
DEBATES

The Logistics of European Economic Growth: A Note on Historical Periodization

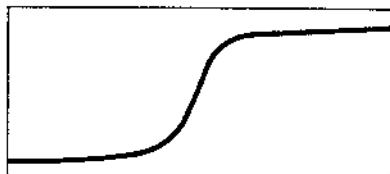
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Logistic curve *n*: a curve representing a function involving an exponential and shaped like the letter S ' a mass of data on growth of subhuman and human populations, of the number of governmental functions, growth of production, inventions, state laws and so on, to show that their growth and diffusion follows the *logistic curve* — P. A. SOROKIN'.

(*Webster's Third New International Dictionary*)

In ordinary usage the term logistics refers to the organization of supplies for a large group of people, such as an army. But the word logistic (singular) is also the name of a mathematical formula. The curve derived from it, the logistic curve, has the form of an elongated S and is sometimes called the S-curve. It is also called by biologists the growth curve, because it describes rather accurately the growth of many subhuman populations, such as a colony of fruit flies in a closed container with a constant food supply. The curve has two phases, one of accelerating growth being followed by a second of deceleration; mathematically, at its limit the curve approaches asymptotically a horizontal line which is parallel to the asymptote of origin.



It has also been observed that many social phenomena, especially the growth of human populations, can be roughly described by a logistic curve. In the case of Europe, three long-period surges of population growth have

been identified, each being followed by a period of relative stagnation or even decline. The first of these began in the ninth or tenth century, probably reached peak rates in the twelfth century, began to slow down in the thirteenth, and was abruptly terminated by the Great Plague of 1348, when Europe lost a third or more of its total population. After a century of relative stagnation population began to grow again around the middle of the fifteenth century, reached peak rates in the latter half of the sixteenth century, and again leveled off or possibly even declined in the seventeenth century. Toward the middle of the eighteenth century the process got underway again, this time much more powerfully, and continued at unprecedented rates until interrupted by the world wars and related misfortunes of the first half of the twentieth century. There is some evidence of a fourth logistic, this time on a world scale, having begun since World War II.

The serious scientific study of historical logistics has scarcely begun, and it would be premature to place too much emphasis upon them. There is, as yet, no compelling theoretical reason to believe that human population growth necessarily follows a logistic pattern, and it is significant that the three identifiable growth surges in Europe have been terminated by natural or man-made disasters, such as plagues and wars. Nevertheless, the similarity of the sequence deserves note. It is plausible that the growth of Greek population between the ninth and fifth century B. C. followed a logistic pattern, as also the population of the Mediterranean basin in the era of the *Pax romana*. Some scholars believe that the three identifiable European logistics were in fact worldwide, and related to climatic variations.

Whether or not the growth of population actually conforms to the logistic curve, there are other related aspects of the phenomenon that intrigue the scientific imagination. It is virtually certain that each of the accelerating phases of population growth was accompanied by economic growth in the sense that both total and per capita output were increasing. (If per capita output merely remained constant as population grew there would be an increase in total output, of course; but we are warranted in making the stronger statement). This is most clearly attested for the third logistic (and the incipient fourth), for which statistical evidence is relatively plentiful; but there is also much indirect evidence for similar behavior during the first and second.

The hypothesis of economic growth accompanying the growth of population is strongly supported by the unquestioned evidence of both physical and economic expansion of European civilization during each of the accelerating phase of population growth. During the eleventh, twelfth and thirteenth centuries European civilization expanded from its heartland between the Loire and Rhine rivers to the British Isles, the Iberian peninsula, Sicily and southern Italy, into central and eastern Europe and even, temporarily, during the Crusades, to Palestine and the eastern Mediterranean. In the late fifteenth

and sixteenth centuries maritime exploration, discovery and conquest took Europeans to Africa, the Indian Ocean and the Western Hemisphere. Finally, in the nineteenth century, through migration, conquest and annexation, Europeans established their political and economic hegemony throughout the world.

There is also evidence that conditions of life for ordinary men and women were becoming increasingly difficult in the decelerating phases of the first two logistics (first half of the fourteenth and seventeenth centuries, respectively), suggesting a decline or at least stagnation of per capita incomes. In the third logistic the opportunity for large scale emigration from Europe in the late nineteenth and early twentieth century palliated the condition of the masses; even so, there were localized subsistence crises in a number of countries, of which the Irish famine of the 1840's was the most dramatic. In the light of these observations the remark of Adam Smith, who was writing in the accelerating phase of the third logistic, to the effect that the position of the laborer was happiest in a « progressive » society, dreary in a stationary one, and miserable in a declining one takes on a new significance.

Another similarity of note is that the final phases of each of the logistics, and the intervals of stagnation or depression that followed, witnessed the spread of social tension, civil unrest and disorder, and the outbreak of unusually fierce and destructive wars. To be sure, wars and civil strife occurred at other times as well; and there is no obvious theoretical reason why the decline of population growth should have resulted in the breakdown of international relations. Possibly the wars were simply fortuitous occurrences that put an end to periods of growth that were already waning. But the question is worthy of further study.

It would no doubt be straining credulity to suggest that notable periods of intellectual and cultural ferment were also related somehow to the logistic. It is remarkable, nevertheless, that the accelerating phases of each period of population growth witnessed outbursts of intellectual and artistic creativity followed by a proliferation of monumental architecture: medieval cathedrals, baroque palaces and the nineteenth century Gothic revival. It is true, of course, that man's creative efforts are not confined to specific historical periods, any more than his destructive tendencies are. The origins of the Renaissance were located in the great depression of the later Middle Ages (one noted scholar, Professor Robert Lopez of Yale, has even suggested that Renaissance art was a response to the depression), and the century of genius that included Galileo, Descartes, Newton, Leibniz and Locke spanned the interval of stagnation and upheaval between the second and third logistics. It is just possible, however, that periods of crisis in human affairs, when the established order appears to be breaking down, may stimulate the best intellects in a variety of fields to a re-examination of accepted doctrines. Such lofty considerations lie outside the scope of this note, however.

Whether or not the logistic will prove to be a useful or enlightening tool of historical analysis, the sequence of population growth briefly described above is now well established, and the associated movements of income, although less definitely established for the first two surges of population, are highly probable. The periodization suggested by these movements provide a more convenient and appropriate framework for a history of European economic development than conventional political dates, such as an arbitrary « end of the Middle Ages » and the outbreak (or termination) of the French Revolution.