Maurice Allais

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1988

Autobiography

My youth

I was born May 31, 1911, in Paris. My parents owned a small cheese shop, and my maternal grandfather was a carpentry worker. I thus came from what is commonly known as the working class.

In August 1914, my father was called to war, and then taken prisoner. He died in captivity in Germany on March 27, 1915. My youth, indeed my entire life, was deeply marked by this, directly and indirectly.

Albeit in often difficult conditions, I was nevertheless able to pursue my secondary studies. I received my high school baccalaureate diploma in Latin and Science in 1928, then my two baccalaureate diplomas in Mathematics and Philosophy in 1929. Throughout my college career I was generally first in my year in almost all subjects, including French and Latin as well as Mathematics.

Fascinated by History, I wanted to apply to the Ecole des Chartes, but on the insistence of my mathematics teacher I entered the special mathematics class in order to prepare for the Ecole Polytechnique, which I entered in 1931. I graduated first in my class in 1933, which is commonly considered to be a "summum" in France. Indeed, the Ecole Polytechnique, together with the Ecole Normale Superieure, are the top of French education in the sciences.

My choice of a government administration upon graduation was the "Corps National des Mines", not because of any particular vocation, but simply because each year the top graduates of the Ecole Polytechnique (three in my class) always chose this government service because of the career possibilities it opened up in the country's large industrial enterprises.

After a year of military service, first in the Artillery School at Fontainebleau and then in the Alpine Army, and two years at the Ecole Nationale Superieure des Mines in Paris, I started as an engineer in the mines public service in October 1936.

My professional career

In 1937, at the age of twenty six, I found myself in charge of the Nantes Mines and Quarries Service, which included five of the 89 French "departments", and also put in charge of a number of controls, in particular that of the general and local railway system.

In 1939, I was called back to the Alpine Army on the Italian front, and was given command of a heavy artillery battery in the area of Briancon. But the real war only lasted two weeks, from June 10, 1940, when Italy declared war on France, until June 25, 1940, the date of the armistice.

Released from service, I took up my old position in Nantes in July 1940 in the German occupation zone. From October 1943 to April 1948 I was director of le Bureau of Mines Documentation and Statistics in Paris.

From January 1941 to April 1948 I simultaneously carried out my administrative functions and published my first works: two fundamental works, *A la Reserche d'une Discipline Economique*, (In Quest of an Economic Discipline), and *Economic et Interet* (Economy and Interest, 1947); and three minor works, *Economic Pure et Rendement Social* (Pure Economics and Social Efficiency, 1945), *Prolégomenes a la Reconstruction économique du Monde* (Prolegomena for the World Economic Reconstruction, 1945), and *Abondance ou Misère* (Abundance or Misery, 1946), as well as various news articles. Throughout this period I worked very hard, at least eighty hours per week.

From April 1948 on, I was relieved of all administrative duties and was able to devote all my time to teaching, research, and writing for publication. I was professor of Economic Analysis at the "*Ecole Nationale Superieure des Mines* " from 1944 on, and Director of a research unit at the "*Centre de la Recherche Scientifique* " (C.N.R.S.) from 1946 on. At various times I held teaching positions at other institutions, such as the Institute of

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Economics
Prev. year Next year

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Presentation Speech

Maurice Allais
Autobiography
Curriculum Vitae
Prize Lecture
Banquet Speech

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statistics at the University of Paris (1947-1968), the Thomas Jefferson Center of the University of Virginia as a Distinguished Visiting Scholar 1958 - 1959), the Graduate Institute of International Studies in Geneva (1967-l970), and the University of Paris-X (1970-1985).

I retired from the civil service on May 31, 1980, but, thanks to the Ecole Nationale Supérieure des Mines and the Centre National de la Recherche Scientific, I have been able to keep some means for working and to continue to in teaching, research, and writing.

I have received many awards for my works (fourteen scientific prizes from 1933 till 1987). The most important was the *Gold Medal of the National Center for Scientific Research* (C.N.R.S.), the most distinguished honour in French Science (as a rule there is only one Gold Medal every year for all sciences). It was awarded to me in 1978 for my lifetime work, the first, and, so far, the only time an economist has ever received this honour.

My involvement in applied economics and politics

In addition to the above activities I have undertaken economic studies for both private and nationalized firms, and for theEuropean Economic Community.

Throughout the years following World War II and until the formation of the European Economic Community in 1958, I was very active as a national or international rapporteur at many of the international conferences aiming to establish an European community. I also took part in various international conferences with the view of the foundation of an Atlantic community and I was rapporteur at the "NATO in Quest of Cohesion" international conference organized in 1964 in Washington by the Center of Strategic Studies of Georgetown University.

Finally, from 1959 to 1962, I was also founder and general delegate to the *Movement for a Free Society,* a liberal (in the European sense of the term) para-political organization.

My contributions to economic science

My contributions to the fundamental Economic Science have essentially focused on five fields, all concerned with the research of the conditions for a maximum efficiency of the economy and with the analysis of the corresponding determining factors of the distribution of income. I have given a broad outline of these contributions in my Nobel Lecture.

My work in applied economics

On a national level and in close connection with my work in economic analysis, I was led to study, more particularly, four areas of applied economics: economic management, the distribution of income and taxation, monetary policy, and the economy of energy, of transport and of mining research.

From the point of view of the management of the economy, the demonstration of the equivalence of states of maximum efficiency and states of equilibrium of an economy of markets (markets in the plural) is naturally of great import. It shows indeed that any economy whatsoever, whether collectivist or private property, must be organized on the decentralized basis of an economy of markets in order to be efficient and to use at best the scarce resources at its disposal.

What are then the conditions of implementation of an economy of markets? What are the ethical questions raised by such an implementation? Can the techniques of an economy of markets and the ethical aspirations of our time be reconciled? What are the monetary conditions of growth? What are the conditions of full employment? Such are the questions which I tried to answer. My major conclusion was that both the economic and ethical objectives of our time can be reached at the same time only if the institutional framework within which the economy works is appropriately reformed, and I have tried to specify the principles for such a reform.

On the international level, the active part I took in various organisations such as the European Union of Federalists, the European Movement, the Movement for an Atlantic Union, and the European Economic Communities, together with my lecturing for several years at the Institute of International Studies in Geneva, have led me to study thoroughly, in various works and memoirs, the international factors of economic development, the liberalisation of international trade, the monetary conditions of international economic relations, and economic unions.

In my study of the factors of development, as well as in that of the various economic systems, I was led to make numerous researches on the compared real income and productivity of France, the Soviet Union and the United States, to study in detail the economies of these countries, and to analyse the possible causes of the productivity differences observed. This analysis shows that the main explanatory factors are their systems of economic organisation together with the institutional framework within which they operate.

At the same time, my contacts with administrative and industrial circles led me to study, in my memoirs on the economy of energy, of transport and of mining research, three series of questions which I was asked on several times. What must the energy policy of investments, exploitation and price be in order to be considered effectively satisfactory? According to what principles must a rational coordination and tariff policy of transports be established? What is the optimal strategy to adopt for the mining research of mineral deposits? All these problems led me to study very diverse and concrete questions, and to reflect on numerous aspects of economic theory, econometrics and operational research. The - often new - solutions which I gave them gave rise to many debates in engineering circles and led many engineers to study economic theory and to apply it to their

respective fields.

For my 1952 memoir on mining research, published in English in 1957, I was awarded The Lanchester Prize 1958 of the Johns Hopkins University and the Operations Research Society of America for the outstanding paper, on *Operations Research*, published in 1957.

All my works in applied economics are closely linked to my works in economic analysis. Theoretical analysis naturally led me to applications, and the study of concrete questions has led me to reflect on the theoretical foundations from which it was possible to provide satisfactory answers.

I have been constantly driven by the conviction that a man of science cannot fail to take an interest in the fundamental problems of his time. I have of course never ceased to think that, whether as an adviser or a teacher, the economist as such should not take a stand on individual ends which often are contradictory. The ends to pursue belong to the field of politics and it is in fact the essential task of political systems to define them through overall compromises. But precisely, on the economic level, the economist's role is to examine whether the ends defined through such comprises are actually compatible with each other and whether the means used to reach them are really the most appropriate.

On the whole, on the level of the analysis as well as on the level of applied economics, my work has endeavoured to rethink the role of economic liberty and of an economy of markets as regards the search for efficiency and the achievement of the ethical objectives of our time, and to contribute to a thorough study of the questions raised by the economic organisation of societies.

There is no doubt that my works in applied economics have been influenced by a philosophy of liberal inspiration (in the European sense) along the lines of Alexis de Tocqueville, Leon Walras, Vilfredo Pareto, and John Maynard Keynes, to name but a few. But, whatever this influence may have been, I have constantly endeavoured to keep my analyses on as objective and as scientific a level as possible. In fact, all my works in applied economics are particularly marked by two characteristics, the first being that they are always founded on a thorough theoretical analysis, the second that they are constantly preoccuppied with the quantitative aspects of the questions studied.

My two parallel interests

During my whole career since 1936, I have had two parallel interests to which I have never ceased to devote an important part of my activity: history and physics.

My research on the history of civilizations

It is in the course of my secondary studies that I first was passionated for history. That passion has never left me since.

From 1961 to 1968 I wrote the first version of a general book, "*Essor et déclin des civilisations-Facteurs economiques*" (Rise and Fall of Civilizations - Economic Factors), which I have continued to improve and develop at different times over the past twenty years. This work, as ambitious as it is daring, tries to draw out permanent regularities, particularly quantitative, from the history of civilizations, dealing with economic systems, standards of living, technology, monetary phenomena, demographic factors, inequality and social classes, the respective influences of heredity and environment, international relations, exogenous physical influences on human societies, and political systems.

My research on the economic and social factors of the history of civilizations has been extremely enlightening for me. Nothing can be more formative than the study of the history of facts, doctrines and economic thought. Whether it be economic systems, the evolution of real income, monetary phenomena, demography, international relations, ideologies, or the interactions of these factors and their relationships of cause and effect, nothing can be more significant than their analysis.

My work in theoretical and experimental physics

My involvement in physics dates from my reflections on physics, mechanics, and astronomy courses at the Ecole Polytechnique. Had the National Centre for Scientific Research existed in 1938, I would have devoted myself to the study of physics and would not have become an economist.

But there again, over the past fifty years, while pursuing my activities as an economist, I have never stopped reflecting and working at various times on the problems involved in the elaboration of a unified theory of gravitation, electromagnetism, and quanta.

On the experimental level, and as a by-product of this theoretical research, I conducted, from 1952 to 1960, experiments on the anomalies of the paraconical pendulum (a short pendulum, about one meter long, suspended by a steel ball), anomalies the existence of which I proved. For these experiments I received the 1959 Galabert Prize of the French Astronautical Society, and I was laureate in 1959 of the United States Gravity Research Foundation.

My main idea at the start was that a link could be established between magnetism and gravitation by observing the movements of a pendulum consisting of a glass ball oscillating in a magnetic field. Of all the observations made in 1952 and 1953 I was not able to draw any definitive conclusion. Through certain experimental devices, I obtained positive effects, but with other devices I obtained no effect whatsoever. A much stronger magnetic field would have been necessary, but it was unrealizable in my laboratory with the available means.

But in the absence of any magnetic field other than that of the earth, I observed, in the course of continuous observations, pursued over periods of about one month from 1954 to 1960, very remarkable anomalies in the movement of the paraconical pendulum, to wit essentially the existence of a significant periodicity of the order of 24 hrs 50 min. Identical results were found in June-July 1958 in two laboratories, some 6 km away from each other, one in a basement, the other in an underground quarry.

At the same time, I observed in the second half of July 1958 a correspondence between the anomalies in the movement of the paraconical pendulum and the anomalies observed in the optical sightings on a fixed sighting mark through a fixed telescope.

Finally during the total eclipses of the sun on June 30, 1954, and October 22, 1959, quite analogous deviations of the plane of oscillation of the paraconical pendulum were observed.

In fact, all these phenomena are quite inexplicable within the framework of the currently accepted theories.

With regard to all these results as well as to their analysis I can make a prediction: if, without interruption, for at least one month, in the same place and at the same time, observations of the movement of the paraconical pendulum are made, together with optical sightings such as those I made, as well as a repetition of the Michelson-Morley (1887) and Miller (1925) experiments, the purpose of which was to display the movement of the earth relatively to the "ether", it will be found that the effects observed by Miller in 1925 correspond to the anomalies in the movement of the paraconical pendulum and the anomalies of the optical sightings which I observed.

All my researches in theoretical and applied physics which, at first sight, appear to be remote from my main activity as an economist, have, in reality, enriched me with valuable experience.

These researches, which constantly presented all kinds of very great difficulties, have led me to reflect on the nature of our knowledge, the nature of experience and theory, the difficulties of experimentation and the interpretation of results, and the scientific method in general.

I have been particularly struck by the identity of problems relating to the construction of models and the meaning of empirical data in economics and physics. Nothing has been more instructive for me than this confrontation between two apparently so dissimilar sciences.

From *Les Prix Nobel*. *The Nobel Prizes 1988*, Editor Tore Frängsmyr, [Nobel Foundation], Stockholm, 1989