



Robert W. Fogel

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1993

Autobiography



I was born in New York City in 1926, four years after my parents and my brother migrated to the United States from the city of Odessa in Russia. Although they arrived in New York penniless, my parents scraped together enough savings to establish the first of several small businesses just after I was born. Despite the hard times of the Great Depression and the modest financial circumstances in which we lived, they created a joyful household and they encouraged my brother and me to be optimistic about the future.

My parents' reverence for learning encouraged both my brother and me toward academic pursuits. In many ways, however, it was my brother who was the main intellectual influence on me until he joined the armed forces in 1941. Almost six years my senior in age and nine years ahead of

me in school, he inspired me with his intellectual brilliance. I still remember the intense discussions by my brother and his college classmates about the social and economic issues of the Depression that I overheard as I lay in my bed, supposedly asleep, in the next room.



My education in the public schools of New York City between 1932 and 1944 was an excellent preparation for a life in science. Because of the Depression, these schools were able to attract a remarkably talented and dedicated collection of teachers who encouraged their students to strive for the highest levels of accomplishment. That environment led me to aspire to a career in science, and also kindled my love for literature and history.

My professional training began at Cornell University (BA 1948) and continued at Columbia University where I obtained my MA (1960), and at Johns Hopkins University, where I obtained my Ph.D. (1963). It was at Cornell that my scientific interests shifted from physics and chemistry to economics and history. The switch in focus was precipitated by the widespread pessimism about the future of the economy during the second half of the 1940s, when forecasts about the imminent return to the massive unemployment of the Great Depression were rife.



I began my graduate training with the naive belief that by combining the study of history and economics I would quickly discover the fundamental forces that had determined technological and institutional changes over the ages and that such knowledge would point to solutions to the current problems of economic instability and inequity. As I became aware of how little was actually known about these large processes and their interconnections, I began to focus on more discrete issues: What did we really know about the role of the factory system in economic and institutional change during the nineteenth century? What was the nature and the magnitude of the contribution of particular new technologies, such as railroads or steel mills, to economic growth? I also concluded that to answer such questions, much greater use had to be made of quantitative evidence, so I set out to master the most advanced analytical and statistical methods that were then taught in the economics department. It was only later that I discovered that the training program I had worked out for myself was unorthodox for an economic historian.

The two teachers who influenced me the most during my year at Columbia were [George J. Stigler](#), who taught the graduate microeconomics sequence, and Carter Goodrich, who taught the sequence in American economic history. Stigler made microeconomic theory come alive. He emphasized not its elegance but its applicability to a wide range of issues in economic policy. He continually moved between theory and evidence, carefully considering the empirical validity for the assumptions that theorists made about the slope or other aspects of the shape of key functions. He often considered when, with what model, and under what implicit assumptions one could draw a particular inference from a given body of data.

Goodrich impressed me not only with his knowledge of the literature of American economic history, but with his willingness to identify the gaps in the profession's collective knowledge of key issues. By the end of the course one not only had a good grasp of what was known about the process of American economic growth, but a list of potential

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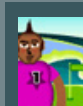
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projects. It had Goodrich that I turned for advice on my master's thesis. He was then engaged in research for his book, *Government Promotion of Canals and Railroads* and raised a number of issues that puzzled him about the financing, riskiness, and benefits of the Union Pacific Railroad. These questions became the subject matter of my master's thesis, which was also my first published book. Although Goodrich did not himself make use of the new mathematical and statistical methods of economics, he encouraged me to do so. He also suggested that, given my substantial interests and quantitative approaches to economic history, [Simon Kuznets](#) at Johns Hopkins was probably the best economist to guide my future training.

The teachers who taught me the most at Johns Hopkins, aside from Simon Kuznets, were Abba Lerner and Fritz Machlup in microeconomic theory; Evsey Domar in macroeconomic theory and the theory of economic growth; T.C. Liu in mathematical economics, and two teachers of mathematical statistics and of sampling design in the School of Public Health.

Simon Kuznets, who supervised my doctoral dissertation, was by far the most influential figure in my graduate training. Soft spoken and of moderate stature, one did not have to be in his class very long to discover that he was a towering intellect, erudite not only in economics, but also in history, demography, statistics, and the natural sciences. His course in economic growth covered the history of technological change during the modern era, demography and population theory, and the use of national income aggregates for the comparative study of economic growth and of the size distribution of income. It was not until some years later that I realized the course presented the substance of the research that later appeared in a series of 10 supplements to *Economic Development and Cultural Change*, and in his 1966 monograph, *Modern Economic Growth: Rate, Structure, and Spread* - the work for which he was awarded the third Nobel Prize in economics. Kuznets's course was valuable not only for the substance of the material but also for the way that he used the material to transmit the art of measurement. He repeatedly demonstrated that the central statistical problem in economics was not random error but systematic biases in the data, and he conveyed a number of powerful approaches to coping with that problem, particularly emphasizing the role of sensitivity analysis.

By the time I left residence at Johns Hopkins, I had worked out a two-pronged research strategy that I thought could keep me going for a decade or more. The first was to measure the impact of key scientific and technological innovations, key governmental policies, and key environmental and institutional changes on the course of economic growth. The second was to promote the wider use of the mathematical models and statistical methods of economics in studying the complex, long-term processes that were the focus of economic historians. In my mind these two objectives were closely interrelated. The best argument for the new methods was the demonstration that in the study of particular issues, such as the contribution of railroads to economic growth, these methods were superior to traditional approaches. The new methods made it possible to lay out the key analytical issues in a manner that made them amenable to measurement, to identify the categories of evidence needed to resolve the points at issue, to develop techniques of measurement that were suitable for both the issues and the available evidence, and to assess the robustness of the results.

Several factors made the realization of my research program possible. One was the willingness of university administrators to provide me with a generous share of the limited research funds at their disposal, a *sine qua non* for work that was both labor and computer intensive. Even when I was still an unproven new assistant professor at Rochester, Lionel W. McKenzie provided several research assistants, a computer programmer, and all of the computer time I could use. Deans D. Gale Johnson and Robert McC. Adams made similar investments in my research at Chicago during the 1960s and early 1970s at levels that reflected as much their estimates of my promise as of accomplishments. This type of support was continued at Harvard by Henry Rosovsky during the last half of the 1970s.

Except for a small grant from the Social Science Research Council (SSRC) when I was still a student at Johns Hopkins, my work on railroads was supported exclusively from university funds. Since my later projects were based on ever-larger data sets, obtained primarily from manuscript sources at archives, these projects could not have been carried out without the generous support of foundations, particularly the National Science Foundation (NSF) and the National Institutes of Health (NIH), but to a significant degree also such private foundations as the Ford Foundation, the Exxon Educational Foundation, and the Walgreen Foundation Endowment Fund. University funding still remained crucial since it took considerable outlays of funds to bring a large project to a point that could win approval from peer review committees.

Another key factor was the plunging cost of data processing made possible by rapid advances in computer hardware and software. These technological developments made it feasible to work with ever-larger data sets. By linking together the data on individuals and households from a wide range of archival sources, data sets could be customized for particular economic issues. The sources include the manuscript schedules of decennial censuses, probate records, military and pension records, genealogies, tax rolls, death certificates, and public health records.

Still another important factor in making such research feasible was the cooperation of officials at the U.S. National Archives and of the Genealogical Library of the Church of Jesus Christ of Latter-Day Saints in Salt Lake City. The Genealogical Library is especially valuable because it is a depository for vast quantities of records from all over the United States, and from many other countries, relevant to economic, social, and biomedical research. Although collected for religious reasons, officials of the Library have made their holdings available to the scientific community, providing a resource that would otherwise

have required enormous sums of money to reproduce.

No single organization has contributed more to the study of long-term economic growth than the National Bureau of Economic Research (NBER). The long-term approach figured prominently in NBER research programs conducted between the late 1930s and the late 1960s. That work, which was conducted mainly at the macro level, was a continuation of the Bureau's pioneering work in the development of national income accounts and related measures of macroeconomic behavior. However, during the 1970s the Bureau's work on long-term growth processes had waned. When Martin Feldstein became President of the NBER in 1977 he decided to undertake a new program on the long-term Development of the American Economy (DAE), and asked me to be its program director.

I appointed an executive committee consisting of Lance E. Davis, Stanley L. Engerman, Robert M. Gallman, Claudia D. Goldin, Clayne L. Pope, and myself to chart the direction of the new program. After reviewing the Bureau's past work, and the new direction it was taking under Feldstein's leadership, the committee sought to identify a set of current policy issues to which the DAE could contribute. In the course of this review we consulted with Simon Kuznets, [Douglass C. North](#), Richard A. Easterlin, and Moses Abramovitz, among others.

After more than a year of investigation, we concluded that to understand the sources of the long-term decline in saving and investment rates, the factors influencing the rate of technological change, or the long-term shifts in the demographic structure of the population and the labor force, we needed to know much more about microeconomic behavior than was known at the time. Research at the microeconomic level, however, had been inhibited by the absence of suitable data. The DAE, therefore, turned its attention to the problem of constructing new data sets capable of illuminating the relationship between the current and the past behavior of families and firms.

The executive committee launched a series of pilot projects investigating the feasibility of creating several representative data sets consisting of intergenerationally linked families. Such data sets would open up entirely new possibilities for examining the interaction of economic and cultural factors and their mutual influence on such variables as the saving rate, the rate of female entry into the labor force, fertility and mortality rates, the inequality of the wealth distribution, migration rates, and rates of economic and social mobility. These data sets could not be created from a single set of records but required the linking of several different types of archival records. The executive committee also began a pilot study on the feasibility of constructing data sets based on firm records that would permit the analysis of the way that firms respond to the changing technological opportunities that are open to them, as well as to the changing institutional and legal environment in which they must operate. Dealing with such issues required the development of representative sets of firm records stretching over long periods of time that not only contained information on the decision-making processes of these firms, but also on the economic consequences of the decisions.

The DAE's review of the pilot projects concluded that the design of portable computers for data retrieval, and of software to manipulate large files, had developed to the point where the creation of such microeconomic data sets was feasible. A score of projects were set out by 1980 and investigators to lead them were chosen. Claudia Goldin, who became the director of the DAE in 1991, reported that there are now some forty DAE research associates. Since the start of the DAE, they have created over fifty longitudinal and cross-sectional data sets that span the period from the late 1700s to the present. These data sets have formed the basis for scores of papers, several conference volumes and a number of monographs.

My ability to work on the problem of creating and studying large lifecycle and intergenerational data sets reached a new level in 1981 when Richard N. Rosett, then Dean of the Graduate School of Business at The University of Chicago, invited me to succeed George J. Stigler as the Charles R. Walgreen Professor of American Institutions. In addition to the unusual research fund endowed by Walgreen, Rosett offered to establish a Center for Population Economics (CPE) that would focus on the interaction of economic, demographic, and biological processes over life-cycles and generations. The invitation was enthusiastically supported by Hanna Gray, who was then the President of The University of Chicago. The generous support of the CPE has been continued by John P. Gould, who succeeded Rosett as Dean, by Robert S. Hamada, the current Dean, and by Hugo F. Sonnenschein, President of The University of Chicago.

Without the resources of the Walgreen Chair and the CPE the current research projects on which I reported in the Prize Lecture would not have been possible. The data on health conditions, for example, comes from a project called *Early Indicators of Later Work Levels, Disease, & Death* which is tracing nearly 40,000 Union Army men from the cradle to the grave. It takes over 15,000 variables to describe the life-cycle history of one of these men. These life-cycle histories are created by linking about a score of data sets. It took more than half a decade of work to investigate the potential of these data sets, work out procedures for data retrieval and file management, and to establish the feasibility of the enterprise in our own minds.

The site committee of the National Institutes of Health which reviewed the original project proposal in 1986 agreed that such a project could in principle make a significant contribution to an understanding of the process of aging, but they were skeptical about the quality of some of the data, about whether the software and programming procedures we had developed by that time were adequate for the management of such a large data set, and about whether the project could be completed within the proposed budget. To resolve these doubts it was necessary to draw a six percent subsample which linked together all of

the separate sources and the effectiveness of the software by analyzing the information in the subsample. It took an additional four years to complete the second phase of the justification of the project. Thus nearly a decade of preliminary research, much of it funded by Walgreen and the CPE, was required before the project was accepted by the peer reviewers of NIH and NSF.

No individual has done more to help me pursue a career in science than my wife of forty-five years. I met Enid Cassandra Morgan during the election campaign of 1948 when she was a Sunday school teacher, a leader of the youth organizations of St. Phillips Episcopal Church, and the head of Harlem Youth for the election of Henry Wallace. Over the years Enid has been both my most confident supporter and my keenest critic. During my graduate training her earnings contributed significantly to the income of our family. When I was an assistant professor she combined care of the children with many hours of unpaid labor as a research assistant in library archives. She helped boost my self-confidence when my unorthodox findings provoked controversy and criticisms, and she often provided insightful suggestions for the improvement of my lectures, papers, books, letters, and research proposals.

Throughout the years she has been the overseer of my social conscience, pulling me back to reality when she saw that my preoccupation with the abstract aspects of scientific issues had led me to extenuate their deeply human aspects. I also benefitted greatly from her experiences as Student Counselor, Dean of Students, and Director of Student Life at Rochester, Harvard, and Chicago. She has helped me to understand the administrator's point of view and to improve what she and my sons refer to as "people skills".

My sons, Michael and Steven, have shared in the joys and the tribulations of being raised by academic parents. They have encouraged me to adhere steadfastly to scholarly principles in the face of unfair criticisms. They have read my papers and books, offered helpful suggestions, and sometimes helped substantially in the process of editing, teaching me how to say more with fewer words.

One aspect of the plunging cost of data processing has been the emergence of large-scale collaborative projects in economic history. Such projects have been promoted partly by economies of scale in the retrieval and cleaning of the data sets and partly by the wide range of skills required to manipulate, analyze and interpret the data. There were, for example, thirty five contributors to the three technical volumes of *Without Consent or Contract*, many of them former students who are now distinguished senior investigators. The research team for the *Early Indicators* project is even larger. It has been my good fortune to have had access not only to the pool of talented students at Chicago, but also to those at Harvard and Rochester. In both the slavery and aging projects these students were often far ahead of the senior investigators in recognizing major unanticipated findings, in proposing novel approaches to the analysis of the data, in discovering new data sets, and in offering probing criticisms.

It is known far and wide among economic historians that much of the credit for the success of my research enterprises goes to Marilyn Coopersmith who has worked with me for more than a quarter of a century. She was the administrative assistant of the DAE program from its inception until 1991, and she has been the associate director of the CPE since 1981. She is not only an effective coordinator but has been a diligent researcher and a friend to a legion of graduate research assistants, who often turned to her for help in overcoming bureaucratic obstacles.

The companionship of scholars and the thrill of continuous learning are two wonderful aspects of a life in science. When one is engaged with students who are both very curious and very bright, it is never quite clear who is teaching whom. I have also had the good fortune of collaborating with senior investigators who are all exceptional teachers with enthusiasm for their work and with great patience for the bewilderment of novices. Their guidance greatly facilitated my efforts to train myself for research involving the interconnections between economics, demography, and the biomedical sciences. James Trussell tutored me as I tried to master the mathematical models of demography and the art of applying them to incomplete data. J.M. Tanner has spent numerous hours teaching me the fundamentals of the branch of medicine called auxology (the study of human growth), looking at our data and helping to interpret them, guiding me through basic texts, calling my attention to the latest relevant papers, and reading and criticizing my work. I received a similar education from Nevin S. Scrimshaw in epidemiology (particularly of infectious diseases), in nutrition, and in some aspects of both physiology and clinical medicine.

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