

A Handbook of Transport Economics

Edited by **André de Palma**, **Robin Lindsey**,
Emile Quinet and **Roger Vickerman**

With a Foreword by **Daniel McFadden**



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Foreword

Daniel McFadden

This *Handbook*, edited by de Palma, Lindsey, Quinet and Vickerman, is welcome for its novelty and originality. It is not the first handbook on transport; there are other excellent volumes that focus on the transport sector or on sub-sectors within transport. These handbooks tend to provide a synthesis of the subject from the different viewpoints of a range of disciplines including operational research, political science, engineering and management as well as economics. There are also handbooks which focus on particular branches of economics such as public economics, development economics and regional and urban economics. But no previous handbook has focussed so deliberately on the transport sector, through the lens of one discipline, economics. What justifies such an approach? One obvious, albeit rather simple, reason is that transport is a sector that presents a range of economic problems and has therefore been studied in great detail through economic analysis, as the editors stress in their introductory chapter.

However, two questions remain:

- First, is it possible to talk about an ‘economics of transport’ without considering the contribution of other disciplines?
- Second, is there a ‘specific economics of transport’ which lends itself to such particular attention?

The answer to the first question is relatively easy. In order to understand the application of economics to the transport sector, it is necessary to have a basic knowledge of the specific conditions which underlie activity in the sector. A simple expression of this is given through the knowledge that we all have as users of transport. For example, we know the distinction between infrastructure and operations, we know that most airports are located outside cities because land is cheaper there, noise is less of a nuisance and so on. In order to understand these functions and the problems they pose, the editors appropriately recommend that readers start with their own textbook ‘*Principles of Transport Economics*’ to which this *Handbook* represents a logical extension.

My opinion, which is shared implicitly by the editors, is that the economics of transport are fundamentally problems of economics, but applied to a particular sector which has some very specific characteristics. From where does that specificity arise? It can be identified in terms of the numerical values of parameters such as the incidence of scale economies, or the environmental costs imposed by different modes of transport, or the incidence of a particular form of organization such as the oligopoly structures found in airline competition or the public-private partnerships often found for the provision of infrastructure. Transport does not require a unique economics based on paradigms and mechanisms that differ from other sectors of the economy. But transport is characterized by certain specific features.

The first of these specific characteristics is the role of space. Transport is necessary

because activities are spatially separated and this separation affects the economic analysis: it creates variable rents for land, it changes the laws of competition and it generates spatial inequalities. The role of transport in the structuring of space is an important issue in policy towards land use. Progress has been made in recent years in understanding the links between transport and land use, notably through the 'new economic geography' following the pathbreaking work of Paul Krugman. The *Handbook* deals with these new advances in detail and explains their significance. But this area still remains tentative and incomplete, particularly in terms of its dynamics, the time lags involved, and the importance of public policy decisions affecting it. All of these combine to create new problems for us to solve.

The second specific characteristic is time. First, spatial separation implies that time is needed to travel. The use of time was first modeled in detail by Gary Becker. Becker treated time as an attribute of all consumption, not just transport, but transport is a sector where time has a particularly important role especially when reliability and comfort are considered. Second, since transport is consumed as it is produced, the choice of when to travel is a key factor in the use of transport. Following the initial work of William Vickrey, there has been considerable research on modeling trip-timing decisions, including work by the editors of this *Handbook*, which contributes to the literature on dynamic models. Third, time, and especially long periods of time counted in years or decades, arises because of the durability of transport infrastructure and the mobile plant which uses it. These long time periods complicate investment decisions. A fourth aspect related to time is the problem of scheduling and pricing of transport services by suppliers. This encompasses not only commonplace tasks such as designing bus timetables but also the use of ITS technology such as yield management software which is routinely used to allocate seats on planes and trains, but can also be used to allocate hotel rooms, hospital beds and facilities in other sectors of the economy.

The third characteristic of transport economics is the multiplicity of decisions that have to be made: choice of destination, transport mode, departure time and route, as well as long-run decisions such as residential location, workplace and vehicle ownership. Most of these choices are discrete. The theory of discrete choice, which I developed in my own research, has become a workhorse not only in transportation but also in many other areas such as industrial organization and marketing. This theory is particularly useful for taking into account the fact that decisions relating to transport are part of a much wider set of decisions relating to the choices between a range of activities, or to the sequential decisions determined by experience or memory, all filtered by psychological attitudes. The diagram below suggests a structure for analysis of these decisions which provides a basis for the way research is developing. It suggests how the development of discrete choice models has led researchers to explore types of behavior which are omitted from the traditional theory of rational behavior under perfect information. The decision maker in our models is far from being fully rational and responds to stimuli usually studied by psychologists. Curiously enough, a parallel development has occurred in the study of risk, which has abandoned the use of models based on expected utility in favor of models which allow for perception bias and the asymmetry of gains and losses. Moreover, there are further parallels with the theory of behavior in an imperfect world originating with the work of Maurice Allais and continued by Daniel Kahneman's Nobel-prize-winning work on prospect theory; developments which were influenced by Herbert Simon's work

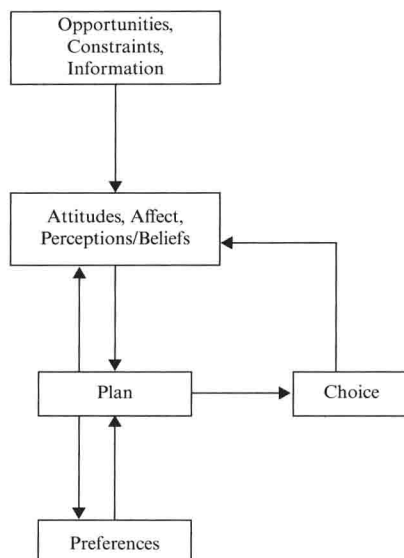


Figure 0.1 The process of decision making (adapted from McFadden 1999)

on bounded rationality. Such models are applicable to many decision situations, both individual and group. Using an integrated view that draws on economics and psychology they are particularly well suited to transport. Valuably, the *Handbook* includes a specific chapter devoted to the psychology of decisions.

The final characteristic I want to emphasize is the relationship between the public and private sectors in the provision and management of transport. Once again, this is not a problem solely related to transport; it can be found in many instances relating to public utilities, including for example, energy and water. However, it is in transport where it has been developed furthest. There are two main explanations for this. The first relates to the importance and nature of externalities, in particular congestion externalities which are endemic to transport. It is thus the role of the regulator or state to take measures to control the undesirable effects. Such measures can include policies on prices or quantities, changes of legislation, and the use of new information and communication technologies such as flexible pricing based on current or forecast levels of aggregate usage. The second explanation arises from the fact that for several reasons, both institutional and technical, public authorities are deeply involved in the supply of transport services. From this has arisen the development of public-private partnerships as well as the need to consider imperfect competition, indirect taxation, contracts and regulation under asymmetric information along the lines developed by James Mirrlees and Eric Maskin.

These four characteristics underpin the structure of the *Handbook* and the selection of topics in each of the five parts. Each topic is addressed by one of the best specialists in the area. The contributors have been chosen for their ability and reputation; some are transport specialists, but others work mainly in other fields. However, each is an expert who is recognised as having contributed to the economics of transport. The *Handbook* does not deal with every topic, but it includes most of the important topics, particularly

those which identify important future developments in the nature and study of transport. I want to thank the editors for bringing this project to fruition and compiling in one volume contributions which will interest both transport specialists and economists. Engineers and management experts will benefit from the summaries, and rigorous analysis, of recent advances in economic research applied to their fields of interest. Researchers and students in economics will see how economic theory can be applied in a specific context to enrich the study of one sector, transport. In this way, the *Handbook* contributes to the cross-fertilisation of different areas of knowledge and constitutes an important development in the advancement of that knowledge.

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McFadden, D., 1999, Rationality for economists, *Journal of Risk and Uncertainty*, **19**, 73–105.

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