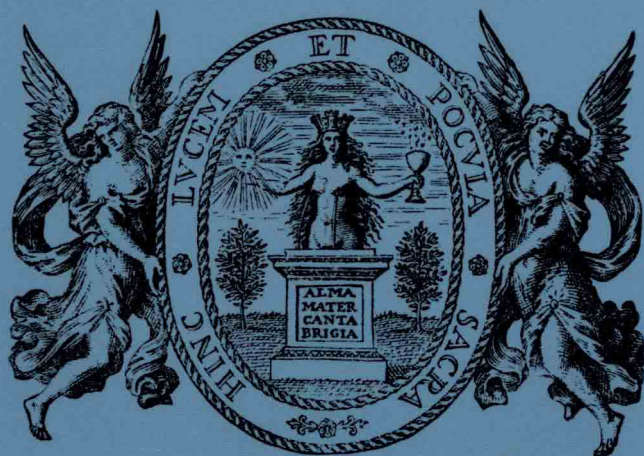


# UNCERTAINTY IN ECONOMICS



G. L. S. SHACKLE

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# UNCERTAINTY IN ECONOMICS AND OTHER REFLECTIONS

BY

G. L. S. SHACKLE

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the University of Liverpool*



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## PREFACE

The strand of thought which links these essays is the nature and effects of uncertain expectation. But only the first of the four parts of this book is concerned with the evolution since 1949 of the ideas which I then put forward in *Expectation in Economics*. The first essay of all is an attempt to express those ideas without any technical apparatus of diagrams or mathematical notation. Of the three cardinal ideas which constitute my theory of expectation, the most difficult to explain has proved to be that of potential surprise. This difficulty appeared with especial vividness when I was honoured by an invitation to take part in the Colloquium on the Theory of Risk in Econometrics held at the Sorbonne in May 1952. Amongst the other members of the Colloquium I found only three who seemed able to place themselves at my viewpoint, Professor Kenneth Arrow, M. Pierre Massé and Professor Herman Wold. It was the last-named whose profound and sympathetic examination of my approach mainly inspired me to try to make still clearer its point and purpose, and to express more systematically my objections to the use of probability as a means of analysing and describing a mental state of uncertainty, and my grounds for claiming that the difficulties could be resolved by the concept of potential surprise. The occasion for this attempt was provided by the invitation to deliver a Special University Lecture at the University of London in October 1952, and this lecture is here reprinted as the second essay of Part I. The editor of *Metroeconomica*, Professor Eraldo Fossati (to whom I feel the warmest gratitude for great and repeated kindness), having published what appear here as Essays I and II, then asked me to complete the restatement of my ideas by writing Essay III. Essay IV seeks to push the analysis of the nature of expectation a step further, in one direction, than was done in *Expectation in Economics*. Essays V, VI and VII were written in the effort to get those elements of my theory, which critics found hardest to assimilate, understood and accepted. The last two essays of Part I seek to make the theory a means of stating, if no more, the problem of profit in a form which is not stultified by failure to distinguish between past and future.

I believe that those readers who turn to this Part I as an exegesis and development of the argument of *Expectation in Economics* will be

indulgent to some inevitable repetition which arises from the circumstances in which the essays were written.

Part II of this book is concerned with the theory of interest-rates. An easy answer to the question 'Why should interest exist?' is that goods available at different times are different goods no matter how nearly identical they may be in all other respects, and therefore it is natural that they should be able to exchange for one another at prices differing from that of an ounce for an ounce, or a shilling for a shilling. But this answer neglects the fact that in comparing an object *A* available at date 1 with an object *B* available at date 2, we do not look at object *A* at date 1 and then transfer ourselves to date 2 in order to consider object *B*. The decision between them must be made at a single date, and in fact if it is to merit the name of *decision* it must be made neither later nor earlier than the moment immediately preceding date 1. Thus what is compared is not *A* and *B*, but the imagined satisfactions obtainable from *A* and *B*, after allowing for the inescapable doubt concerning the reality of the prospect of *B*. No man by any precaution or ingenuity can guarantee to himself the exact realization of an imagined future satisfaction. Uncertainty must therefore, as Lord Keynes was the first to show us, be one of the main explanations of interest. But this proposition is only the first step towards the construction of a theory. Expectations are inexpressibly tricky and elusive material. For *stability* of interest-rates we have to postulate two 'camps' of divergent opinion, the Bulls and Bears of the *Treatise on Money*. But this again is not sufficient, for as I tried to show in my earlier book (on the business cycle) called *Expectation, Investment and Income*,\* the long-term interest-rate must be looked on as an 'inherently restless variable'. I have not here developed that line of thought any further, but in Essay X I have tried to present in a fresh way the general notion that in a modern Western economy interest is mainly a manifestation, not of impatience nor of the higher technical productivity of roundabout methods of production, but of uncertainty. But the endeavour to re-examine from the beginning the whole question of the cause and nature of interest, which resulted in this essay, threw up one by-product to which I would draw the reader's attention, namely, the related concepts of possessor-satisfaction and the decision-interval.

The 'classical' theory, according to which interest is the price which equates the supply and demand of real resources for investment,

\* Oxford, 1938, pp. 52, 53.

was able at one blow to explain both the causes and the consequences of interest-rate changes. But the uncertainty or liquidity-preference theory of the origin of interest leaves us to deal separately with its effects on the pace of investment. Here the main problem is to reconcile the conclusions of theory with the testimony of business men, who have appeared to deny to interest the role and importance, in the calculations upon which they base their investment-decisions, which theory suggests that it ought to have. Here again the explanation seems to be that the effect of a fall (for example) in the long-term interest-rate in raising the 'present value' of durable equipment, and the consequent stimulus given to the making of such equipment, is overwhelmed and rendered negligible by the uncertainty regarding the size or even the algebraic sign of those future profits upon which the 'present value' depends. It still seems undeniable, however, that interest-rate changes must sensibly affect the apparent profitability of constructing those types of equipment, such as buildings and civil engineering works, which may be deemed a secure source of profit or valuable services for several decades ahead. Yet it is by no means true in general that a given change in the interest-rate used for discounting all future net earnings of such assets will have its greatest absolute effect on the present value of those instalments of such earnings which are most distant in time. If all such instalments are taken to be equal, the effect will in fact be greatest for those instalments whose futurity in years is the reciprocal of the annual interest. This is very easily proved, but so far as I am aware it had not been pointed out before the appearance of Essay XI in the *Economic Journal* of March 1946.

If Lord Keynes had rewritten the *General Theory* after two or three years, it seems possible that he would have made some use of Myrdal's scheme of thought centred on the *ex ante-ex post* distinction. Keynes had emancipated himself from the classical economists' assumptions, but not from their static, non-expectational mode of thinking; yet the dominant theme of his book is that 'A monetary economy... is essentially one in which changing views about the future are capable of influencing the quantity of employment and not merely its direction'.\* The whole emphasis of the book is on the essential importance of expectations, yet the formal frame of concepts is quite unsuited to that purpose. One part of the argument in particular is crippled and confused by the lack of an explicit termin-

\* *The General Theory of Employment, Interest and Money* (London, 1936), p. vii.

ology for distinguishing from each other quantities which are contingent, conjectural and plural because they refer to the future, and quantities belonging to the same economic context which, however, are known and unique because they belong to the past. This is the multiplier and the consumption function. Here consumption is said to depend on income and income on net investment and the propensity to consume, and we are offered the familiar concept of the simultaneous mutual determination of several variables. For a 'static' argument this is perfectly well, indeed it is, of course, the basis and essential principle of static analysis. But for an expectational analysis it is disastrous. What is that income in view of which consumption-spending is decided? Is it the realized income of a past period? Then, of course, we are abandoning the comparative statics framework in favour of period analysis. Or is it the expected income of the same period for which the consumption-spending is being decided? Then what happens if the realized income of that period, which will be partly governed by the consumption-spending, turns out to differ from the expected income which governed the consumption-spending? Some such difficulty, I think, must have been the source of the controversy which the multiplier idea aroused. In Essays XII and XIII I seek to disentangle the matter by using Myrdal's concepts.

Essay XIV is an attempt to distil the essence of that very difficult book in which the *ex ante-ex post* scheme of thought was first introduced. Myrdal's essay appeared first in Swedish in 1931 and then in German in 1933. In neither of these forms was it really accessible to English-speaking economists, and when at last it was translated into English the date was 1939, and a book which would have been a sensation before 1936 was hardly noticed. This book, *Monetary Equilibrium*,\* is none the less a classic, and the justice of time will give it an honoured place alongside Wicksell's *Geldzins und Guterpreise* in the chief literature of economic dynamics.

Essay XV, which suggests a system of criteria for assessing the effects of Budgetary policies on price-levels, stands a little aside from the main concerns of Part III.

And lastly, Part IV. Some economists are content to work at particular problems without considering at all how their subject fits into the general body of knowledge and philosophical speculation; they would think it a waste of effort to ask themselves what we are doing when we create theories or offer explanations, and they would

\* Hodge, 1939.

be impatient with anyone who suggested, for example, that an analysis of the meanings of the word 'time', and the role of various concepts which come under this heading, is any concern of the economist. But the philosophy of our business is far from being a side issue. When the claim is made by some, expressly or implicitly, that the way is now open for the economist to become a prophet and peer with assurance into distant years, or even to tell us within a few percentage points what the chief features of the situation will be in twelve months' time, it is clear that the most profound questions of the nature of human existence are not irrelevant to the economist's most practical duties and concerns.

G. L. S. SHACKLE

October 1954

#### AUTHOR'S NOTE FOR C.U.P.L.E. REPRINT

When plural rival hypotheses are entertained concerning some question, but it is recognised that the existing list of such hypotheses cannot be known to be exhaustive, and may even be by its nature indefinitely extensible, the use of probability to express the adjudged claim of any one such hypothesis to be taken seriously seems inappropriate. The properties of a non-distributional uncertainty variable to serve this purpose were suggested in a series of publications, including the *Economic Journal* 1939, *Oxford Economic Papers*, First Series No. 6, 1942, and *Expectation in Economics*, (Cambridge University Press, 1949 and 1952). The present volume contains some further expository approaches, theoretical extensions and special applications. The role of uncertainty in determining the essential nature of some central economic phenomena, including profit, the interest-rate and the effects of money, is also here explored. The whole theme was presented as a strand in a more general skein of ideas in my *Decision, Order and Time in Human Affairs* (Cambridge University Press, 1961) where a bibliography lists chapters and articles by other writers in which these suggestions have been extensively criticised and discussed.

G. L. S. SHACKLE

17 April 1968



## ACKNOWLEDGEMENTS

I should scarcely have felt it excusable to add further, in Part I of this book, to the material already presented in the two editions of *Expectation in Economics*, had it not been for the continually repeated experience of meeting in person, or receiving letters from, economists and other scholars in many countries who have expressed in the kindest terms an interest in these ideas. I take this opportunity of expressing the warmest gratitude to those who have given this greatly valued encouragement, among them the following:

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At the 1953 meeting of the British Association for the Advancement of Science, part of the proceedings of Section F was a symposium on 'Uncertainty and Business Decisions', and I owe a very special debt for fresh insights and constructive criticism to those contributors to this colloquium who took *Expectation in Economics* as the text of their analyses. In this connection I wish especially to thank Professor W. B. Gallie, Professor of Philosophy in the Queen's University, Belfast; Professor D. J. O'Connor, Professor of Philosophy in the University of Liverpool; Professor G. P. Meredith, Professor of Psychology in the University of Leeds; and Professor B. R. Williams of the University College of North Staffordshire; as well as those other economists and mathematicians whom I have tried to thank elsewhere.

I wish to thank the editors of the journals where the essays in this book, except the last in the book, were originally published, for the permission which they have given for these essays to be reprinted. For permission to reprint that last essay I wish to thank the Committee of the University Press of Liverpool. The articles are listed below in order of the dates of their first appearance:

The multiplier in closed and open systems, *Oxford Economic Papers*, old series, no. 2 (1939).

Myrdal's analysis of monetary equilibrium, *Oxford Economic Papers*, old series, no. 7 (1945).

Interest-rates and the pace of investment, *Economic Journal*, vol. LVI (1946).

The deflative or inflative tendency of Government receipts and disbursements, *Oxford Economic Papers*, old series, no. 8 (1947).

The nature of interest-rates, *Oxford Economic Papers*, new series, vol. 1 (1949).

Probability and uncertainty, *Metroeconomica*, vol. 1 (1949).

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A chart of economic theory, *Metroeconomica*, vol. v (1953).

The logic of surprise, *Economica*, vol. xx (1953).

The economist's view of profit, *The Company Accountant*, new series, no. 26 (1953).

Economics and sincerity, *Oxford Economic Papers*, new series, vol. v (1953).

What makes an economist? Liverpool University Press, 1953.

I wish, finally, to thank the staff of the Cambridge University Press for the endless care, skill and resource which they have lavished upon this book.

G. L. S. SHACKLE

# BIBLIOGRAPHY

The following is a list of books and articles in which the system of ideas proposed in my *Expectation in Economics*, and further treated in the essays of Part I of this book, have been discussed or applied:

## A. BOOKS

TITLE	AUTHOR	PUBLISHER	DATE	CHAPTER, ETC.
<i>A Survey of Contemporary Economics</i> (volume II, edited by B. F. Haley)	Andreas G. Papandreou	Richard D. Irwin, Homewood, Illinois, U.S.A.	1952	Ch. 5
<i>Die Konjunkturschwankungen</i>	Walter Adolf Jöhr	J. C. B. Mohr, Tübingen	1952	Ch. 10
<i>An Essay in the Theory of Profits and Income Distribution</i>	B. S. Keirstead	Basil Blackwell, Oxford	1953	Ch. 3
<i>Uncertainty and Business Decisions</i> (edited by C. F. Carter, G. P. Meredith and G. L. S. Shackle)	W. B. Gallie, D. J. O'Connor, G. P. Meredith, C. F. Carter, B. R. Williams	Liverpool University Press	1954	Chs. 1, 2, 4, 5, 6, 8

## B. ARTICLES

TITLE	AUTHOR	JOURNAL	VOLUME NO.	DATE
Expectation in economics	C. F. Carter	<i>Economic Journal</i>	LX	237 Mar. 1950
Ovishetens roll i ekonomisk planering	Harald Dickson	<i>Ekonomisk Tidskrift</i>	LII	[2] June 1950
A study in expectations { Part I	J. Mars	<i>Yorkshire Bulletin of Economic and Social Research</i>	{ 2 [2] [1]	July 1950 Feb. 1951
A 3-dimensional model of the Shackle $\phi$ -surface	Harry G. Johnson	<i>Review of Economic Studies</i>	xviii	46 1950-1
Alternative approaches to the theory of choice in risk-taking situations	Kenneth J. Arrow	<i>Econometrica</i>	19	[4] Oct. 1951
Subjective probability and the economist	B. S. Keirstead J. D. Sargan	<i>Economia Internazionale</i>	IV	[4] Nov. 1951
On the use of the theory of probability in economics	R. S. Weckstein	<i>Yorkshire Bulletin of Economic and Social Research</i>	V	[1] Feb. 1953
Expectations and economic stability	Melvin D. Brockie	<i>Review of Economic Studies</i>	xx	53 1952-3
A revised theory of expectations	C. F. Carter	<i>Weltwirtschaftliches Archiv</i>	70	[1] 1953
Shackle's $\phi$ -function and gambler indifference-map	B. R. Williams	<i>Economic Journal</i>	LXIII	252 Dec. 1953
Investment, uncertainty and expectations	R. A. D. Egerton	<i>Metroeconomica</i>	VI	[3] Dec. 1954
Shackle's theory of expectation and the level of aspiration	David C. Duncan	<i>Review of Economic Studies</i>	xxii	[2] Feb. 1955
Expectation, surprise, and the theory of choice	W. E. Armstrong	[In the press]		

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PART I



ON EXPECTATION AND  
UNCERTAINTY



# I

## PROBABILITY AND UNCERTAINTY\*

In his novel *The Widows of the Magistrate*, Keith West tells how certain Chinese officials once plotted rebellion against their Emperor. The brief passage that I am going to reproduce describes the thoughts of a certain sentry, who had to decide whether to obey his immediate superior, the treacherous Captain of the Guard, or to stand alone against the rebels in loyal defence of the Emperor's representative, the Lady Hibiscus:

In the room above, where the great drum stood, the sentry named Kwong Hui was testing the stacked bows of mulberry wood and setting the arrows in order.

'I am a man who seizes opportunity', he told the admiring women and the sleeping children.

'If I obey the Captain of the Guard, two things may happen. Either the rebellion succeeds, and I remain a soldier in the guard, or the rebellion fails, when I lose my head. Whereas if I obey the Lady Hibiscus, two things may happen. Either the rebellion succeeds, and I lose my head, or the rebellion fails, when I shall receive rewards quite beyond my imagination to conceive. Now of these four possibilities, the last only attracts me. So I shall strive to hold this tower unentered, as long as is possible, until the arrival of help from elsewhere. That is the course of wisdom, as well as the course of courage, and I am deficient in neither wisdom nor courage.'

This eminently wise and sensible decision, reached with such incisive logic, might not have been so readily attained had the sentry been acquainted with the theory of probability. For then he might have argued thus: 'I find in the record of history a thousand cases similar to my own, wherein the person concerned decided upon treachery, and in only four hundred of these cases the rebellion failed and he was beheaded. On balance, therefore, the advantage seems to lie with treachery, provided one does it often enough.'

Having one's head cut off is, for the person concerned, rather final. Had the sentry decided to support the rebellion, he might have had time, just before the axe fell, to reflect that he would never, in fact, be able to repeat his experiment a thousand times, and that thus the guidance given him by actuarial considerations had proved illusory.

\* *Metroeconomica*, vol. 1 (1949), pp. 161-73. Trieste.



When some kind of performance, such as the tossing of a coin or the throwing of a pair of dice, has been many times repeated in suitably uniform circumstances, we can establish for each possible result of such performance the approximate number of times it will occur in a given number of repetitions of the performance. If then some value is assigned to each possible result, so that with a tossed coin we count, for example, a head as worth 1 and a tail as worth 0, or with dice we value any throw by the number appearing on the upper faces of the dice, and if for each possible result we multiply its valuation by the number of times it will occur in some suitably large number of repetitions of the performance, we shall get a valuation of this series of performances considered as a whole. Provided our frequency-ratios are correct (it will be remembered that we have postulated 'suitably uniform' circumstances and a 'large' number of repetitions: I do not propose here to probe further into these terms), this valuation of the series of performances considered as a whole has nothing whatever to do with ignorance or uncertainty: it is knowledge. If each of the possible courses of action open to me in some situation consists in such a series of performances, and if the values assigned to various possible outcomes of any one type of performance properly reflect my tastes, then my choice can fall without hesitation on that series whose valuation is highest.

What conditions must be satisfied in order that this sort of knowledge may be applied when an individual decision-maker is faced with a choice (as every one of us is, every day and every hour) between a number of rival courses of action? The conditions can be epitomized by two statements:

(1) The frequency-ratios, unless derived *a priori*, must have been obtained from a set of performances sufficiently uniform and sufficiently numerous. This condition may be satisfied in varying degrees and will accordingly give answers of varying precision. We must notice that the experience or the set of performances from which the frequency-ratios are obtained need not have been suffered or made by the person who proposes to use the knowledge.

(2) The experiment, to the valuation of whose outcome the frequency-ratios are to be applied, must be what I shall call a *divisible* experiment.

It is this second condition which, in a great and fundamentally important class of cases, cannot be satisfied. The first condition may often, of course, be only very poorly met, and the valuation assigned to an experiment will not then fully deserve to be called knowledge. True uncertainty will have entered; not because frequency-ratios