The Historical Demography of Northern Europe 1400-1650

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The population of Northern Europe from 1400 to 1650, like all preindustrial populations everywhere, constituted a complex system or regime with an equally complex set of relationships between demographic processes and their physical, economic and social, and cultural environments. All human populations strive to survive and reproduce within the range of possibilities afforded them by the natural world – in the form of natural resources and diseases, weather, and other natural hazards – by contemporary technology and social organisation, and by collective, often only partly conscious sets of rules and assumptions regarding the proper configuration of marriage, household, family, and other individual-level decisions. From a global perspective, different human societies have pursued very different 'strategies' – again, whether consciously, unconsciously, or partly consciously – with regard to such questions as when one should marry, what persons should constitute a household, how many children are desirable, and the like, all with profound effects upon the ways in which each demographic system can meet the challenges imposed by the natural world. The tangible results of different 'strategies' might be very different rates of population growth, immiseration, social change: very wide-ranging results indeed. One of the effects of the great strides taken in the past generation by historical demography as a discipline has been the constant reminder that enquiry in this field is a constant dialog among the recovery of empirical reality, theorisation about systems, and the relationship between these realities and systems on the one hand, and cultural and social context on the other.[1]

1. These opening remarks have been heavily influenced by, among others, Livi-Bacci 1992, esp. pp. 1-73, and Wrigley 1993. A very good illustration of the profound relationship between historical demography and the processes with which it is concerned on the one hand, and the history of social rules on the other, although from a much more recent period of the European past, is Watkins 1990.

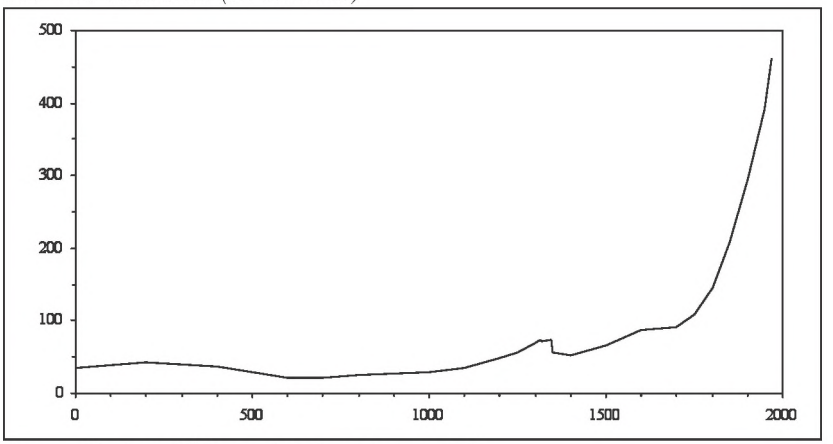
What follows is an attempt to survey the demographic history of Northern Europe during the period 1400-1650. It is necessarily very selective. In part it takes the form of a report upon the current state of the secondary literature of pertinence to the subject, with the aim of making it accessible to an audience of historians who are not specialists in demographic history. In part it has its own arguments to make about the interpretation of what we know and the conceivable directions that future work might take. It also aims to try to show the many ways in which the history of population during this period of European history is not hermetically sealed from other strands of historical enquiry, but on the contrary presents some very important prospects for fruitful exchange between branches of historical research that are conventionally regarded as separate.

The population of Europe

We may begin by considering the deceptively simple topic of the course of aggregate population totals in Europe as a whole or in individual countries. First, let us consider European population history over a very long timeframe indeed, and in particular the way in which the period with which we are concerned here fits into the much longer perspective. *Figure 1* displays the most commonly accepted modern estimates of the population of Europe as a whole (excluding the former Soviet Union) over the past two millennia, following the estimates by Jean-Noël Biraben.[2] It is without doubt very possible to be sceptical of the exact levels at which this graph should lie for just about any century up to very fairly times; but as a first approximation it can serve. What stands out, in this very long-term perspective, is that the period with which we are concerned fits into part of a distinctive phase of Europe's demographic past. After the seventeenth century, Europe's population embarked upon a new era in which the rules binding together demographic processes and their natural and economic environment changed seemingly completely. Partly through the wholesale transformation of the economic environment through agricultural

2. Biraben 1979, reprinted as Biraben 1980. For an earlier contribution to the estimation of world and European populations, see Durand 1977.

Figure 1. Estimated population of Europe (excluding former Soviet Union) over two millennia (in millions)



Source: Biraben 1979, reprinted as Biraben 1980.
OBS: I have accepted Biraben's estimates but added two further data points to represent the immediate eve and aftermath of the plague mortality of 1347-50 according to my interpretation of generally-accepted estimates.

and industrial change and partly through accompanying changes in social transformations (including alteration of the disease environment and cost/benefit considerations surrounding childbearing), the result – by the early twentieth century – was that Europe had achieved unprecedentedly lower mortality and fertility levels, and had in the process increased its absolute population levels at least fourfold in a historically remarkably short time.[3]

On the other hand, during the first millennium of the Christian era the population of Europe to all appearances was checked within an extremely narrow set of limits, by the comparative standards of later centuries. Biraben's estimates allow for modest increase during the later Imperial Roman era and decline in the centuries of Imperial collapse and Germanic migrations; but what is striking is the very narrow range within which absolute levels were constrained. It is unlikely that we will ever know much about the respective contributions of mortality and fertility which conspired to bring about this result, but it does seem safe to conclude that mor-

3. Livi-Bacci 1992, pp. 100-45; for the fertility transition which represented the culmination of these far-reaching changes, see Coale and Watkins, eds. 1986.

tality and fertility in the long run were very closely balanced, and that the demographic system of this phase of European history was finely tuned to permit very little variation from a stationary population regime.

In between these late-Antiquity/early-medieval and recent/modern phases of European demographic history lay our period. The general outline of aggregate population change over Europe at large from the eleventh to the sixteenth century is fairly well established in broad terms and familiar to most historians.[4] A sustained increase from around the year 1000 to some time around or after 1300; collapse as a direct result of the re-entry of plague into Europe in the mid-fourteenth century; a succeeding period in which population further declined, stagnated, or showed fitful signs of recovery; then the sustained growth of the 'long sixteenth century', culminating (in many European countries) in another phase of slowed growth, a plateau or even a new (though in most countries much more modest) decline in the middle and later seventeenth century: this is the generally accepted outline, even if the exact course or chronology for particular countries or the causes of the turning-points are still subjects of great debate. In contrast with what came before and after, then, perhaps the most striking thing about this later-medieval/early-modern phase of European demographic history is its *cyclical* nature: a combination of economic and physical circumstances and of human reaction to them produced a series of up-down phases characteristic of what we have come to consider the old-Regime cyclical dynamics of population and economy. Rates of growth or decline during these cycles were, by comparison with more recent European demographic history or with the experience of many twentieth-century non-Western societies, relatively modest, with periods of 'rapid' growth (as in the sixteenth century) translating to no more than between 0.5 and 1.0 per cent per annum.

In this sense the period 1400-1650 is the latter half of a phase or interval rather than a distinctive period in its own right. The period 1400-1650 is itself bifurcated in another sense. These years span a time when the evidentiary basis for our knowledge of population history was transformed. This, too, has been well described

4. The best recent syntheses at the European-wide level are Bardet and Dupâquier, eds. 1997, and de Vries 1994.

elsewhere and the general story is well known.[5] Both Protestant and Catholic Reformations compelled new measures to record vital events – baptisms, marriages, and burials – at the parochial level as part of reformed ecclesiastical discipline. The growing demands of the State likewise resulted in an intensified effort to utilise the disposable human and material wealth of European countries, one byproduct of which was a new array of records which can serve, in various ways, as the basis for longitudinal and cross-sectional studies of local, regional, and national populations. (In this respect again the experience of different European countries differed widely, and by and large Southern Europe, especially Italy, was ahead of Northern Europe in the proliferation of documents of use to historical demographers).[6] Thus whereas before 1500 it is often necessary to resort to such sources as last wills and testaments as proxy measures for variations in absolute numbers of deaths (rendering rates comparable over time and space difficult) or other aspects of historical populations,[7] the range of sources available by 1600 or 1650 for serious demographic analysis had been transformed. Most notable are the parish registers of vital events which became widespread over much of Northern Europe by the end of the sixteenth or the early seventeenth century (and in some parts of Southern Europe somewhat earlier), and which allow both aggregative analysis of events over time and reconstitution of individual and family life-course events; and the various enumerations of households or individuals, whether in the guise of hearth or poll tax returns, *stati d'anime* or the Swedish *Husförhörslängder,* which permit estimations of size and (in some respects) composition of populations at local or large levels, each particular type of enumeration carrying its own set of interpretational difficulties. This revolution in record-keeping – for it seems in no way too grandiose to call it that – simultaneously signifies a remarkable leap in the effectiveness of early-modern bureaucratic impulses and in our ability to investigate historical populations.

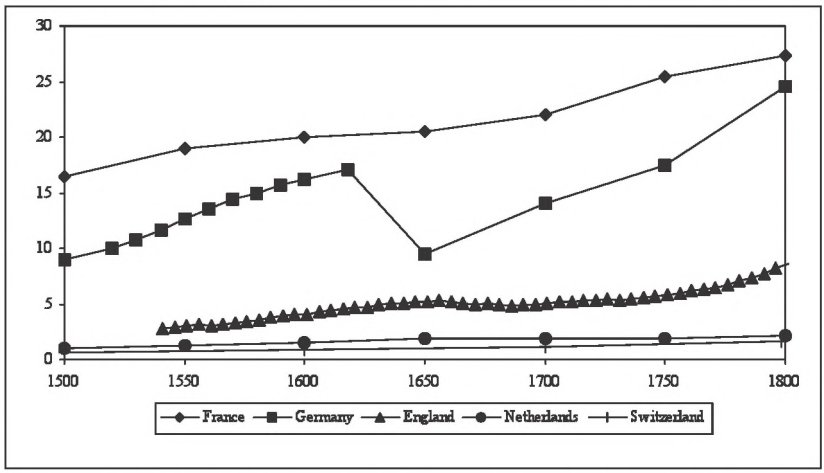
The result is that we are on much firmer ground after 1500 than

5. Surveyed briefly by de Vries 1994, pp. 4-10, and Poos 1989, pp. 795-6, and in much more detail in Willigan and Lynch 1982, pp. 57-159. Surveys of early sources for particular countries include Kälvemark 1977; Lassen 1966; Johansen and Oeppen 2001; Tomasson 1977; Reher and Robinson 1979; Erder 1975.

6. Cf. Bellettini 1980.

7. E.g. Goldberg 1988 and Dubuis 1991.

Figure 2. Some estimates of national populations in Northern Europe, 1500-1800 (in millions)



Sources: For England, Wrigley and Schofield 1989, pp. 528-9; for the Netherlands, de Vries 1986, Faber, Roessingh, Slicher van Bath, van der Woude and van Xanten 1965; van der Woude 1980; Hélin 1980; for Germany (as within her 1914 borders), Bulst and Pfister 1997; de Vries 1994, p. 13; for France, Dupâquier and Lepetit 1988, p. 68; for Switzerland, Mattmüller 1987, vol. 1, p. 4.

before in being able to make estimates of national populations and of the demographic processes that underlay them. As examples, *Figure 2* displays recent estimates of national populations for five Northern European countries from 1500 to 1750. Perhaps the most striking point to be drawn generally from these series is that while every one of these nations conformed to the general overall pattern already sketched out – sustained growth during the sixteenth century, a phase of slowed growth, levelling-off, or decline in the seventeenth, and a renewed upward phase in the eighteenth – there were equally marked variations from country to country in the timing and scale of these changes (perhaps most marked in the very recent estimates for the population within the 1914 borders of Germany by Neithard Bulst and Christian Pfister, who argue for a strikingly large population decline in that country during the period of the Thirty Years' War).[8]

Clearly population growth was not uniform among European

8. Bulst and Pfister 1997.

countries during the early-modern period, and the same is true when Europe is considered regionally: for between 1500 and 1650, and indeed until the beginning of the nineteenth century at least, Northern Europe's population grew at a markedly faster rate than that of Mediterranean countries. From being roughly on a par with the Western Mediterranean European countries in 1500 in terms of absolute population, Northern Europe by 1800 had come to support a population two-thirds larger than the Mediterranean countries, both symptomatic of and a contributing factor to the very different path in social and economic history which Northern and Northwestern Europe had taken in those centuries.[9] Another aspect of the ways in which Northern Europe diverged from Mediterranean Europe during this period is in the scale and chronology of urbanisation. The geography of urban growth in Europe generally during this period was highly variegated; and although the period 1500-1800, 'viewed globally, could be described as an epoch of steady, gradual urbanization', with the urban population as a percentage of total population almost everywhere standing higher in 1800 than in 1500, different regions differed considerably. Urban growth in Northern Europe was dramatically high between 1550 and 1650 and then decelerated, whereas in Italy and Iberia rapid urban growth in the sixteenth century gave way to collapse in the seventeenth. These changes are outlined in summary form in *Table 1*, following the data and arguments of de Vries.[10]

Before 1500 it is much more difficult to be so certain of national trends, and by and large the best available evidence comes from information pertaining to a much more local level: that of individual communities, districts or provinces. It is also the case that much of this earlier evidence for changes in absolute population levels stems from fiscal or ecclesiastical sources whose nature makes it necessary to engage in a much greater degree of estimation and

9. A point made by de Vries 1994, p. 12. Taking his figures (p. 13) and considering 'northern Europe' as Scandinavia, England, Scotland, Ireland, the Netherlands, Belgium, and Germany, and 'Mediterranean Europe' as Italy, Spain, and Portugal (omitting France as arguably neither definitively 'northern' nor 'Mediterranean'), the aggregate figures (in millions) are:

	1500	*1550*	*1600*	*1650*	*1700*	*1750*	*1800*
Northern Europe	19.6	23.5	27.0	26.3	30.1	34.4	49.8
Mediterranean	18.3	20.0	22.3	19.6	22.8	26.5	31.2

10. de Vries 1984, pp. 38-40; quoted passage from p. 38.

Table 1. Urban percentage of total population by country, 1500-1750

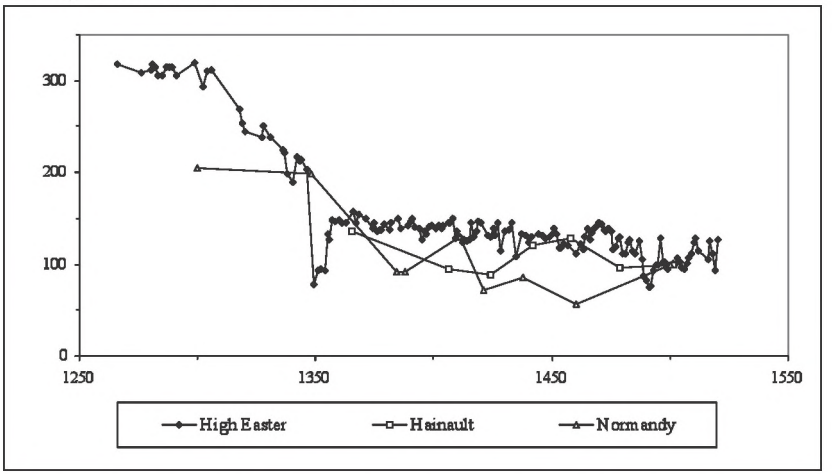
Country	**1500**	**1550**	**1600**	**1650**	**1700**	**1750**
Scandinavia	0.9	0.8	1.4	2.4	4.0	4.6
England and Wales	3.1	3.5	5.8	8.8	13.3	16.7
Scotland	1.6	1.4	3.0	3.5	5.3	9.2
Ireland	0	0	0	0.9	3.4	5.0
Netherlands	15.8	15.3	24.3	31.7	33.6	30.5
Belgium	21.1	22.7	18.8	20.8	23.9	19.6
Germany	3.2	3.8	4.1	4.4	4.8	5.6
France	4.2	4.3	5.9	7.2	9.2	9.1
Switzerland	1.5	1.5	2.5	2.2	3.3	4.6
Northern Italy	12.4	15.1	16.6	14.3	13.6	14.2
Central Italy		11.4	12.5	14.2	14.3	14.5
Southern Italy		11.9	14.9	13.5	12.2	13.8
Spain	6.1	8.6	11.4	9.5	9.0	8.6
Portugal	3.0	11.5	14.1	16.6	11.5	9.1

Source: de Vries 1984, p. 39.

qualification. *Figure 3* illustrates this point by displaying three series of population estimates for rural populations during the later fourteenth and fifteenth centuries. The data are: males aged twelve and older and resident within the large rural community of High Easter in Essex (England), drawn from the fiscal record of *per-capita* payments at the annual meeting of the local court;[11] estimates at several points in time of numbers of hearths in the county of Hainault in the Low Countries, drawn from local hearth censuses;[12] and Guy Bois's estimate of the population of eastern Normandy, drawn mainly from *monnéage* or hearth-tax rolls.[13] All these series are displayed in Figure 3 as indices, with the level of each series in 1500 being set at the index baseline of 100, because of the very different absolute levels of population under study. Each source has its own

11. Poos 1991, pp. 91-110.
12. Blockmans 1980, p. 859; Arnould 1956, pp. 23-75.
13. Bois 1984, pp. 23-77.

Figure 3. Some series of rural population indices from the fifteenth century: High Easter, Essex (England), the County of Hainault, and Eastern Normandy (indexed data: 1500 = 100)



Sources: For High Easter, Poos 1991, pp. 91-110; for Hainault, Blockmans 1980, p. 859; Arnould 1956, pp. 23-75; for Normandy, Bois 1984, pp. 23-77.

array of qualifications and considerations of interpretation, but all seem fairly firm as bases for general changes in levels over time.

Comparing the series in this way reveals some common characteristics. By and large all three series imply either stationary or declining local populations through much of the fifteenth century (with only Normandy showing any real signs of new expansion toward the end of the 1400s), and in all three cases there was some fluctuation around the trend as would be expected from smaller, locally-based population series.

The picture is less clear-cut with regard to urbanization during this period, partly (again) because of the unevenness of sources: while the populations and economic fortunes of individual towns large and small in Northwestern Europe between the Black Death and 1500 have been a burgeoning field of historical research,[14] to generalise beyond the particularities of particular towns' circumstances has been more difficult. Whereas the urban experience of

14. To pick out just a few recent surveys: Derville 1983; Prevenier 1983; Dubois 1988; Higounet-Nadal 1980.

Northwestern Europe between 1500 and 1800 was that relative urbanization increased during periods of overall population increase, and *vice versa*, it is possible that the opposite was the case between 1350 and 1500,[15] and at the very least a functional redistribution of Europe's urban infrastructure – the network and hierarchy of urban centres of various sizes in relation to their rural hinterlands – is a research area currently of much interest to urban historians in several countries.

This rapid survey has left a number of questions hanging in its wake. We can see with reasonable clarity the general outline of aggregate population change in Europe for all or at least most of our period, something of its scale and the timing of its turning points. To turn to more detailed explanation of causes is to run into more serious barriers of empirical knowledge: for only some countries or regions and only for some of our period can the available sources permit a more sophisticated review of the components of the demographic system which produced the results we have just seen.

Demographic processes are, first and foremost, the products of the interplay between mortality and fertility (the latter of which in turn, in preindustrial populations, is most directly a product of nuptiality patterns). The scale of analysis is critically important too: national estimates of demographic rates can mask remarkable variations from locality to locality or from place to place within a range of economic and social typologies, and it is an inescapable function of the nature of early European historical demography that one must often extrapolate from the local, which is know-able, to the national, which is only approximatable.[16]

15. de Vries 1984, pp. 42-3, tentatively suggests that both urban populations, and urban populations as a proportion of total populations, may have been higher in 1500 than before the Black Death, but notes the relative paucity of data that would support this conclusively. Britnell 1993, p. 170, argues that in England the urban sector was larger relative to the total English population and wealth in the early sixteenth century than in 1350, despite a long-running debate about the existence of an 'urban crisis' in that country in the later Middle Ages, though acknowledging the variety of opinion on the matter.
16. One good illustration of this is Dobson 1989. Variations in nuptiality and fertility due to local micro-economic circumstances was a prime element for proponents of 'proto-industrialisation' theory in the early-modern period, for which see (for example), Kriedte, Medick and Schlumbohm 1981.

The following discussion focuses upon mortality, fertility, and household formation, and may appear to presume that the effects of net migration are relatively unimportant at the national level; such a presumption is certainly not tenable at more local levels and in fact it is likely that for some countries it is not so even at the national level as early as the sixteenth century.[17]

Mortality

One long-established emphasis in the writing of European historical demographers has been upon the mortality side of the equation, the 'positive check' of the Malthusian scenario. This position would argue that changes in mortality, rather more than changes in fertility, were decisive in accounting for the turning points in the long wave of cyclical population change, at least until the eighteenth century; that (in the arguments of many authors) what mattered most in setting the medium-term mortality experience was the frequency, severity, and instability of mortality in the form of 'crisis mortality', short-run upswings in death rates caused by epidemics or harvest shortfalls; and that changes in mortality were essentially 'exogenous' to, or stemmed from circumstances outside the active agency of, human society and economy (the autonomous epidemiological careers of various diseases or the short- and long-run fluctuations in weather that resulted in harvest crises). The implication of this argument would be, then, that the persistent population stagnation of the fifteenth century was primarily the result of continuing high levels of mortality from plague (and perhaps other diseases), which was in the course of transition from the spectacularly widespread and lethal epidemics of the Black Death and its immediate aftermath in the fourteenth century to the more contained and localised (but still recurrent) disease patterns that the sixteenth century witnessed; that the demographic growth of

17. A prime example is that of the Netherlands, as a result of its integration into a global mercantile and colonial network: while the Dutch Republic was a net recipient of migrants, from 1602 to 1795, perhaps one million Dutch sailors departed from Dutch ports, of whom at least two-thirds never returned: de Vries 1986, pp. 107-9. England on average lost an average of between 20,000 and 40,000 net emigrants per quinquennium in the sixteenth and seventeenth century: Wrigley and Schofield 1989, p. 219.

the sixteenth century was mostly a result of a relative diminution of crisis-type mortality (though still punctuated by serious crises transcending local dimensions, such as that of the later 1590s in much of northwestern Europe);[18] and that the further plateau of the mid-seventeenth century was again an exogenous movement toward shorter life expectancy.[19]

The centrality of plague in discussions of late-medieval and early-modern European mortality patterns is well-established and understandable; a recent survey of the impact of plague in England between 1485 and 1665 concludes that bubonic plague 'was the commonest cause of mortality crises throughout the sixteenth and for most of the seventeenth century', justifying contemporaries' particular dread of this disease's ability to strike particularly rapidly and particularly lethally.[20] The impact of plague upon medical and public-health thinking and practice has been a subject of much study in recent years, and the same is true of other diseases of particular importance to the period, such as syphilis.[21] And plague represents perhaps the single most compelling aspect of our period's claim to be a distinctive phase of European demographic history, for the eruption of plague into the European population and its subsequent withdrawal – for reasons which still remain a matter of debate – very nearly coincided with the outer chronological limits of our chosen years. To illustrate this, *Figure 4* displays the number of known plague epidemics drawn from narrative and other sources for the countries of Northern Europe from 1347 to 1725, as compiled by Jean-Noël Biraben in his monumental *Les hommes et la peste*.[22]

It is worth remarking that the nature of Biraben's data makes this graph an index of how widespread plague epidemics were (at least insofar as this type of record can track them), as opposed to

18. For which see Souden 1985.

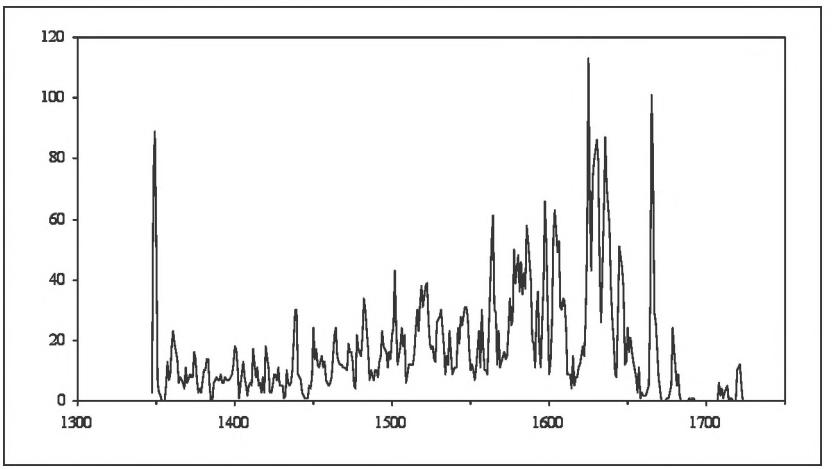
19. For statements of this position in broad terms see Perez-Moreda and Reher 1985; Flinn 1981; Hatcher 1977; Blockmans 1980. The centrality of plague mortality to medieval population experience has been argued particularly strongly for Scandinavia by Benedictow 1992 and 1993; cf. reviews of these works respectively by Pedersen 1995, and by Johansson 1994; Brothen 1996. Benedictow responds to Johansson in Benedictow 1996, pp. 207-41.

20. Slack 1985, p. 69.

21. Arizzabalaga, Henderson and French 1997.

22. Biraben 1975-6, vol. 1, pp. 363-71.

Figure 4. Known plague epidemics in Northern Europe



Source: Biraben 1975-6, vol. I, pp. 363-71.
OBS: The figure aggregates data from France, England, Scotland, Ireland, Belgium, the Netherlands and Luxembourg, Germany, Austria, Bohemia, Switzerland, and Scandinavia.

their collective severity or mortality levels. Thus the index graphed in Figure 4 should not be taken as a proxy for the changing importance over time of plague as a factor in overall mortality; by the nature of the information graphed here, the high incidence of the disease in the first half of the seventeenth century is dominated by references from German territories, for instance. But in any event, whatever its overall contribution to general mortality or to crisis mortality, and whether its withdrawal from Northwestern Europe was at least partly the result of cumulative efforts to isolate and quarantine or an inscrutable and truly exogenous event,[23] plague's disappearance is one of the most distinctive features of Europe's demographic experience during the late seventeenth and early eighteenth centuries.

There are, however, other reasons to be sceptical of the model of demographic processes as driven by mortality, especially crisis mortality, as a paradigm with applicability throughout Northern Europe and throughout our period. Wrigley and Schofield demon-

23. For which Slack 1985, pp. 311-37, provides a discussion which goes beyond the limits of the English experience.

strated in their aggregative analysis of 404 English parish registers from the mid-sixteenth century onward that periods of frequent crisis mortality did not necessarily coincide with periods of high mortality generally: between 1550 and 1649 a parish would, at a crude average, experience one month of crisis mortality every six or seven years, and yet over the course of the seventeenth century the incidence of crisis mortality declined perceptibly at the same time as life expectancy was also markedly declining.[24] This is not to be taken as an argument that the same was necessarily true of all countries in Northwestern Europe – the precise data needed to confirm or refute this are lacking or await analysis before the mid-1600s, and indeed as we shall see there is every reason to suspect variation from country to country in this and other aspects of population behaviour – but simply that the correlation between crisis mortality and general mortality is not axiomatic for all populations.

For another thing, there is a conceptual problem with regarding the medium- to long-term movements of mortality levels in Europe generally as a strictly 'exogenous' force, entirely acting upon (as opposed to being partly a product of) other aspects of European social and demographic history. Urbanization is a good example: the special nature of urban demography, with the much more severe mortality of towns and with depressed fertility also due to their distorted age- and sex-compositions resulting from in-migration, constitutes one of the most deeply entrenched features of Europe's preindustrial population regime.[25] From the sixteenth century onward the pace of urbanization certainly affected the shape and scale of mortality patterns, at least at the local level.

Perhaps an even better illustration of this point is the relationship between 'subsistence crises' stemming from harvest failures and their relationship to mortality crises. Historians have conventionally depicted this relationship as one in which severe malnourishment of longer or shorter duration causes people to succumb to infectious diseases, which account for the bulk of mortality during subsistence crises. This is further linked to the reliance of most preindustrial populations upon cereals as the predominant component of diet, making the poor directly and keenly vulnerable to scarcity or price fluctuations. Moreover, it is presumed that during

24. Wrigley and Schofield 1989, pp. 528, 640.
25. de Vries 1984, pp. 175-249; cf. van der Woude 1982.

harvest crises, social dislocations provoke vagrancy and thus promote conditions for the spread of infectious diseases which would have been less likely to assume epidemic form under less unsettled conditions. The linkage – whether in medical or in empirical historical-demography terms – is quite complex.[26] To demonstrate the linkage between grain prices (the usual surrogate for harvest fluctuations) and mortality has been possible on a sophisticated basis only as early as the seventeenth century; and the best recent analysis implies that between the 1670s and the mid-1700s the linkage was real but weak for France and weaker still for England.[27] Surveying the evidence for Europe generally, including less rigorously econometric analyses of earlier data, Livi-Bacci concludes that in early-modern Europe large increases in grain prices often but not always gave rise to marked increases in mortality, with infectious diseases (such as typhus) being the proximate cause of mortality upsurges where it is possible to investigate cause of death.[28] The point here is that the strength of the linkage between dearth and death was not constant either over time or space. In the seventeenth and eighteenth centuries the chronology of mortality crises in England was similar to that of Northern Holland but dissimilar to those of France or Scotland, for example.[29] Moreover, the degree to which a particular region or area was vulnerable to this linkage depended very much upon a variety of factors involving economic development: in particular, degrees of local agricultural specialisation and the effectiveness of market integration through inter-regional bulk transport. In this respect it is likely that England broke free from the linkage between dearth and death by some time around the mid-eighteenth century, whereas in France this transition came somewhere later, while de Vries argues that the linkage was 'weak, if not altogether absent', in the Netherlands as early as the sixteenth century because of the precocious nature of that country's integration into an international market.[30] In this respect too, then, our period represents a distinctive phase of European demographic history: for within the century or so after

26. The following discussion derives heavily from Walter and Schofield 1989.
27. Galloway 1988.
28. Livi-Bacci 1991, pp. 40-62.
29. Wrigley and Schofield 1989, pp. 340-2; Walter and Schofield 1989, pp. 48-57.
30. Walter and Schofield 1989, pp. 48-57; de Vries 1986, p. 119.

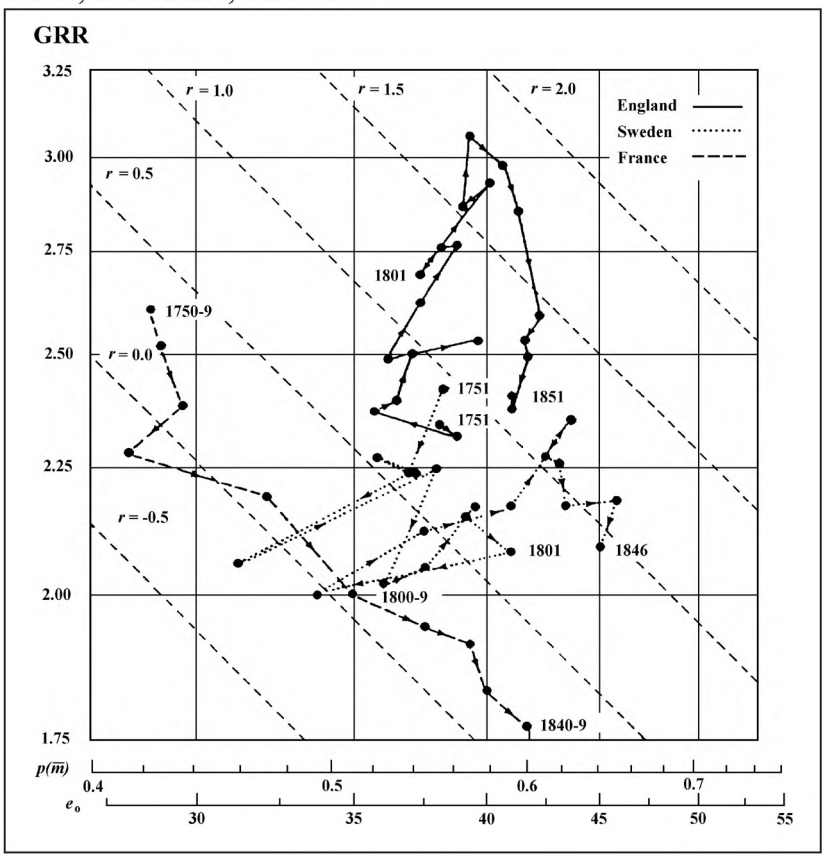
1650 a long-standing aspect of the relationship between population and its economic and natural environment began to be shattered.

The relationship between mortality and fertility

Acting in concert, the mathematics of population and the limits of human physiology set boundaries around the potential combinations of mortality, fertility, and intrinsic population growth rates that preindustrial populations can sustain. One distinction which comparative demographers draw is that between a 'high-pressure' demographic regime – one in which the potentially high growth rates impelled by high birth rates are thwarted by equally high death rates, either as a constant wastage or in the form of vicious cycles of rapid growth followed by crises which drive population down again – and a 'low-pressure' demographic regime – in which both mortality and fertility are comparatively moderate and, if not resulting in a more nearly stationary population, at least give rise to more moderate swings in population levels and thus stave off the worst human costs of more rapid cycles of growth and crisis. 'High' and 'low' are, of course, very relative terms. It is generally agreed that Northwestern Europe, at least back to the sixteenth century, was an exemplar of the 'low-pressure' model in the comparative perspective of preindustrial populations generally, that – neglecting the local variations which micro-climates of disease, environment, or local economy might create – the demographic regimes of Northwestern Europe's various countries were recognisably variations upon the same general pattern (again, when compared with other preindustrial populations elsewhere in the world), but nonetheless that there were still some significant differences in the ways that mortality, fertility, and growth manifested themselves within the broad context of similarity.

Figure 5 illustrates this point by charting the demographic terrains of England, France and Sweden between 1750 and 1850, rather later in historical time than the period with which we are really concerned here, but more or less the earliest period for which we can compare national-level estimates of mortality and fertility levels in this way. The graph is constructed to show mortality levels along the X-axis – in the form (from the bottom-most scale)

Figure 5. Mortality, fertility, and intrinsic growth rates in England, France, and Sweden, 1750-1850



Source: Wrigley and Schofield 1989, p. 246.
OBS: The data are graphed at successive points (represented by the large solid dots), decennially for France, quinquennially for England and Sweden.

of expectation of life at birth (e_0), so that life expectancy increases (or mortality decreases) from left to right in the graph – and fertility levels along the Y-axis – in the form of Gross Reproduction Rate or GRR (mean number of female births per woman completing childbearing years), so that fertility increases from bottom to top of the graph. The diagonal, dashed lines represent intrinsic population growth rates, so that (for instance) any point on the line marked $r = 0.5$ represents a combination of mortality and fertility

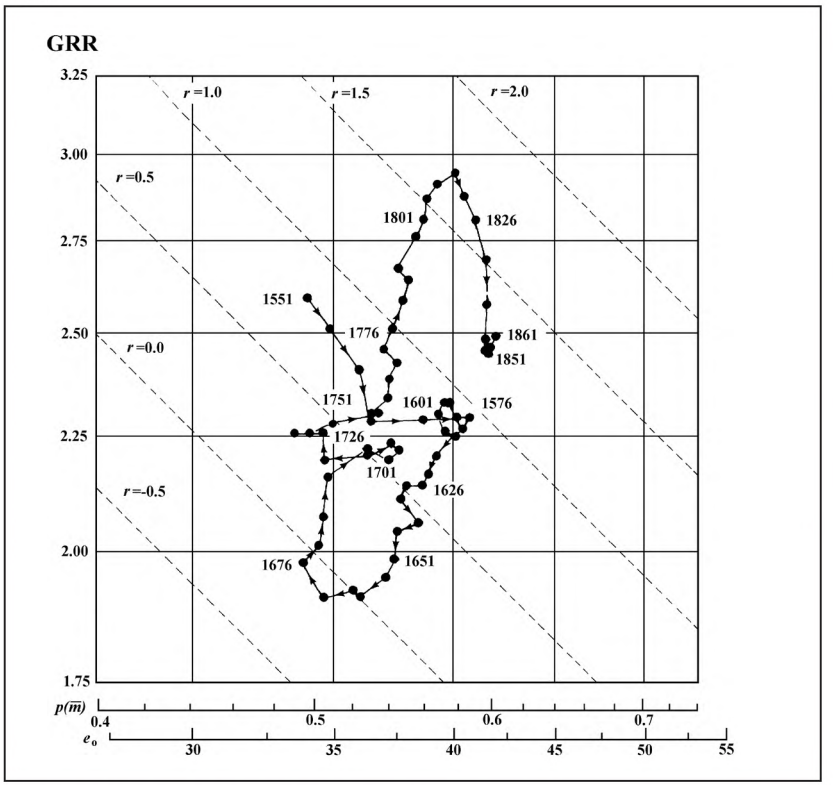
levels which will result in population growth of one-half of one per cent per annum. The scales of the graph have been set in order to make it possible intuitively to see the respective contributions of mortality and fertility change toward growth rates: that is, a movement from left to right (an increase in life expectancy) of a given number of centimetres will have the same effect in raising population growth rate (all other things being equal) as a movement from bottom to top (an increase in fertility) of the same number of centimetres.[31]

The three different datasets graphed in this way represent the successive points in the 'demographic terrain' – that is, combinations of mortality and fertility – which each of the three countries is estimated to have experienced at different stages during the period. It is striking how different the three countries' experiences were. England experienced a surge of population growth from 1750 to the early nineteenth century mainly through a large increase in fertility levels (that is, vertical movement up the graph); in Sweden likewise, the intrinsic growth rate increased during this period, but this was mainly accomplished through an increase in life expectancy (that is, horizontal movement from left to right on the graph); while France maintained a more or less steady, slower growth (just above the $r = 0.0$ line) but did so as a result of steadily increasing life expectancy and steadily declining fertility. Since the population history of Sweden during this period has been known for considerably longer than that of France or England, this serves as a lesson in the historiography of historical demography: assumptions that similar underlying processes contributed to the demographic experiences of different countries were confuted when more information became available, and the moral of the story is that, for this relatively recent period at least, one should be wary of generalising from country to country, in this as in other aspects of historical demography.

Figure 6 is a similar graph showing the English demographic terrain back to the mid-sixteenth century, based upon the aggregative back-projection of Wrigley and Schofield from the parish registers that were instituted by the Church of England in 1538 and which permit the earliest detailed analysis in this manner for any North-

31. Discussion in this and following paragraph is based upon Wrigley and Schofield 1989, pp. 246-8.

Figure 6. Mortality, fertility, and intrinsic growth rates in England, 1551-1861



Source: Wrigley and Schofield 1989, p. 243.

ern European country. The primary conclusions which Wrigley and Schofield made in their 1981 study (which appear to have been confirmed in their more recent volume based upon parish-register reconstitution) were that changes in the overall growth rate of the English population during the early-modern era resulted from shifts in both mortality and fertility in different degrees during different parts of this period. From 1551 to the early seventeenth century population growth was maintained via a fertility rate that was falling and a life expectancy that was rising; over much of the seventeenth century growth rates were falling through a combination of further declining fertility and a lowering of life-expectancy; and from the late 1600s into the early 1800s the renewal of population

growth to unprecedented levels was (as we have seen) more due to rising fertility than lengthening lifespan.

Perhaps the most puzzling conundrum of the demographic history of our period is the combined question of why population remained so stationary for so long during the 1400s, and what the forces were which caused European populations to embark upon a new round of expansion thereafter. Figure 6 is a useful tool for considering this conundrum. It helpfully displays in a visually intuitive form the combinations of mortality and fertility that must obtain to produce any given level of population growth within the general confines of a relatively 'low-pressure' demographic regime, whatever the country or period. That is to say: if we take it as a reasonable approximation that the opening one hundred years of our period of interest here, the fifteenth century, were a period of essentially zero population growth (as implied by Figure 3, above), then the combination of mortality and fertility required to sustain stationary population must have lain somewhere on or close to the $r = 0.0$ line of the graph. Or alternatively, as some might argue,[32] it must have lain somewhere along the same line if it were extended further to the left and above the point where it intersects with the left-hand margin of Figure 6. Of course, extending that line beyond the margin of the graph will rapidly transport the observer into a demographic terrain which is no longer capable of being regarded as 'low-pressure'; as a tangible illustration, just beyond that margin lies the point occupied by rural China in 1930, where growth was about one-third per cent per annum and the life expectancy (e_0) was just under 24 years.[33] And depending upon where along that line one chooses to imagine the population of Northern Europe as lying in the fifteenth century – or some part of the population thereof, for we have no reason to assume that there was homogeneity in this respect among various Northern European populations in the 1400s, in view of the empirically demonstrable variety a century or two later – one must then accept a corresponding explanation for the renewed demographic growth

32. This is essentially the position of Benedictow 1996, pp. 36-41, arguing on the basis of palaeo-demographic analysis of skeletal remains for a life expectancy (e_0) in the low 20s.

33. Livi-Bacci 1992, p. 22, presents a similar graph with much wider ranges of life expectancy and fertility levels and a much wider range of European and non-Western populations.

of the long sixteenth century. The further upward and toward the left one chooses to locate a fifteenth-century population, that is, the more one must assume that the renewed demographic expansion of the long sixteenth century resulted from increasing life expectancy rather than increasing fertility. Likewise, the further upward and toward the left one chooses to locate a fifteenth-century population, the more one must believe that a remarkable, wholesale transformation of the mortality environment took place within a historically short space of time, in the form of movement across the graph of a scale and speed compared to which most of England's early-modern demographic changes pale in comparison.

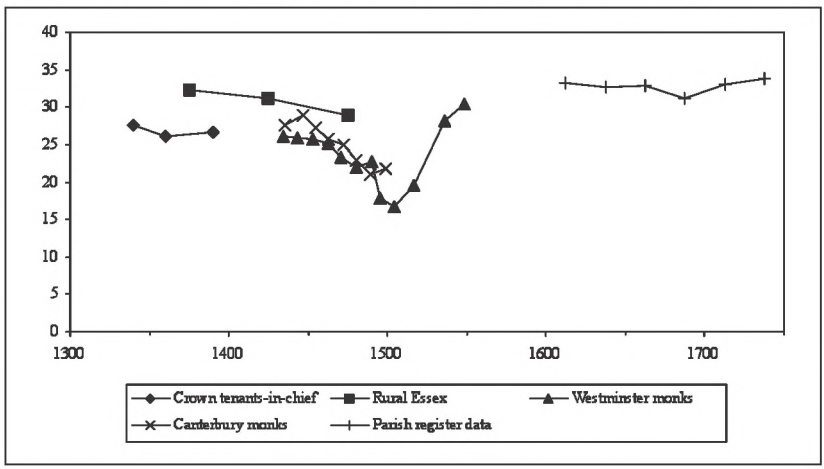
It is perhaps the safest assertion this present discussion will make that no clear explanation of this conundrum can yet be offered. In view of the scarcity of direct, empirical demographic data, historians have generally focused upon social and economic factors which may or may not have affected the patterns of marriage, fertility, and household formation through the influence of wage and price levels, land availability and redistribution of settlement, and the like; and proponents have been equally vocal in arguing for either a mortality or a fertility transition to explain the demographic changes which occurred around 1500.[34] It is also the case that generally speaking, for the pre-parish-register era, whereas mortality or life-expectancy information is difficult to obtain fertility information is even more scarce; and to compound matters, pre-1500 mortality or life-expectancy data which do present themselves to the scrutiny of historical demographers by and large tend to be most uninformative on the mortality experiences of infants and children, which is a serious handicap in view of the fact that changes in the life expectancy of the very young were a major factor in changes in e_0.

Figure 7 presents several sets of data for male life expectancy at age 25 (e_{25}) from England from the fourteenth to the eighteenth centuries. The early-modern data come from the recently published results of parish-register reconstitution by Wrigley, Davies, Oeppen and Schofield from 26 English parishes.[35] There are two

34. Poos 1991, pp. 111-29, argues for equal contributions of mortality and fertility in accounting for this transition in England, and briefly surveys the debate as it stood in the late 1980s; Bailey 1996 is a critical review of this position.

35. Wrigley, Davies, Oeppen and Schofield 1997, p. 305.

Figure 7. Some estimates of English male life expectancy at age 25 (e_{25})



Sources: For the early-modern period, Wrigley, Davies, Oeppen and Schofield 1997, p. 305; for Westminster and Canterbury, Harvey 1993, pp. 112-45 and Hatcher 1986 respectively; for rural Essex data presented in Poos 1991, pp. 115-20; for tenants-in-chief, Poos and Oeppen (forthcoming).

series of life expectancy data for the fifteenth century, derived from the life-histories of monks in the monasteries of Westminster and Canterbury.[36] One set of data for a small sample of rural (mainly peasant) populations comes from three communities in the county of Essex.[37] Finally, one series of estimates is displayed which are based upon the records of the inquisitions *post mortem*, tenurial records dealing with tenants-in-chief of the English Crown (and thus pertaining in general to fairly well-off freeholding men); the values shown in Figure 7 are based upon a new set of methodological re-examinations of these data which will be published in the near future.[38] The data presented here are unlikely to resolve

36. Hatcher 1986; Harvey 1993, pp. 112-45; the data for the Westminster and Canterbury monks were kindly provided to me by J. E. Oeppen, who did the statistical analysis of the two datasets.
37. Based upon data presented in Poos 1991, pp. 115-20. The estimates for life expectancy at age 12 presented there have been converted to e_{25}s by reference to Princeton Model West life tables and are undoubtedly very approximate: cf. Coale and Demeny 1983.
38. Poos and Oeppen (forthcoming), which substantially revises upward the previous estimates from this source by Russell 1948.

the conundrum, even for England, let alone for anywhere else; but they suggest, first, that the very severe mortality evident in the monastic populations (and rising to very high levels near the end of the 1400s) may have been related to their urban, dense physical surroundings, whereas the two lay medieval populations may be more representative of England's population at large. There the conundrum must rest at present.

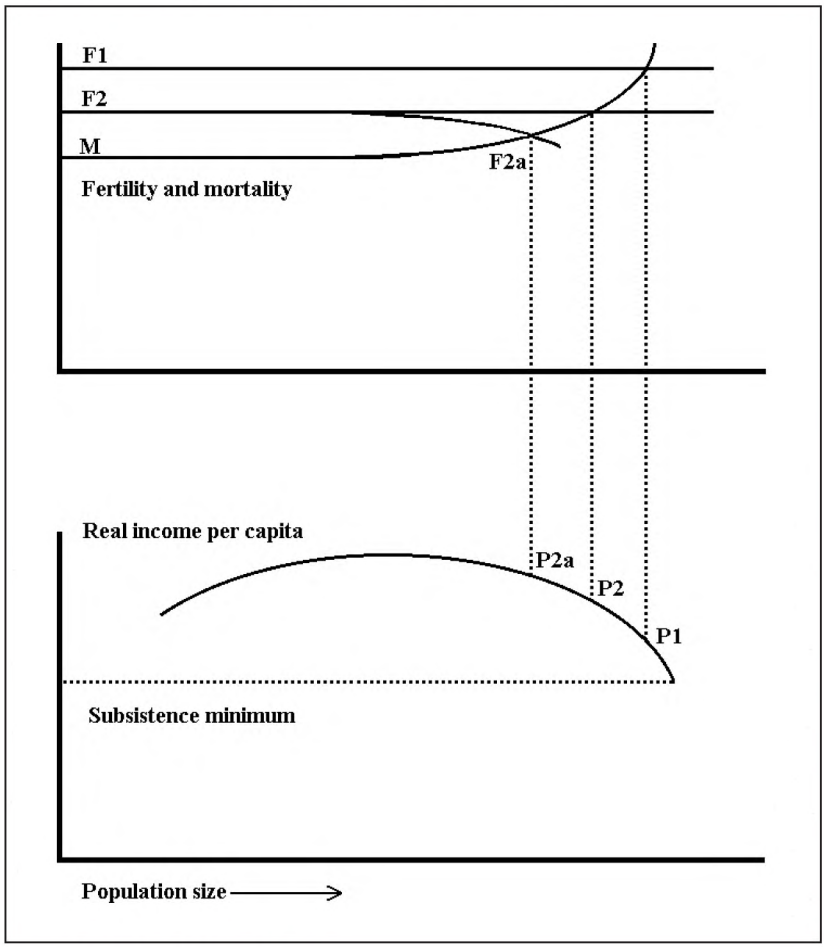
Household formation

The final set of issues to be considered in this brief survey concern the ways in which the patterns of mortality, fertility, and nuptiality relate to their economic environment. This relationship can be considered theoretically as an aggregate process, but in real life it operated through the intermediary of essentially individual-level decisions regarding marriage and household formation. In the absence of significant illegitimacy and effective contraception, which most historical demographers would argue to have held true for most of Europe during our period, nuptiality was the primary linchpin between economic circumstances and fertility.

Figure 8 is a simplified, economist's-eye view of the implications of different marriage systems and their bearing upon living standards.[39] It sketches in a schematic way what happens when a preindustrial population increases (moving from left to right in the figure). The lower curve represents the declining marginal *per-capita* real income toward the right of the figure, presumed to be characteristic of preindustrial economies which past a certain stage of growth experience declining marginal returns to capital, land, and labour. The upper graph displays a hypothetical mortality level (M), which is stationary (other things being equal) up to a certain level of population size, and then begins to increase as a result of the growing level of poverty associated with declining living standards. Line F1 represents one sort of fertility pattern. In this case, fertility is high and is insensitive to economic circumstances, so that if population continues to increase, mortality must ultimately rise to meet or overtake fertility, and the corresponding point on the lower graph (P1) represents a *per-capita* real income driven

39. Derived from Wrigley 1993, p. 369.

Figure 8. Fertility, mortality, and living standards



Source: Wrigley 1993, p. 369.

down close to subsistence; this would represent a 'high-pressure' demographic system. Line F2 represents a variation on the theme: fertility is also insensitive to economic circumstances but is lower than F1, so that the equilibrium point represents a lower population level and a correspondingly high *per-capita* real income (point P2). Suppose, however, that as living standards declined a point was reached at which fertility also responded to economic circumstances – for example, people married at later ages or more peo-

ple never married – the result might be something like curve F2a, where as population increased and living standards declined fertility also declined. The result would again tend to force equilibrium toward a lower maximum of population level with (again) a correspondingly higher point on the real-income curve (P2a).

This exercise would suggest on a theoretical level that the collective cultural rules, whether conscious, semi-conscious, or subconscious, that any given preindustrial society observed concerning at what age and in what circumstances one ought to marry would be of major importance for the mutual relationship between economy on the one hand and the tendency of its population to grow slowly or quickly and with varying degrees of susceptibility to crises on the other. And indeed, in practice historical demographers have shown that preindustrial societies have chosen very different paths to follow in this regard. Since Hajnal's influential article in 1965 it has become customary to speak of a 'European marriage pattern' – in the present context that perhaps ought to be specified as a 'Northwestern European marriage pattern' – which set this part of Europe (northwest of a hypothetical line running from Trieste to St Petersburg) from much of the rest of the traditional world. This pattern consisted of a set of mutually reinforcing characteristics: a relatively late age at marriage for both sexes, a relatively high proportion of persons who never marry, a tendency for marriage to coincide with the establishment of a new household ('neo-local household formation') and for that household to be simple rather than complex in structure, and a tendency for young persons to leave their parental homes during their teenage years and live as servants in other households for an interval between early adolescence and marriage.

The neolocality requirement meant that the rhythms of (perceived) economic prospects would dictate the rhythms of marriage patterns and constituted a mechanism for adjusting nuptiality and fertility so as to stave off the worst effects of population growth: in other words, it tended to push populations toward point P2a rather than P1 in Figure 8.[40] Such was definitively the case for England in the parish-register era. One might further envision at least two major variants on the theme of how worsening economic environment might serve to apply the brakes of growth via nuptiality – in a

40. Hajnal 1965, revised and expanded in Hajnal 1983.

predominantly 'peasant' agrarian economy such might take place through the increasing scarcity of a 'niche' such as a viable farmstead, in an economy where wage labour or rural industry was more predominant it might be through a more diffused mechanism of wages and other less tangible forms of 'niche', with implications for the flavour of family ideology which either situation might help to encourage – and in an era of significant social and economic change in the countryside the two models might not be alternatives in an absolute sense but might rather refer to the marriage behaviour of different fractions of rural society at different times and places.[41]

In the years since Hajnal first articulated this pattern much empirical work has been done which partly vindicates and partly complicates his initial description of it. As far back as we can clearly see, mean ages at first marriage were indeed high for both sexes in global perspective: data from as early as the later sixteenth or early seventeenth century from England, France, the Netherlands, and Scandinavia imply a mean age at first marriage for women falling typically between 22 and 25 years and for men between 25 and 28 years, though it is more difficult, for this early period, to establish proportions never marrying.[42] At the same time, further detailed investigation has shown that the size and composition of households, the corresponding patterns of organisation of the household as work groups as well as kin groups, and (implicitly) the cultural rules surrounding all of these issues refute any notion of even relative homogeneity even within Western Europe. Thus Laslett, for example, proposed a household typology based upon classification of 'West', 'West/central or middle', 'Mediterranean', and 'East'.[43] The concept of a 'Mediterranean' zone of household typology appears particularly problematic, however; recent studies of Iberia and Italy imply a more markedly 'Northwestern' (i.e. neolocal and nuclear) household pattern the further south one travels in these peninsulas, and one study of Southern Italy in the seventeenth century discovered a diversity of household patterns that seem more correlated with local legal, tenurial, occupational, and rural/urban factors than with larger cultural zones.[44]

41. These remarks closely follow the arguments of Schofield 1989.
42. de Vries 1994, pp. 28-9, has a convenient tabulation of parish-based data from these countries.
43. Laslett 1983.
44. Poos 1989, p. 807; Benigno 1989.

It is a corollary of the conundrum discussed earlier, that of accounting for Northern European demographic behaviour during the fifteenth century, that we should be likewise in a state of uncertainty about the earlier history and geography of the 'Northwest European' marriage and household pattern. On the one hand, the more that has come to be known of these matters from the sixteenth century onward, the more complex and variegated the social and demographic landscape of traditional Europe, northern and otherwise, has become. On the other hand, at least until recently among medieval social historians there has been a tendency to regard the history of the family in the Middle Ages as more marked by change over time than variations over place.[45] Some more recent studies of later-medieval household and family structures, drawing upon both the scanty surviving evidence from various parts of Europe for direct study of households and upon the more tangential record of such issues as marriage behaviour revealed in ecclesiastical-court cases, have however attempted to argue that one may just glimpse in the late Middle Ages some of the larger geographical variegations of household typologies which foreshadowed their better-documented early-modern descendents. Examples include the fifteenth-century Tuscan *catasto* in comparison with later Northern Italian family forms, or the late-Byzantine *praktika* (census-like enumerations of rural settlements on the Slav frontiers) with later Balkan family forms.[46]

Conclusion

Whatever consensus may emerge on these issues, it seems reasonably clear that for most of Northern Europe for most of the period 1400-1650, people collectively found the means to constrain periods of demographic expansion to modest rates of growth (as demonstrated in Figures 2 and 3 above), which avoided the worst potential outcomes of population outrunning resources. Rather, populations manage to balance cyclical dynamism with (in modern economists' jargon) a 'soft landing' in the seventeenth century,

45. Particularly noteworthy in this respect are the arguments by Herlihy 1985.

46. I argue along these lines in Poos 1986. Some similar lines of argument are made on different grounds by Smith 1992.

unlike the very hard (though arguably almost wholly exogenous) landing of the fourteenth century. This period of Northern European demographic history was, then, neither a crisis nor a turning-point (though within its own parameters it certainly contained particular crises and particular turning-points). Instead, I would argue, it is a particular phase of the history of European population with some coherence and identity, which set it off both from earlier and later centuries, and from other regions of Europe and beyond.

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