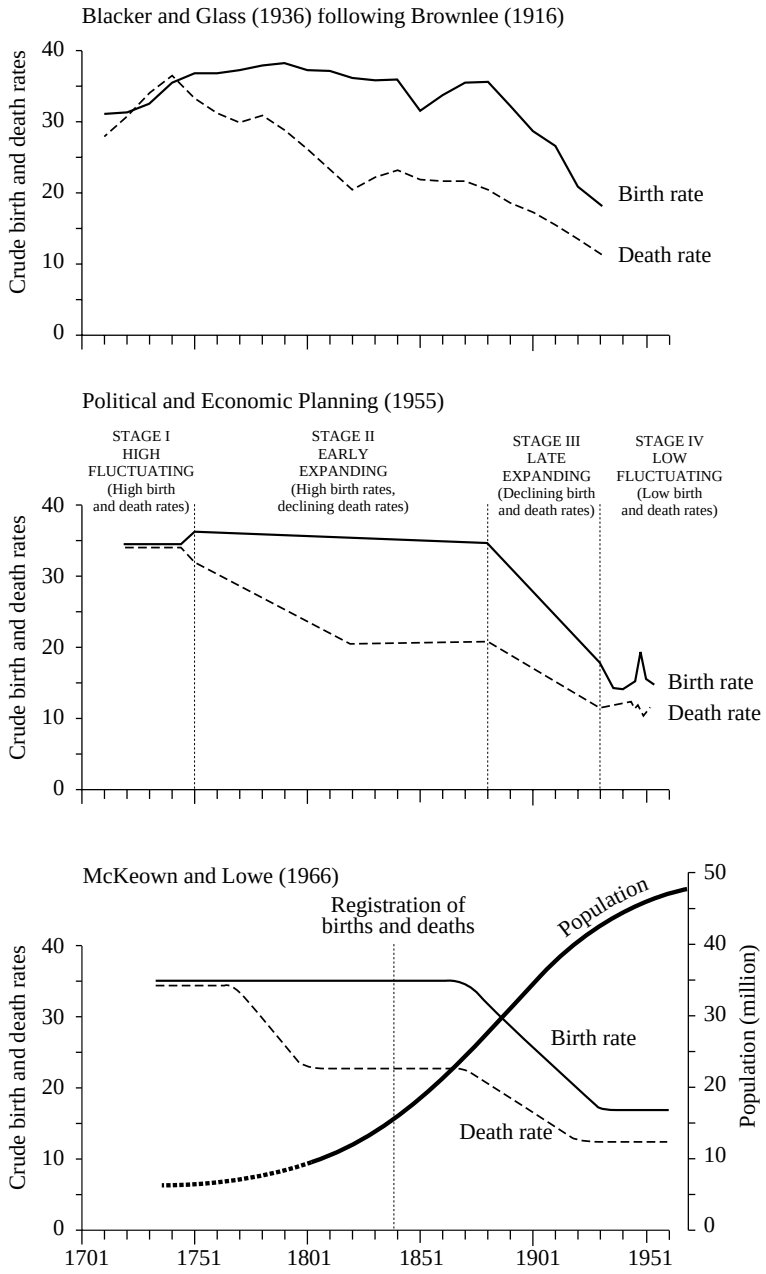

Figure 1.4. Three early diagrammatic representations of the demographic transition in England and Wales

The picture of long-term changes in fertility and mortality are better captured by using the total fertility rate and life expectancy at birth, measures which are not vulnerable to shifts in the age structure of a population. That is, figures 1.1 and 1.2 have been substituted for figure 1.4. But, as Szreter has recently argued, 'the principal virtue and function of the idea of demographic transition has always been in providing a graphic metaphor that summarily describes – and predicts – a long-term emergent pattern of change'.[36] It is this 'graphic metaphor' that persists in the demographic transition model, now more a pedagogic device than an explanatory tool.

However, there is still considerable debate about the existence of a global demographic transition and whether the various processes involved may be expressed in the form of a general theory. Although Warren S. Thompson and Adolphe Landry are widely credited with the identification of different demographic patterns in terms of population growth potential, it was Frank W. Notestein who in the 1940s and early 1950s offered the first coherent statement of what could be called a theory of the demographic transition.[37] To oversimplify, Notestein's theory can be reduced to the following four propositions.

1. The demographic transition is initiated by the secular decline of mortality.
2. Mortality decline is caused by the cumulative influences of the agricultural, the industrial and the sanitary revolutions which, respectively, lead to better food supplies, an improvement in the factors of production and the standard of living in general, and improvements in public health.
3. Rapid population growth is the result of the temporal lag between the decline of mortality and that of fertility.
4. Fertility decline eventually occurs because the social and economic supports to high fertility are removed. The materialism and

footnote 35 (*cont.*)

		1701–10	1751–60	1801–10
Brownlee	CDR	31.6	30.3	23.9
	CBR	28.6	36.9	37.5
Wrigley *et al.*	CDR	26.0	25.2	23.9
	CBR	30.3	32.4	37.8

There is a remarkable match between the estimates for 1801–10, but there the similarity ends.

[36] Szreter (1993), quoted from p. 692.

[37] Landry (1934 also 1909), Thompson (1929), Notestein (1945, 1953). Of the three, the work of Adolphe Landry (1874–1956) has been rather neglected although he coined the phrase 'le régime démographique'. See Sauvy (1956).

> individualism associated with the urban way of life give impetus to the rational control of fertility by means of contraceptive practices.[38]

Notestein's 1953 paper offers some additional points of emphasis for the theory. For example, although 'it is evident that urbanization provides no mystical means for the reduction of fertility' it seems likely that the particular pressures of urban-industrial life created the conditions for the weakening of old ideas and beliefs, and the establishment of a new small family size ideal. The principal factors involved were probably as follows: 'the growing importance of the individual rather than the family, and particularly the extended family group; the development of a rational and secular point of view; the growing awareness of the world and modern techniques through popular education; improved health; and the appearance of alternatives to early marriage and childbearing as a means of livelihood and prestige for women.'[39] But perhaps of greater importance, the 1953 paper also gives some of Notestein's arguments on historical precedents: Europe as model. 'An understanding of their experience [Europe and the industrialised countries of the New World] gives us considerable information about the kinds of processes likely to be found in other parts of the world as technological development gets under way.'[40] And, 'Both the Japanese experience and the different course of events produced by a different sort of economic development in such areas as Ceylon, Formosa, and Puerto Rico tend to confirm the hypothesis that the principles drawn from the European demographic transition are widely applicable throughout the world.'[41] 'But in the densely settled regions of Asia the initial conditions are strikingly different from those of Europe a century ago.'[42] There it is less likely that

[38] See Woods (1982a), p. 161, for a more detailed discussion of Notestein's ideas; also Chesnais (1992), especially pp. 1–28, Jones *et al.* (1997) and Dupâquier's introduction to Bardet and Dupâquier (1998), pp. 7–17.

[39] Notestein (1953), p. 18.

[40] Notestein (1953), p. 15.

[41] Notestein (1953), p. 21. See also Notestein (1945), figure 4, p. 47, where the similarities between CDR and CBR trends in England and Wales, 1881–1939, and Japan, 1921–41, are illustrated.

[42] Notestein (1953), p. 21. Notestein concludes his paper by proposing a list of policies to speed the process of social change because of the difficulty of relying on the sort of economic development which automatically produces the socio-economic change required for the transition to low mortality and fertility. Examples of the policies are: lifting the age at marriage; promoting community education; communicating information on the practice of birth control; weakening the support system provided in the extended family by providing some element of basic economic security. See also Notestein (1948) written at a time when Notestein was not only Director of the Office of Population Research at Princeton University, but also Consultant-Director of the United Nations Population Division.

without policy interventions events will follow the course they have taken in Europe.

Although Notestein's theory has been elaborated, revised and criticised it still retains, even after fifty years, relevant arguments about the nature of demographic change as the response to socio-economic development, the possibility of drawing and applying lessons from the European past, and the justification for policy interventions when economic development has stalled or failed to induce rapid modernisation.[43] From the perspective of Europe's population history, and especially the experience of England and Wales in the nineteenth century, Notestein's theory of the demographic transition fits only some of the facts. First, and as will already be obvious from figure 1.1, the demographic transition in England and Wales was not initiated by the secular decline of mortality, but rather the modern rise of population was launched by a cyclical upswing in fertility after which mortality and fertility declined together. Secondly, nuptiality variations did not play a prominent part in the theory although the western European experience appears to have been influenced by the presence of a distinctive form of marriage pattern, one which had dominated for several centuries in place of the extended family norm. Thirdly, although England might be described as the first industrial-urban nation, the processes of industrialisation and urbanisation cannot be said to have initiated demographic change in any simple way. Indeed, urbanisation probably worsened the life chances of the working population during the eighteenth and nineteenth centuries. However, the decline in marital fertility probably was, as Notestein argued, very much a matter of changed attitudes, a new small family size ideal formed in the setting created by improved education, secularisation and the enhanced bargaining power of women.

Although it must be acknowledged that only a small part of Notestein's version of demographic transition theory applies to nineteenth-century England and Wales it nonetheless provides a valuable point of departure; a framework against which to set empirical experience so far as it is now known, and one to which reference will be made on several occasions in the chapters that follow. But there are other approaches, rather less well formalised perhaps, which attempt to con-

[43] These criticisms and revisions are far too numerous to list, but Greenhalgh (1995), pp. 3–28, in particular raises important issues in relation to the limitations of modernisation theory, the need to combine concepts of structure and agency, the dangers of Eurocentrism, and the importance of gender and culture. It is also important to appreciate that there are several parallel transition theories, for example Omran (1971) on epidemiology and Zelinsky (1971) on mobility.