different times through the lives of people, families, and lineages—to follow their course through retrospective accounts from the 1930's to the Second World War, postwar affluence, and the economic stagnation of the 1970's. Analysis of the survey data produces a snapshot of Middletown families without the sense of historical depth and process that Hill conveys in his concluding overview of broader currents of family change.

Many contributions about family change and continuity emerge from the research of Middletown III, but perhaps the most important one involves the stream of questions it raises about the validity of popular views on family trends since the 1920's. The danger of false knowledge is self-evident, especially with respect to policy. Equally problematic is the very thin state of knowledge on the process of family change. In *Middletown Families*, two waves of data collection separated by half a century leave most everything about this process to the realm of imagination. Then-and-now comparisons pose a good many puzzles about how the Middletown families of 1975 evolved from the family patterns of the 1920's. Perhaps these puzzles will generate fresh thinking about the course of family change and stability in 20th-century America. No development could be more timely or valuable.

GLEN H. ELDER, JR.
Departments of Human Development and Sociology, Cornell University, Ithaca, New York 14853

Population Patterns: A Reconstruction

The Population History of England, 1541–1871. A Reconstruction. E. A. WRIGLEY and R. S. SCHOFIELD, with contributions by Ronald Lee and Jim Oeppen. Harvard University Press, Cambridge, Mass., 1981. xvi, 780 pp., illus. $60. Studies in Social and Demographic History.

In 1798 T. R. Malthus published his *Essay on the Principle of Population*, the first systematic analysis of the relationship between economic and demographic change. Emphasizing the fundamental disparity between the potential rates of expansion of population and the food supply, he argued that mortality (the positive check) usually intervened to curb overpopulation. Malthus also suggested that prudence in the form of delayed age at marriage (or the preventive check) might serve as an alternative to the otherwise inevitable increase in death rates. As he was writing England was in the initial phase of the industrial revolution, a development in productivity that eventually would transform the material basis of English society. Just three years later, in 1801, the population of England was enumerated for the first time, an administrative innovation that initiates a new era in terms of the sources of historical demography.

Now, nearly two centuries later, E. A. Wrigley and R. S. Schofield, two of the co-directors of the Cambridge Group for the History of Population and Social Structure, have addressed the issues of population dynamics before and after industrialization by reconstructing estimates of vital rates and the size of the English population back to 1541. They employ a novel methodology, that of back-projection of cohorts beginning with the age groups recorded in the 1871 census, and the major source for English demography in the pre-census era, the recordings of baptisms, marriages, and burials made by the incumbents of 404 of the 10,000 ancient parishes of England.

Because England was the first country to undergo industrialization, its population history has had unusual importance. During the second half of the 18th century, commentators disagreed about as basic a matter as whether the population had grown since the Glorious Revolution of 1688, a dispute that suggests the problematic nature of demography in an era without demographic sources. England's population experience informed economic and social theorizing from the time of Adam Smith to that of Karl Marx, and during the 20th century scholars have argued about the relative importance of changes in mortality and changes in fertility in the rapid population growth in the period of industrialization. Although national tabulations of the number of 18th-century vital events at ten-year intervals had existed since the early 19th century, the accuracy of the figures was so uncertain that a plausible case could be made for the preeminence of either factor. Rather than directly demonstrating the validity of a particular thesis, scholars more typically attempted to rule out alternative explanations by using indirect arguments.

In this volume, Wrigley and Schofield have achieved a major advance in the establishment of a reliable data base for English population history in the pre-census period. Although some disagreement about the record will continue, as was apparent at a March 1982 Asilomar, California, conference on the book, future revisions necessarily must contend with the Wrigley-Schofield estimates and match their rigorous and imaginative techniques. The task of reconstructing the population history of England between 1541 and 1871 was complex. The first five chapters and ten of the 16 appendixes of the volume explicate the approach and procedures used. Both in their use of best-practice demography and in their thorough explanation, these sections could serve as a textbook for a graduate course in the methodology of historical demography.

Variation in the original quality and in the survival of English parish registers made a random or systematic sample impossible. Volunteers interested in local history sent to Cambridge monthly tabulations of the numbers of baptisms, marriages, and burials; some 3.7 million of these monthly totals entered the sample. Since temporal gaps appear even in these documents of relatively high quality, missing events had to be inserted into the holes. Since larger parishes were over-represented among the 404 parishes reported on, the size distribution was weighted to conform to the distribution of a random sample of parishes in 1811. Also, the number of vital events occurring in London had to be incorporated separately into the sample. Additional corrections were required to account for the increasing interval between birth and baptism and for the leakages of events into the registers of nonconformist congregations. Multiplying by the ratio of the total population in 1811 to the population in the 404 parishes yielded estimates of the numbers of events occurring on a national basis.

The enumerations by age in the early 19th century censuses indicated that further correction was in order. Too many were in the younger age groups for the estimated number of children baptized in the corresponding birth cohorts. The correction for the undercounting of births had to be increased in this period. The combination of census and vital statistics records generally results in estimates more secure than those based on either source alone. Unfortunately, auxiliary sources of demographic information are much scarcer in the 16th through the 18th centuries. The most compelling evidence supporting Wrigley and Scho-

field's finding of the dominant role of increasing fertility during the era of rapid growth of the Industrial Revolution derives from family reconstitution, a genealogical rather than a temporal means of organizing the information in the parish registers. In some 12 parishes studied in this manner, female mean age at first marriage fell more than three years between the second half of the 17th century and the first half of the 19th. On the other hand, Wrigley and Schofield's estimate of low fertility and consequently an older population during the 17th century clashes with the evidence used by the political arithmetician Gregory King, who reported a younger (and implicitly a higher-fertility) population for 1695.

In response to the inevitable uncertainties about the completeness of the parish register data, Wrigley and Schofield show that reasonable alternative assumptions about reporting do not radically change the main outlines of their interpretation. In particular, markedly changing the ratio of baptisms to burials produces unrealistic figures for the level of net migration in the population generated by the back-projection procedure. In order for Wrigley and Schofield's estimates to be radically off the mark, a significant number of families in the century between the Restoration of 1660 and the period of rapid growth of dissenting congregations would have to have been so disaffected from or apathetic about Anglican ritual that they avoided the celebration and recording of their vital events by the parish minister. Though this type of nonregistration is the most difficult to detect through demographic means, one would expect that such alienation from the practices of the established church would have attracted more comment by contemporaries.

Back-projection of cohorts generates estimates of net migration and population size at five-year intervals between 1871 and 1541. Without this approach the volume of net migration would have to be assumed in order to calculate the size of the population at each date before 1801. The computer program, devised and refined by Jim Oeppen, constructed these figures by making several passes through the data, in effect determining successively more precisely the extent of the trade-off between net migration and the size of the population at each earlier date. By specifying the population by age, the back-projection technique produces more refined measures of fertility, such as the gross reproduction rate and the ratio of the non-working-age to the working-age population. Though the procedure necessarily used several less than completely realistic assumptions, it appears that the results are less sensitive to the details of the back-projection technique than they are to the adjustments made to the series of vital events.

Wrigley and Schofield's reconstruction of English population back to the mid-16th century revises and clarifies earlier interpretations. First, growth was not constant. Although the population expanded rapidly during the 16th and into the early 17th century, it stabilized and even declined for part of the period between 1621 and 1686. Following a half century of very modest growth, the population rose moderately until the penultimate decade of the 18th century and then surged to a peak rate of 1.55 percent per annum during 1821–26.

Variations in the rate of population growth were not solely the result of changes in death rates, although Wrigley and Schofield's family reconstitution studies point to the stability in marital fertility over the entire three centuries. Both mortality and fertility varied markedly, with changes in marriage patterns causing alterations in the latter. Life expectancy in the late 16th and early 17th century was as high as in the mid-19th. Mortality increased during the middle half of the 17th century and remained high until it began a slow decline in the fourth decade of the 18th century. Fertility also followed a long cycle, with the gross reproduction rate declining from 2.8 in the middle of the 16th century to a nadir of 1.9 in 1650–1680; it then rose slowly to 2.3 by 1756 and accelerated to a peak of 3.06 in 1816. Until the mid-18th century changes in birth and death rates were roughly equally responsible for variation in the rate of population growth. During the period of most rapid expansion, the century after 1750, increased fertility was the source of more than two-thirds of the increase in the intrinsic growth rate of the English population.

The reconstruction of the English population in this volume is a major achievement in the field of historical demography. Wrigley and Schofield have created these estimates in order to analyze the relationships between changes in demographic variables and variations in other phenomena, such as prices and temperature. Both the long cycles and short-period (monthly and annual) fluctuations are analyzed. Employing econometric techniques, Ronald Lee, a Berkeley economist, has contributed a separate chapter on the latter topic.

Because of their interest in the Malthusian model, the most important independent variable for Wrigley and Schofield is the index of real wages, a time series driven by variations in the prices of foodstuffs. They demonstrate specifically, as Malthus argued generally, that increases in population beyond a half percent per annum depressed the level of real wages. This Malthusian connection was, however, severed during the 19th century as both real wages and population increased rapidly. Malthus was not the last social scientist to be better at predicting the past than the future.

Although mortality was significantly correlated with price fluctuations in the short run, Wrigley and Schofield stress the complexity of the relationship and the exogenous role of mortality in the system of English population dynamics. The long wave in mortality was possibly shaped more by variations in the disease environment than by alterations within the society and economy of humans. Most puzzling, both to the authors and to the reader, is the relationship between the turning points in the curves of real wages and fertility. The latter did respond in accordance with Malthusian predictions (lower real wages raised age at marriage and lowered fertility), but only after a lag of a half-century. Wrigley and Schofield briefly argue both for the possibility of deficiencies in the index of real wages and for the plausibility of a response by birth cohorts who compared their economic circumstances with those faced by their parents. Since there is only one trough in fertility between 1541 and 1871, the analysis of this long cycle is necessarily as much historical as statistical. Better understanding of these shifts will come through the study of microdemographic behavior available in family reconstitution data, the subject of a future volume planned by the Cambridge Group, and through regional and local comparisons within England. The crucial role played by nuptiality in the secular trends that are a major focus of this volume indicates that understanding the timing of entry into marriage will be the central issue in future work.

Like most work in historical demography, this study will have a modest impact on population studies more generally. In demonstrating that fertility was by no means invariant before its secular decline after 1870 and that it was the leading force behind the rapid growth of population during the Industrial Revolution, Wrigley and Schofield have made older, simpler models obsolete. But they also show that the English pattern in the century after 1750 differed sharply from those of Sweden and France. Historical complexity has replaced generalizations

that could usefully be juxtaposed to, for example, the experiences of the populations of currently developing societies. Historical demography is an iconoclastic rather than a synthetic science.

However, its combination of meticulous demography, methodological innovation, imaginative analysis, and substantive importance make *The Population History of England* a landmark work in historical demography and the social-scientific approach to history. If not the last word on English population before 1801, it surely is now the best word. Its methods, findings, and insights will stimulate researchers for years to come.

DANIEL SCOTT SMITH
Department of History, University of Illinois, Chicago 60680, and Newberry Library, Chicago 60610

Economic Models Under Challenge

Rational Expectations and Econometric Practice. ROBERT E. LUCAS, JR., and THOMAS J. SARGENT, Eds. University of Minnesota Press, Minneapolis, 1981. xl, 690 pp., illus. Cloth, $60; paper (in two volumes), $13.95 per volume.

Studies in Business-Cycle Theory. ROBERT E. LUCAS, JR. MIT Press, Cambridge, Mass., 1981. xii, 300 pp., illus. $17.50.

The theory of macroeconomics has been irreversibly affected by the powerful and original developments pioneered by Robert Lucas and Thomas Sargent. Those of us who disagree with them have been forced to rethink our models, assumptions, and prejudices. And we have co-opted some of their ideas. They have converted to their cause a noticeable portion of professional economists; they have influenced economic policy; and they have done all this against the opposition and even the ridicule of the economics mainstream.

The mainstream view is what Paul Samuelson called the neoclassical synthesis. This tradition owes much to the work of John Maynard Keynes and accepts that active policy measures are required in order to stabilize the economy and prevent excessive booms and slumps. But Keynes wished to discard most of the neoclassical theory of the allocation of scarce resources, with its assumption that people and businesses act rationally in their own interest. The Samuelsonian synthesis, on the other hand, developed an uneasy truce wherein the general level of prices and wages is determined in one way but then neoclassical ideas take over to explain relative prices, or how much one good costs relative to another.

The mainstream view, therefore, contains a potentially serious inconsistency between macro- and microeconomics, but as long as the economy performed well the worries were muted. Starting in the mid-1960's things started to go wrong, and the combinations of inflation and unemployment we have experienced since then have grown steadily worse, despite or because of the efforts of both Democratic and Republican administrations and advisers. The time is right for new approaches.

The collection edited by Lucas and Sargent covers many of the major contributions to rational expectations theory and a number of empirical investigations. These papers explain the assumption of rational expectations, as first proposed by John F. Muth, and how this assumption has been incorporated into a new model of the business cycle. Several papers test the theory against time-series evidence and discuss the appropriate statistical methods to be used when assuming rational expectations. The implications of the new theory for macroeconomic policy are developed in detail. For general readers the collection has two shortcomings. First, many of the best papers are omitted, because they are in the Lucas collection. Second, all the papers were written for an audience of professional economists, and noneconomists will find them pretty tough going. The main use of this collection is as a reference for the professional economist.

Studies in Business-Cycle Theory, the collection of papers by Lucas, does contain several nontechnical articles in which the main features of his new approach to macroeconomics are set out, together with a discussion of the implications of the models and the motivation behind them. At his best, Lucas writes well, and one can see him wrestling with his feelings as he goes out of his way to praise his intellectual opponents and then pours withering scorn on their ideas. It makes for good reading. Someone with only a modest knowledge of economics who wants a serious introduction to the new theory could get a lot out of this book.

Rather than dealing with the papers in the volumes individually it makes more sense for me to try and explain what the new ideas are all about. The theory has three basic ingredients. The first is that prices and wages are determined competitively and adjust with complete flexibility to clear all markets; that is, supply always equals demand. The second is that markets behave as if the persons trading in them form unbiased—"rational"—expectations of all the uncertain variables that affect their own decisions. (This means that individuals and firms must have an intuitive understanding not only of how they are affected by economic events occurring in their own particular industry or market but also of how general monetary and fiscal policy and even worldwide economic events will affect them.) The third is that observed cyclical fluctuations in the economy result from the short-run errors that individuals make. People do have limited information, since knowing probable values does not mean knowing what actually happens.

Given these axioms, it follows that in the absence of any major disturbance or shock the economy will operate at an efficient equilibrium point where no one can be made better off without making someone else worse off.

At the level of the individual firm or worker, changes in the technology, movements in world trade, and even the weather may all create uncertainty and lead to layoffs and unemployment. Output and employment fluctuations may be quite large for particular firms or industries, but in the aggregate these will tend to average out, so that total output and unemployment will remain fairly constant. The unemployment rate in equilibrium, which is called the "natural rate," results from the frictional and structural adjustments that are occurring in individual firms and markets.

Causes of Business Cycles

Fluctuations in the aggregate demand for goods are taken to be the main cause of observed business cycles, where output and unemployment for the economy as a whole deviate from their equilibrium or natural levels. The rational expectations economists see erratic and unpredictable government policy as the principal cause of such demand fluctuations. In particular, changes in the quantity of money induce cyclical fluctuations in the economy.

When the Federal Reserve Board acts