



## MAURICE ALLAIS AND HIS ATTEMPT AT RIGOUR IN ECONOMIC SCIENCE

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*Among the names of those economists of world importance and who in no small measure have served in the development of the various fields of economic science, belongs that of the French*



*economist Maurice Allais. In 1988 he was awarded the Nobel Prize for economics, the second Frenchman, who has received such an honour. (The first being his pupil and adherent G. Debreu).*

Maurice Allais was born on 31 May 1911 in Paris. He grew up in modest circumstances. As a four-year old boy he had already suffered the loss of his father and the drama scarred him for the rest of his life.

Nevertheless despite the harsh material conditions that he had to endure during his studies these were not to prevent him in 1933 from completing Ecole Polytechnique as pre-miant.

After completing school he worked as a state official and besides this wrote several scientific works of which it is necessary to mention in particular these two: *A la recherche d'une discipline économique* (1943) and *Economie et intérêt* (1947). Later, the most important results he reached were to be linked to by R. Solow, E. Phelps and W. Baumol.

In 1948 he was appointed professor of economic analysis at the Ecole Nationale Supérieure des Mines and directed a research team at the National Centre of Scientific Research (CNRS). From 1970 he managed the Juglar Centre of monetary analysis at the Paris X University.

In 1980 he retired, though continues in his research activity and lectures at the Ecole Nationale des Mines on the *Bases of Monetary and Economic Cycle Analysis*. As a perceptive observer he foresaw in a study published in May 1987

a serious currency crisis that occurred in October 1987. In his argument he referred to three fundamental analogies of the financial situation in 1987 and the crisis of 1929 – 1933, namely:

- considerable indebtedness
- strong speculative waves
- the dangerous practice founded on financing long term investments by means of short-term deposits.

M. Allais is a disciple of the French school of economic thought. To his work today are linked in particular the names of G. Debreu, M. Boiteux and E. Malinvaud. Allais' contributions to the development of economic science have indeed been both numerous and significant. They may be divided into four main areas:

1. He managed to construct rigorous bases of a modern theory of a general economic equilibrium, a theory of markets and money macroeconomic dynamics.
2. He attempted a revision of the theory of capital and interest.
3. He enabled a better understanding of the laws of the movement of capital and its connection with the creation of money.
4. He is an expert in the theory of utility and risk.

### General economic equilibrium and money macroeconomic dynamics

Economic science has long attempted to draw up a rigorous model of market equilibrium, which would at the same time allow its efficiency to be analysed. We come across this problem in verbal form back with Adam Smith according to whom "the invisible hand" (or market) guides all individual decisions of firms and consumers and serves in the final result to achieving the general interest.

At the end of the 19th century L. Walras constructed his model of general economic equilibrium. The economic system is understood as a system of equations and functions that on the one side express individual demands for goods and services as well the supply of labour from the side of households and on the other side, the supply of go-

ods from the side of firms and their demand for factors of production. Through the solution of this system we arrive at a set of equilibrium prices.

In the years 1940 – 1950 M. Allais attempted to perfect Walras' model by elaborating a mathematically more rigorous formulation of it. In his work *A la recherche d'une discipline économique*, published in 1943, he solves questions of the existence of a system of prices that would enable the ensuring of equality between supply and demand in all markets, determining conditions for their stability and the resources by means of which it would be possible to achieve such stability. This field of his research opens into the fundamental questions of economics, what are value, price, wealth distribution.

Allais' main contribution to perfecting Walras' model of general economic equilibrium lies in the fact that for the first time he proved two mutually equivalent theorems

which all economists know well: every equilibrium state of a market economy is a state of equilibrium of a market economy. In other words, general economic equilibrium is Pareto's optimum, which is defined as that situation in which no economic subject can improve its position without the standing of other subjects being worsened.

Allais in contrast to von Hayek thought that in a planned managed economy the state of equilibrium and maximum efficiency may be achieved, nevertheless under the condition that two conditions are fulfilled: the planner is as it were omniscient (has perfect information on the sources of all goods as well as on the production functions and the utility functions of all economic subjects) and moreover, does not follow any aim other than satisfying the needs of members of society.

The theory of general economic equilibrium and both theorems, which derive from it are however according to Allais founded on completely unrealistic assumptions concerning the course of the production function and the utility function. This concerns in particular the hypothesis of the convexity of the indifference curves and the isoquants. Their convexity means that yields are either constant or declining. Without these hypotheses it is not possible to prove theorems of equivalence.

In 1966 – 1967 Allais realised that he must completely abandon Walras' model and construct his own model of the market economy. This he based on the term the distributable surplus and in what was then an antithesis to the Walras Principle, he no longer based it on a single price system. Allais thus puts forward a model that is constructed on completely new bases.

The establishing of a general economic equilibrium is here understood as the process of decentralised decision making, in the framework of which individual economic subjects operating in the economy attempt to find, realise and distribute a given surplus. A state of general economic equilibrium occurs when there no longer exists any realisable surplus.

Allais through his theory of equilibrium attempts to attack the connection between multiple individual decisions and maximum efficiency, which may serve to underpin any liberal policy, rejecting state intervention in the economy.

### Revision of the theory of capital and interest

The second field which M. Allais focused on is the theory of capital and interest, which had for a long time been incomplete and had been founded only on simplified models. Allais claims that the conclusion of the classical theory, according to which the equilibrium of the supply of capital and the demand for it leads towards an internal optimum, is not acceptable, because the general theory of capital and interest must take into consideration the two types of mutual dependency: those which exist between subjects operating on markets and those which manifest

themselves between various periods, because the majority of decisions have an impact in the future. Therefore in his work *Economie et intérêt* (1947) he elaborated an analysis of appraisal processes and the maximum efficiency of capitalisation, in which as the first economist in history he considers also future generations and not only the current generation. He introduces into economic theory two new terms: primary income (by this is understood the total value of wages and income from land rents) and characteristic function (this is functional dependency, which characterises the production processes at a time). All these matters helped him to, with several years' lead, achieve results to which the neo-classical theory of growth later arrived at in its conclusions. In the stated work he examines which conditions it is necessary to fulfil so that that economy in a state of permanent growth reaches the situation, which is termed "maximum maximorum" (this is the situation in which the maximum per capita income is reached). On the basis of his analysis he proves that in order to reach an optimal state of investment that maximises per capita consumption it is essential that the wage interest rate (i.e. the average amount of wages is taken as a unit) is equal to the rate of growth of the population. So, if the population does not increase the wage interest rate should be zero. This is a rule, which is termed the "golden rule of accumulation" and the discovery of which is accredited to R. Solow.

### The theory of money and credit

Allais also became interested in the problems of the theory of money and he belongs to a group of economists which gave new credence to the quantitative theory of money. He believes thought that the current system of credit is not able to ensure the problem-free functioning of market economies. In Allais' view the difference between money cash and savings is unclear, in consequence of which it is not possible to reliably control the money supply and therefore today no one no longer knows what money actually is.

The credit system has enabled precisely in consequence of the indeterminate increasing of means of payment and credit, the development of inflation, brought about default and supported speculation on both foreign exchange as well as financial markets.

In Allais' view it is necessary to undertake cardinal reform that would force banks, in the creation of bank deposits to respect the correspondence of terms between liabilities and assets. Only then could there be fulfilled the monetary conditions which would be capable of ensuring the effective functioning of the market economy. Allais believes that the basic role of the state is to maintain a stable value of its money, because without this economically rational decision-making is impossible. Therefore there must be introduced a strict system of the control of lending. Though in fact experience shows that it is not



possible to have an efficient economy and a just distribution of incomes in an economy that is from the monetary point of view unstable.

The current system, which enables banks to create money, is in Allais' view absurd, because banks borrow money, which they do not own and in this way gain unauthorised incomes. Therefore he proposes that there be established banks especially for accepting deposits and other banks especially for providing loans. At first, deposits would be received from their own clients and the deposits would be taken care of, but could not be lent. In this way this way there would not be created any money "ex nihilo". These banks would however charge their clients for services connected with the administration of their accounts.

As far as lending banks are concerned, these would borrow money for the long-term and from this money would provide short-term loans, without creating money. The rate of growth of the money supply in circulation would thus depend solely on the central bank and incomes from the creation of money would flow to the state, which would thus gain further sources of financing (besides taxes). Because, according to M. Allais, it is necessary to reform also the tax system, which in his view punishes the most capable, meaning the most efficient.

In this way Allais' theory of money is closely connected with his radical and original proposals concerning the tax system. Allais calls for a lowering of all income taxes, basing this on the principle, that the state does not have any moral right to intervene in the private life of people and in particular to tax the fruit of their labour. According to Allais, only well managed enterprises (i.e. only those which are profitable) pay taxes, meaning that the less effective are in essence not taxed.

M. Allais believes that there exist three types of taxes. Firstly the existing capital tax should be substantially increased, and which would relate to all physical assets: land, estate, etc. This tax would have a unitary rate (2%), which would enable the receipt of budgetary revenues equalling 8% of GDP;

Furthermore, in Allais' view, there should be set a unitary rate for VAT. And finally last but not least a significant source of financing state expenditures would be revenues achieved from the creation of money, which would be realised only by the central bank.

It may be said that Allais' ideas concerning reform of the money and tax system are particularly audacious and that they are a component of his bilateral thinking, meaning minimisation of state intervention into economic activities.

Allais' conviction that neither economic efficiency, nor justice can exist in the distribution of incomes in a monetarily unstable economy, led him to research of the money market. In his analysis however he did not confine himself simply to the case of a static equilibrium, but rather dealt also with conditions of stability of dynamic equilibrium on the money market. By doing so he was ranked as a pi-

oneer in research in the field of money macroeconomic dynamics.

Allais is the author of one of the first analyses of theoretical determination of demand for money, to which work W. Baumol later linked. In 1965-1987 he published a whole series of scientific works, in which he offered a new formulation of the function of the demand for money. This rests on new terms, which Allais introduces into economic science. There is the term the rate of forgetting, the value of which changes during the course of the economic cycle and also the term psychological time, in which, in contrast to physical time, the laws of the money dynamic are non-variable.

Allais' formulation of the function of the demand for money has two new features; it is marked by its heredity (people's behaviour is conditioned by past events, where it is necessary to take into consideration the hereditary psychological process of forgetting) and it is relativist (if we replace physical time with psychological time, then the demand for money is non-variable, because people in identical situations always behave the same regardless of the socio-economic conditions they are living in).

### The theory of utility and risk (Allais' Paradox)

A further contribution of Allais' to the development of economic science is that in the field of decision-making under risk and uncertainty. This concerns a part of economic science, the object of which is to help both firms and consumers make decisions that would be mutually coherent, where their preferences and information on the future are taken into consideration.

The roots of the theory of individual behaviour under uncertainty stretch back to the 17th century. B. Pascal and P. de Fermat may be rightly identified as its founders, and according to whom rational behaviour under uncertainty and risk presumes the respecting of the rule of maximisation of expected money profit.

Empirical experience from Saint Petersburg in 1720 however showed that the principle as a rule is not in accordance with actuality. D. Bernoulli attempted to justify these results by the fact the money profit achieved may not be evaluated solely according to its amount in absolute terms. He argued that it depends – on an indirectly proportionate basis – on the amount of capital that the subject owned at the outset: one money unit of profit clearly has less value for a millionaire than for a poor man. Each person constructs for themselves their own evaluation of profit, which can be expressed by a logarithmic function of expected utility (U), which it is necessary to maximise.

$$U = \log(C + g)$$

where C = original capital

g = expected profit.

In 1944 J. von Neumann and O. Morgenstern published their Theory of Games in which they based their work precisely on the Bernoulli Principle.

Such an approach is unacceptable for Allais, because it does not take into consideration the psychological significance of the probability distribution of values around their average, which represents the basic element of risk theory. To test his hypothesis, in 1952 he undertook research including about 100 people who according to him had such knowledge of probability theory that they could be considered to be rationally behaving economic subjects.

At the CNRS symposium proceedings in Paris in 1952 Allais presented the results of his research. These results showed that in the case of none of the respondents did their behaviour conform only according to the principle of maximisation of expected utility.

Let us presume, together with Allais that the economic subject should decide twice. In the first case he should choose one of the situations A and B;

- A: certainty that he will gain 100 million
- B: 10% probability that he will gain 500 million  
1% probability that he will not gain anything  
89% probability that he will gain 100 million.

In the second case he should choose one of the situations C and D:

- C: 11% probability that he will gain 100 million  
89% probability that he will not gain anything

- D: 10% probability that he will gain 500 million  
90% probability that he will not gain anything.

In contrast to the Bernoulli Principle the subject chooses A rather than B, because in the direct vicinity of certainty there is preferred security. If the only criterion of a given subject's choice had been the percentage probability that he would win, then he would have preferred C to D. However, the difference of probabilities that he wins between the situations C and D is small, whereas the difference of an expected profit is significant. Therefore the subject prefers D to C. This behaviour may be explained by the fact that the preferring of a guarantee is a growing function of the emergence of a favourable event. A weakness of von Neumann and Morgenstern's theory of expected utility is the presumption that this preference is constant.

Allais' paradox simply corresponds to psychological fact according to which in the vicinity of certainty there is preferred guarantee. From the beginning there prevailed the opinion in economic theory that Allais' hypothesis is applicable only in certain exceptional cases. Today it is, however, now generally accepted and can be said that it enabled in a substantial way the revision of the theory of expected utility, which stimulated the development of alternative approaches.