

CAR OWNERSHIP FORECASTING

E. W. Allanson

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GLOBAL TRANSPORT PLANNING



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E. W. ALLANSON

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Series Editors' Introduction

This particular work is the first of a broad-ranging series of books which will cover many of the varied aspects of transportation. The subject area will be generally divided into two parts: the first, dealing with planning and technological aspects of transportation, the second with specialized transportation.

Within the context of this series, technology and planning will include the wide spectrum of various aspects of the design and planning of vehicles and infrastructure for the transport of freight and passengers, as well as operational and management considerations. The general aim of the planning and technology series is to provide readers with the state of the art and to summarize the status of transportation.

The second part of the series will seek to generate monographs dealing with improving the mobility of those groups in society increasingly characterised as the transportation disadvantaged, particularly, but not exclusively, the elderly, the disabled and families with low income. It is anticipated that the content of these books will be derived largely from research, policy analysis and documental field experience. The subject matter will include advances in relevant technology, service and methods demonstrations, improved planning and methodology, major or proposed changes in public policy and innovative proposals for system development or change.

Occasionally, more specific monographs will be published, presenting the results of individual studies into areas of special interest to planners and technologists.

As with any monograph series, the emphasis is on currency of information, and the material will be of interest to the transportation practitioner, the postgraduate student and academics working in the field.

NORMAN ASHFORD
WILLIAM G. BELL

Preface

The object of this book is to provide a straightforward, readable commentary on the development and performance of prediction procedures. It is a topic which continues to generate a large amount of research and discussion; a problem which may appear at first sight subject to precise understanding and explanation, but which has aroused considerable technical and philosophical scepticism.

In content the book is primarily concerned with technical problems which have been experienced by modellers and forecasters. It is hoped that the discussion provides a basic appreciation of the key points, whether they are of a mathematical nature or otherwise. Throughout the book there is a theme which attempts to relate the academic debate surrounding the issue to technical, rather than philosophical, concepts. One of the main aims is to develop an appreciation of the way in which forecasters have tried to come to terms with the uncertain economic and social climate of the last quarter of the twentieth century.

The book is structured on a chronological as well as geographical basis. This has been possible because of the particular way in which research car ownership has been organised. Exchanges between authorities in different western countries has been very limited. Consequently, the book has been divided into two major sections. Firstly, a general description of the evolution of various approaches is discussed in the context of work conducted in the United Kingdom. This is followed by a comparative study of the development of procedures in the United States and, briefly, Australia. The book concludes with an assessment of the problems associated with the application of techniques by regional and local planning authorities in the United Kingdom.

A full rendition of every example of model development and usage is beyond the scope of this work. Subsequently, direct reference has been afforded to instances where significant developments or valid

criticisms have been made. Most chapters contain a select list of references which have been cited in the text, whilst a (not exhaustive) bibliography provides scope for further reading as well as an indication of the scale and range of contributions in the field.

E.W. ALLANSON

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A review of this nature must, of necessity, make reference to a wide range of published material. Thanks are due to the following concerns for granting permission to either quote passages, or include diagrams, from books or reports published by them; the Bodley Head, Faber and Faber, Her Majesty's Stationery Office, the Department of Motor Vehicles (State of California), the United States Department of Transportation, Prentice-Hall Publishers Inc., the Eno Foundation for Transportation, the Publication Division of Massachusetts Institute of Technology, Diana Crawford Ltd, The Transport and Road Research Laboratory, the Transportation Research Board, Cambridge Systematics Inc., the New South Wales Ministry of Transport and the MIT Press.

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nomy, Transportation, American Economic Review, Canadian Journal of Economics, Urban Studies. Mr H.R. Kirby, Mr K.J. Button and Professor M.E. Ben-Akiva kindly agreed to the use of material contained in unpublished papers.

In order to improve clarity of presentation it has been necessary to re-draft several of the diagrams extracted from publications. Any uncredited views expressed in the book are those of the author and do not necessarily conform with those of his present or past employers.

Abbreviations

ACTRA	Advisory Committee on Trunk Road Assessment
CATS	Chicago Area Transportation Study
DOE	Department of the Environment (UK)
DTp	Department of Transport (UK)
FAPS	Future Automobile Population Stochastic Model
FES	Family Expenditure Survey
GDP	Gross Domestic Product
GLC	Greater London Council
NSW	New South Wales
NTS	National Travel Survey
OPCS	Office of Population, Censuses and Surveys (UK)
RHTM	Regional Highway Traffic Model
RRL	Road Research Laboratory (TRRL from 1972 onwards)
SATS	Sydney Area Transportation Study
SMMT	Society of Motor Manufacturers and Traders
TPA	Transportation Planning Associates
TPP	Transport Policies and Programme
TRRL	Transport and Road Research Laboratory (RRL prior to 1972)

Introduction

The Scope of the Problem

THIS COMMENTARY is concerned with a critical assessment of car ownership prediction techniques as they have been developed in the United Kingdom, the United States and other developed countries since 1950. A great deal of work has already been carried out in the field of car ownership prediction and, owing to a combination of circumstances, the degree of research and publication of results has tended to accelerate in size and scope in recent years. Since much of the earlier work has become generally accepted as valid or, alternatively, superseded, this study concentrates on the developments of the last decade. Not only are the wider theoretical issues considered, but an attempt is made to examine the practicalities of the application of car ownership prediction at national, regional, local and individual (or household) level, with particular reference to the work of several (typical) local authorities.

For many years now car ownership prediction methods have been a subject surrounded by controversy. This has resulted in a lively and continuing discussion in the political arena at various levels as well as in the academic and general press. Arguments are presented at a variety of levels and from a number of standpoints. Often, car ownership prediction techniques are introduced into discussions which are concerned with wider issues, including the use of scientific quantitative philosophy in the field of economic, social and transport planning. This may be regarded as one extreme, although it is felt inappropriate to include a long essay on the validity of the use of scientific (or, at least, mathematical) models in social and economic planning. Further discussion on the subject could add little to the mountain of literature already available and it must be admitted that, in a world composed of a large number of competitive nation states, many of which are

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highly industrialised and which contain sophisticated economic and social systems, there is no realistic alternative to some level of application of logical scientific reasoning to the problems of planning for the economic, social and transport conditions of the foreseeable future.

At the other extreme is the over-detailed analysis and application of prediction techniques. A phenomenon which involves such a notable human input and which is influenced by a wide range of variables cannot be treated with the same level of simple analysis as is applied to many socio-economic variables (despite the long history of the application of simple extrapolatory, but not explanatory, models). The result has been a magnitude and depth of research activity into the field which is indicated by the (not exhaustive) accompanying bibliography. Research and publication has accelerated since 1970, to the extent that the production of papers has taken on the form of the predictive curve used by one of the major authorities in the field.

Growth in car ownership

The growth in automobile ownership in the United States has often been used as an empirical base for the development of models for use in other countries (see Appendix 3). In spite of a continuing search for evidence of "saturation" in the number of vehicles in use, the growth in ownership has followed a steady path since 1945. Previous reductions in the growth rate are explained in terms of the effects of the Depression of the 1930's and the impact of the Second World War.

In national terms several notable points on the car ownership curve have been approached and then passed. By 1922 the rate of ownership of vehicles to persons already exceeded 0.1. Seven years later, just before the Depression began, the rate stood at 0.19, a level not experienced in many European countries until relatively recent times. By 1950 the renewed trend had already taken hold and there was very little deviation in growth rate until 1977, by which time 99,904,000 automobiles were in use (representing an ownership rate of 0.46 cars per person).

Ownership in the UK and most European countries has lagged far behind that experienced in the USA (see Appendix 3). Here the general availability of private vehicles has been a phenomenon of the period since World War II. To a much greater extent than in the

United States, ownership was restricted to the affluent classes until relatively recently. Even as late as 1964, at a time when the construction of a national motorway network had already commenced, 62 per cent of UK households were without access to private vehicles. It is worthy of note that the rate of ownership experienced in the US by 1929 was not achieved in the UK until 1966. This gives some indication of the contrasting role which the automobile has played in these countries and the extent of the time lag between the two. Despite a relatively slow start and the effects of economic depression in recent years, the UK is now a considerable way down the road to emulating the pattern already experienced in the US and several other expansive western economies. Most forecasters agree that such trends will continue; the major problems have been associated with the future rate of growth and the point at which new car registrations will represent only the replacement of scrapped vehicles.

The importance of car ownership forecasting

The critical role played by the private automobile in the social and economic life of the USA is easily appreciated. Consistent levels of ownership and use have had their influence upon all forms of social and economic activity, and on the resultant pattern of land use and civic design. To a much greater extent than in most countries, urban development and car ownership have been inextricably linked.

In Britain, at least on a superficial level, the effects of the "mixed blessing" of car ownership have been more problematical. Despite the fact that more than 60 per cent of British households enjoy access to at least one private car, a long national debate continues on the moral, social, and economic consequences of the move towards those levels of car ownership already experienced in the United States.

Even in the UK there are few aspects of life (and even death) which have not been affected by the growth in car ownership. A large number of agencies are directly interested in the future patterns of ownership and use, and, to a large number of others, the problem is of more than academic interest.

In many countries central government has a particular interest in forecasts of car ownership, as a transport authority whose responsibility it is to provide the necessary physical infrastructure to accommodate