INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

THE ECONOMIC REGULATION OF THE ROAD TRANSPORT INDUSTRY

FILE COPY

September 1970

Economics Department
Prepared by: Conrad J. Oort (Consultant)
Economics Department Studies on Problems of
Sector and Project Analysis

* EC-117, July 15, 1963, Herman G. van der Tak, The Economic Comparison of
Hydroelectric Projects with Alternative Developments of Thermal Electric
Power

EC-128, May 7, 1964, Herman G. van der Tak, The Evaluation of Agricultural
Projects: A Study of Some Economic and Financial Aspects

EC-130, October 26, 1964, Lee Charles Nehrt, A Pre-Investment Study of
the Flat Glass Industry

EC-132, January 22, 1965, Herman G. van der Tak and Jochen K. Schmedtje,
Economic Aspects of Water Utilization in Irrigation Projects

Cost of Capital

* EC-140a, December 16, 1965, Jan de Weille, Quantification of Road User
Savings

* EC-147, September 26, 1966, Herman G. van der Tak and Jan de Weille,
An Economic Reappraisal of a Road Project: The First Iranian Road Loan
of 1959 (IRN-227)

EC-157, December 20, 1967, Mark Blaug, A Cost-Benefit Approach to
Educational Planning in Developing Countries

* EC-158, January 11, 1968, Alan A. Walters, The Economics of Road User
Charges

EC-160, March 18, 1968, Herman G. van der Tak and Anandarup Ray, The
Economic Benefits of Road Transport Projects

* EC-161, May 29, 1968, Ayhan Cilingiroglu, Manufacture of Heavy Electrical
Equipment in Developing Countries

* EC-162, May 31, 1968, Jack Baranson, Automotive Industries in Developing
Countries

* EC-164, August 21, 1968, Shlomo Reutlinger, Techniques for Project
Appraisal under Uncertainty

EC-169, May 1969, Helen Hughes, Problems of Food Processing Industries
in Developing Countries

EC-173, November 1969, Hans H. Thias and Martin Carnoy, Cost-Benefit
Analysis in Education: A Case Study on Kenya

* Reissued in World Bank Staff Occasional Papers, distributed by
Johns Hopkins Press.
A substantial part of the Bank's resources is devoted to the improvement of road networks in developing countries. Public policy can directly affect the benefits to be derived from highway projects by determining the conditions of road usage and by regulating the road transport industry. In order to clarify the economic problems underlying the first policy issue, the Bank several years ago requested Professor Alan A. Walters to prepare a study of road user charges, which was issued as World Bank Staff Occasional Paper No. 5, The Economics of Road User Charges. Continuing this line of research, the Bank commissioned Professor Conrad J. Oort of the University of Utrecht, the Netherlands, to examine the second area.

The Economic Regulation of the Road Transport Industry presents a review of regulatory policies on the basis of economic theory and of its practical implications. The author examines the problem in three successive stages, beginning with the road transport industry considered in isolation, moving on to the coordination between different modes, and finally placing transport in the framework of the total economy. He accepts economic efficiency in transport as the major policy criterion, since the examination of other possible objectives leads him to conclude that the latter are largely irrelevant for transport policy.

Although a great many studies are available on specific aspects of regulation and in particular regulatory systems, it appears that so far no systematic and comprehensive analysis has been made of the whole field. Moreover, some fundamental points of economic theory, in particular concerning the case for protection of public transport, have not been adequately treated in the existing literature.

These factors account for the length of the study, even though it does not deal in detail with every one of the many specific regulatory practices employed in the different countries. The author has grouped the instruments of regulation into four broad classes: specific taxes and subsidies, rate regulation, entry restrictions, and capacity restrictions. Each group of instruments is evaluated in terms of its effects on economic efficiency and of its effectiveness in achieving the various specific purposes of road transport regulation.

The author concludes that "a study of present regulatory policies in the road transport industry can hardly fail to leave the overwhelming impression of their inefficiency. Restrictive regulation, whether of rates, entry, or capacity, is not only detrimental to economic efficiency as such, but it is often totally ineffective in terms of the very objectives it is supposed to serve." He indicates that this conclusion holds for developed and developing countries alike, and that the case against restrictive regulation is particularly strong for the developing countries. They can least afford the inefficiencies of restrictive regulation and are to some extent still in a position to avoid the errors to which most developed countries have long been committed.
The author gratefully acknowledges the helpful comments of colleagues in the Economics Department and the Projects Department of the Bank. He is particularly indebted to Mr. H.G. van der Tak, whose ideas and suggestions have greatly contributed to the development of his thinking on the subject, and whose amicable but penetrating critique of the many successive drafts have often led the author to rethink his analysis or to change the presentation on important points. Among the many other people who have helped him he wants to mention especially Professor William Vickrey of Columbia University, who commented on an early draft of Part One that was presented as a discussion paper at the American University, and who also made a great many valuable comments on the final draft. He is also very grateful to Mrs. Suzy Henneman, who has performed the ungrateful task of editing a text of close to 300 pages, with the author out of reach across the Atlantic. Finally, he wants to thank Mrs. Amy Wang for typing the manuscript; her speed and accuracy have become proverbial at the Utrecht Economics Institute.

Since the author has had complete freedom to work out his subject, his conclusions should not be considered as a statement of official Bank policy. The author is solely responsible for the views expressed.

Other studies on problems of sector and project analysis given circulation outside the Bank are listed on the inside front cover.

Andrew M. Kamarck
Director
Economics Department
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I.</strong> INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1. Purpose of the Study</td>
<td>2</td>
</tr>
<tr>
<td>2. Regulation Versus Centralization</td>
<td>3</td>
</tr>
<tr>
<td>3. Economic Efficiency and Competition</td>
<td>4</td>
</tr>
<tr>
<td>4. A Note on Terminology</td>
<td>5</td>
</tr>
<tr>
<td><strong>PART ONE: THE THEORY OF ECONOMIC EFFICIENCY AS APPLIED TO ROAD TRANSPORT</strong></td>
<td>8</td>
</tr>
<tr>
<td>II. INTRODUCTION</td>
<td>8</td>
</tr>
<tr>
<td>1. The Assumptions</td>
<td>8</td>
</tr>
<tr>
<td>2. Increasing Returns to Scale in Road Transport</td>
<td>9</td>
</tr>
<tr>
<td>3. Outline of Part One</td>
<td>11</td>
</tr>
<tr>
<td>III. EFFICIENT PRICING AND INVESTMENT</td>
<td>13</td>
</tr>
<tr>
<td>1. Constant Quality of Output</td>
<td>13</td>
</tr>
<tr>
<td>2. Varying Quality of Output</td>
<td>21</td>
</tr>
<tr>
<td>3. Efficient Peak-Load Pricing and Investment</td>
<td>28</td>
</tr>
<tr>
<td>IV. ECONOMIC EFFICIENCY AND COMPETITION</td>
<td>33</td>
</tr>
<tr>
<td>1. Constant Quality of Output</td>
<td>33</td>
</tr>
<tr>
<td>2. Varying Quality of Output</td>
<td>33</td>
</tr>
<tr>
<td>V. IMPLICATIONS OF INCREASING RETURNS TO SCALE</td>
<td>37</td>
</tr>
<tr>
<td>1. Indivisibilities in Current Operations</td>
<td>37</td>
</tr>
<tr>
<td>2. Indivisibilities in Investment</td>
<td>45</td>
</tr>
<tr>
<td>3. Economies of Scale</td>
<td>45</td>
</tr>
<tr>
<td>4. The Case of &quot;Thin&quot; Markets</td>
<td>48</td>
</tr>
<tr>
<td>5. External Economies of Scale</td>
<td>50</td>
</tr>
<tr>
<td>VI. IMPLICATIONS OF IMPERFECT PRICING</td>
<td>53</td>
</tr>
<tr>
<td>1. Time Differentiation</td>
<td>53</td>
</tr>
<tr>
<td>2. Quality Differentiation</td>
<td>61</td>
</tr>
</tbody>
</table>
VII. IMPLICATIONS OF UNCERTAINTY .................................. 54
   1. The Marginal Conditions of Economic Efficiency ................................ 64
   2. Economic Efficiency and Competition .................................................. 67
   3. Uncertainty and Imperfect Pricing ..................................................... 68
   4. Summary ................................................................................................. 71

VIII. THE SCHEDULED CARRIER PROBLEM ........................................ 73
   1. Economic Rationale of Scheduling ......................................................... 74
   2. Impediments to Perfect Pricing ............................................................. 75
   3. Economies of Scale .................................................................................. 77
   4. Public Service Obligations ........................................................................ 79
   5. Competition Among Scheduled Carriers ................................................. 79
   6. Competition Between Scheduled and Unscheduled Carriers ..................... 81
   7. Summary ................................................................................................. 81

PART TWO: THE OBJECTIVES OF REGULATION

IX. INTRODUCTION ..................................................................................... 84

X. REGULATION TO IMPROVE INTERNAL ECONOMIC
   EFFICIENCY IN ROAD TRANSPORT ....................................................... 85
   1. The Special Aspects of Road Transport .................................................. 85
   2. Competition and the Scheduled Carrier ............................................... 98
   3. Competition and the Contract Carrier ................................................... 110
   4. Competition and the Private Carrier ..................................................... 113
   5. Summary ................................................................................................. 116

XI. REGULATION TO ENSURE EFFICIENCY IN THE
   TRANSPORT INDUSTRY ........................................................................ 118
   1. Transport Coordination ........................................................................ 119
   2. The Railroad Problem .......................................................................... 120
   3. Road Regulation and the Railroad Problem .......................................... 124
   4. Summary ................................................................................................. 128
## XII. EXTERNAL PRICE DISTORTIONS AND EXTERNAL EFFECTS  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. External Price Distortions</td>
<td>131</td>
</tr>
<tr>
<td>2. External Effects</td>
<td>135</td>
</tr>
<tr>
<td>3. Summary</td>
<td>135</td>
</tr>
</tbody>
</table>

## XIII. OBJECTIVES OTHER THAN ECONOMIC EFFICIENCY IN TRANSPORT  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Income Policy for Road Carriers</td>
<td>138</td>
</tr>
<tr>
<td>2. Objectives Outside of Transport</td>
<td>139</td>
</tr>
<tr>
<td>3. Summary</td>
<td>142</td>
</tr>
</tbody>
</table>

## PART THREE: THE INSTRUMENTS OF REGULATION  

## XIV. INTRODUCTION  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Antitrust Policies</td>
<td>145</td>
</tr>
<tr>
<td>2. Information Policies</td>
<td>149</td>
</tr>
</tbody>
</table>

## XV. SPECIFIC TAXES AND SUBSIDIES  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Offsetting Taxes and Subsidies</td>
<td>152</td>
</tr>
<tr>
<td>2. Regulatory Taxes and Subsidies</td>
<td>154</td>
</tr>
<tr>
<td>3. General Revenue Taxes</td>
<td>159</td>
</tr>
</tbody>
</table>

## XVI. RATE REGULATION  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Maximum Rate Regulation</td>
<td>162</td>
</tr>
<tr>
<td>2. Minimum Rate Regulation</td>
<td>164</td>
</tr>
<tr>
<td>3. Regulation of Scheduled Carrier Rates</td>
<td>168</td>
</tr>
<tr>
<td>4. Rate Regulation in Practice</td>
<td>170</td>
</tr>
<tr>
<td>5. Summary</td>
<td>172</td>
</tr>
</tbody>
</table>

## XVII. ENTRY RESTRICTIONS  

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Qualitative or Subjective Entry Conditions</td>
<td>174</td>
</tr>
<tr>
<td>2. Quantitative Entry Restrictions</td>
<td>176</td>
</tr>
<tr>
<td>3. Scheduled Carriers</td>
<td>179</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>XVIII. CAPACITY RESTRICTIONS</td>
<td>182</td>
</tr>
<tr>
<td>1. Firm-Oriented Licensing Systems</td>
<td>183</td>
</tr>
<tr>
<td>2. Market-Oriented Licensing Systems</td>
<td>187</td>
</tr>
<tr>
<td>XIX. THE SOCIAL COST OF EXCESSIVE RESTRICTION</td>
<td>195</td>
</tr>
<tr>
<td>1. The Static Effects</td>
<td>196</td>
</tr>
<tr>
<td>2. The Dynamic Effects</td>
<td>198</td>
</tr>
<tr>
<td>3. Direct Costs of the Regulatory Process</td>
<td>200</td>
</tr>
<tr>
<td>4. Summary</td>
<td>200</td>
</tr>
<tr>
<td>XX. INTRODUCTION</td>
<td>203</td>
</tr>
<tr>
<td>XXI. SUMMARY OF MAIN CONCLUSIONS</td>
<td>205</td>
</tr>
<tr>
<td>1. Economic Theory and Regulation</td>
<td>205</td>
</tr>
<tr>
<td>2. The Objectives of Regulation</td>
<td>208</td>
</tr>
<tr>
<td>3. The Instruments of Regulation</td>
<td>211</td>
</tr>
<tr>
<td>XXII. PROBLEMS OF TRANSITION</td>
<td>214</td>
</tr>
<tr>
<td>XXIII. SUGGESTIONS FOR FURTHER RESEARCH</td>
<td>217</td>
</tr>
</tbody>
</table>

**BIBLIOGRAPHY**
<table>
<thead>
<tr>
<th>FIGURES</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Efficient Price and Output</td>
<td>15</td>
</tr>
<tr>
<td>2. Operating Cost Savings from Expansion of Durable Capacity</td>
<td>18</td>
</tr>
<tr>
<td>3. Current Value of Investment in Expansion of Durable Capacity</td>
<td>18</td>
</tr>
<tr>
<td>4. Efficient Price and Output with Varying Quality</td>
<td>23</td>
</tr>
<tr>
<td>5. Efficient Supply Function</td>
<td>25</td>
</tr>
<tr>
<td>6. Efficient Pricing with Fluctuating Demand</td>
<td>30</td>
</tr>
<tr>
<td>7. Firm's Selling Price, Variable Quality of Output</td>
<td>35</td>
</tr>
<tr>
<td>8. Efficient Pricing with Indivisibilities: One-Vehicle Fleet</td>
<td>38</td>
</tr>
<tr>
<td>10. Efficient Pricing with Indivisibilities: Many-Vehicle Fleet</td>
<td>43</td>
</tr>
<tr>
<td>11. Imperfect Time Differentiation of Prices</td>
<td>54</td>
</tr>
<tr>
<td>12. Economic Cost of Uncertainty</td>
<td>66</td>
</tr>
</tbody>
</table>
I. INTRODUCTION

1. Since the nineteen-thirties, all developed countries have engaged in economic regulation of the road transport industry. 1/ Introduced originally as a depression policy, economic regulation has since undergone surprisingly few changes in content and in official justification. In the developing countries of Africa and Asia, economic regulation of road transport has usually been imposed by the colonial power and shaped after the latter's transport policy. Other developing countries, mainly in Latin America, have introduced regulation on their own initiative.

2. Economists are generally dissatisfied with regulatory policies and almost unanimously critical of official policy justification. 2/ In the recent past, their critical approach has in some instances produced a slight echo on the policy level. 3/ But in the vast majority of countries, the restrictive regulation introduced during the great depression continues to be applied with few basic changes, for obvious political reasons. Vested interests of the road transport industry and those of its

1/ In this paper, economic regulation of the road transport industry (henceforth, simply regulation) is interpreted as public measures which serve an economic purpose and are imposed specifically on the road transport industry. It excludes noneconomic forms of regulation such as technical requirements of vehicles, professional ability of drivers, and other safety measures. It also excludes the application to transport of general economic measures such as fiscal and social laws and antitrust policies, to the extent that their application is intended to be nondiscriminatory relative to other sectors of the economy.

2/ It is difficult to give a representative list of references without quoting virtually the entire literature on transport economics. For a lucid recent statement, see J.R. Meyer, M.J. Peck, J. Stenason and C. Zwick, The Economics of Competition in the Transportation Industries, Cambridge: Harvard University Press, 1964, henceforth called Competition. According to H.M. Kolsen, most public statements of intention on transport policy merely have the function "of making the right kinds of political noises and of being sufficiently vague to permit almost anything to be undertaken under their umbrella." (The Economics and Control of Road-Rail Competition, Sydney: Sydney University Press, 1968, p. 151, henceforth called Road-Rail Competition.)

3/ See, e.g., the deregulation of interstate trucking in Australia in the mid-fifties, following the Hughes and Vale Case (decision of the Judicial Committee of the Privy Council, 1954, C.L.R.2); President Kennedy's transportation message of April 1962; and the Canadian National Transportation Act of 1967 which, following the recommendations of the Royal Commission on Transportation, Chairman M.A. MacPherson, has greatly reduced the area of transport regulation in Canada.
main competitor, the railways, are protected by regulation. These interests, supported by the treasury when it underwrites railway deficits, are politically far more powerful and vocal than the scattered interests of the economy as a whole.

3. For society, the present situation is hardly rational, economically or otherwise. Too often, it is a product of conventional wisdoms that have largely outgrown their historical justification, a lack of political incentive to change, and sometimes a cultivated confusion about the policies' final objectives as well as their real effects. But the cold voice of reason can be ignored only at a cost which the policy-maker should consider. A rational transport policy must be based on an explicit statement of objectives, on an examination of possible instruments, and on the selection of measures to most efficiently achieve the stated objectives. The almost total lack of policy reviews along these lines leads us to conclude that policy-makers are not enough aware of the cost which inefficient regulatory practices in transport may impose on the economy at large.

1. Purpose of the Study

4. We present here a critical review of present regulatory policies in the road transport industry (public and private, passenger and freight) on the basis of the criteria just mentioned. We shall examine the possible objectives of regulation and the types of instruments actually employed, to see in what respects present regulatory policies are rational as a function of their objectives and in what respects they are not. Although the problem is a general one, the study is concerned especially with regulation of road transport in developing countries, which can least afford the luxury of inefficiency. It is difficult to measure the economic loss from inefficient regulation on the basis of available data. We will see that the cost may well be quite substantial when we consider not only misallocations within the industry, but also the effects on location and on the economy's product mix.

5. For two reasons, this paper will focus on the objective of economic efficiency, derived from the concept of optimum resource allocation. First, it is generally agreed that economic efficiency should be an element of transport policy. It is often considered the most important and sometimes the only objective, at least as much in developing as in highly industrialized economies. 1/ Second, even if transport policy is made to serve other objectives, such as social policy or political unity, the results should be compared with those of the economic efficiency model, to show policy makers the comparative cost of using transport policy or alternative instruments.

1/ This is stated very clearly in the Report of the Royal Commission on Transportation (Canada): Chairman M.A. MacPherson, Ottawa: The Queen's Printer, 1966, Vol. II, p. 11: "Public policy in Canada should seek to create an efficient transport system. This we define as the objective of the National Transportation Policy."
6. The specific objectives, instruments, and effects of regulatory policies differ substantially from country to country, but three major reasons for control run through nearly all policy statements: to ensure adequate road transport service at reasonable prices, to prevent excessive competition among road transport firms, and to bring about rational coordination between the road transport industry and other modes of transport, especially the railways. In developing countries, the inadequate supply of vehicles, spare parts and fuels due to insufficient home production and restriction of imports for balance of payments reasons is also often used to rationalize a licensing system and rate regulation.

7. Part One will review the relevant economic theory. A closer analysis of the objectives of regulation in Part Two will reveal a wide range of goals of road transport regulation. Desires for allocative efficiency and economic growth, income redistribution, and other objectives such as political unity are combined to motivate regulatory policies. As a first step towards a clear analysis of the issues, we will need to separate these different objectives as much as possible.

8. Part Three will review the many specific forms of regulation that countries employ, the major categories being specific taxes and subsidies, rate regulation, restrictions on entry, and restrictions on capacity. Each instrument has its specific merits and shortcomings and its relative efficiency will depend on the particular objectives it is supposed to serve. We undertake only a general review, based primarily on the criterion of economic efficiency. We do not include public operation of the road transport industry as a tool, but devote some special comments to it in the next section.

9. In Part Four we shall summarize the first three parts and fill in the remaining gaps, especially with regard to the links between objectives and instruments. An attempt will be made to present an overview and the major policy implications. A chapter will be devoted to problems that may arise during the transition from existing regulatory systems to the recommended policies. The final chapter will offer a few suggestions for further research in road transport regulation.

2. Regulation Versus Centralization

10. The term regulation suggests that we accept unrestricted competition as a basis of reference and place the burden of proof on the proponent of regulation. We might just as logically assume centralized control of the road transport industry and investigate the most efficient system of public administration (instructions, incentives, extent of decentralization, etc.). Although in theory and on purely economic grounds the two approaches, applied to the same problem, should eventually lead to the same conclusion, in practice the economists' margin of ignorance is still so large that the starting-point inevitably tends to bias the results. The procedure we follow can be justified only on the grounds that it is the natural one in all mixed economies based on decentralized decision-making, in which public control is applied only when individual
actions are shown to be in conflict with the general interest, or when they fail to provide certain goods or services even though the social benefit exceeds the social cost.

11. The theory of welfare economics has shown two major areas in which such conflicts occur. The case of natural monopolies, or sectors in which the most efficient scale of production is large enough to serve the entire market, does not occur in the road transport industry as a whole: economies of scale are of limited significance. The other area is that of public goods which cannot be traded on the market because the product is not exclusive (an obvious example is national defense). Although some transport service benefits do not accrue to the shipper, the main product is surely not a public good and is perfectly capable of being bought and sold on the market. If these propositions are correct—and they will be further investigated in this paper—there is no reason to treat the road transport industry as different from the other sectors of the economy, and the presumption in favor of unrestricted competition and the price system is then valid. We shall examine to what extent this conclusion must be modified because of certain environmental effects which road transport produces, such as air pollution (externalities).

3. Economic Efficiency and Competition

12. Before we discuss the problems of competition in the road transport industry, it may be useful to summarize the case for unregulated competition and the unrestricted freedom of choice by transport users. 1/ Since we have interpreted the term regulation to exclude policies that apply to all sectors of the economy, unregulated competition does not imply the absence of antitrust policies but rather the application of adequate antitrust policies in all sectors.

13. On the demand side, transport is but one stage in a complex production process including storage, distribution, possibly transshipment, location of plants and distribution centers, the use of roads, etc. Moreover, since transport has many dimensions beside cost, such as speed, timing, dependability, packaging and handling, breakage, comfort, and safety, the possibilities of substitution open to the user are highly complex. Since any one user is almost always in a different situation from that of any other and no simple rule can summarize the optimum solution for all, unrestricted freedom of choice by the user on the basis of efficient prices is in general felt to be better suited to the transport market than a regulated form of decision-making.

1/ For a very lucid statement on the same point, see A.A. Walters, Integration in Freight Transport, London: Institute of Economic Affairs, 1968.
14. On the supply side of the market, the general case for unrestricted competition applies to road transport without major qualifications. Even when an actual competitive market does not exactly correspond to the classical model, effective competition does exert a permanent pressure towards cost minimization in both the short and long run. Free entry and free pricing will tend to eliminate inefficient firms and induce the introduction of new methods of production, and will tend to ensure performance of all services for which the users are willing to pay the economic cost and absence of services which offer insufficient returns. Provided prices reflect social cost—a point to which we shall return later—the competitive system will tend to produce an optimum allocation of resources and contribute to economic efficiency in the long run.

15. In road transport, more so than in many other industries, flexibility is essential for economic efficiency. Since transport services cannot be stored, capacity that is not utilized at any moment of time represents a loss of economic resources. Flexibility of prices and mobility of transport capacity from one submarket to another can help reduce the social waste. Unrestricted competition is one of the most effective means of ensuring such flexibility, since the decentralized decisions of individual transport firms, based on specific cost-revenue comparisons, provide the required adaptation of supply to the specific demand requirements and the specific cost conditions in each submarket.

4. A Note on Terminology

16. Since in this paper, several terms are used in a sense which may not always correspond to the interpretation of these terms in different countries, we now define some of the major terms to prevent the semantic confusion that often leads to spurious and unnecessary argument. To begin with, the term road transport industry and all its derivatives will refer exclusively to vehicle operations. The analysis of pricing and investment problems deals with the prices of transport services and the investment in rolling stock. The present paper is not concerned at all with roads except as a factor of production: the price of road usage plays exactly the same role in our analysis as the price of fuel.

17. Individual (road) transport service is defined as a transport operation between particular points, at a particular time, and for a capacity indicated in the contract between individual carrier and individual user. In passenger transport, the user will be the passenger, or a number of passengers contracting as a unit (e.g. a family). The individual passenger service may occupy part of a vehicle (as in the case of a bus), the whole of a vehicle (as is common with taxis), or more than one vehicle (e.g. large charter groups). Likewise, in freight the individual shipment may occupy an entire truck, less than a truck, or more than a truck. In this connection, we shall define individual transport as transport operations which involve no more than one individual transport service per vehicle-trip. An individual carrier is a carrier who performs only individual transport services. Individual transport may be either contract
carriage, when shipper and carrier are distinct legal entities, or private
 carriage (transport on own account), when they are the same. A contract
carrier is defined as a carrier who performs only contract carriage, and
a private carrier (carrier on own account) as one who performs only pri-
 vate (own account) services.

8. The reverse of individual transport is joint carriage, defined
as transport operations involving more than one individual transport serv-
ice per vehicle-trip. Examples in passenger transport are buses, and taxis
when they take more than one individual passenger unit in one trip. A
joint carrier is a carrier who performs only joint carrier services, in
the sense that he never restricts the use of his capacity for any particular
trip to one single user, although a bus may happen to have only one occu-
pant and a general delivery service may happen to carry only one consign-
ment. Mixed carriers are carriers that sometimes act as individual carriers
and sometimes as joint carriers. An example is the taxi which normally
carries only one passenger unit but sometimes acts as a minibus.

19. What we call individual and joint transport is often referred to
as private and public transport. We have decided to avoid the latter terms
because they invite confusion with the question of ownership. We shall also
avoid the term common carrier, since it has a very specific legal content
that tends to differ from country to country. Instead, we shall con-
centrade on the economic concept of a scheduled carrier.

---

1/ For a description of the various legal concepts in the U.S. trans-
 portation system, see Dudley F. Pegrum, Transportation Economics
and Public Policy, Homewood, Ill.: Richard D. Irwin, 1963, Chapter
5. The British terminology can be found in K.M. Gwilliam, Transport
PART ONE

THE THEORY OF ECONOMIC EFFICIENCY
AS APPLIED TO ROAD TRANSPORT

II. INTRODUCTION

III. EFFICIENT PRICING AND INVESTMENT

IV. ECONOMIC EFFICIENCY AND COMPETITION

V. IMPLICATIONS OF INCREASING RETURNS TO SCALE

VI. IMPLICATIONS OF IMPERFECT PRICING

VII. IMPLICATIONS OF UNCERTAINTY

VIII. THE SCHEDULED CARRIER PROBLEM
II. INTRODUCTION

1. In this part we examine the implications of economic theory as applied to the road transport industry. We will refer to the theory of economic efficiency rather than the theory of welfare economics to indicate that we want to abstract entirely problems of income distribution and other objectives not directly related to efficient operation of the road transport industry. The possible implications of these other objectives will be examined in Chapter XIII in Part Two. We shall consider it the objective of policy that all road transport services valued at least as highly as their social costs be supplied, and none that do not satisfy this condition. The foundations of the theory of economic efficiency will be accepted without proof or comment. 1/ As a basis for further analysis, we shall specify explicitly its special implications for the road transport industry on several points where the general theory is not directly applicable or requires a specific interpretation. As we have defined the road transport industry to cover only vehicle operations, the analysis will focus on application of the theory to pricing of road transport service and investment in rolling stock, and will not deal with the roads.

2. We intend to investigate whether, or under what conditions, unregulated competition in the road transport industry will tend to conform to the conditions of economic efficiency, formulated to fit the road transport industry. This will serve as indispensable background for a more comprehensive and more operational analysis of regulation, to be carried out in the later parts of the paper.

1. The Assumptions

3. The analysis in Part One will proceed under two groups of assumptions, namely:

   (1) the absence of external price distortions and external effects;

   (2) the absence of significant increasing returns to scale in the road transport industry.

The absence of external price distortions and external effects enables us to consider the conditions of economic efficiency in one economic sector and ignore the fact that other prices in the economic system may be distorted, i.e., it excludes second-best problems. Costs and prices in both the transport sector and all other sectors are therefore assumed to fully reflect all social costs and all social benefits. Applied to road transport, these assumptions imply that the price of road usage is an efficient price, that external effects such as air pollution and noise hindrance are absent or are converted into money costs by an appropriate charging system, and that the prices of competing transport services (mainly rail transport) are fully efficient. This assumption may not be fully realistic. But it enables us to examine the conditions of economic efficiency in their simplest form, providing a basis on which we can superimpose the complications that arise when we drop the assumptions. No immediate policy conclusions can be drawn from the present analysis, and it may seem irrelevant to practical problems. However, like the hidden foundations of a building, the "pure" conditions of economic efficiency are an indispensable basis for further work.

4. On the contrary, the assumption of no significant increasing returns to scale in the road transport industry is not intended as a temporary simplification but as a statement about the actual situation in the industry. The issue will be examined in detail in Chapter V, but because of its significance we comment briefly on it here.

2. Increasing Returns to Scale in Road Transport

5. The assumption that there are no significant increasing returns in the road transport industry has far-reaching implications. It implies not only that a competitive organization of the road transport industry is possible and potentially efficient, but also that efficient pricing and investment on the margin will automatically ensure efficiency in non-marginal adjustments of current output or of investment. More precisely, the assumption permits us to deal with only the first-order maximum conditions, since the second-order conditions are satisfied automatically.

6. Increasing returns to scale are of three distinct types. The first is associated with the decrease in costs per unit of service with trucks or buses of larger size, up to a limit usually determined by law. Although the term is not quite correct in theory, we shall refer to the latter as indivisibilities (i.e., of the unit of supply). We shall speak of economies of scale when unit cost declines as the firm expands. This second type of increasing returns is the one implicitly referred to when discussing the feasibility of competition. When unit cost decreases significantly over a sufficiently large interval, competition becomes impossible, or at least can no longer produce an efficient organization of the industry. The third and last source of increasing returns appears to be specific to the joint carriage sector of the transport industry, in which the timing of the transport service cannot be perfectly adapted to the preferences of each user because of the indivisibility of the unit of supply (the individual bus or truck), the nonstorability of transport
services, and the resulting discontinuity of supply over time. Under these circumstances, a larger total output, generally associated with a higher frequency of service, will improve the quality of the product without any increase in unit cost. Since these quality improvements are a function of the total market rather than of the size of the individual transport firm, we shall refer to them as external economies of scale.

a. Indivisibilities

7. Indivisibilities, in the sense of individual units of supply (trucks or buses) that must be of a certain minimum size in order to attain the lowest cost per unit of service, do not seem to be of great importance in the road transport industry. They are clearly less important in road transport than in other modes of transport such as rail and shipping. In the case of very "thin" markets, regions that are exceptionally sparsely populated or that have very few trade relations with other areas, a monopolistic situation is inevitable. In general, however, the indivisibilities in road transport are so small that they do not stand in the way of workable competition. Moreover, the size of the individual road transport unit is highly flexible, all the way down to the small pick-up truck and the private automobile or taxi.

8. Indivisibilities do raise special problems in the case of joint carriers. Indivisibilities of the unit of supply (the individual truck or bus), in conjunction with the nonstorability of transport services, imply a discontinuity of service over time. This gives rise to external economies of scale and leads to some intricate problems of competition and regulation in the case of joint carriers. We shall examine the latter problems in Chapter VIII.

b. Economies of Scale

9. If significant economies of scale were to occur over a range of output that includes a substantial part of the road transport market, workable competition would be impossible or at least inconsistent with economic efficiency. What scanty empirical evidence there is does not support the proposition that road transport is subject to significant economies of scale. Moreover, in most countries where regulation does not favor mergers or the expansion of existing firms over the entry of new firms, the road
transport industry is in fact very competitive. 1/ This is at least a strong indication that the economies of scale in road transport, if they exist at all, are not sufficiently important to induce a concentration of production in few large firms which are able to eliminate their smaller competitors on the basis of their cost advantages and thereby prevent workable competition.

10. There may be regions or routes where actual competition is absent because demand is so low that it can be served by only one firm or at most a few firms of optimum size. In some such cases, regulation may be needed to prevent monopolistic practices, but this case of very "thin" markets requires special examination and does not affect the main argument. Then again, even in markets where competition is feasible, monopolistic practices may result from private agreements between carriers and public antitrust regulation may be required. Since antitrust policy applies to all firms and is of no special relevance to road transport, it falls outside our original definition of road regulation.

c. External Economies of Scale

11. Improvement of quality (mainly increased frequency) as a function of total output, the third type of increasing returns to scale, arises only in joint carriage. This type is not inconsistent with workable competition, because the improved quality of output is not a function of individual firm size but of total industry output. We shall have to examine more closely whether it is consistent with the efficiency of competition in the welfare sense.

3. Outline of Part One

12. We begin in Chapter III by working out the theory of economic efficiency under a number of simplifying assumptions. As we shall see, special examination of the road transport industry is needed to incorporate changes in the quality of transport services resulting from changes in the utilization of available capacity. After a brief discussion of the special problems associated with the peak-load phenomenon, the results will be applied to the question of whether competition is in principle

---

1/ See Meyer, Peck, Stenason and Zwick, Competition, who argue that whatever concentration there is in U.S. trucking "is largely a consequence of ICC policy...Without control of entry by the ICC, it is likely the trucking industry would be even more unconcentrated." (p. 213). See also James C. Nelson, "The Effects of Entry Control in Surface Transport," from Transportation Economics, National Bureau of Economic Research, New York: Columbia University Press, 1965 (henceforth called "Entry Control"), pp. 398-405, 416-420, where he explains that other factors than economies of scale are responsible for the emergence of some very large trucking firms in the U.S.
consistent with economic efficiency, given the simplifying assumptions (Chapter IV). This will require special analysis for the case of variations in the quality of service.

13. The next three chapters (V-VII) will consider the implications of dropping the simplifying assumptions, namely, the absence of increasing returns, the feasibility of perfect pricing, and the absence of uncertainty. The assumption of perfect pricing indicates that we provisionally abstract all technical and organizational problems - in general, all costs of pricing - that may stand in the way of any proposed pricing system. In practice, the feasible differentiation of prices is limited. We shall investigate the implications of imperfect pricing in Chapter VI. In accordance with the general orientation of this analysis, we shall do so first in terms of the theoretical conditions of economic efficiency, and second in terms of the extent to which unregulated competition tends to conform to the theoretical conditions of economic efficiency. The same procedure will be followed for the implications of other assumptions.

14. Chapter VIII will be devoted to the special problems raised by the scheduled carrier. Our analysis in the preceding sections will have shown that practically all the problems of road transport arise in that sector. Scheduled carriers far from dominate the road transport industry. In freight, scheduled services are of minor importance. They have an economic function only in the market of small consignments, and even there only to the extent that it is not served by transport on own account. In the area of passenger services, scheduled carriers (buses) are indeed important, but they meet competition from private automobiles as well as taxis. Since, however, this paper concludes that scheduled carriage is the major area of the road transport industry requiring regulation for efficiency, it is entirely appropriate that the subject should be given special attention. But it should be kept in mind that it concerns only a small part of the road transport industry.
III. EFFICIENT PRICING AND INVESTMENT

1. In this chapter, we shall examine the marginal conditions of efficient pricing and investment under the assumptions presented in the previous chapter. These assumptions imply in particular that we need consider only the marginal conditions of economic efficiency: in the absence of increasing returns to scale, the second-order efficiency conditions may be ignored. We shall first examine the traditional theory, which assumes a constant quality of output. In the case of transport services, the quality of output includes such characteristics as speed, comfort, handling care, etc., and it is unrealistic to assume that these characteristics are independent of output: quality tends to deteriorate the higher the utilization of vehicle-capacity. We take account of such variations in the quality of output in sections 2 and 3. Section 4 will deal with the special problems of peak-load pricing and investment, which are of particular importance to transport.

1. Constant Quality of Output

2. The marginal conditions of economic efficiency are most conveniently stated separately for current output and for investment. The interdependence of these two does not prevent a separate formulation, one concerning short-run policy (decisions to obtain variable factors of production) and the other long-run policy (decisions to obtain durable factors of production).

   a. Current Output

3. Given the capacity of durable factors (i.e. trucks or buses), current output (volume of services in given period) should be pushed to the point where the value users attach to the marginal unit of supply is equal either to the marginal (social) cost of supplying it, or this cost plus a marginal rent to limit demand to maximum output at the available vehicle capacity. At a constant quality of output, the value which users attach to the marginal unit of output is equal to the equilibrium price, i.e., the price that equates demand to output. The marginal condition of efficient current output then reduces to the equality between the equilibrium price of output and its marginal social cost, plus a (non-negative) marginal rent. It may be noted that this is equivalent to the well-known
marginal cost pricing principle, if we interpret marginal cost to include marginal rent. 1/

4. The efficient price and output condition is illustrated for several different situations in Figure 1. The vertical line at $x_{(\text{max})}$ indicates maximum output at the given capacity of the durable factors of production. The marginal cost of output is taken to be approximately constant until output approaches the limits of capacity; it then rises because the capacity limit becomes more and more of a bottleneck to increasing output. This type of marginal cost function may be taken as typical for most existing situations.

5. At the intensity of demand indicated by the demand curve $d_1$, the efficient price and output are $(x_1, p_1)$. Capacity is clearly underutilized, since output can be expanded without any rise in marginal cost; the durable factors earn no return at all beyond the recuperation of wear and tear through usage, since total current revenue $(p_1, x_1)$ is just sufficient to pay for the variable factors of production, including the wear and tear. 2/ At the demand $d_2$, capacity is beginning to act as a bottleneck and the efficient price-output combination is at $(x_2, p_2)$. In this situation, the durable factors earn a total (intramarginal) rent as indicated

---

1/ We note that marginal cost, in the context of current output decisions, is a short-run concept. Many economists have proposed that so-called long-run marginal cost is the proper basis for efficient pricing. This is incorrect, unless long-run marginal cost is interpreted as the result of a deliberate policy to stabilize prices over time (on the latter issue, see Chapter III, section 3, especially para. 37, and Chapter X, section 1-e). As a theoretical concept, long-run marginal cost has two decisive shortcomings: (1) it is not defined unless demand is constant over time or capacity can be adapted immediately and fully to all changes in demand (the case of "pure putty"); (2) whenever it differs from short-run marginal cost it induces incorrect decisions by the users. The point has been stressed in particular by M. Allais, et al. in Options in Transport Tariff Policy, by A.A. Walters in The Economics of Road User Charges, World Bank Staff Occasional Paper No. Five, Baltimore: Johns Hopkins Press, 1968, p. 32 ff, and by C.D. Foster, The Transport Problem, London: Blackie & Son, 1963, Appendix 1.

2/ The recuperation of wear and tear through usage is generally not sufficient to pay for the total cost of the fixed factors, because total cost includes deterioration over time as distinct from deterioration from use.
Figure 1: Efficient Price and Output

Price

P₃

Marginal rent at d₃

P₂

Marginal cost

P₁

Current output

x₁

x₂

x_max

IBRD-5223
by the shaded area. 1/ Finally, at the demand $d_3$, capacity is fully utilized and output equals the maximum output at that capacity. The efficient price $p_3$, which equates demand to the maximum possible output, is no longer equal to marginal cost, but to marginal cost plus an element of marginal rent, as shown in Figure 1. 2/

6. The marginal condition of efficient current output may be stated as follows: output should equal the quantity demanded, at a price equal either to the marginal (social) cost of that output or to that cost plus a (non-negative) marginal rent which serves to limit demand to maximum output at the available capacity. It could be argued that the marginal rent will always be zero, since the marginal cost function never becomes totally inelastic. In theory, this may hold for most cases; an exception would be a movie theater with a fixed number of seats and no standing allowed. But a very inelastic marginal cost function lacks operational meaning, since it is in practice indistinguishable from the situation depicted in Figure 1 at $x(\text{max})$. For this practical reason and because there are cases of totally inelastic supply at capacity, we take explicit account of the marginal rent in defining the efficient price and output condition.

b. **Investment in Durable Capacity** 3/

7. Traditionally, the marginal condition of efficient investment is formulated as follows. Capacity should be expanded to the point at which the discounted savings of present and future operating costs resulting from marginal expansion equal the fixed cost of the investment,

---

1/ Under the assumptions stated (in particular the absence of uncertainty), and further assuming unrestricted competition, the intra-marginal rent may indeed be regarded as the revenue accruing to the durable factors of production, which serves to remunerate them for the fixed costs, i.e., that part of their purchase price that is not covered by the sum of all discounted charges for wear and tear during their economic life; these charges are included in the marginal cost of output. In reality, the rent may include windfall profits (or losses) and monopoly rents.

2/ Strictly speaking, the marginal cost function is not defined at $x(\text{max})$ but one can interpret marginal cost at $x(\text{max})$ as the left-hand limit of $\lim_{h \to 0} \frac{1}{h} [C(x) - C(x-h)]$, where $C(x)$ is total operating cost.

3/ In the case of the road transport industry, the durable factors of production consist primarily of vehicles. Since vehicle capacity is for all practical purposes continuously divisible, it is meaningful to consider the marginal conditions of efficient investment, rather than to focus on discrete investment projects as appropriate in the case of, say, road investments.
i.e., the total cost of the durable assets minus the sum of all discounted charges for wear and tear included in the marginal social cost of current output. To simplify the presentation, we shall assume that these charges for wear and tear are in fact zero, i.e., that the durable assets depreciate only by the passage of time. The results are easily adapted to a more realistic assumption. When wear and tear as a function of current output is zero, the fixed cost of investment becomes equal to the price of the durable assets.

8. The marginal condition of efficient investment just stated is correct for the demand curves $d_1$ and $d_2$ in Figure 1. This is illustrated in Figure 2, in which the dotted lines represent current capacity and marginal cost after an expansion of capacity. In the case of $d_1$ (underutilization of capacity), additional capacity will not reduce current operating cost; this period's contribution to the total discounted earnings of additional capacity would be zero. In the case of $d_2$, the cost saving for the current period is represented by the shaded area to the left of $x_2$. It might be thought that the shaded area to the right of $x_2$, which does not represent cost savings but a surplus on expanded output, should be included as well, since it represents a social benefit derived from the expansion of capacity. However, for marginal expansions of capacity, these surpluses are of the second order of magnitude and may therefore be ignored, provided price equals marginal cost at $x_2$. 1/

9. The traditional formulation is incorrect for $d_3$ in Figure 1. This is illustrated in Figure 3 for the extreme case of constant marginal cost up to the limit of capacity, e.g. the case of the theater with a fixed number of seats and no standing room. Again, the dotted lines represent marginal cost and capacity after a marginal investment. Even at full utilization of capacity, as in Figure 3, investment does not reduce operating costs, but makes possible an increase in current output which, at the margin, is evaluated by the users at the price $p$. The net value of the investment for the current period (net of additional current operating costs) is represented in Figure 3 by the shaded area below the demand curve. For marginal expansions of capacity, it equals the difference between the efficient price and marginal cost, multiplied by the increase of output. For discrete expansions of capacity, this expression would have to be modified, since it includes the triangular area above the curve which is not properly part of the net value of investment. Since the area above the curve is of the second order of magnitude, it may be ignored for marginal expansions of capacity.

10. The implication of the case represented by Figure 3 is that the marginal condition of efficient investment should be reformulated to include situations in which the efficient price is not equal to marginal cost, encompassing the situations of Figures 2 and 3 and combinations of

1/ The formal proof of these propositions will be given in paras. 10-13.
Figure 2: Operating Cost Savings from Expansion of Durable Capacity

Figure 3: Current Value of Investment in Expansion of Durable Capacity
the two (d3 in Figure 1). We open the formal presentation by letting x be current output (in terms of transport services) and p its market price. Let C be total current operating cost, which is a function of current output and of the available vehicle capacity K: C = C(x, K). The increase in social welfare W for the current period, due to a marginal increase of vehicle capacity, consists of the difference between the increase of social benefit B and the increase in operating cost C:

\[
\frac{dW}{dK} = \frac{dB}{dK} - \frac{dC}{dK}
\]

= \frac{dB}{dx} \cdot \frac{dx}{dK} - \left( \frac{\partial C}{\partial x} \cdot \frac{dx}{dK} + \frac{\partial C}{\partial K} \right)

= \left( p - \frac{\partial C}{\partial x} \right) \cdot \frac{dx}{dK} - \frac{\partial C}{\partial K} \quad \text{(since } \frac{dB}{dx} = p) \]

The second term (\(-\frac{\partial C}{\partial K}\)) represents the saving of current operating cost due to a marginal expansion of vehicle capacity at a given and constant volume of output x. The expansion of vehicle capacity will reduce operating cost by reducing the average load factor. Its effect on average cost (C/x) will be the same as that of a proportionate reduction of output; the decongestion effect is the same. 1/ The reduction of average operating cost due to a marginal expansion of capacity may therefore be written as \(-\frac{\partial C}{\partial x}/x\), multiplied by the proportionality factor x/K. The reduction of total operating cost, at the given and constant level of output x, becomes \(-x \cdot \left( \frac{\partial C}{\partial x}/x \right) \cdot x/K\) so that we finally obtain:

\[
\frac{\partial C}{\partial K} = -x \cdot \left( \frac{\partial C/x}{\partial x} \cdot \frac{x}{K} \right)
\]

\[
= -x \cdot \left( \frac{1}{x} \cdot \frac{\partial C}{\partial x} - \frac{1}{x} \cdot \frac{C}{x} \right) \cdot \frac{x}{K}
\]

\[
= - \left( \frac{\partial C}{\partial x} - \frac{C}{x} \right) \cdot \frac{x}{K}
\]

Substituting this into the equation for \(\frac{dW}{dK}\), we have:

1/ The term decongestion effect is unfortunate because it suggests the road problem rather than the vehicle problem we are concerned with here. For this reason, we shall propose the term crowding in the next section. Analytically, however, the two problems are much the same. In both cases, increased utilization of capacity gives rise to costs in terms of quality deterioration (quality of road services in the one case, quality of road transport services in the other). Conversely, in both cases an increase in capacity (of the road or of the fleet) will produce benefits that correspond to a reduction of these costs.
\[ \frac{dW}{dK} = \left( p - \frac{C}{x} \right) \cdot \frac{dx}{dK} + \left( \frac{C}{x} - \frac{C}{x} \right) \cdot \frac{x}{K} \]

11. The first term, which may be regarded as the surplus on any increase of current output that results from the increase of vehicle capacity, will be zero when price is equal to marginal cost, i.e., in the situations illustrated in Figures 1 and 2 by the efficient prices at demand \( d_1 \) and \( d_2 \). When output is at its maximum level consistent with the available capacity (as in the case of demand \( d_3 \) in Figure 1), \( \frac{dx}{dK} \) becomes equal to \( x/K \). Output under this condition will increase proportionately with capacity. For these two cases, we therefore obtain the following expressions for the marginal net social benefit of vehicle capacity during the current period:

\[ \frac{dW}{dK} = \left( p - \frac{C}{x} \right) \cdot \frac{x}{K} \]

when \( p = \frac{C}{x} \)

\[ \frac{dW}{dK} = \left( p - \frac{C}{x} \right) \cdot \frac{x}{K} + \left( \frac{C}{x} - \frac{C}{x} \right) \cdot \frac{x}{K} \]

when \( x = x \text{ (max)} \)

When price and output policy is efficient, these cases are indeed the only possible ones. Price is then either equal to or exceeds marginal cost, but in the latter case, output must be at the maximum level consistent with available capacity.

12. Consequently, for an efficient price and output policy, equation (1) becomes:

\[ \frac{dW}{dK} = (p - \frac{C}{x}) \cdot \frac{x}{K} \]

where \( p \) denotes the efficient price of current output. In other words, when pricing is efficient, the net social return from a marginal expansion

---

1/ If capacity is defined in units of (potential) output, the value of \( dx/dK \) turns out to be between 0 and 1. It is 0 when \( K \) is strongly underutilized and 1 when \( K \) is fully utilized. Its value at any other rate of capacity utilization depends on the rate of capacity utilization \( (x/K) \), and on the elasticities of demand and of operating cost.
of vehicle capacity earned during the current period is equal to the dif-
ference between price and average operating cost, multiplied by the rate
of capacity utilization. It can be seen that the social return from a
marginal expansion of vehicle capacity is zero for periods in which ca-
pacity is strongly underutilized (demand curve d1 in Figures 1 and 2).
Average operating cost will then equal marginal operating cost, which in
turn equals the efficient price. The expression dW/dK will then be zero.
Conversely, the social return from additional capacity will be relatively
large when capacity is strongly utilized: x/K is then high, and the effi-
cient price will be much higher than average operating cost (see d3 in
Figure 1).

13. Finally, if pk is the efficient price of a unit of vehicle ca-
pacity and the superscript i denotes the time period, the marginal condi-
tion of efficient investment becomes:

\[ \int_0^n e^{-rt} \left( \frac{\bar{p}^i}{x^i} - \frac{C^i}{x^i} \right) \cdot \frac{x^i}{K^i} \, dt = \frac{p_k}{K} \]

where n denotes the economic life of the durable assets and r the social
rate of discount. 1/ In other words, vehicle capacity should be expanded
to the point at which the efficient price of a marginal addition to ca-
pacity equals the discounted difference between the efficient price of
output and the average operating cost, multiplied by the rate of capacity
utilization and summed over the entire economic life of the vehicle.

2. Varying Quality of Output

14. Particularly in the area of services such as transport, increased
utilization of vehicle capacity will not only raise operating costs but
also lower product quality. In the road transport industry, quality de-
terioration may take the form of increased delays, of crowding and loss of
comfort for passengers, and of reduced handling care for freight. These
factors, like the congestion effects that occur on the roads, must there-
fore be included in the definition of social cost. This requires several
modifications of the marginal efficiency conditions.

15. To begin with, we must distinguish between what we shall call
operating cost, namely all costs in terms of factor inputs (fuel, driver's
wages, etc., including charges for road usage), and those costs represent-
ing quality reduction due to limited vehicle capacity. We shall call these

1/ For a short review of the problems associated with the concept of a
social rate of discount, see C.J. Oort, "Criteria for Investment in
the Infrastructure of Inland Transport," Second International Sys-
posium on Theory and Practice in Transport Economics; European Con-
ference of Ministers of Transport, Paris: OECD publication 24.241,
1968, Section 2.5.
costs crowding costs, a term which suggests the passengers' situation but is meant to refer to freight as well. The term has the advantage of being similar to the analytically analogous congestion costs of road usage.

a. Uniform Evaluation of Quality

16. We begin by assuming that the money value of a given deterioration of quality is equal for all users. The assumption does not necessarily imply that the market price of output will be equal for all output, since users will be indifferent between a relatively high market price and high quality service (low average crowding costs) and a low market price and low quality service (high average crowding costs). If firms do not all have the same cost characteristics, some may specialize in high-quality and others in low-cost services. For simplicity's sake we shall assume that cost characteristics are equal for all firms and thus that neither users nor producers are interested in a differentiation of prices and qualities.

17. The situation is illustrated in Figure 4, in which operating plus crowding cost is referred to as social cost. For convenience's sake, marginal operating cost is shown as constant. The marginal crowding costs, represented in Figure 4 by the distance between the marginal social cost curve and the constant marginal operating cost curve, is zero when capacity is strongly underutilized, but rises progressively with increasing utilization of the available capacity. Consequently, when marginal crowding cost is positive, it is always higher than average crowding cost.

18. The demand curve of Figure 4 raises special issues. It shows the marginal valuation of output by the users, at a constant maximum quality of output (i.e., assuming no crowding at all), whereas in fact the quality of output deteriorates as output increases, given total vehicle capacity. If the market price of the service were equal to the marginal operating cost (po), equilibrium would be established at the output x', at which the cost of transport to the users equals their marginal valuation of output. The cost of transport (p') consists of the market price (po) plus the average crowding cost which the user pays in accepting comparatively poorer service compared to the maximum quality. In other words, the value which the user attaches to the marginal unit of output at its actual quality is equal to the value it would have had at maximum quality (p') minus the value of reduced quality (= average crowding cost).

19. The cost of transport p' is not an efficient price nor is x' an efficient output, because p' is lower than the marginal social cost of output: the individual user pays only the average crowding cost, though he should be charged with the marginal crowding cost. The consumption of an additional unit of output reduces the quality of all units of service. The money value of this aggregate deterioration represents the marginal crowding cost. At the output x', marginal social cost exceeds the value p' which users attach to the marginal unit of output. Quality is
Figure 4: Efficient Price and Output with Varying Quality

- Demand at constant maximum quality
- Marginal social cost
- Average social cost
- Marginal operating cost
- Current output maximized at $x$ and $x'$

IBRD-5226
sacrificed to quantity: the value which users attach to the units of output beyond the output $x$ is not sufficiently high to compensate for the deterioration of quality to all users.

20. The efficient position would be at $x$, where the cost of transport equals marginal social cost. Since the average crowding cost is paid by the user in the form of lower quality of service, the efficient market price should equal marginal operating cost ($p_o$) plus $p_C$, the difference between marginal and average crowding costs. The element $p_C$ could be regarded as the crowding costs which an additional user imposes on all other users of the service. It is entirely analogous to a congestion charge for road usage. In the context of vehicle utilization it will be referred to as the (efficient) crowding charge.

21. By way of example, consider the case of taxi services, at a given total taxi capacity. The individual passenger should pay for the marginal operating cost of the taxi. He will incur an additional cost whenever total demand exceeds total supply because he will lose time in waiting for his turn. If the ride plus waiting time takes, say, twenty minutes for each passenger, valued at $0.10 per minute, the total cost of the ride to the passenger would be his fare plus $2. If the fare equals the taxi's marginal operating cost, the total cost to the passenger would be represented by $p'$ in Figure 4. Now assume that an additional passenger increases total time to twenty-one minutes per trip for all 50 passengers. He occasions a total crowding cost of fifty minutes or $5. Clearly, his own time cost of $2.10 does not provide a correct signal for his transportation decision. He should be confronted with the total cost he occasions, i.e., $5 plus the taxi's marginal operating cost. Since he suffers $2.10 worth of time costs himself, the efficient price of his ride equals $5 minus $2.10 -- the efficient crowding charge, $p_C$ of Figure 4 -- plus the taxi's marginal operating cost -- the efficient operating charge, $p_o$ of Figure 4. Together, they constitute the efficient price, $p_o + p_C$.

22. Since the analysis will proceed in terms of market prices, we define an efficient supply function as marginal operating cost plus the difference between marginal and average crowding cost, both at a given total vehicle capacity. The demand function can then be redefined in terms of market prices and of the output at the prevailing quality. In other words, we subtract the function of average crowding cost from both the demand and the social cost functions of Figure 4. The situation is illustrated in Figure 5. In the following, the demand function will always be interpreted in the conventional sense, i.e., the quantity of transport services demanded as a function of the market price, at actual qualities of service. The demand function consequently depends on vehicle capacity: the larger the available capacity at any given output, the higher the quality of service and therefore the higher the equilibrium price at which that output can be sold.

23. The preceding can be formalized as follows. As before, $x$ will represent current output of road transport services, $k$ vehicle capacity and $p$ the market price. Let the operating cost of output be represented
Figure 5: Efficient Supply Function

Price

Demand at actual quality

Efficient supply

Marginal operating cost

Current output

x

x_{\text{max}}

IBRD-5227
by \( C = C(x, K) \) and let \( Q = Q(x, K) \) be a physical measure of total crowding (e.g., in units of time lost compared to a situation with no crowding).

Let \( a \) be the money value which users attach to crowding (\( a \) being assumed uniform for all users), and \( S = S(x, K) \) the efficient supply function as defined above. The total social cost of current output can then be written as \( C + aQ \), and the efficient supply function as \( S = \frac{C}{x} + a\left(\frac{Q}{x} - \frac{Q}{x}\right) \).

24. The marginal conditions of an efficient price and output policy require that the market price of transport services equal the marginal operating cost of the carrier plus the efficient crowding charge. As we have shown, the second element is equal to marginal minus average crowding cost. Consequently, we have for the efficient price \( \bar{p} \)

\[
(4) \quad \bar{p} = \frac{C}{x} + a\left(\frac{Q}{x} - \frac{Q}{x}\right) = S(x, K)
\]

Note that the efficient crowding charge replaces the marginal rent in the formulation of the efficient price which we derived in paras. 10-13. When we take account of the fact that quality deteriorates with increasing output (at a given capacity), the efficient supply function becomes asymptotic with respect to maximum output, so that the case of \( d_3 \) in Figure 1 can no longer occur. The marginal rent is then always zero.

25. The marginal condition of efficient investment in vehicle capacity is also highly analogous to that stated in paras. 10-13. By exactly the same reasoning, we obtain the following expression for the net social benefit, produced by a marginal addition to vehicle capacity during the current period, analogous to Equation (1):

\[
(5) \quad \frac{dW}{dK} = (\bar{p} - S) \cdot \frac{dx}{dK} + (S - \frac{C}{x}) \cdot \frac{x}{K}
\]

When price and output policies are efficient, (5) reduces to

\[
(6) \quad \frac{dW}{dK} = (\bar{p} - \frac{C}{x}) \cdot \frac{x}{K},
\]

analogous to Equation (2). As before, the social return from investment at efficient pricing is zero for periods in which vehicle capacity is strongly underutilized, when the crowding charge is zero and marginal operating cost coincides with average operating cost (so that \( \bar{p} = \frac{C}{x} \)). The marginal condition of efficient investment is as stated by Equation (3).

b. Nonuniform Evaluation of Quality

26. The assumption of the preceding section that the deterioration of quality due to crowding has the same money value to all users of the service is clearly unrealistic in the case of transport services. In
freight transport, the value of quality will tend to vary with the cost of storage of the commodity, its value in relation to transport cost, etc. In passenger transport it will vary with money income, the urgency of transport to the individual user, etc. Consequently, it is important to investigate the implications of a nonuniform evaluation of quality by the users of the service.

27. When quality of service has a different value to different groups of users, welfare could conceivably be increased by separating the market into submarkets, each supplying a different quality product. A higher quality product would be offered at a higher price to users with a stronger preference for quality. By applying the marginal conditions of economic efficiency separately to each submarket, welfare would be increased in two ways:

1) by a redistribution of output relieving crowding in high-quality submarkets at the expense of increased (but not highly valued) crowding in low-quality submarkets, and

2) by a redistribution of capacity in the same direction.

28. The marginal conditions of an efficient price and output policy applied to each separate submarket (see Equation 4) would require that the price of transport services in that submarket equal marginal operating cost of output plus the difference between marginal and average crowding cost, as evaluated by that particular group of users. If the subscript \( j \) denotes submarket \( j \) in which all users value a unit of crowding (e.g., time lost) at \( a_j \), we have:

\[
\bar{p}_j = \frac{\delta C_j}{\delta x_j} + a_j \left( \frac{\delta Q_j}{\delta x_j} - \frac{Q_j}{x_j} \right)
\]

\[
= S_j \left( x_j, K_j \right)
\]

29. It is clear that the efficient price \( \bar{p} \) will be higher for higher values of \( a_j \): when \( a_j \) greater than \( a_i \), we will have \( p_j \) greater than \( p_i \). For, if the prices were the same, Equation (7) would require the rate of crowding \( Q_j \) to be lower than \( Q_i \). But this is inconsistent with demand

\[1/\] At the same rate of crowding, both \( \frac{\delta C_j}{\delta x_j} \) and \( \frac{\delta Q_j}{\delta x_j} - \frac{Q_j}{x_j} \) would be the same as the corresponding terms for market \( i \). Since \( a_j \) is greater than \( a_i \), \( \delta Q_j/\delta x_j - Q_j/x_j \) is non-negative, the rate of capacity utilization in market \( j \) must be lower than in market \( i \) to satisfy Equation (7), except in the uninteresting case of no crowding at all. A reduction of crowding in market \( j \) will reduce both \( \delta C_j/\delta x_j \) and \( \delta Q_j/\delta x_j - Q_j/x_j \), compensating for the relatively high value of \( a_j \).
conditions, as everyone would then prefer service \( j \) to service \( i \): the quality of service \( j \) would be better than that of \( i \), but the prices would be the same. Consequently, if \( a_j \) greater than \( a_i \), we will have to have \( Q_j \) less than \( Q_i \) and \( p_j \) greater than \( p_i \). A separation of the market increases welfare by raising the price and reducing crowding in submarket \( j \), and vice versa in submarket \( i \).

30. The marginal conditions of efficient investment in vehicle capacity require in the first place that, at every moment of time, total available capacity be divided among the submarkets so that the marginal net social benefit of capacity is equal in all submarkets. By substituting \( S_j \) for \( S \) in Equation (6) as permitted by Equation (7), we obtain that:

\[
\frac{\partial W}{\partial K_j} = (S_j - \frac{C_j}{x_j}) \cdot \frac{x_j}{K_j} \]

should be equal for all \( j \).

If \( a_i \) is greater than \( a_i \), an equal rate of capacity utilization in both markets would imply \( S_j \) is greater than \( S_i \). Since, at an equal rate of capacity utilization, \( x_j/K_j = x_i/K_i \) and \( C_j/x_j = C_i/x_i \), then \( dW/dK_j \) would be greater than \( dW/dK_i \), which is inconsistent with maximum welfare. Welfare could be increased by shifting capacity from submarket \( i \) to submarket \( j \), increasing quality and price in submarket \( j \) where the users attach a higher value to the quality. This proves the second proposition stated above concerning the economic advantages of a differentiated market in situations where different user groups attach a different value to quality of service.

31. One final comment may be made on the formal properties of the system. The \( n \) prices \( p_i \), the \( n \) output levels \( x_i \) and the \( n \) capacity levels \( K_i \) are determined by \( n \) demand equations, \( n \) efficient supply equations, the \((n-1)\) conditions of Equation (8), and finally by total capacity \( K \). The latter is in turn determined by the marginal condition of efficient investment, for which we may once more refer to Equation (3).

3. Efficient Peak-Load Pricing and Investment

32. The market for a product such as transport services may experience peak loads when the efficient price of output (and possibly its quality) varies appreciably over time for reasons other than changes of factor prices. \(^1\) The latter restriction excludes the case of price fluctuations due to variations in supply, such as occur for agricultural products. The peak-load problem in this "pure" form is due to a combination of factors whose occurrence in the transport market will be discussed as is appropriate in later chapters. For the moment, we state the three essential conditions for the problem to arise at all, namely:

\(^1\) We remind the reader at this point that we are still maintaining the assumptions made in para. 3, Chapter II, in particular the absence of indivisibilities and the feasibility of perfect pricing.
(1) the employment of durable factors of production,
(2) appreciable shifts in demand within a period which is short relative to the economic life of the durable assets involved, and
(3) limited possibilities of storage or of other means to transfer supply from one time period to another.

The necessity of the first element is clear: without durable factors output could always be adapted to demand in the short run. In the present context, durable factors are relevant not so much because of the time lag between investment decisions and increased capacity (uncertainty), but because capacity is adjusted to a shift in demand only for a change in the marginal social return which is large enough in either duration or degree to warrant additional investment or disinvestment.

33. Efficient peak-load pricing and investment raises no fundamentally new problems for the theory set out in the previous sections. At each moment, efficient pricing and output is determined on the basis of marginal operating cost plus a (non-negative) charge which reflects the scarcity of capacity and serves either to limit demand to available capacity or to take account of crowding costs. Similarly, the marginal condition of efficient investment requires that, on the margin, discounted net returns from investment, compounded over the entire economic life of the assets involved, equal investment costs.

34. At a low intensity of demand relative to available capacity, the efficient price of output will be equal to or close to average operating cost. The situation is illustrated in Figure 6 by the demand curve $d_1$: the efficient price $p_1$ is equal to average operating cost. Total current revenue is just sufficient to pay for total current operating cost. It is clear that this cannot represent a stable situation, since the marginal social return from investment for this period is zero. In terms of Equation (2), $(p - C/x) = 0$ and hence $dW/dK = 0$ for this period. If demand were expected to remain at $d_1$, capacity would be reduced (by not replacing obsolete units) until the marginal social return from investment became sufficient to warrant the maintenance of capacity at its existing level. Apart from the case of structural decline, the situation $d_1$ must represent a short-run underutilization of capacity due to a temporary slack in demand.

---

1/ The implicit assumption here that marginal operating cost equals average operating cost is justified only if we disregard indivisibilities. If there are indivisibilities - e.g., a bus which can take a fixed number of passengers - average operating cost may be considerably higher than marginal cost. This complication will be dealt with in Chapter V.
Figure 6: Efficient Pricing with Fluctuating Demand

Efficient supply
Average operating cost

Current output
35. Consider demand curve \( d_2 \). The efficient price \( p_2 \) exceeds average operating cost by \( b_2 \), which reflects either an increase of marginal operating cost or a deterioration of quality, or both. In any case, the marginal social return from investment is now positive and equals \( b_2 \cdot x/K \). This situation could be stable, if the present value of a constant stream of these net returns over the economic life of the durable assets involved were equal to marginal investment cost. If \( d_2 \) represents normal utilization of capacity, \( d_3 \) represents a peak demand. The efficient price \( p_3 \) exceeds average operating cost by \( b_3 \), which in Figure 6 includes a marginal scarcity rent. The situation is not a stable one, since the marginal social return from investment far exceeds the marginal investment cost and \( d_3 \) must therefore represent a short-run peak utilization of capacity, due to a temporary peak in demand. In each of these situations, the efficient price and output policy at any particular time follows immediately from the marginal conditions set out in the preceding sections.

36. Because demand and supply functions at different moments of time are generally not independent, difference in the price of a good at different moments will elicit attempts to transfer demand and supply from one period to another. Depending on the costs of such transfers (by storage or production and consumption delays, for example), the peaks and the underutilization of capacity will be reduced, bringing both situations closer to normal utilization, represented in Figure 6 by \((p_2, x_2)\). We shall call these adjustments of demand and supply resulting from price differentials between periods the time elasticity of demand and supply. Generally, short-run time elasticity will be greater than long-run time elasticity, since the cost of transfer tends to increase with the length of the period involved. Because services such as transportation and goods such as electricity cannot be stored, they will tend to have a low time elasticity, and peak-load problems will arise. In transport, time elasticity is particularly low for passenger transportation and for those commodities that cannot be stored at a reasonable cost.

37. Should actual market prices not be allowed to vary as much as the efficient prices? A policy of price stabilization is often put forward, for reasons that may be based simply on the technique of pricing (feasibility and cost of fully adapted prices) or on other, more complex considerations that cannot be dealt with at this point. 1/ Whatever its merits, price stabilization leads to social losses and economic inefficiency. Insufficiently low prices during slack periods lead to a waste of social resources: services will not be performed although users would be willing to pay their social cost. Insufficiently high prices during peaks lead to excess demand, which in most cases increases crowding beyond the efficient level and creates delays and other types of deterioration in the quality of service. Even when crowding is not increased beyond the efficient level (e.g., because maximum output is legally or practically fixed, as is the case for theaters and buses with a fixed number of seats),

1/ The matter is discussed in section 1-e of Chapter X.
a price below the efficient supply price still results in economic inefficiency, because it induces costs of preemption (queueing) and because it prevents the most urgent wants from being satisfied. Moreover, price stabilization reduces the transfer of demand and supply from one period to another, clearly a negative contribution to economic efficiency.

38. The efficient investment policy, in a context of variable demand, raises no special problems. Net social returns from investment are defined in terms of a variable stream, to which periods of underutilization may contribute little or nothing (demand d₁ in Figure 6), and peak periods may contribute a great deal (demand d₃ in Figure 6). In general, however, below-peak periods will share the burden to some extent (demand d₂ in Figure 6). If a brief peak period were to be charged with the entire burden of the investment cost, the resulting price might suppress demand during that period to the point where it would no longer be the peak. Equilibrium will be reached with efficient peak-load pricing and efficient peak-load capacity when the discounted net returns from a marginal expansion of capacity, during peaks as well as slack periods, add up to the fixed cost of the investment. ¹/

IV. ECONOMIC EFFICIENCY AND COMPETITION

1. Constant Quality of Output

1. Under the assumptions stated in Chapter II, para. 3, unregulated competition will tend to bring about efficient pricing, output, and investment, provided no individual firm or coalition of firms dominates the market. If we ignore variations in the quality of output, each firm will regard market prices as parameters and will attempt to maximize profits by adjusting current output and capacity. At any time, the firm will operate either at capacity (if market price is at least equal to marginal cost at capacity) or at such an output that marginal cost equals the market price. These are the marginal conditions of efficient output stated in the beginning of Chapter III. The competitive market mechanism will bring about a market price which equates demand and supply, and prices will be equal to marginal cost plus whatever marginal scarcity rents accrue to the firms.

2. Existing or new firms will invest in additional capacity until discounted net revenues to be derived from a marginal addition to capacity equal the amount invested. It can be seen from Equation (1) in para. 10 of the last chapter that, at constant market prices, net revenue from a marginal investment is equal to the increase in social welfare. Consequently, competitive investment behavior also accords with the marginal conditions of efficient investment stated in the beginning of Chapter III.

3. Since we assume no cost decreases with expansion, the fact that market price equals or exceeds marginal cost implies that current revenue will always pay for operating costs, while the marginal equality between discounted net revenues and the amount invested ensures that total investment cost is also covered. This implies that the second-order conditions of economic efficiency are satisfied along with the first-order conditions.

2. Varying Quality of Output

4. The situation is somewhat less obvious when we include the possibility of variation in the quality of output. Even if we assume that the value which users attach to quality of service is equal for all users (cf. Chapter III, 2-a), the individual supplier need not consider market price as a parameter, because he can offer a higher quality service at a higher price, or a lower quality service at a lower price. The relevant parameter is market price minus the value of quality or plus the average crowding cost. When all users value quality equally, this sum must indeed be equal for all output. In terms of the symbols we used in Chapter III, \( p + a(Q/x) \) should be equal for all output (\( p \) is the market price, \( a \) the value of quality, \( Q \) is total physical crowding and \( x \) the volume of output). In a competitive market, this expression will be a fixed parameter for the individual firm.
5. Figure 7 illustrates the position of an individual firm. At a given capacity, both marginal operating cost of the \( j \)th firm \( (C_j/x_j) \) and marginal physical crowding \( (Q_j/x_j) \) will increase with output. Since \( p_j + a(Q_j/x_j) \) is fixed for each firm, its selling price \( p_j \) will fall with increasing utilization of capacity. Quality of service deteriorates and the price of service falls. In order to maximize net revenue, the firm will set a price \( p_j \) such that marginal revenue equals marginal cost, or:

\[
\frac{\delta C_j}{\delta x_j} = \frac{\delta p_j}{\delta x_j} \cdot x_j
\]

\[
= x_j \left( \frac{\delta p_j}{\delta x_j} \right) + p_j
\]

Since \( (p_j + a(Q_j/x_j)) \) is a fixed parameter,

\[
\frac{\delta [p_j + a(Q_j/x_j)]}{\delta x_j} = 0
\]

It follows that

\[
\frac{\delta p_j}{\delta x_j} = -a \left( \frac{\delta Q_j}{\delta x_j} - \frac{Q_j}{x_j} \right).
\]

Substituting this into the equation for \( \frac{\delta C_j}{\delta x_j} \), we obtain

\[
\frac{\delta C_j}{\delta x_j} = -a \left( \frac{\delta Q_j}{\delta x_j} - \frac{Q_j}{x_j} \right) + p_j \quad \text{or}
\]

\[
(9) \quad p_j = \frac{\delta C_j}{\delta x_j} + a \left( \frac{\delta Q_j}{\delta x_j} - \frac{Q_j}{x_j} \right)
\]

In other words, the individual firm will set a price equal not to marginal operating cost, but to this cost plus the efficient crowding charge, marginal minus average crowding cost. This corresponds entirely to the marginal condition of efficient output and pricing (cf. Equation (4) in Chapter III, para. 24).

6. With regard to investment, the \( j \)th firm will increase capacity \( (K_j) \) until the discounted net revenue from a marginal addition to capacity equals the amount invested. The marginal net revenue of additional capacity \( (dR_j/dK_j) \) equals:

\[
(10) \quad \frac{dR_j}{dK_j} = \frac{d(p_jx_j - C_j)}{dK} = (p_j - C_j) \cdot \frac{x_j}{K_j}
\]
Figure 7: Firm's Selling Price, Variable Quality of Output

\[ P_j + \frac{a \cdot Q_j}{P_j} \]

Marginal cost

Selling price

Marginal revenue

Current output

IBRD-5229
That is, the marginal net revenue of capacity equals the market price minus average operating cost, multiplied by the rate of capacity utilization \( x_j/K_j \). This corresponds to the marginal social net benefit of investment in Equation (6) in Chapter III, para. 25. Since under perfect competition, the prices of durable factors of production are parameters to the individual firm, it will maximize net revenue in the long run by pushing investment to the point where the discounted value of \( dR_j/dK_j \), summed over the economic life of the assets, equals the price of the investment. This is the same as the marginal condition of efficient investment given by Equation (3) in Chapter III, para. 13.

7. These conclusions remain valid even when users do not all attach the same value to quality of service, as long as there is perfect competition. Firms may operate in different submarkets, in each of which price plus the value of (average) crowding (the expression \( p_j + a_j/Q_j/x_j \)) will be a parameter. Competition will ensure that capacity in every submarket is consistent with the marginal condition of efficient investment, and hence that total capacity is distributed efficiently among the different submarkets (cf. Chapter III, 2-b).

8. In conclusion, under the given assumptions, competition does tend to create a situation in which the marginal conditions of efficient pricing, output, and investment are satisfied. Moreover, each firm will cover its costs out of revenue, in both the short (current operating cost being covered by current revenue) and long run (discounted total operating cost plus investment cost being covered by total discounted revenues).

1/ This can easily be seen with reference to Figure 7. An increase of capacity will shift the marginal revenue and the marginal cost curves to the right by the same amount and \( p \) will remain the same. Omitting the subscript \( j \) for simplicity, the increase in revenue will be:

\[
\frac{dR}{dK} = (p \frac{dx}{dK} - \frac{dC}{dK}) = p \cdot \frac{dx}{dK} - \frac{SC}{Cx} \cdot \frac{dx}{dK} - \frac{SC}{C_k}
\]

The last term can be written:

\[
\frac{SC}{S_K} = -x \cdot \frac{SC/x}{Sx} \cdot \frac{x}{K} : \text{the cost reduction due to a marginal increase of capacity equals the cost reduction due to a proportionate decrease of output. Hence:}
\]

\[
\frac{SC}{S_K} = - \left( \frac{SC}{Sx} - \frac{C}{x} \right) \cdot \frac{x}{K} \cdot \frac{x}{K}.
\]

Since the utilization of capacity remains equal, \( \frac{dx}{dK} = \frac{x}{K} \) so that

\[
\frac{dR}{dK} = p \cdot \frac{x}{K} - \frac{SC}{Sx} \cdot \frac{x}{K} + \left( \frac{SC}{Sx} - \frac{C}{x} \right) \cdot \frac{x}{K} \]

\[
= (p - \frac{C}{x}) \cdot \frac{x}{K}
\]
V. IMPLICATIONS OF INCREASING RETURNS TO SCALE

1. In the two preceding chapters we have ignored the possibility of increasing returns to scale in the road transport industry. In this chapter, we examine the facts and their implications, if any, for the marginal analysis we have been using and for the question of whether unregulated competition can be regarded as potentially workable and efficient in the welfare-economic sense. Finally, we examine the implications of indivisibilities and economies of scale in the special case of "thin" markets.

1. Indivisibilities in Current Operations

2. The indivisibilities problem arises in the road transport industry only when the unit of supply (the individual vehicle) is larger than the unit of demand (the individual passenger or small consignment), i.e., only in the joint carrier market. In current operations, the problem stems from the availability of capacity only in such discrete units. Utilization of these units gives rise to fixed costs in the sense that the major part of operating expenses are independent of the load carried (driver's wages, a large part of fuels, oils, maintenance, terminal costs, etc.). For joint carriers (buses, trucks that carry more than one consignment), these costs are indivisible with respect to the separate services rendered.

3. To get an overview of the problem, we consider the case of a fleet with one or two vehicles. 1/ In Figure 8, marginal operating cost for a one-vehicle fleet is taken to be constant up to the limit of capacity \( x_{\text{max}} \). Average operating cost is the sum of average (marginal) operating cost and a constant sum (the indivisible cost of operating the vehicle) divided by output. Average operating cost includes all costs of running the vehicle and all costs of the vehicle's deterioration by usage, but does not include the deterioration of the vehicle resulting from the sole lapse of time. The marginal revenue curve is derived from \( d_1 \).

4. Demand curve \( d_1 \) illustrates the classical welfare-economic problem associated with increasing returns. At efficient price and output \( (p_1, x_1) \), the vehicle operates at a loss (the lower shaded area). But welfare would still be served by running the vehicle, provided the consumer's surplus exceeds the deficit. In the figure, this condition is clearly satisfied. The high values on the demand curve to the left of \( x_1 \) indicate that there are intramarginal passengers or shippers to whom the service is worth far more than \( p_1 \). The total consumers' surplus is represented roughly by the area under the demand curve between \( x=0 \) and \( x = x_1 \), minus the total price

1/ We ignore the issue of varying quality of output because it is not essential in this discussion.
Figure 8: Efficient Pricing with Indivisibilities: One Vehicle Fleet

Price

$P_1$, $P_2$

$d_1$, $d_2$

$\text{Average cost}$

Volume of output

$\bar{x}_1$, $x_1$, $x_{1,\text{max}}$

IBRD-5230
But how in general do we determine whether the surplus is at least as large as the deficit, and how should the deficit be financed? The two questions are closely related, since they both arise from the fact that total revenue does not cover total operating cost at the efficient price of output. In theory, both could be solved by applying a form of two-part pricing, consisting of a per-unit charge equal to $p_1$ and a fixed charge per user which would yield sufficient revenue to cover the deficit. The fixed charge may have to be differentiated between users so that it does not exceed any user's surplus and cause him to withdraw from the market. In practice, two-part pricing is often impossible or prohibitively costly, while an adequate differentiation of fixed charges raises even more problems.

These problems do not seem to arise when demand is higher ($d_2$) and the efficient price ($p_2$) exceeds average operating cost. However, the deficit problem reemerges when we assume that more vehicles are available. In Figure 9, similar to Figure 8, but with a two-vehicle fleet, the efficient output is $X_2$ and the efficient price $p_1$ and a deficit is again involved. The market data give no direct evidence whether the utilization of the second vehicle is justified, as it clearly is not in the case of Figure 9.

Figures 8 and 9 point up a second problem associated with indivisibility: the efficient price of output tends to fluctuate rather widely in response to variations of demand. For example, when demand shifts from $d_1$ to $d_2$, the efficient price rises from the very low level $p_1$ to the

---

1/ The present context does not justify a review of the complicated issues raised by the surpluses and the surplus criterion. For reference, see C.J. Oort, Decreasing Costs as a Problem of Welfare Economics, Amsterdam: Drukkerij Holland, 1958, Chapter II, I.M.D. Little, A Critique of Welfare Economics, Oxford: Clarendon Press, 1957, Chapter X; Foster, The Transport Problem; and Walters, The Economics of Road User Charges, pages 56 ff.


3/ The case of $d_2$ also illustrates the widespread misconception that the discontinuity of the marginal cost function at $x_{\text{max}}$ renders the efficient price indeterminate. See paras. 4-6, Chapter III.
Figure 9: Efficient Pricing with Indivisibilities: Two-Vehicle Fleet

Price and cost

\[ \bar{p}_2 \]

Average cost 1

Marginal cost

\[ \bar{p}_1 \]

Current output

\[ x_1 \quad x_{1\text{ max}} \quad x_2 \quad x_{2\text{ max}} \]

IBRD-5231
much higher level \( p_2 \), provided the demand \( d_2 \) does not justify the utilization of a second vehicle. Figure 9 shows that the latter is not likely: the surplus on the additional output \( (x_2 - x_1(\text{max})) \) looks appreciably smaller than the fixed cost of operating a second vehicle. The limiting value of \( p_2 \) is clearly that the surplus generated by moving from \( x_1(\text{max}) \) to \( x_2 \) would just fall short of the fixed operating cost of the additional vehicle. The higher the fixed cost (i.e., the greater the indivisibility), the wider the possible variation of the efficient price. 1/ In theory,

1/ The problem has been immortalized in the railway literature by the famous example of the traveller to Calais, which is supposed to show the inadequacies and inequities of fully flexible efficient pricing. (See G. Dessus, "The General Principles of Rate-fixing in Public Utilities," International Economic Papers, No. 1 (1951), pp. 5-22.) The traveller presents himself at the Paris station one day when there is still plenty of room in the train: he pays only the marginal cost of his travel, i.e., virtually nothing. Another day, the railway cars are all full, so that another car has to be hitched on for him: he pays the full operating cost of that additional car. Finally, on a particularly unlucky day, the train is loaded to capacity so that an additional train must be run to accommodate the famed traveller, who will now have to pay the entire operating cost of the entire train. We shall skip further embellishments such as the case that no more railway cars are available, requiring an investment which would be charged in toto to our unhappy traveller, the case that track must be doubled, tunnels widened, etc.

As is common with such parables, the story has a grain of truth among a great deal of chaff. For one thing, strictly efficient pricing in the welfare-economic sense would not require the traveller to pay the entire operating cost of the additional railway car or train. On the contrary, the efficient price would drop to practically zero, since capacity is then no longer a scarce factor. It is only when he is forced to get onto an already crowded train that the efficient price is high. This points up a second error in the story: it fails to take account of the fact that quality deteriorates as more passengers are added to a train of a given capacity. As we have seen in Chapter III, the efficient price will rise continuously with higher levels of crowding.

While price may drop drastically as new units (cars, trains) are brought into operation, the extent of the price variation is limited by the elasticity of demand (i.e., the additional travel elicited by a fall of price) in relation to the size of the indivisible unit. The story shows the impracticality of large price swings in the special case of unforeseen demand variations, of a scheduled carrier that cannot wait for additional travellers, and of large indivisible rail units. These special elements, not relevant to the present discussion, will be taken up in later chapters.

The traveller to Callais case is discussed by Walters in the context of uncertainty; see his Economics of Road User Charges, pp. 65-70.
these price fluctuations are entirely consistent with economic efficiency, but in practice they may be difficult to put into effect or they may be considered undesirable. 1/

7. Now that we have gone over the two basic problems arising from indivisibilities in current road transport operations -- the deficit and the variability of prices -- we want to investigate their implications, especially with respect to the efficiency of unregulated competition in the road transport industry. Except when two-part pricing is practicable, the unregulated market will not produce a solution consistent with economic efficiency. For one thing, the owner of the vehicle incurs a loss at the price \( p_1 \) which would induce him to stop operations (Figure 8). In fact, however, he will not charge the price \( p_1 \), but will maximize his net revenue by setting his price at \( p_1' \), reducing the level of output to \( x_1' \), and creating a net operating surplus, indicated by the higher shaded area in Figure 8. Price \( p_1' \) does not maximize welfare, since the output \( (\bar{x}_1 - x_1') \) has a value to the users far larger than the cost involved. A similar conclusion holds for the case of \( d_2' \).

8. But Figure 8 shows the extreme situation of only one truck or bus to serve demand, a highly unlikely occurrence in the road transport industry except in very "thin" markets or at times of very low demand. In general, the market will be served by a large number of units, allowing workable competition provided there are no economies of scale, 2/ and assuming adequate antitrust policies. In this case, demand for the services of the marginal vehicle will be virtually horizontal (Figure 10), and there is no conflict between economic efficiency and unregulated competition. The private profit-maximizing output is identical to the efficient output. The operation of a marginal vehicle depends on whether the price of its services exceeds or falls short of average operating cost. 3/ This coincides with the welfare criterion.

9. In theory, the market must be infinitely large in relation to the capacity of the indivisible unit for Figure 10 to be valid. But in practice the surpluses generated by operating an additional vehicle soon

---

1/ See discussion in Chapter X, section 1-e.
2/ See this chapter, section 3.
3/ Outside the slack periods, the price will tend to be higher than average operating cost, allowing a positive net operating revenue which serves to recover the time costs of the vehicle. The market price cannot fall below the average operating cost, because all vehicles would be withdrawn from operation. Nor is it possible, except in the very short run, for the price to be too low to provide sufficient net operating revenue, since that would induce transport firms to stop replacing vehicles. All this is consistent with economic efficiency in the welfare-economic sense.
Figure 10: Efficient Pricing with Indivisibilities, Many-Vehicle Fleet

Price

Average operating cost

Marginal cost

Current Output

\[ p \]

\[ d \]

\[ x \]
become negligible. In conclusion, the operating indivisibilities of road transport vehicles do not stand in the way of workable and efficient competition, except possibly in very "thin" markets, to be discussed in section 4.

10. It follows that when the total market is large in relation to the size of the individual vehicle, unregulated competition will tend to bring about a market price equal to average operating cost, as long as demand at that price falls short of total available capacity. At a lower price, capacity will be withdrawn and at a higher price it will be brought in, since its employment will earn a net operating revenue. Furthermore, in a large market small price variations induce a change in the quantity demanded which is large in relation to individual vehicle capacity. Consequently, deviations of the market price from average operating cost can only be very small. In other words, an upward shift in demand will be accommodated by the employment of additional vehicles with only a very slight increase in price, and vice versa. Outside the case of "thin" markets, indivisibilities produce no appreciable variability of prices as long as available capacity is less than fully utilized.

11. When capacity is fully utilized, the response of prices to a shift in demand will depend on the investment (and disinvestment) pattern, to be discussed in the next section. We note at this point that the variability of prices at full utilization of available capacity is a function of many elements besides indivisibility, all of which will be dealt with in later chapters:

(1) the behavior of demand through time. If we are dealing with peak-load patterns, the variability of prices may be considerable even without any indivisibilities (Chapter III, 3).

(2) the time lag between an upward shift of demand and the availability of new capacity. Under conditions of imperfect foresight and of a considerable gestation period of investment, prices may vary considerably, even without any indivisibilities.

(3) the relation of investment cost to operating cost. When capital assets deteriorate mostly through time and not by usage, prices may vary considerably between the low average operating cost and the high level needed to induce new investment, even without any indivisibilities.

In the present context, we conclude that indivisibility, one among many sources of price variability, is relatively unimportant in road transport except possibly in the case of "thin" markets.
2. **Indivisibilities in Investment**

12. Economic efficiency requires that investment be pushed to the point at which the social value of the marginal unit equals its price. 1/ The social value includes reductions in operating cost and surpluses on any additional output generated. 2/ When there are no indivisibilities and pricing is optimal, there are no surpluses to be taken into account. In the case of indivisibilities, however, the additional output generated by investment may yield a surplus. 3/ The problems involved are closely related to those just discussed for operating costs. When the market is large enough compared to the capacity of a single vehicle, competitive investment policy will be efficient in spite of indivisibilities. Surpluses generated by output from an additional indivisible unit of capacity become negligible, private revenue from investment will coincide with its social value, and pricing will tend to be optimal, provided there are no economies of scale and antitrust policy is adequate to ensure workable competition. We conclude that indivisibilities in investment do not stand in the way of workable and efficient competition in road transport outside of "thin" markets where the capacity of a single vehicle is large in relation to total demand.

3. **Economies of Scale**

13. Analytically, the case of economies of scale to the firm is entirely analogous to that of indivisibilities in the unit of supply. If we reinterpret the indivisible unit as the optimum-sized firm rather than the single vehicle, the analysis of sections 1 and 2 applies without essential modifications. The conclusion will also be the same, except that we must now interpret the condition that the market be large relative to the individual firm. If the optimum size of the individual firm is very large, many sectors of the road transport market would be "thin". But if we argue as before that in road transport economies of scale are not important beyond the relatively small firm, our previous conclusions do apply, and we are justified in treating "thin" markets as exceptional cases, to be examined jointly with the issues of indivisibilities in the unit of supply and economies of scale to the individual firm.

14. The empirical evidence on economies of scale in the road transport industry is rather scanty. The great majority of studies conclude that either there are no economies of scale in trucking, or they are of very limited significance. After examining in detail the cost findings of the Interstate Commerce Commission, the authors of *The Economics of Competition in the Transportation Industries* assert that "it is the length

---


2/ Chapter III, Equation (1), para. 10.

3/ Section 1 above.
of haul and not size per se that apparently explains most cost difference between firms... So-called economies of scale would appear to be equally available to small and large firms. Thus, in the trucking industry the small and large firms are on a cost parity.1/ A British study of milk collection leads its author to conclude that there are no economies of scale in trucking. 2/ Stanley L. Warner, in a study for the Transporta-

1/ Meyer, Peck, Stenason and Zwick, Competition, p. 95 and 97. The authors refer to Interstate Commerce Commission data published in various U.S. Government Printing Office reports, primarily: Cost Study of Class I Carriers of General Freight in the Middlewest Territory, 1953, Washington, 1954, Southern Carrier Cost Study, 1950, Washington, 1952, and Explanation of the Development of Motor Carrier Costs with a Statement as to Their Meaning and Significance, Washington, 1958. Whereas the ICC studies, based on a very large sample (305 carriers), conclude that average ton-mile costs decrease with the firm's output, Meyer et al. in Competition show that the data are entirely consistent with the hypothesis that average length of haul rather than firm size explains the decrease in ton-mile costs. The authors' conclusion is supported by a cross-section study of 102 New England carriers by R.A. Nelson, who found a high negative rank correlation (0.82) between length of haul and the ton-mile cost (Motor Freight Transport in New England, A Report to the New England Governors' Council, Boston, 1956.) Similar results were obtained by M.J. Roberts on the basis of a study of 114 trucking firms in the Midwest ("Some Aspects of Motor Carrier Costs: Firm Size, Efficiency, and Financial Health," Land Economics, August 1956, pp. 229-238). Somewhat similar results are reported in the Report of the Royal Commission on Transportation (Canada). The report includes a special study by D.W. Carr and Associates, "Truck-Rail Competition in Canada," which states that a survey of commercial trucking shows no economies of scale beyond a medium-sized operation (Vol. III, pp. 3-92).

2/ M. Chisholm, "Economies of Scale in Road Goods Transport? Off-Farm Milk Collection in England and Wales," Oxford Economic Papers, October 1959, pp. 282-290, with comment by A.A. Walters and reply by Chisholm in Oxford Economic Papers, February 1961, pp. 116-121. The study was based on a sample of 285 firms, serving about half the milk collection in England and Wales. The author uses a regression equation of the form:

$$\log (Y - 0.4) = K + A \log X_1 + B \log X_2 + C \log X_3$$

where

$Y =$ cost per gallon of milk
$X_1 =$ gallons per vehicle mile
$X_2 =$ gallons per farm

and $X_3 =$ number of vehicles, in percent of number expected on basis of miles per year.

Since C does not differ significantly from zero, there is no evidence of economies of scale.
tion Center at Northwestern University, obtains a slightly different result. 1/ Although he finds "the number of shipments, average weight, and average haul turned out to offer a reasonably complete explanation of the costs of the firms in the sample", and concedes that "the interpretation of the empirical results concerning economies of scale should be tempered by the fact that a different approach might have resulted in different conclusions", he still concludes that the evidence suggests the existence of some economies of scale, but of a very small magnitude: operating ratios decline by about one percent for a doubling of output. 2/

15. In a Dutch study which examines the available statistical evidence and offers some new data based on Dutch findings, the authors reject the


2/ The Warner study is based on a cross-section analysis of 72 general freight trucking firms during the years 1955-1960. A standard least-squares fitting process was applied to a linear model of the type

\[
\log C = b_1 + b_2 \log O + b_3 \log W + b_4 \log H + U
\]

where \( C \) = total operation cost
\( O \) = total number of shipments
\( W \) = weight of shipment
\( H \) = average haul

and \( U \) is a random factor. The results of the analysis are summarized by the author as follows (standard error in parentheses);

\[
\begin{array}{c|c|c|c|c}
R^2 & \hat{b}_1 & \hat{b}_2 & \hat{b}_3 & \hat{b}_4 \\
\hline
.943 & .574 & .947 & .742 & .321 \\
(0.012) & (0.024) & (0.012) & (0.012) \\
\end{array}
\]

The high value of \( b_2 \) indicates that there is a very little evidence of economies of scale: a 100 percent increase in output would lead to a 95 percent increase in cost. After adjustment for bias and revenue (on the theory that small firms may have revenue advantages due to greater flexibility and locational advantages), the effect of size on net revenue reduces to economies of scale of only 1.1 percent (standard error 0.3). For all intents and purposes this implies no economies of scale in trucking.
hypothesis that trucking is subject to economies of scale. 1/ The average fixed cost (management and general administration, operating labor, fixed vehicle cost) were found to increase significantly with firm size, especially the cost of management and general administration. This may well be an important source of diseconomies of scale in developing countries, where experienced management of large firms is relatively scarce.

16. Walters summarizes the state of the evidence, especially with respect to British data, as follows: "What may one conclude from all this fragmentary and imperfect evidence? There is clearly no convincing evidence of economies of scale." 2/ Without further comment we may accept these findings and refer readers interested in details to the literature. 3/

4. The Case of "Thin" Markets

17. In some markets the demand for road transport services per unit of time may be so low that effective competition is impossible, as when one or only a few firms of optimum size could serve the whole market. A market might be so "thin" that not even a single truck or bus of optimum size could be fully utilized. This situation may lead to monopolistic practices or to oligopolistic behavior. Furthermore, because of indivisibilities or economies of scale, efficient pricing and investment in the welfare-economic sense may be inconsistent with the pricing policy that allows the road transport firm to recover its costs out of revenue. 4/

1/ Stichting Economisch Bureau voor het Wegvervoer (Economic Bureau for Road Transport, Netherlands), "Onderzoek naar het verband tussen bedrijfsgroottes en de hoogte van de exploitatiekosten van de ondernemingen in het beroepsgoederenvervoer over de weg" (Analysis of the relationship between size of firms and operating costs in trucking), report submitted to the Commission of the European Communities (Brussels, 1963). The Dutch data are obtained from a sample of 239 trucking firms in 1956 and 1957. The report concludes that average variable cost (fuel, lubricants, tires and maintenance) decline for very small firms, due to quantity discounts, but become constant well below a firm size of 100 tons total capacity.

2/ Walters, Integration, p. 33.

3/ The books already quoted and the lists of references they provide yield a fairly complete picture of the available studies. Representative of the few studies that come up with significant economies of scale is the article by P.W. Emery in Land Economics (Vol. XLI, August 1965, pp. 285-289), "An Empirical Approach to the Motor Carrier Scale Economies Controversy". See also "Economies of Scale in Trucking", by Allan C. Flott, in the 1965 papers of the Transportation Research Forum.

4/ The issue of price variability will be taken up at several points in later chapters.
18. Monopolistic tendencies will not be serious provided entry into the market is free. The threat of competition from other sectors of the road transport market will normally suffice to enforce a quasi-competitive market behavior on the part of the single supplier or the few suppliers. When external competitive pressure is inadequate or is cancelled by entry restrictions, certain measures may be needed to prevent monopolistic practices. For entry restrictions, the most obvious remedy is to abolish the restrictions when they are government-imposed and to apply antitrust measures when they are based on private agreements. If external competition is inadequate for other reasons, maximum prices may have to be set to prevent monopolistic practices. These measures will be discussed in Part Three of this study.

19. The problem of the deficit resulting from efficient pricing and investment under conditions of increasing returns to scale has been examined in the preceding sections. Figure 8 illustrates the classical problem of welfare economics for the case of indivisibilities and a very "thin" market: at demand $d_1$ efficient pricing ($P_1$) involves a deficit (the lower shaded area). A similar analysis can be made for the case of unexploited economies of scale which cause average cost to decline with increasing output. Marginal cost would then be lower than average cost, so that efficient pricing involves a deficit similar to that of Figure 8. 1/ In both cases, there are three major policy options:

(1) Apply two-part pricing, which enables carriers to recover their total costs out of revenue without departing from efficient pricing. An apparently ideal solution to the problem, two-part pricing entails a number of practical difficulties that we have indicated already.

(2) Allow the carriers to apply efficient pricing by financing the deficit from public funds. The difficulty with this solution is that it is necessary to determine whether the surpluses are large enough to justify the costs. With two-part pricing this follows immediately, since users are willing to pay for the costs in the form of per-unit prices and fixed charges. With a public subsidy, other methods must be devised. Moreover, public funds may be limited.

(3) Allow carriers to charge whatever prices will serve to just cover their costs. The drawbacks of this solution are obvious; its advantage is that it does not require

1/ For an elaboration of the problem and further references, see C.J. Oort, Decreasing Costs as a Problem of Welfare Economics, Chapters II and III, and Walters, The Economics of Road User Charges, p. 45 ff.
the application of a surplus criterion as in the case of public subsidies.

The relative merits of these different policy options will be examined at some length in Chapter X, in the context of the specific problems raised by the scheduled carrier.

20. In concluding, we emphasize the limited significance of "thin" markets in practice. We have argued that economies of scale generally do not enter into the picture, since firms can generally operate in several submarkets at the same time, except when restricted by regulation. Consequently, the issue reduces pretty much to the indivisibility of the vehicle. In practice, road transport vehicles are not very indivisible: small units can be used (minibuses, pick-up trucks, etc.). While this raises per-unit costs of service, it can reduce the difference between efficient and full-cost pricing illustrated in Figure 8. Indivisibilities are relevant only for joint carrier services, and thus the "thin" market problem is limited to the road transport market served by joint carriers. The problems involved will be taken up in Chapter VIII.

5. External Economies of Scale

21. We have seen that indivisibilities per se do not pose any serious problem to competition in the road transport industry, with the possible exception of areas where demand is so low that the single bus or truck is no longer of negligible size compared to the total market for joint carrier services. Were it only for the traditional implications (the alleged indeterminacy of efficient prices due to the discontinuity of the marginal cost function, the alleged variability of prices, and the possible deficit and its associated problems), indivisibility could be ignored. But in the case of joint carrier services, the indivisibility of the unit of supply combined with the nonstorability of transport services, implies discontinuity of performance over time. Unlike goods that can be stored, and unlike those transport services which can be bought and sold at any time, joint carrier services are available only at certain times. Different users' demands must be bunched in time to permit joint carrier service. Collective timing, frequency of service, and the trade-off between frequency and cost raise a number of special economic problems, which will be examined with other joint carrier problems in Chapter VIII. At this point, we limit the analysis to one aspect of time discontinuity, the fact that it may give rise to external economies of scale.

22. As noted in Chapter II, para. 6, the time discontinuity of joint carrier services may lead to economies of scale for the joint carrier industry as a whole. An expansion of the market will increase the frequency of service and thereby improve its quality with no additional outlay. The associated economies of scale, which accrue to the industry as a whole, are important except when total demand for joint carrier services is so high
that service is practically continuous. 1/ For joint passenger transportation, time discontinuity would seem to be important except possibly at peak hours in downtown areas, while for joint freight transportation it would seem to be important only in "thin" markets (those that cannot support even one service a day, for example) and for products requiring frequent delivery. Time discontinuity and the associated external economies of scale would seem to be primarily a passenger problem.

23. While economies of scale do not stand in the way of workable competition because they are external to the individual firm, unregulated competition may no longer be fully efficient in the welfare-economic sense. External economies of scale tend to lead to underinvestment in capacity for the joint carrier market as a whole and a corresponding suboptimal frequency of service. This occurs because the firm underestimates the social gain to be derived from operating an additional vehicle by considering only the price that his own passengers will be willing to pay, whereas he ignores the benefits to passengers of competing firms. 2/ For example, consider the case of a circuit of one hour's duration served by six independent buses, such that service is provided every ten minutes. The introduction of an additional hourly bus by a new firm may lead to a rescheduling by the other bus companies to provide service roughly every 8 1/2 minutes. The increased frequency of the service to passengers who remain with the other carriers involves a social gain (reduction of waiting times), which is not taken into account by the new carrier.

24. Obviously, the increased frequency is realized only when the other carriers do rearrange their timing, and when the other carriers do not contract capacity to offset the service added by the first carrier. The latter condition will generally be satisfied. Even though the competing carriers lose some passengers, they can recoup at least part of the financial

1/ The actual frequency which will be regarded as "practically continuous" is, of course, different for different groups of transport services. In general, it will tend to be higher for passengers than for freight, and presumably also higher for short-distance than for long-distance transport. Within each of these groups, it will depend on the cost of adapting the timing of demand to the timing of supply: costs of obtaining or disseminating schedule information, cost in terms of waiting for connections and of delays in delivery, or of alternative arrangements (storage facilities, resort to contract carriage or transport on own account, etc.).

2/ Since the firm does not account for the losses to other carriers from transferring passengers, it might seem that the net private revenue as calculated by this firm overstates the social benefit of the investment by the amount of these losses. But given efficient pricing, the loss of a marginal passenger to a competing carrier produces a net social loss of zero. The marginal social value of the service (= the price paid) equals its marginal social cost, which in turn equals the efficient price.
loss by increasing their prices or by attracting additional passengers, in both cases through higher quality of service. Thus, private net revenue does understate the social benefit of investment in additional capacity, when that capacity increases the overall frequency of service. Under these special conditions, unregulated competition may lead to some underinvestment in capacity by joint carriers.

25. Because the economies of scale do not involve cost reductions with expansion but rather an improvement of quality, we must look at demand rather than cost in adapting the analysis of Chapter III. So far, we have interpreted the demand function as showing both the price at which a certain output will be bought and the marginal social benefit of that output. As long as we disregard the external economies of scale considered here, this equality is valid. But when additional output may involve a higher frequency of service and a quality improvement for all users, the marginal social benefit will equal the equilibrium price plus the value of these induced economies. In other words, consider demand as composed of two elements: (a) demand at maximum quality, i.e., continuous frequency of service, minus (b) the cost to the users of lower frequency of services. 1/ The equilibrium price of output is (a) minus the average value of (b), whereas the marginal social benefit is (a) minus the marginal value of (b). Since (b) decreases with higher levels of output, the marginal value is always lower than the average value. Consequently, the marginal social benefit of service will be higher than the equilibrium price. 2/

26. Our final conclusion is that unregulated competition in the joint carrier market may lead to underinvestment in capacity, and more especially to insufficient frequency of service. This is due to the economies of scale that occur when the industry expands, which are largely external to the individual firm. Whether unregulated competition is at all workable in such markets is another question, and will be considered in Chapter VIII. The policy implications of our present conclusion will be taken up in section 2 of Chapter X.

1/ Cf. Chapter III, para. 18.

2/ Obviously, (b) will not be continuous, since indivisibilities prevent frequency from increasing continuously with output. This in no way invalidates the analysis, though we may have to take account of surpluses when the indivisibilities are large in relation to the size of the market.
VI. IMPLICATIONS OF IMPERFECT PRICING

1. We have been assuming the feasibility of what we have called perfect pricing: complete and immediate adaptation of prices to prevailing demand and cost conditions, and complete differentiation of prices according to the values different groups of users attach to the quality of service. In many cases this assumption may not be very realistic. Information may be imperfect; there may be inevitable time lags between a change of market conditions and the appropriate change of prices (as well as output and capacity); perfect adaptation and perfect differentiation may be administratively and technically costly.

2. Limitations of perfect pricing are particularly important in industries such as transport which show relatively marked short-run variations in efficient prices over time and relatively pronounced quality differentiations. The problems associated with efficient pricing in transport are due in particular to the nonstorability of transport services and, in varying degree, to the other reasons for the relative time inelasticity of demand and supply cited in Chapter III, section 3. The relevance of these factors is obvious for the element of time differentiation, but also holds for the differentiation of prices according to the quality of service. It is not so much the systematic differences in quality associated with specific factor inputs that raise pricing problems, but the elements of quality that are a function of capacity utilization: the crowding effects (delays, deterioration of service, etc.).

3. We remind the reader we still assume no uncertainty; this assumption is discussed in the next chapter. The main purpose of this chapter is to find out whether competition, given certain limitations of pricing, will still satisfy the marginal conditions of economic efficiency and, if not, what divergences occur. We investigate the implications of imperfect pricing with respect to time differentiation and for quality differentiation. In both cases, the theoretical conditions of economic efficiency require a measure of price differentiation which the individual firm cannot or will not apply. But we will show that the competitive market can attain a high degree of quality differentiation by means of specialization among firms. The serious problems of imperfect pricing arise with respect to time differentiation, which specialization cannot deal with. For the purpose of the present analysis, the underlying reasons for imperfect pricing are immaterial. However, this does not imply they are unimportant, since the policy implications of the analysis will depend on whether the limitations of perfect pricing stem from cost considerations or policy measures (see Chapter X).

1. **Time Differentiation**

4. Imperfect time differentiation of prices means that prices in successive periods are not, or not completely, adjusted to known differences in demand conditions. The situation is illustrated in Figure 11, where $d_1$ and $d_2$ represent the demand functions in two successive periods.
Figure 11: Imperfect Time Differentiation of Prices
(we assume cross elasticities may be ignored). \( S \) is the efficient supply function, given capacity \( K \); \( K \) is assumed equal for the two periods. At the efficient uniform price \( \bar{p} \), output in the two periods will be \( x_1 \) and \( x_2 \), respectively. The efficient uniform price represents a second-best solution: it is the most efficient price, given that prices cannot be differentiated; it minimizes the losses from imperfect time differentiation of prices (as represented in Figure 11 by the sum of the two shaded triangles).

a. The Efficient Uniform Price

5. In general terms, given the available vehicle capacity \( K \), the efficient uniform price \( \bar{p} \) is given by \( \frac{\delta W}{\delta p} = 0 \). If we ignore interest charges for the short time intervals we are presumably dealing with, we may write:

\[
\sum_i \frac{\delta W}{\delta x_i} \cdot \frac{\delta x_i}{\delta p} = 0
\]

We know that \( \frac{\delta W}{\delta x_i} = (\bar{p} - S_i) \): the difference between the (uniform) market price (the value of a marginal unit of output) and the efficient supply price of output in the period considered. Substituting this expression in the above equation we obtain:

\[
\sum_i (\bar{p} - S_i) \cdot \frac{\delta x_i}{\delta p} = 0 \\
\sum_i \frac{S_i}{\delta p} \cdot \frac{\delta x_i}{\delta p} = 0
\]

(11) \( \bar{p} = \frac{\sum_i \frac{S_i}{\delta p} \cdot \frac{\delta x_i}{\delta p}}{\sum_i \frac{\delta x_i}{\delta p}} \)

The efficient uniform price turns out to be a weighted average of the efficient supply prices of the actual sales in the different (potential) submarkets. The slopes of the demand functions at the outputs \( x_i \) serve as weights. If the demand curves in the different periods have equal slopes at the corresponding levels of output \( x_i \), the efficient uniform price \( \bar{p} \) will be a simple average of the efficient supply prices. In terms of Figure 11, the efficient uniform price will be equidistant between \( S_1 \) and \( S_2 \).

6. It is clear from Figure 11 that imperfect time differentiation of prices involves economic losses, which may be represented by the shaded areas. The price is too low in period 1, and the economic costs of output beyond \( x_1 \), particularly the cost of general deterioration of quality due to overcrowding, exceed the value which users attach to that output. The price is too high in period 2: additional output up to \( x_2 \) could have been realized
at a value that exceeds its social cost. The losses will obviously be larger, the greater the variation of demand. They will also be larger, the higher the rate of capacity utilization: marginal social cost (operating cost and in particular crowding cost) will start to rise significantly only when capacity is no longer underutilized. At very low rates of utilization, the efficient prices $\tilde{p}_1$ and $\tilde{p}_2$ may be equal or almost equal: imperfect time adjustment of prices is primarily a peak-load problem.

7. The size of the losses will also depend on the elasticities of demand. The relevant elasticities are not only the partial elasticities of each separate demand function with respect to its price, but also the time elasticities: the cross elasticities of demand in one period with respect to the prices in other periods. Including the time elasticities will increase the elasticities of the two demand curves $d_1$ and $d_2$ as a function of price differentials. In many cases, the demand elasticities in terms of known prices and price differentials will be far higher, and the associated losses from imperfect price differentiation far greater, than if price variations are unpredicted.

b. Competition and the Efficient Uniform Price

8. Given that prices cannot be varied from one period to another, will the uniform price established by a competitive firm coincide with the efficient uniform price? In order to answer this question, let us consider the policy of an individual firm under competition. To the individual competitive firm, the expression $(p + a Q /x)$ is a fixed parameter. Given that the firm's supply price cannot be varied among different time periods (indicated by the subscript $i$), the firm will set a uniform price $p$ such that its net revenue is maximized with respect to $p$, given capacity $K$. The firm's net operating revenue (again ignoring interest on time differentials) is given by:

$$R = \sum_i [p x_i - C_i]$$

The uniform price should be such that \( \frac{\partial R}{\partial p} = 0 \).

9. We have:

$$\frac{\partial R}{\partial p} = \sum_i \left( \frac{\partial (p x_i - C_i)}{\partial x_i} \right) \frac{x_i}{\partial p} + \sum_i \left( \frac{\partial [x_i (p + a q_i /x_i) - a q_i - C_i]}{\partial x_i} \right) \frac{x_i}{\partial p}$$

1/ See Chapter IV, para. 4.
Since \( p + aQ_i/x_i \) is a fixed parameter, 
\[
\frac{\partial}{\partial x_i} (p + aQ_i/x_i) = 0
\]
and we get:
\[
\frac{\partial R}{\partial p} = \sum_i \left[ p + aQ_i/x_i - a \cdot \frac{\partial Q_i}{\partial x_i} - \frac{\partial c_i}{\partial x_i} \cdot \frac{\partial x_i}{\partial p} \right] = \sum_i \left( p - S_i \right) \cdot \frac{\partial x_i}{\partial p}
\]
where \( S_i \) is the efficient supply price:
\[
S_i = \frac{\partial c_i}{\partial x_i} + a \cdot \frac{\partial q_i}{\partial x_i} - a \cdot \frac{q_i}{x_i}
\]
Consequently, we have:
\[
\frac{\partial R}{\partial p} = \sum_i \left( p - S_i \right) \frac{\partial x_i}{\partial p} = 0
\]
or:
\[
p \sum_i \frac{\partial x_i}{\partial p} = \sum_i S_i \frac{\partial x_i}{\partial p}
\]
The uniform price established by a competitive firm will be:
\[
(12) \quad p = \frac{\sum_i S_i \frac{\partial x_i}{\partial p}}{\sum_i \frac{\partial x_i}{\partial p}}
\]
If we compare the uniform competitive price (Equation 12) with the uniform efficient price (Equation 11), the two turn out to be equal.

c. Competition and Efficient Investment

10. We know from Equation (5) that the marginal net social benefit of investment in a given period is given by:
\[
\frac{dW}{dK} = (p - S) \frac{dx}{dK} + (S - C) \frac{x}{K}
\]
If the market price is to be uniform in a number of successive periods, the total net social benefit of a marginal addition to capacity over these periods (disregarding interest charges) will be:

\[
\frac{dW}{dK} = \sum_i \frac{dx_i}{dK} (\bar{p} - S_i) + \frac{x_i}{K} (S_i - \frac{C_i}{x_i})
\]

where \(\bar{p}\) is the efficient uniform price of output in all periods \(i\).

11. The private net revenue derived during a given period from a marginal investment in capacity is given by Equation (10) as:

\[
\frac{dR}{dK} = \frac{x}{K} (p - \frac{C}{x})
\]

For a succession of periods \(i\), with a uniform price \(p\), this becomes:

\[
\frac{dR}{dK} = \sum_i \frac{x_i}{K} (p - \frac{C_i}{x_i})
\]

12. Combining Equations (13) and (14), and substituting \(\bar{p}\) for \(p\) in Equation (14), which is permitted since the competitive price was shown to be equal to the efficient price, we obtain:

\[
\frac{dW}{dR} = \frac{dR}{dK} + \sum_i (S_i - \bar{p}) (\frac{x_i}{K} - \frac{dx_i}{dK})
\]

In other words, \(dW/dK\) will be greater or smaller than \(dR/dK\) according to whether the expression \(\sum_i (S_i - \bar{p}) (\frac{x_i}{K} - \frac{dx_i}{dK})\) is greater or smaller than zero. We shall denote:

\[
\sum_i (S_i - \bar{p}) (\frac{x_i}{K} - \frac{dx_i}{dK})\text{ by } A
\]

and

\[
(S_i - \bar{p}) (\frac{x_i}{K} - \frac{dx_i}{dK})\text{ by } A_i.
\]

13. Let us first consider the question for the case of only two time periods, as illustrated by Figure 11. The expression \(A\) will be positive when the price elasticities of demand are assumed equal for the two periods. It is then always possible to reduce the uniform price along with a marginal expansion of capacity such that the original rate of capacity utilization is maintained in both periods. The expression \(A\) would then be
zero, 1/ but since this is not the optimum solution for the new uniform price, A will in fact be positive. 2/ The same conclusion holds even more strongly when the absolute value of the price elasticity of demand (|$\gamma_i$|) is negatively correlated with the rate of capacity utilization. By reducing the uniform price sufficiently to maintain the average level of capacity utilization in period 2 (so that $A_2 = 0$), the average utilization in period 1 will fall, which would render $A_1$ positive. 3/ As a result, $A$ would be positive. It will tend to be larger, the stronger the negative correlation between $\gamma_i$ and the rate of capacity utilization $x_i/K$. The argument can be summarized and generalized as the proposition that $dW/dK$ will be larger than $dR/dK$ whenever the absolute value of the price elasticity of demand is equal for all periods, or is negatively correlated with the rate of capacity utilization.

14. On general grounds, $\gamma_i$ is in fact very likely to be negatively correlated with $x_i$. At times of peak demand, the effect of a price reduction on demand will be counteracted by the increase in crowding costs that accompanies any increase in output. This does not occur, or occurs to a much smaller extent, in slack periods, when crowding costs are non-existent or very low. Consequently, the partial elasticity of demand with respect to price would tend to be lower in periods of peak demand than in slack periods. This conclusion is supported by empirical evidence, which generally shows demand to be relatively price-inelastic during peaks. Our final conclusion is that $dW/dK$ is greater than $dR/dK$: the competitive level of investment falls short of the efficient level; conversely, at the efficient level of investment, total cost will not be covered by total revenue. Under certain conditions, in particular given a strong negative correlation between the level of output and the elasticity of demand, the difference between the social cost and the private revenue from investment may be quite substantial.

15. In the special case of joint carriers, there may be an additional reason why competitive investment is insufficient under conditions of imperfect pricing. Joint carriers will often limit the deterioration of service that would result from accommodating all peaks in demand by setting minimum standards of quality (e.g., limited or no standing room in buses, time schedules that are more or less rigorously followed). This implies a reduction of output below the equilibrium level (i.e., below the level $x_i$.

1/ The term $(x_i/K) - (dx_i/dK)$ will be zero for all $i$, since the assumption implies that $(dx_i/dK) = x_i/K$ for all $i$.

2/ Equation (11) can be shown to imply that, given equal elasticities, the efficient uniform price will be reduced by less than the amount needed to restore the original rate of capacity utilization after an expansion of capacity. Any movement towards the efficient price involves a net social benefit which, in the case considered, will be reflected in the expression $A$ being positive.

3/ This is because $(S_1 - \bar{p})$ is greater than zero.
in Figure 11). When excess demand is eliminated on a first-come-first-served basis, the value of the service to those who are excluded is very likely to be higher than the marginal value of service which (implicitly) goes into the investment equation. This could be solved in theory by marginal passengers selling their tickets at a premium to those late-comers who are willing to pay the higher price, but such recontracting is generally impractical in road transport. The efficient investment equation will have to take account of this factor, although the competitive market cannot.

16. So far, we have tacitly assumed that all competing firms follow the same pricing policy: we have required only that the individual firm not differentiate its prices within the period considered. This condition is still consistent with different firms charging different prices, each remaining constant during the period. However, if user preferences with regard to quality of service are the same, and the market is reasonably perfect, the competing firms will in fact set the same price. In a perfect market, high and low prices of service can coexist only if the quality of service is differentiated. Given equal user preferences, this implies one price for all firms since a multiple stable equilibrium price is highly unlikely to exist under those conditions. Consequently, any differentiation among firms can only be the result of differences in user preferences (see next section), or of market imperfections which impede the establishment of equal conditions for all users. 1/

d. Conclusion

17. There is a good case for flexibility of prices in terms of predictable variations in demand, and the case is stronger, the more time elastic the demand for transport services. Price rigidities inevitably produce economic losses, of overcrowding in periods of above-average demand, of overcharging in periods of below-average demand. These losses can be reduced only by reducing the rigidities themselves. If, for whatever reason, prices cannot be varied from one moment to another, the competitive market will tend to establish a uniform price that is equal to the efficient uniform price. Given the imperfect pricing that results from price rigidities, the competitive level of investment will fall short of the efficient level, or, conversely, at the efficient level of investment total cost will not be covered by total revenue. This conclusion rests on the very reasonable proposition that the price elasticity of demand is not positively correlated with the rate of capacity utilization. The underinvestment in peak-load capacity tends to be particularly pronounced in the case of joint

---

1/ Under conditions of imperfect foresight, some firms may find it profitable to specialize in providing high-priced service, which will be used only during peaks. In this manner, the competitive market can accomplish some differentiation that will reduce the tendency towards underinvestment in peak-capacity. The case is discussed with reference to the example of hotel space by W.S. Vickrey in his Microstatics, New York: Harcourt, Brace & World, 1964, p. 244-249.
carriers, who maintain certain minimum standards of quality and ration peak-load demand on a first-come-first-served basis. Policy implications of these conclusions will be discussed in Chapters VIII and X.

2. Quality Differentiation

a. Efficient Pricing and Investment

18. We showed in Chapter III, section 2, that economic efficiency requires a differentiation of prices and qualities of services when users do not all attach the same value to quality. In order to demonstrate the welfare losses from imperfect differentiation of prices, let us consider the case in which we impose the condition that the price must be uniform in all (potential) submarkets. By the same reasoning as in the previous section (para. 5), we obtain for the efficient uniform price $\bar{p}$:

$$\bar{p} = \sum_j S_j \cdot \frac{\partial x_j}{\partial p}$$

where the subscripts $j$ denote different (potential) submarkets, each defined by a different value $a_j$ which the users attach to the quality of service.

19. It is clear that a uniform price, which necessarily implies a uniform rate of crowding, will produce suboptimal situations in all submarkets where the evaluation of quality by the user is above or below the average. The quality of service will be too low in the former case and the price too high in the latter. A division of the market into separate submarkets could increase welfare by a redistribution of capacity which relieves crowding in high-quality submarkets at the expense of increased (but less highly valued) crowding in low-quality submarkets. 1/

20. We note in passing that, contrary to what one might expect, imperfect differentiation of prices does not necessarily imply underinvestment in vehicle capacity. One might reason that, with a uniform price of service, users who value quality highly are prevented from obtaining the additional capacity for which they would be willing to pay, and that special measures should be called on to neutralize the effects of imperfect pricing on investment. However, such reasoning would be incorrect. Provided investment policy is efficient in terms of the uniform price of service (and hence the uniform rate of capacity utilization), additional vehicle capacity by the definition of efficient investment will produce a social benefit that falls short of its social cost. The average rate of crowding will be somewhat reduced for all users, but its relatively high value to some groups of users will be offset by a relatively low value to

other groups. The only way to obtain an improvement would be by differentiating prices and qualities as indicated above. 1/

b. Competition and Efficient Investment

21. It is quite a different matter whether competitive investment policies may not lead to underinvestment in vehicle capacity. While the practical possibilities of differentiation by one firm are limited, differentiation can be achieved by quality specialization among firms. In fact, it is precisely in this manner that the appropriate differentiation will tend to be brought about by the competitive mechanism. This may but need not be associated with different types of vehicles employed (taxis versus buses, trucks versus delivery vans, etc.). The total market will be in equilibrium and economic efficiency will be achieved when net earnings are equal in all markets, the high-quality firms operating at low load-factors and high prices, and the low-quality firms at high load factors and low prices. Moreover, all possibilities of efficient quality differentiation will tend to be exploited by specialization among firms. We conclude that, in a competitive market, unregulated competition is indeed consistent with an efficient quality differentiation of prices and services.

22. This conclusion may not hold for joint carriers, which exist by virtue of the economies of scale inherent in the joint transportation of many passengers or in carrying many small consignments with one vehicle. If the market is rather "thin", there may not be room to differentiate the quality of service. The joint carrier will have to compromise between the desire of some users for quality (speed, comfort) and the desire of others for a low price. When both total demand and income level are low, one might expect to find slow and uncomfortable service, possibly combined for passengers and freight (the "mammy wagon"). The demand for high quality service may be met by individual carriers (taxis) since there is no market for high-quality joint carrier service. This may explain the apparent paradox in the structure of passenger transportation to be found on sparsely travelled routes of some developing countries, namely the very wide quality gap between the joint carrier and the taxi.

23. In the case of "thin" markets served by joint carriers that cannot effectively differentiate quality, the situation is the same as we have shown to result from imperfect time differentiation of prices. If the joint carrier were to determine his investment policy as if he operated

1/ It may be noted that the efficient total vehicle capacity, associated with a perfectly differentiated transport market, need not be larger than the efficient total capacity associated with an undifferentiated market. Whether it will in fact be larger or smaller depends primarily on the relative demand characteristics in the different submarkets.
in a competitive market, the level of investment would be excessive or deficient, depending on whether the absolute value of price elasticity of demand is positively or negatively correlated with the value different groups of users attach to quality. In other words, efficient pricing and investment by the joint carrier would lead to a surplus or deficit depending on whether the price elasticity of demand is positively or negatively correlated with the value which the different groups of users attach to quality of service. 1/

24. No a priori judgement seems to be possible on this point, nor is the available empirical evidence conclusive. Higher valuation of quality goes with higher income levels and higher value of commodities transported. At higher income levels, substitute means of transport are often available that are far less close substitutes at lower levels of income. This would point to a positive correlation. On the other hand, the overall responsiveness of transport demand to price tends to be low at high levels of income. The issue is not sufficiently important to warrant extensive examination, since it is limited to the special case of joint carriers in very "thin" markets. On a general level, we may conclude that the issue of imperfect quality differentiation of prices is of limited significance. Most markets will allow sufficient specialization among firms to obtain a differentiation of qualities and prices in accordance with maximum economic efficiency.

25. When different groups of users attach a different value to the quality of service, economic efficiency generally requires a differentiation of qualities and hence of prices. Insufficient quality and price differentiation inevitably produces economic losses, resulting from inadequate quality for some user groups and overcharging for other groups. These losses can be reduced only by reducing the insufficient quality and price differentiation itself. With the exception of "thin" markets, competition will tend to bring about an adequate differentiation of qualities and prices by means of specialization among firms. Unregulated competition is then consistent with economic efficiency, with respect to both pricing and investment. 2/

1/ This proposition disregards other possible reasons for surpluses or deficits, such as indivisibilities, imperfect time differentiation of prices, etc.

2/ This does not hold for joint carriers. As Vickrey has pointed out, it is one of the severe disadvantages of transit vis-a-vis private cars that it has fewer possibilities to offer varied quality of service. The same roadway may be used by cars of varying degrees of luxury, but there are only few efficient (or politically acceptable) ways for transit to offer differentiated frequencies of service, different degrees of crowding and comfort, etc.
VII. IMPLICATIONS OF UNCERTAINTY

1. The Marginal Conditions of Economic Efficiency

1. So far, we have assumed the absence of uncertainty, that is, the presence of perfect knowledge of all relevant market conditions, present and future, on the part of both carriers and users. We assumed that prices and current output could always be adjusted without time lag to changed demand or cost conditions, and investment could always be adapted completely to the pattern of demand and cost known to prevail at present and at all relevant future times. In reality, uncertainty about these conditions is a normal aspect of all economic activity. This has implications primarily for investment decisions but also affects current prices and output, when there is a lag between the occurrence of a deviation from the expected market conditions and the adjustment of current prices and output to these changed conditions. The time lag may be due to imperfect information, to technical or organizational rigidities, etc. 1/ We still accept as a theoretical working hypothesis that current prices and output should, at every moment of time, be fully adjusted to the marginal efficiency conditions set out in Chapter VII, although this proposition may have to be modified in favor of a certain stabilization of prices. 2/

2. The general aspects of the many problems raised by uncertainty cannot be covered in this paper. Uncertainty implies a probability of mistaken decisions, which involves a social cost. Consequently, it may be worthwhile to devote economic resources to improve the flow of information. How this should be realized and at what cost is one general issue we cannot cover. Whether, to what extent, and in what cases the loss of economic resources due to mistaken investment decisions or lagged responses can and should be further reduced by public regulation or even centralization of decisions is another such matter; it cannot be discussed in general terms without going into the whole theory of economic organization. We shall limit the discussion of these problems to the specific case of the road transport industry.

a. Price and Output Conditions

3. If we assume perfect pricing, which implies full and immediate adjustment of prices to all fluctuations of demand and cost conditions, the marginal conditions of efficient price and output are not affected by the introduction of uncertainty, provided current output is fully flexible. The latter condition is almost always satisfied for transport and such commodities as electricity, where a certain capacity is made available and demand determines its rate of utilization.

1/ For a discussion of these problems and the effects on pricing, see Walters, The Economics of Road User Charges, p. 65 ff.

2/ See Chapter X, section 1-e.
4. Even with perfect pricing, uncertainty involves cost, because adjustment to unforeseen price variations is always less efficient than adjustment to foreseen changes in market conditions. The situation is illustrated in Figure 12. Let $p$ be the price that users, in a preceding period, expect for the current period. The quantity demanded during the current period, as a function of current prices, given the previous expectation that the price $p$ would prevail, is represented by the demand curve $d_s$. The demand curve $d_1$ represents the quantity demanded as a function of the current price, under the assumption that current and expected price always coincide (perfect foresight). 1/ In general, the short-run demand curve $d_s$ will be rather inelastic as compared to the long-run (or perfect foresight) demand curve $d_1$.

5. The efficient supply curve $S$ shows the efficient supply price at a given capacity $K$, (determined earlier on the basis of expected demand conditions). Efficient supply as a function of actual demand conditions might differ slightly from $S$, to the extent that unexpected variations of demand would induce investment or disinvestment during the current period. However, a change in demand during only the current period will affect the marginal social return of investment only slightly, and the time lags involved will generally exclude short-run capacity changes.

6. Under the assumption of perfect pricing but imperfect forecasting, the efficient price of current output will be at $p_s$ and the efficient output at $x_s$. Without uncertainty, the efficient price would have been at $p_1$ and the efficient output at $x_1$. The economic cost of uncertainty is represented in Figure 12 by the shaded area. In transportation, it consists in the cost of those transport services which would not have been consumed under perfect foresight, i.e. if the expected price had been at $p_1$ rather than at $p$ (in the figure, the cost of the output $x_s - x_1$), less the cost of the alternative arrangements the users would then have been able to make (such as the use of alternative means of transport, storage, etc.). In our figure, these alternative arrangements would have cost users less than the transportation they would have replaced as indicated by the value of $(x_s - x_1)$ on the long-run demand curve $d_1$. As Figure 12 shows, the cost of uncertainty will be larger, the fuller the utilization of capacity. Consequently, we are dealing primarily with a peak-load problem. 2/

---

1/ The demand curve $d_s$ depends on the expected price $p$: it will shift with the expected price. The price $p$ has no relevance for the demand curve $d_1$: at any point on $d_1$, the associated current price is, by definition of $d_1$, also the expected price. The demand curve $d_1$ may be regarded as a long-run demand curve: it yields the quantity demanded per unit of time at any price, given that the price has prevailed long enough for the expected and the current price to converge.

2/ We note in passing that the absence of any price adjustment would increase the economic loss to area ace in Figure 12, which could be considered the sum of the cost of uncertainty (the shaded area) and the loss from imperfect pricing (the area abde). The more inelastic short-run demand, the less important the loss from imperfect pricing will be, relative to the cost of uncertainty.
Figure 12: Economic Cost of Uncertainty

Price

Current output

IBRD-5234
7. While policy cannot predict the unpredictable, it might help reduce the cost of uncertainty if price expectations can be improved by better information. Certain techniques of pricing, such as predetermined rate schedules, could also help, but might hinder the efficient short-run adjustment of prices. In terms of Figure 12, fixed rates would have to raise the expected price at least to \( d \) to compensate for the loss of short-term flexibility, since at \( d \) the loss from imperfect pricing would be equal to the loss from imperfect foresight (the shaded area in Figure 12).

b. Investment Conditions

8. Given efficient price and output policies, the marginal conditions of efficient investment (Equation (3), Chapter III, para. 13) are affected by uncertainty only in that future net returns are now a stochastic variable and should be redefined in terms of average (expected) values. This raises no special problems. The marginal condition of efficient investment, thus redefined, in principle includes the provision of reserves to accommodate unexpected peaks in demand. In most industries, unexpected deviations of demand are met by compensating fluctuations in inventories. This is impossible for nonstorable commodities such as transport services which can only be held in reserve capacity. The question is closely related to peak-load pricing and investment, which we examined at some length in Chapter III, section 3. In the present context, reserve capacity raises no new theoretical issues. The social value of accommodating unforeseen peaks of demand is fully accounted for in the investment condition.

9. The assumption of perfect pricing which underlies the marginal conditions of efficient investment may not always be realistic. While this may not be a very serious matter for storable commodities not subject to peak-load problems, it does raise special problems for transport. The implications of imperfect time adjustment of prices to predictable variations in demand were examined in Chapter VI, section 1. They will be reexamined in section 3 of this chapter for the case of unforeseen fluctuations.

2. Economic Efficiency and Competition

10. There is no reason why the competitive mechanism could not deal efficiently with uncertainty. Assuming perfect pricing, the price at any moment will correspond to the efficient (short-run) supply price at the available capacity and the prevailing demand conditions \( (p_s \text{ of Figure 12}) \). Investment will be such that the sum of discounted net revenues expected for all relevant future periods equals the investment cost. Expected net revenues must now be interpreted in a probabilistic sense:

\[
\frac{dR}{dK} = \sum_i \alpha \left( p_i - \frac{C_i}{x_i} \right) \cdot \frac{x_i}{K}
\]
where $\alpha_i$ is the probability of a particular price-output combination. 1/
Since this is equal to the expression for $dW/dK$, competitive investment behavior corresponds to the marginal condition of efficient investment.

11. At the present level of abstraction, uncertainty mainly affects the conclusion drawn in Chapter IV that competitive pricing and investment behavior tend to ensure that each firm covers costs out of revenue, in both short and long run. In a context of uncertainty, the latter will be true only in a probabilistic sense. In actuality, firms may make windfall profits or suffer unforeseen losses, as expected net revenues turn out to have been under- or overestimated. But this does not invalidate the general proposition that competition, under the given assumptions, will tend to conform to the marginal conditions of economic efficiency.

3. Uncertainty and Imperfect Pricing

12. The case of imperfect flexibility of prices under uncertainty, while similar to that of imperfect time differentiation examined in Chapter VI, section 1, is different enough to justify a separate analysis. If in Figure 11, $d_1$ and $d_2$ are interpreted as possible alternative demand conditions for a future period whose market price we wish to determine at present, $\alpha_1$ and $\alpha_2$ are their respective probabilities. $S$ is the efficient supply function, given the capacity $K$. At the price $p$, actual demand will be $x_1$ or $x_2$, assuming (as is justified for transport) that output is fully flexible within the limits of capacity.

13. Imperfect flexibility of prices involves alternative economic losses represented by the shaded areas in Figure 11. The expected loss is equal to the sum of the separate losses, each weighted by its probability, and will depend on the rate of capacity utilization: imperfect flexibility is again primarily a peak-load problem. As in our other cases of imperfect pricing, the size of the economic losses will also be a function of the elasticities of demand. For unforeseen adjustments, these elasticities will often be rather small, so that the direct losses from imperfect price adjustment (disregarding investment effects) also tend to be small. While this holds for unforeseen variations of demand, it emphatically does not imply that all direct losses from imperfect price adjustment are negligible. The losses from imperfect adjustment of prices to

1/ Since experience shows that economic operators generally prefer certainty to the expected value of uncertain returns, producers may require a somewhat higher return on investment (a risk premium), which would reduce investment and raise prices. If the capital market is reasonably efficient, this risk premium will reflect the community's preference for certainty. Conversely, users who can predict their future requirements may be willing to reduce theirs and the producers' risks by entering into long-term contracts. If the future market is well developed, the net result may be to virtually eliminate the risk premium.
foresightable variations in demand (peak-load pricing) may be substantial, since demand will tend to be far more elastic with respect to expected than to unexpected price variations. 1/ As we have noted in para. 6, uncertainty involves an inevitable economic cost, even with perfect pricing, precisely because the elasticity of demand is larger for predicted than for unforeseen price variations. However, since the cost of imperfect adjustment to foreseeable demand fluctuations is in principle avoidable, it is relevant from an operational point of view.

14. Returning to the question of unforeseen variations of demand, let us investigate whether the competitive mechanism will tend to establish efficient prices and produce an efficient investment policy, given certain price rigidities. Let us assume that the price p, established in a previous period, cannot be changed immediately to take care of variations in actual demand. The reasons, at this point, are not relevant. Following the same procedure as in paras. 5-9 of the previous chapter, we find that the competitive price p turns out to be equal to the efficient price, namely:

\[
(16) \quad p = \frac{\sum \alpha_i \left( S_i \cdot \delta x_i \right)}{\sum \alpha_i \cdot \delta x_i / p}
\]

where \( \alpha_i \) is the probability of each demand function \( d_i \). However, for the same reasons as set out in paras. 10-15 of the previous chapter, the competitive level of investment will tend to be lower than the efficient level (or, conversely, at the efficient level of investment expected net revenue will fall short of investment cost). 2/ Competitive investment will be too small to provide adequate capacity for unforeseen peaks in demand, in the sense that the social benefits of additional capacity would have exceeded its social cost. In the present context this may be expressed as the

1/ See para. 4 above.

2/ It may be recalled that this conclusion depends on the price elasticity of demand being negatively correlated with the intensity of demand. This is indeed very likely for unforeseen fluctuations: an unforeseen high level of demand is often due to special circumstances (e.g. failure of alternative means of transport) which tend to make demand inelastic, and vice versa.
tendency for the competitive market to provide insufficient reserve capacity. 1/ Moreover, if the carriers maintain certain minimum standards of quality and deal with excess demand during unforeseen peaks by first-come-first-served methods, additional underinvestment in reserve capacity will result. 2/

1/ The inadequate provision of capacity under conditions of uncertainty has received far more attention in policy statements and in the economic literature than the general case of underinvestment due to imperfect pricing. This is understandable, since the problem of unremerative standby capacity has a certain intuitive appeal. B.A. Weisbrod, for example, in his article, "Collective-Consumption Services of Individual-Consumption Goods," Quarterly Journal of Economics, August 1964, pp. 471-477, reasons that potential users of a service value its availability even if they never actually use it. Since the producer cannot capture the value of this "option demand", actual revenue fails to include what Weisbrod calls an "external" social benefit of the available capacity, whether or not prices are perfect in our sense. Adequate standby capacity thus involves a financial deficit.

Weisbrod's reasoning is incorrect, unless it is supplemented either by imperfect pricing or increasing returns to scale. Both the social benefit of a marginal investment and its private returns under competition will in fact take full account of the "option demand", by including in the investment function every possible level of demand and its associated probability (see para. 10 above). The fact that some potential users may attach a high value to availability simply implies that the service generates a high intramarginal surplus. The occasional user, when he uses the service, will pay the price that equates demand to capacity at that moment. By entering the market, he will raise the equilibrium price somewhat, thus possibly displacing another, marginal user. He would have been willing to pay much more than the equilibrium price: the excess represents a typical intramarginal surplus. However, intramarginal surpluses are nothing special. They are generated in every production process. They are not relevant to the investment criterion unless we are dealing with indivisibilities or increasing returns to scale, i.e., with cases in which we require a total as well as a marginal investment criterion.

A more sophisticated analysis is contained in an article by G. Brown, Jr., and M.B. Johnson, "Public Utility Pricing and Output Under Risk," American Economic Review, March 1969, pp. 119-128. The authors show that, even with perfect pricing in our sense, optimal capacity implies a financial deficit, unless there is a perfect futures market where the producer can sell rights to future service. This is an additional argument for the more general underinvestment thesis that we have presented.

2/ Cf. Chapter VI, para. 15, and footnote 1/ to para. 16.
15. The implications of insufficient reserve capacity may be very serious. Whereas inadequate short-run flexibility of prices may only slightly affect economic efficiency, the short-run inelasticity of demand is an indication of the high price that users would be willing to pay for additional transport facilities during unforeseen peaks in demand. Inadequate reserve capacity may entail high costs in terms of economic efficiency, such as immediate losses because of late delivery, spoilage, time lost by passengers and by freight, etc. The absence of sufficient reserve capacity in the complex organizations of a modern economy may slow down an entire production process or organization. Costs incurred by users to prevent immediate losses will be social costs of insufficient capacity to the extent that the cost of these provisions by users exceeds the cost of additional stand-by capacity in transport. The user may, for example, hedge against unforeseen deficiencies of transport by holding larger reserves and investing in additional storage facilities, by shifting to transport on own account (including private automobiles), by always being early enough to be first in line during unforeseen peak periods, etc. The losses from insufficient capacity are compounded when we include the fact that both transport firms and users may incorporate a risk premium in their calculations. This will reduce the reserve capacity being held by transport firms, and will increase the costs that users are prepared to incur as a hedge against insufficient transport facilities.

4. Summary

16. Imperfect short-run flexibility of prices in response to unforeseen fluctuations of demand produces economic losses. Due to the short-run inelasticity of demand with respect to unforeseen price fluctuations, these losses may not be very high. Given certain rigidities of price adjustment to unforeseen fluctuations of demand, the (rigid) competitive price will tend to be equal to the (rigid) efficient price. Unregulated competitive pricing is still consistent with economic efficiency. The reserve capacity to be provided by a competitive market tends to be deficient or, conversely, at the efficient level of investment in reserve capacity, total cost will not be covered by total revenue (interpreted in a stochastic sense). The underinvestment in stand-by capacity tends to be particularly

1/ Even if we disregard the technical and organizational costs of perfect flexibility of pricing, the economic losses from imperfect flexibility may in some cases be offset by the fact that strong short-run fluctuations may confuse the users' views of the underlying supply conditions. Perfect flexibility, as compared to some short-run rigidities of prices with respect to unforeseen demand fluctuations, might then reduce the losses from imperfect pricing at the expense of higher losses from imperfect adjustment of demand. These problems will be taken up in Chapters VIII and X.
pronounced for joint carriers that maintain certain standards of service and ration inadequate capacity during unforeseen peaks on a first-come-first-served basis.
VIII. THE SCHEDULED CARRIER PROBLEM

1. In the preceding chapters we have examined a number of problems that could cause the pricing and investment pattern brought about by unregulated competition to be less than fully efficient in the welfare-economic sense. We have examined two basic sources of such problems, impediments to perfect pricing (Chapters VI and VII), and increasing returns to scale (Chapter V). We have shown that complications arise only when the unit of supply (the vehicle) is indivisible in an economically relevant sense, that is, in the case of joint carriers. So far, the actual problems involved - mainly underinvestment in capacity - have not appeared to be very serious.

2. The picture may change, however, when we introduce the notion of the scheduled (joint) carrier. The economic rationale of scheduled services, briefly examined in section 1 below, is mainly derived from the time discontinuity of joint carrier services. 1/ Under conditions of uncertainty the unpredictable timing of joint carrier services may impose substantial costs on the user: waiting time that could have been used profitably, special arrangements (e.g., storage facilities) to bridge unforeseen delays, etc. The point of scheduled services is to reduce these costs by giving a guarantee of service at predetermined times. 2/

3. There are various reasons why the problems of imperfect pricing and increasing returns are pretty much centered on the scheduled carriers. The impediments to perfect pricing are likely to be more pronounced for scheduled carriers, who tend to employ fixed rate schedules as well as fixed time schedules, and who may be technically or politically unable to differentiate qualities as much as they would like. In addition, the price mechanism may not be able to translate the value of the service guarantee into a special remuneration for the special costs of the service guarantee. These points will be examined in section 2. There are also some indications that scheduled carriers may be subject to significant economies of scale, which will be taken up in section 3. Perhaps the most important special aspect of the scheduled carriers is that they lend themselves more readily than other carriers to public measures aimed at correcting the underinvestment in joint carrier capacity resulting from unregulated competition. Strictly speaking, these policy issues do not belong in the present chapter, but a few comments in section 4 are necessary to a full understanding of the scheduled carrier problem. The policy issues as such will be taken up in Chapter X and in Part Three.

1/ See Chapter V, para. 21.

2/ At this point we do not specify whether the guarantee refers to a certain capacity being supplied at certain preannounced times, or to all demand at those times being met. We shall come back to this question later in this chapter.
4. Having examined the special aspects of the scheduled carrier in sections 2 through 4, we still have to determine in what respect unregulated competition is inconsistent with economic efficiency. We shall do so first with respect to competition among scheduled carriers (section 5), focusing on whether the competitive system could establish an efficient integrated network of scheduled services, considering the time pattern of competing and complementary services. Competition between scheduled and unscheduled carriers, to be examined in section 6, raises entirely different issues, centered around the possible need to protect the scheduled carrier.

5. We note that the special aspects of the scheduled carrier are often discussed in terms of "public service obligations" or the need for "dependability of service". Neither concept is clearly defined or easily avoided. Both have many different dimensions, of which we shall examine only those that relate to economic efficiency within the road transport industry. Any other objectives for regulation such as regional development, the "right" of everyone to a certain minimum of public transport, the "equity" of queuing versus pricing as a means of rationing scarce capacity, etc., regardless of whether they are announced as "public service obligations", are out of order at this stage of the discussion. 1/

1/ These other aspects will be examined in Chapters XII and XIII.

2/ Schedules need not be completely rigid, but may be stated in terms of frequency per time period or latest time of departure. The optimum type of schedule will depend on the time pattern of demand, particularly its predictability, and the value of delays. These values will in general be higher for passengers than for freight. For passengers they will be higher, the higher the income level. Consequently, there may be a case for less rigid scheduling in low-income societies than in high-income societies, if at the same time a certain flexibility of timing serves to increase the average loading factor of the joint carrier.
scheduled joint carrier has two characteristics: it operates according to a preannounced schedule and it gives a certain guarantee that the scheduled services will in fact be supplied.

7. Scheduled services impose a cost on the supplier because he can no longer fully adapt the timing of service to the market situation: average load factors will inevitably be lower than without scheduling. There is a trade-off between these costs of scheduling to the supplier and the cost of nonscheduling to the users, the operational variables being the extent of scheduled services, the rigidity of their timing, and the content of the service guarantee given by the scheduled carrier. The optimum will generally be a mix of scheduled services on the one hand and of nonscheduled joint carrier services as well as individual services on the other. The nonscheduled joint carrier services supply relatively cheap transport to meet unpredictable demand, whereas individual transport supplies high-cost services fully adapted to the timing of the individual user. The scheduled carrier supplies an intermediate service. In the next sections, we will try to determine whether the unregulated market system is able to bring about an efficient mix of scheduled and nonscheduled services and, if not, in what respects unregulated competition fails to meet the objective of economic efficiency.

2. Impediments to Perfect Pricing

8. The scheduled carrier tends to use rate schedules, which means that prices do not quickly adjust to unpredictable short-term variations of demand and that they adjust to long-term shifts in demand only after a time lag. The economic rationale of rate schedules is fairly obvious, the most compelling reason being that joint carriers deal with a great number of passengers or small consignments. It is very inconvenient to both users and carriers for prices to be changing unpredictably. Since the elasticity of demand to unforeseen price changes tends to be low, the economic significance of full price flexibility tends to be small. Moreover, freely fluctuating prices may tend to obscure the underlying seasonal and hourly pattern of prices, and hence may actually distort the decisions of users rather than orient them correctly. Since the real state of demand may be known only just before the scheduled time of departure, and since "recontracting" between early and late customers is usually impracticable, fully flexible prices will not even serve to efficiently ration capacity by giving priority to the most urgent demand. Furthermore, if scheduled carriers tend to be relatively large firms, as they are in practice, fully

---

1/ The fact that public policy may impose the use of rate schedules for other reasons than economic efficiency in transport is not relevant at this point.

2/ Cf. Chapter VII, para. 7, and footnote to para. 16. This disorientation cannot practically be prevented, in the case of these "small" contracts, by publishing information on "normal" seasonal and hourly prices because the cost of information and of decision-making rapidly becomes prohibitive.
flexible pricing would pose very difficult if not unsurmountable problems of internal organization to such a large firm with its decentralized operations. In conclusion, the scheduled carrier does not have an efficient alternative to price-setting by preannounced rate schedules. This can affect the differentiation of prices with respect to both predictable and unpredictable variations of demand.

9. In practice, the scheduled carriers' rates are usually differentiated not at all or to a very limited extent with respect to predictable variations of demand. Effective peak-hour pricing, although a prime concern to transport economists, is seldom practiced. In passenger transportation its reverse is often practiced, peak-hour travel being favored by reduced rates in the form of commuter tickets, season tickets, special rates for school children, etc. 1/ These shortcomings of existing rate schedules are not technically necessary nor are they imposed by the cost of more efficient rate structures. 2/ The scope for useful rate differentiation is sufficient to allow effective peak-hour pricing. Theoretically, the scheduled carrier is therefore not inherently more liable to imperfect pricing and to the resulting underinvestment in peak capacity than carriers that do not employ rate schedules. In practice, however, given the prevailing structure of rates, scheduled carriers are bound to incur substantial losses if they are to provide sufficient peak capacity. 3/

10. The situation is entirely different with regard to unpredictable variations of demand. Pricing by rate schedules is inconsistent with ad hoc adjustment to unforeseen demand fluctuations, and we have seen that this rigidity of prices may be desirable for the type of services considered. However, it does imply either underinvestment in stand-by capacity to meet unforeseen peaks in demand, or losses to the carrier that does provide sufficient stand-by capacity.

11. So far, we have considered the implications only of rate schedules, but the more important special feature of the scheduled carrier is his time schedule. The implied guarantee of service at the preannounced times prevents him from utilizing capacity in a more profitable alternative. If the guarantee is of value to the users, they will be willing to pay for its cost to the carrier. But since fixed rate schedules do not allow the carrier to raise his prices whenever an alternative would be more profitable, there are only two ways to recover the cost of scheduling: raise the entire level of rates, or charge the users separately for

1/ Reduced rates may be imposed on the scheduled carriers for a social purpose, but we are still abstracting objectives other than economic efficiency.

2/ The case has been argued most forcefully by W.S. Vickrey in a number of publications. See his "Pricing in Urban and Suburban Transport", American Economic Review, May 1963, pp. 452-465.

3/ Cf. Chapter VI.
the service guarantee. The first possibility is clearly not consistent with economic efficiency. In particular, it puts the scheduled carrier at an unjustified competitive disadvantage in relation to his unscheduled competitors (see section 6 below). The second alternative may take the form of long-term contracts, of advance reservations, or of a system of two-part pricing involving a fixed entry fee for use of the scheduled services. These possibilities will be examined more closely in Chapter X. At this point we simply assert that all these methods have their limitations when applied to the road transport industry. Under these conditions, we must again conclude that the scheduled carrier will tend either to underinvest in capacity or to run a loss when he does provide sufficient capacity. 1/

3. Economies of Scale

12. The fact that scheduled road carriers, especially for passengers, are almost always relatively large firms does not in itself prove much about optimum firm size, since these firms are usually operated either as public monopolies or on the basis of public charters given to one or a few large bus companies. But several facts indicate that the optimum size of scheduled carriers is likely to be fairly large. For one thing, the supply guarantee requires the scheduled carrier to hold sufficient reserve capacity to ensure against breakdowns (i.e., to prevent the probability of failure to supply the scheduled service from exceeding the level implied by the guarantee). Unscheduled carriers, on the other hand, will hold such reserves only to the extent that the expected loss of revenue from breakdowns at least equals the cost of holding the reserve capacity. Since pooling reserves reduces the cost of insurance, the larger reserve requirements of the scheduled carrier imply correspondingly larger savings on large-scale operations.

13. Other factors favoring size derive from the nature of scheduled operations. Scheduled carriers must plan fairly far ahead. This involves administrative costs that may well be subject to economies of scale. In general, the more highly planned nature of scheduled operations tends to favor the introduction of automated procedures, standardized equipment, etc., all of which involve significant economies of scale. Moreover, scheduled carriers do not experience the diseconomies of scale which are probably the main limitation on the size of the nonscheduled carriers. Nonscheduled carriers will maximize their revenue by supplying services when and where they receive the highest short-term return. In a dynamic economy, this requires a high degree of flexibility which in practice can be achieved only

1/ This may be aggravated by the fact that scheduled carriers may be unable to differentiate qualities and prices as much as they would like to. Cf. Chapter VI, para. 16, footnote 1/.
by the decentralized decision-making of small firms, 1/ which even the most sophisticated computer cannot yet replace. The advantages of small size do not exist for the scheduled carrier, to whom short-term flexibility is irrelevant. On the basis of these general considerations it would seem likely that scheduled carriers are subject to economies of scale. 2/ The empirical evidence is inadequate and inconclusive. 3/ We can only say that

1/ For purposes of internal organization, a large firm would require clear instructions for, and close control of, the individual operators. This is in practice inconsistent with the high degree of flexibility in pricing and in physical operations, with respect to different submarkets as well as over time, which are needed in the highly variable transport market.

2/ The general case has been argued very convincingly by Gilbert Walker in Road and Rail, London: Allen and Unwin, 1947, p. 172 ff.

3/ A study by J. Johnston would lead to the conclusion that economies of scale do exist in scheduled bus operations ("Scale, Costs and Profitability in Road Passenger Transport," Journal of Industrial Economics, June 1956, pp. 207-223). A time-series study of one large bus company with a fleet of 1,300 vehicles shows a significant cost depression: a 10 percent increase in car miles is associated with a 7 percent increase in total expenses. Similarly, a cross-section study of 24 firms of different sizes shows a slight decline of average cost with the size of the firm (significant for short-run, but not for long-run average cost).

Two more recent studies, published in the Journal of Transport Economics and Policy (January 1970, pp. 15-28 and 29-36), reach a different conclusion. The first study, by N. Lee and I. Steedman, concludes on the basis of a multiple regression analysis of 44 British municipal bus companies with a combined fleet of over 10,000 vehicles (46 percent sample) that "the weight of evidence supports the hypothesis of constant returns to scale in municipal bus operations" in Britain, although they grant that "it is possible that scale economies might accrue to very large undertakings" (i.e., larger than any of those included in the sample or indeed present in the total population). The last point is stressed as possibly quite important by A.J. Harrison in "Economies of Scale and the Structure of the Road Haulage Industry," Oxford Economic Papers, November 1963, pp. 287-307. The second study, by R.K. Koshal, contains an analysis of city and intercity bus operations in India, for a sample of 26 companies with a total fleet of over 20,000 vehicles. The author concludes that "there is no evidence of economies or diseconomies of scale for the Indian bus transport industry".

there is a certain a priori likelihood that large firms have cost advantages in the case of scheduled carriers, but no solid evidence. If the theory is true, we run into the dilemma discussed in Chapter V: either output and investment will be suboptimal or the carrier will incur a deficit.

4. Public Service Obligations

14. As we have mentioned in para. 5 of this chapter, we shall discuss only those aspects of public service obligations that derive from the objective of economic efficiency in the road transport industry. All other aspects of public service will be considered in Chapters XII and XIII. So far, the analysis of economic efficiency as applied to road transport has revealed only one possible shortcoming of unregulated competition, namely underinvestment in joint carrier capacity, which may be due either to imperfect pricing or to increasing returns to scale. Hence, the only type of public service obligation directly based on economic efficiency would be one attempting to correct this kind of underinvestment by obliging joint carriers to hold a larger capacity than they otherwise would. This imposes a net loss on the carriers concerned.

15. For two reasons, authorities should impose such public service obligations on scheduled carriers only. First, scheduled carriers, as we have just seen, are particularly susceptible to imperfect pricing and economies of scale, far more so than other joint carriers. Second, scheduled carriers lend themselves much more readily to public service obligations than other joint carriers, for the simple reason that the services to be provided can be specified in advance. It would obviously be difficult if not impossible to formulate objective and operational policy criteria obliging nonscheduled carriers to hold additional capacity, if there is no schedule and no objective reference for the obligation. We conclude that the only practical means of increasing joint carrier capacity beyond the level induced by unregulated competition is to impose appropriate direct obligations on the scheduled carriers, and on scheduled carriers only.

5. Competition Among Scheduled Carriers

16. In this section, we disregard the existence of nonscheduled carriers in order to concentrate on whether unregulated competition can produce an efficient system of scheduled services. Competition among joint carriers is necessarily imperfect because indivisibility of the unit of supply implies discontinuity of service over time, except when demand is so large that supply is practically continuous. 1/ There is little point in examining the latter case, since it is of very limited practical significance.

17. In the absence of regulation, scheduled carriers can compete not only in price and quality, but also in the timing of their services. Unrestricted competition with respect to schedules may or may not in the

1/ See Chapter V, para. 22.
end lead to the most efficient total timing-and-frequency-pattern of scheduled services, because the behavior of firms under oligopolistic conditions is highly unpredictable. 1/ But even if competition among existing firms were to create a stable and efficient common pattern of scheduled services, the equilibrium would still be subject to disturbances from entry of new firms, given no legal barriers to entry.

18. Instability in the time pattern of services due to schedule competition is inconsistent with the economic function of scheduled carrier services, i.e., to provide transportation at predetermined times for long enough that users need not take costly precautions against uncertainties of performance. Consequently, economic efficiency demands a conscious coordination of time schedules among competing scheduled carriers. Voluntary coordination between competing scheduled carriers involves the danger of monopolistic pricing practices, particularly because it is almost inevitably accompanied by restrictions on the entry of outsiders. Consequently, it is not a very promising solution, and is in fact almost universally rejected in favor of public regulation of schedules and hence also of entry.

19. Assuming public regulation of schedules and entry, will otherwise unregulated competition among scheduled carriers lead to an efficient organization of the market in other respects, such as volume of supply, pricing, quality of service and investment? At first sight there would seem to be a very real danger of monopolistic practices, since scheduled carriers tend to be large firms, while competing scheduled carriers have excellent opportunities and incentives to collude in their commercial policies. The need for coordination on routes, frequencies, and schedules inevitably establishes a climate of cooperation, sometimes enhanced by common arrangements for shared terminal facilities and other supporting or complementary services. All this would seem to point toward the need for extensive public regulation to guard against monopolistic practices. Pockets of real monopoly power do exist and do require such regulation. But the real problem in most actual cases appears to be the weak competitive situation of the scheduled carrier rather than its monopolistic tendencies. Regulation

1/ A new competitor might set his schedule just ahead of the existing carrier's times of service in order to "cream off" users who prefer earlier times of service, leaving the existing carrier only with those who prefer a slightly later time. However, the new carrier may be able to increase his net revenue by providing intermediately timed services at higher prices, attracting users who are willing to pay for earlier service. In any case, the new competitor's policy will induce a reaction on the part of the existing firms, which makes the problem exceedingly complex and in fact indeterminate, unless we make very specific assumptions about the reaction pattern in an oligopolistic setting. The available empirical data about these reaction patterns does not yet permit a general theory of predictable market behavior.
usually tends to support the scheduled carrier rather than to guard against monopolistic practices. In practice the major question is whether regulation is needed to protect the scheduled carrier against competition from unscheduled carriers. To this important point we now turn.

6. Competition Between Scheduled and Unscheduled Carriers

20. The preceding analysis has shown that the scheduled carrier is at a marked competitive disadvantage as compared to unscheduled carriers. The scheduled carrier is more strongly subject to imperfect pricing and economies of scale than other carriers and tends to be burdened with public service obligations designed to correct underinvestment in standby capacity. Moreover, the scheduled carrier may be unable to "sell" his supply guarantee, even though it involves a specific cost. Users may be willing to pay an "insurance premium" in addition to the price paid for services rendered, but at any specific time this value is not translated into a preference for the scheduled over the unscheduled carrier, unless the scheduled carrier can employ a system of advance reservations. Except in long-distance passenger transportation, the latter is probably not feasible in the road transport industry, either for passengers or for small consignments. There is some truth in the popular statement that unrestricted competition leads to "pirating" by unscheduled carriers at the expense of scheduled carriers. The term is emotive and misleadingly general, but correct to the extent that unregulated competition does fail to produce the most efficient mix of scheduled and unscheduled services, at the expense of the former.

21. We note in passing that the arguments which emerged from the preceding analysis correspond rather closely to those often used to support a policy of protection for the scheduled carrier. The mythology of popular transport economics may be misleading in a great many ways - of which we shall note a number in the following chapters - but it also contains some practical wisdoms which economic theory should acknowledge and which policymakers should heed. In popular discussions, perhaps the oldest and certainly the most prevalent objection against unregulated competition is its alleged failure to provide a sufficiently dependable transport system. The concept of dependability is a complex one, but the points that constantly recur in policy discussions are precisely those on which the preceding theoretical analysis shows unregulated competition may fail to ensure efficiency in the welfare-economic sense: the provision of adequate scheduled services (with the implied supply guarantee), and the provision of sufficient standby capacity.

7. Summary

22. Since competition between scheduled carriers may not result in efficient coordinated timing of their services, regulation of time schedules and of entry may be required. In the absence of competition from unscheduled carriers, competition among scheduled carriers may not work well enough to prevent monopolistic practices, even with a strong antitrust policy. This need not occur when there is free competition from unscheduled carriers.
The real problem then will often be the weak competitive position of scheduled carriers, who may not be able to pay their total cost out of revenue at the most efficient level of service and capacity. The advantages of scheduled service and of sufficient capacity, measured by the money users would be willing to pay for them, are not fully reflected in the carrier's revenue. In both cases this is primarily the result of impediments to perfect pricing, including the problems of "selling" the scheduled carriers' supply guarantee, with economies of scale as a possible additional cause. The policy problems are: the regulation of schedules, the control of monopolistic carriers in "thin" markets, and the deficit that scheduled carriers run at efficient levels of output and investment. We shall focus further discussion of scheduled carriers on the last point, which raises the most important policy problems.

23. In principle, the analysis of scheduled carrier problems applies to both passengers and freight, but in practice the problem arises primarily for passenger services. For one thing, small consignments are a minor part of total freight transport and, as we have seen, scheduled freight services are important only for small consignments. Moreover, rigid timing is generally far more important to passengers than for freight. Consequently, for freight services the importance of stand-by capacity tends to be limited, because peaks can be spread out at a relatively low cost in storage and delays. For the same reason, the advantage of scheduled over nonscheduled service will tend to be relatively small, except when the total volume of freight per unit of time is so small that delays in nonscheduled service would be quite long.
PART TWO

THE OBJECTIVES OF REGULATION

IX. INTRODUCTION

X. REGULATION TO IMPROVE INTERNAL ECONOMIC EFFICIENCY IN ROAD TRANSPORT

XI. REGULATION TO ENSURE EFFICIENCY IN THE TRANSPORT INDUSTRY

XII. EXTERNAL PRICE DISTORTIONS AND EXTERNAL EFFECTS

XIII. OBJECTIVES OTHER THAN ECONOMIC EFFICIENCY IN TRANSPORT
IX. INTRODUCTION

1. We divide the objectives of road transport policy into two broad groups: those concerning economic efficiency in the transport industry (Chapters X-XII), and a catch-all category of other objectives (Chapter XIII). We ask three main questions.

(1) To what extent does the free play of market forces fail to achieve these objectives?

(2) If and to the extent it fails, is regulation of the road transport industry the most effective instrument to correct the situation?

(3) If it is, do the drawbacks of regulation (the secondary distortions that may be caused by the measures and the administrative cost) outweigh the social benefits?

The relative importance of these questions will be somewhat different for our two groups of objectives. With regard to economic efficiency, the first question will necessarily occupy a central position. The other objectives, however, are generally formulated in such a manner that the free play of market forces by definition does not achieve the ends involved. As a result, the emphasis in Chapter XIII will be on the policy alternatives rather than the choice between regulation and unrestricted competition.

2. The objective of economic efficiency is concerned with the optimum performance of the economy as a whole. An industry can never be considered in isolation, because a policy that is appropriate in one setting may be wholly inappropriate in another. For example, minimization of private cost may be inconsistent with maximum efficiency in the welfare-economic sense, when the prices of certain factors of production are distorted. Similarly, the traditional precepts of welfare economics with regard to pricing and investment depend on optimum pricing in other sectors, especially those producing competitive and complementary products. In order to break the total problem of economic efficiency in the road transport industry into manageable separate issues, we shall assume in Chapter X that all other prices in the economy are optimal in the welfare-economic sense, including the prices of competing transport services (mainly rail transportation) and the prices of all factors of production (particularly road pricing). In Chapter XI we shall examine the implications of lifting the assumption with regard to the other modes of transportation, while Chapter XII will discuss market imperfections outside transport and their implications for the road transport industry.

---

1/ For a general discussion of transport policy objectives, see M. Alais, et. al., Options in Transport Tariff Policy, Chapter 21.
X. REGULATION TO IMPROVE INTERNAL ECONOMIC EFFICIENCY IN ROAD TRANSPORT

1. The literature on transport economics and the public discussion of transport policy contain many propositions about possible shortcomings of unregulated competition in the road transport industry. Some of the major points will be reviewed in this chapter. The first section will contain a brief review of the so-called special aspects of the road transport industry, advanced in many discussions on transport policy as arguments for regulation. We shall see that most are either incorrectly understood or irrelevant, and that the rest reduce to the two kinds of basic issues spelled out in Part One: the indivisibility of the unit of supply (the individual truck or bus) and the associated discontinuity over time of joint carrier services; and the issue of imperfect pricing. Both these questions occur only or primarily in the section of the industry we call the joint carrier market, particularly in the market of scheduled road transport services. The policy problems raised by the scheduled carrier will be examined in section 2. Sections 3 and 4 will deal with possible shortcomings in the actual operation of the competitive system outside the scheduled carrier area, first for contract carriers (including taxis) and then for private carriers (including private automobiles).

1. The Special Aspects of Road Transport

2. The case for unrestricted competition, insofar as it is based on the economic advantages of flexibility, is usually undisputed. The economic need for regulation is argued on other grounds. On a very general level, it is said competition cannot ensure economic efficiency because demand and supply of road transport services exhibit certain special aspects which allegedly prevent normal operation of the unregulated market system. For example, it is said that supply and demand of transport services are exceptionally inelastic, due to their nonstorability. Coupled with the relative ease of entry into the road transport industry (limited professional qualifications and relatively low investment), this is said to imply an inherently unstable market.

3. The specific way in which unregulated competition in the road transport industry is said to leave the efficiency objective unfulfilled will be considered in subsections a through e. It would be neither possible nor sensible to consider any but major issues which have at least some semblance of rationality. A great many theories that have appeared,

1/ We remind the reader that the term regulation as we use it does not concern noneconomic regulation (e.g., safety measures) or the application of general economic policies (such as fiscal, social, antitrust policies) to the road transport industry.
apparently more or less as shots in the dark, are thereby eliminated. 1/ This kind of political buckshot, which no reasonable interpretation could mistake for real economic ammunition, will be ignored.

a. Ease of Entry

4. It is often argued that regulation of the road transport industry is needed because in an open system entry into the industry is exceptionally easy. The facts are not in dispute. With the possible exception of scheduled carriers, economies of scale apparently do not exclude small, even one-vehicle, firms. Moreover, compared to other small firms (e.g., in the retail trade), road transport firms require limited initial capital investment. Finally, the road transport business has no high professional qualifications that could create a threshold to entry.

5. In and of itself the relative ease of entry into the road transport industry does not establish a prima facie case for regulation. It would do so only if one could demonstrate that ease of entry causes "excessive" entry. Now "excessive" entry — like its close relatives "excessive" competition and "excessive" investment — is one of the most abused and least clearly defined concepts of transport economics. To begin with, entry may be "excessive" according to different criteria. It may be interpreted as the cause of an "excessive" number of (small) firms serving the same market, in the sense that their combined output could have been produced at a lower total cost if there had been fewer firms. At first sight, this seems very improbable. If economies of scale in the road transport industry are such that large firms can operate at a substantially lower cost per unit of service, the smaller firms will either grow to optimum size or be pushed out by their more efficient large competitors. 2/ If economies of scale are in fact important, entry into the road transport industry would not be easy at all, because new firms would be competitive only if they make a sufficiently large initial investment to reach optimum size. The whole theory collapses from its internal inconsistencies. While economic reality may be more complicated than this simple model suggests, we conclude that the present interpretation of "excessive" entry does not establish a prima facie case for regulation.

1/ For example, the proposition that uncontrolled new entries are a source of instability. As a defense of vested interests this is about as thinly disguised and, outside the scheduled carrier area, as unfounded an excuse as one can imagine. Transport politics in general is exceptionally good at abusing emotive terms: instability, creaming-off, pirating, ruinous competition, predatory behavior, overcapacity, etc. Another type of argument against unrestricted entry, especially of small firms, is that they are difficult to regulate. If administrative convenience were to carry that much weight, there would be little room for dynamic development.

2/ On the economies of scale in road transport, see Chapter V and the references given there.
6. Another interpretation of "excessive" entry is based on the theory that the net incomes earned in the road transport industry are below those earned in comparable employments. If we assume for the moment that the facts are correct (although in fact, they are debatable 1/) they can be explained by three different hypotheses: the road transport industry offers nonpecuniary advantages which compensate the carriers for their relatively low money incomes; entry into other employments is restricted by private or public measures or by relatively high capital requirements; or potential carriers consistently overestimate the net income to be earned in the road transport industry.

7. The first two hypotheses, whatever their merits, do not establish a case for regulation in the road transport industry. If people voluntarily enter the business of road carrier rather than other trades which yield higher incomes for comparable skills, this would seem to indicate that they prefer the former. Restrictions on entry into road transport would reduce their welfare to maintain higher incomes for the existing carriers. Such a policy would appear to be antisocial as well as inconsistent with economic efficiency. As to the second hypothesis, the appropriate policy would be to ease access into the other professions: restricting access into the road transport industry will simply force the potential carriers into employments where their net income (including nonpecuniary advantages) will be still lower than it would have been in the road transport industry.

8. This conclusion may have to be modified in times of general unemployment. During the great depression of the thirties, when most regulatory policies were introduced, it was argued that the absence of alternative employment opportunities would create a rush into the few open trades, such as the road transport industry, subjecting these industries to wholesale default. By restricting entry, the authorities of many countries threw a fence around the road transport industry to protect it against such "excessive" competition. It is questionable whether this was a rational policy even in the depression, but the reasoning is certainly not relevant to conditions of economic development and growth.

9. The third hypothesis illustrates a classical tenet of transport economics. It is said that potential entrants into the road transport industry consistently overestimate the net income to be earned. In the absence of restrictive measures, they will depress net incomes below the expected level. Although some will drop out after a while, new entrants will continue to "spoil the market" and waste economic resources. The over-capacity they create would be temporary for the individual defaulting firm but permanent for the market as a whole; earnings would be permanently sub-normal and bankruptcies recurrent. New firms would stand ready to try their

1/ See the empirical data on bankruptcies given in note 1 to para. 9 below.
hand at the losing game. While the facts themselves are highly debatable, 1/ the theory is surely very curious, as it pictures carriers maintaining consistently wrong observations, permanent ignorance, and universal overoptimism. Outside of highly abnormal situations such as a severe depression, this theory of a permanent reserve army of prospective carriers who keep incomes

1/ The British history of bankruptcies in road haulage appears to be the best documented. Investigations by the Geddes Committee (British Ministry of Transport, Carriers' Licensing, London: Her Majesty's Stationery Office, p. 29-31) show that in the years 1961-1963 the number of failures was relatively small: the industry took between seventh and tenth place in the order of occupations with the most failures, while the failures affected only 0.2 percent of the total road haulage fleet.

One could argue that the relatively low rate of failure does not necessarily disprove the alleged inherent tendency of the road transport industry to "excessive entry", since it may be interpreted as evidence of the success of the British licensing system. However, despite a very liberal licensing system (see Chapter XVIII below, section 1), the rate of bankruptcy in road haulage in the Netherlands is well below the average of all occupations: 0.16 percent of road haulage firms (1960-66, annual average) compared to 0.22 percent of all firms (1963). (Source: Centraal Bureau voor de Statistiek (Central Bureau of Statistics), Commissie Vervolprogramma, Jaarverslagen (Yearly Reports of the Transport Licensing Commission)).

Even the figures for the inter-war period, when restrictive licensing was introduced, show that the level of bankruptcy in British road haulage was lower than in many other professions, as shown by W.K. MacLeod and A.A. Walters in "A Note on Bankruptcy in Road Haulage," Journal of Industrial Economics, November 1956, pp. 63-67. Their findings are summarized in the following table:

<table>
<thead>
<tr>
<th>Percentage Bankruptcies (1921-1938)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Road Haulers</strong></td>
</tr>
<tr>
<td><strong>Period</strong></td>
</tr>
<tr>
<td>1921-24</td>
</tr>
<tr>
<td>1925-29</td>
</tr>
<tr>
<td>1930-33</td>
</tr>
<tr>
<td>1934-38</td>
</tr>
</tbody>
</table>
below subsistence and who never learn from past facts is so contrary to experience and common sense as to merit no further comment. 1/ Moreover, even if the theory were correct, it would still not argue for quantitative restrictions of entry. Improved flow of information and a requirement that the prospective carrier have a minimum of relevant knowledge (qualitative or subjective conditions of entry) should suffice to reduce misinvestments to a frictional level that is inevitable in a dynamic economy. 2/

10. The preceding would seem to warrant the provisional conclusion that ease of entry does not in itself constitute a special aspect of the road transport industry requiring special regulation. On the contrary, restrictions on entry would appear to be inefficient and unfair. When regulation is called for on other grounds, the relative ease of entry into the industry may complicate, frustrate, or hamper regulation. But these effects should be discussed only in the context of the chosen grounds for regulation.

11. In developing countries, entry barriers are particularly undesirable because road transport is one of the few trades that can school entrepreneurial talent without substantial capital investments. 3/ Moreover, in these countries the problem is usually a shortage of trucking capacity rather than a surfeit.

b. Inelasticity of Supply and Demand

12. Another special aspect of the road transport industry often advanced to support regulation is the alleged inelasticity of supply and demand. There are a great many misapprehensions on this point. To begin with, the supply of road transport services is inelastic only in the very special sense of time elasticity. Because transport services are not storable, short-run fluctuations of demand cannot be met by inventory

1/ Given restrictive entry regulation, we may indeed find an apparent reserve army of prospective carriers wanting a license. It is the inevitable result of rationing and proves nothing at all about the situation without restrictive entry control.

2/ The Royal Commission on Transportation (Canada), Chairman M.A. MacPherson, is, as far as we know, the only public body that has had the courage to state openly that dynamic competition implies some failures: "Thus, accepting the objective of efficiency and reliance upon competition to achieve it means accepting also the necessary corollary condition, which is flexibility and mutability - and the possibility of bankruptcy - in the individual firms comprising the industry." (See the Commission's report, Vol. II, page 13.)

fluctuation. 1/ Supply is, however, highly elastic at all levels of output below full or almost full utilization of capacity. Moreover, capacity is itself highly adaptable when not hampered by restrictive regulation. The relative ease of entry, the relatively low capital cost of expanding the fleet, the generally short gestation period of such investments, and the rapid depreciation of existing stock imply a high elasticity of supply, in both expansion and contraction. Moreover, the time needed to adjust capacity is relatively short, so that there is no question of exceptionally long lags.

13. Much the same holds for the alleged inelasticity of demand. There is no indication that transport demand is any more inelastic than the demand for other factors of production, except possibly in the very short run due to the nonstorability of the service (low time elasticity). In some cases, however, even time elasticity of demand may not be low, e.g., when the commodity to be transported can be stored though the transport service cannot.

14. The alleged inelasticities of supply and demand in the road transport industry reduce to the peak-load problem. 2/ It may be recalled that low time elasticities of supply and demand plus strong time variability of demand imply great fluctuations of the efficient prices over time. Pronounced short-term fluctuations of the efficient prices raise two problems: instability and imperfect pricing. We shall examine the former in subsection e; the latter we examined in Part One, where it was shown that imperfect pricing, due to the cost of perfect pricing or to deliberate stabilization, tends to lead to underinvestment in capacity. It is the one important element in the discussion of elasticities in the road transport industry. Part One also shows that the matter is relevant mainly for scheduled carriers. The policy problems will be examined in section 2 of this chapter. Thus we see that apart from imperfect pricing, there is little reason to pay special attention to the elasticities of supply and demand in the road transport industry.

c. Problems of Joint Cost

15. The literature on transport economics abounds with accounts of the special problems posed by joint costs in transport. Joint costs arise when the production of one type of service is indissolubly linked, in fixed proportions, to that of another type of service. The most famous case in transport is the so-called haul-and-backhaul problem. Clearly, joint costs are nothing exceptional in the modern industrial setting of multi-product firms. In the last analysis, all production that uses

1/ Note that this may be compensated by the mobility of vehicles among separate (regional or other) submarkets, which is exceptionally high as compared to the mobility of practically all other durable factors of production.

2/ See Chapter III, section 3.
durable factors has a form of joint costs, since current capacity will also be available for future production. The citation of joint costs as a special aspect of transport is only evidence of a preconception on the part of some politicians and transport economists that transport must be regulated and therefore must exhibit special characteristics that justify regulation.

16. The efficient prices of jointly produced products are perfectly determinate on the basis of the pricing criteria set out in the previous chapter. They are unambiguously defined by two conditions: that the price of the combined output is equal to the efficient price of the combined output; that either the separate prices are such as to clear the supply of both products, or one product's price equals its specific cost and the other's equals the efficient price of the entire combined output minus the first product's specific cost. There is no need to go into the question at this point, as it can easily be shown that joint costs do not stand in the way of a perfectly determinate solution of efficient pricing and investment, and that this solution will tend to be achieved under conditions of workable competition. 1/

17. The point can be illustrated with reference to the haul-and-backhaul case. If there is greater demand for transport going in one direction on a route than in the other, the efficient prices in the two directions will diverge, just as they diverge between peak and slack periods. In the "weak" direction the price will contain little or no marginal scarcity rents or marginal crowding charges, whereas these charges may be a substantial part of the price for a trip in the "strong" direction. The combined prices must equal the efficient price of the round trip. This case poses no special problems, except for those who mistakenly adhere to the theory that efficient prices are to be derived from cost considerations alone. Nor does the haul-and-backhaul problem imply, as is sometimes argued, that every competing firm will always spoil every other's market by treating the other's main service as his own backhaul. The efficient solution is one of stable, normal profit equilibrium with differentiated prices, which will tend to be realized under unregulated competition unless there are market imperfections, a general problem which has little to do with the specific problem of joint cost. 2/

1/ A clear statement of the theory and a comprehensive list of references is contained in Littlechild, "Marginal-cost Pricing with Joint Cost".

d. Market Imperfections

18. It is said that unregulated competition does not operate well in the case of road transport because the market suffers from various imperfections. To begin with, the market is divided into a great many imperfectly communicating submarkets based on regions and routes, types of commodities carried, specialized vehicles, personal or commercial ties between individual transport firms and particular shippers, etc. Product differentiation is certainly not a special characteristic of the road transport industry. It occurs in practically all service trades and in a great many industries. In fact, it is not likely to be particularly serious in road transport, because the isolation of the submarkets is inherently not as great as in many other sectors.

19. This conclusion depends to some extent on the organization of the market. Regulation, to the extent that it restricts firms to particular services, may completely separate submarkets. Whatever the merits of such regulation, compartmentalization of the road transport market creates inefficiencies. Even in the absence of restrictive regulation, a reasonable degree of osmosis among submarkets can exist only if users can be informed in a relatively simple manner about services and prices offered, and if carriers are likewise informed about the opportunities in different submarkets. An efficient organization of information is not impossible (e.g., via freight bureaus), but is in fact often absent or deficient. This may account for certain failures of unregulated competition, but it is not an immutable, inherent feature of the road transport industry. In any case, it does not establish a prima facie case for restrictive regulation.

20. A slightly more sophisticated version of the previous theory is based on the idea that new entrants into the road transport industry, aided by ease of entry, often begin by occupying a corner of the market protected by personal connections or advantages of location, for example. From this protected base the newcomer attempts to conquer a share of his competitors' trade by undercutting them in their traditional markets. The established firms, the theory concludes, are constantly threatened by such "dumping" practices and leapfrogging bankruptcies result.

21. The theory seems more sophisticated because it does not assume that prospective carriers make consistently wrong observations and calculations. It may well describe a process that does occur in some cases, but there is no evidence that it would conflict with economic efficiency. In fact, it is precisely this type of competitive pressure which counteracts

---

1/ See Martin T. Farris in "Transportation Regulation and Economic Efficiency," American Economic Review, May 1969. Referring to the U.S. he states that "in the motor carrier field entry control, not economies of scale, seems to enforce the oligopolistic pattern." (p. 247).
market imperfections. By eliminating pockets of unexploited profits and encroaching upon the market of competitors, the new entrants perform the double function of providing new, better, or cheaper services, and making competition in existing markets more effective. If existing firms cannot meet the increased competition and leave the market, competition has simply succeeded in enforcing maximum efficiency.

e. Instability of the Road Transport Market

22. One of the most prevalent arguments for regulation is the alleged instability of prices in the road transport market. Instability tends to be interpreted to mean relatively wide price fluctuations in the short run. There is no evidence that the road transport market is unstable in the more technical economic sense, as described by the cobweb theorem. 1/

23. We shall have to examine whether road transport prices do in fact vary exceptionally and whether this is undesirable for economic efficiency. The answers will tell us whether the alleged instability is relevant in justifying special measures. In order not to confuse different issues, we shall assume in this section that market prices correspond to the efficient prices of transport services, taking account of the limitations placed on price flexibility by the cost of perfect pricing. We shall focus on changes in demand as the cause of price variations, since changes in factor prices are not as important in practice and because it is generally agreed that they should be reflected in the price of output. 2/

24. Though many reasons are advanced for price stabilization, only economic efficiency is relevant here. This eliminates stabilization to protect the incomes of the carriers, stabilization to combat inflation, etc. 3/ What remains is stabilization to prevent misdirected decisions, especially long-term decisions, on the part of users or carriers. Such misdirected decisions could occur when unhampered fluctuations of market

---

1/ In the cobweb theorem, the instability of the market occurs essentially because the quantity supplied can be adapted to price changes only after a relatively long time lag. Conventional examples are agricultural products (the hog-corn cycle) and construction. Under these conditions, a shift in demand induces a dramatic change of price, to which suppliers react as if there were a new equilibrium. The suppliers' overreaction creates instability. It is not corrected in time by market signals because of the time lag. It is clear that this model is not at all applicable to the road transport industry.

2/ Besides, the question whether fluctuations of factor prices cause "instability" raises issues of pricing in the factor markets rather than in the road transport industry itself.

3/ See Chapter XIII.
prices hide the underlying (long-run) structure of prices. Stabilization would then serve to increase the transparency of the long-term price structure by removing some short-term price signals. There is always a compromise between short-term efficiency (full adaptation of prices to momentary market conditions) and long-term efficiency. 1/

25. It is useful to consider separately the various types of price fluctuations that occur in the market of road transport services. They can be grouped into four classes with reference to the underlying shifts of demand: systematic (hourly, daily, seasonal); long-term trend; cyclical; and short-term deviations from the systematic demand structure.

26. Systematic fluctuations of market prices seem to pose no serious problem. In some submarkets, the cost of perfect pricing may encourage the carriers to simplify the price structure, especially in the scheduled carrier market, where preannounced rates and a certain simplicity in the rate structure are a practical necessity. Since the simplification is in the commercial interest of the carriers, it does not require public regulation. But it does pose other problems, since voluntary stabilization of prices, as we have seen in Part One, leads to underinvestment in capacity. This point will be taken up in the next section.

27. Beyond voluntary simplification of the price structure, there seems to be no conceivable economic reason to prevent market prices from fully responding to systematic variations in demand. When they are systematic, price variations are predictable; it is hard to believe that either carriers or users could be misled in their long-term decisions by a regularly recurring and therefore easily observable pattern of hourly and seasonal price variations. Whenever the price structure is insufficiently transparent in this sense, a case should be made for improving the flow of information rather than for imposing rate control, which involves considerable administrative cost and leads to losses in economic efficiency.

28. The losses in economic efficiency induced by price stabilization have been discussed already on a theoretical level in Part One, Chapter V, section 1. Stabilization of prices, particularly when it means insufficient differentiation between peak- and off-peak prices, leads to a deterioration of the quality of service in the peaks and a reduction in capacity utilization in the off-peak periods, compared to the efficient situation during these periods. In the process, it impedes efficient distribution of transport over time.

29. Moreover, price stabilization is self-defeating in that it replaces variations in price by variations in the quality of service, particularly delays. And while quality of service can be maintained in spite of price stabilization by imposing physical standards (fixed times of departure, minimum handling standards, maximum crowding, etc.), these imply

1/ See Chapter VII, para. 7 and Chapter VIII, para. 6.
the use of a rationing device to eliminate the excess demand. Queuing is very inefficient in this respect, both because it tends to perpetuate the deterioration of quality (time lost in queuing and time lost by those who are not served), and because it does not assure that the most urgent demand will be satisfied before the least urgent.

30. The price elasticities of demand for transport with respect to systematic price variations can hardly be so low that the disadvantages of stabilization would be negligible. Price stabilization will in any case create underinvestment in peak-load capacity which requires additional correctional measures. From the point of view of economic efficiency it would seem that public regulation to reduce systematic variations of road transport prices has few, if any, merits to set against its considerable drawbacks. Besides, present rate-setting practices of scheduled carriers are generally characterized by very inadequate differentiation of prices, especially between peak- and off-peak periods, rather than by price fluctuations. 1/

31. The long-term trend in the demand for road transport services is of little importance to the present issue. Since the indivisibilities in the supply of vehicles are negligible, capacity can be expanded practically continuously with demand, as contrasted to the supply of roads, where indivisibilities are important and efficient road prices will rise as the volume of traffic increase. For the same reason, capacity can also be contracted in response to demand, provided demand does not fall faster than the natural rate of vehicle deterioration. The latter case is extremely unlikely, considering the strong upward trend of demand for road transport services and the rather limited economic life of road vehicles. Consequently, the long-term trend of demand will not by itself affect the price of road transport services. The expansion of demand may increase certain costs, notably the cost of road usage (road prices increase with the rate of utilization), but this is outside the domain of our present inquiry. As far as the road transport industry itself is concerned, the trend movement of demand does not establish a case for the stabilization of prices over time.

32. Cyclical variations of demand (accelerations or decelerations of the rate of expansion) are, for essentially the same reasons as long-term trends, unlikely to cause price variations lasting beyond a short period of adaptation. A downward shift of demand, even if it creates some overcapacity and a fall of prices, will soon be overtaken by the natural depreciation of vehicles. Conversely, an acceleration in the expansion of demand may produce temporarily higher prices, but because there are no important indivisibilities and the gestation period of investment in road vehicles is short, prices will soon return to their previous level. In short, road transport capacity can be adapted relatively quickly to cyclical shifts in demand, and price fluctuations tend to be short-lived.

1/ See Chapter VIII, section 2.
33. Likewise, cyclical variations of demand will not cause serious over- or underinvestment in road vehicles. The price signal is reversed soon enough to forestall an exaggerated investment reaction. Even if this reaction were to occur, price stabilization would simply lead to artificial scarcities or underutilization of capacity, which in turn would tend to produce the same reaction pattern as price signals. Consequently, cyclical variations in demand, even if they produced exaggerated investment reactions (a proposition that is not supported by empirical evidence at all), do not establish a case for stabilization of prices in the road transport industry.

34. Unpredictable short-term price fluctuations may be inconvenient to both carriers and users, since they complicate planning and management. To some extent, the market will take account of these costs of perfect pricing by means of long-term contracts or preannounced rate schedules. Remaining price fluctuations might still confuse certain carriers' or users' understanding of the underlying pattern of prices, and their mis-directed long-term decisions might create inefficiencies. But we saw in Chapter VIII that a limitation of unforeseen price fluctuations involves small economic losses relative to a failure to follow systematic variations of demand, due to the relatively low short-term elasticities of demand in response to unforeseen price variations. 1/

35. The case for some rate stabilization appears considerably stronger in this situation than for systematic price variations, but it still is not very convincing. Joint carriers tend to employ more or less fixed rates anyway. It seems highly unlikely that contract carrier users would be seriously confused by unpredictable price fluctuations, whose temporary nature is easily identified.

36. While the advantages of price stabilization are dubious in the case of contract carriers, its disadvantages are pronounced. In addition to creating considerable administrative cost of regulation in this complex market, price stabilization tends to be self-defeating because it introduces unpredictable variations of quality, in particular, delays. Moreover, we have seen in Part One, Chapters VI and VII, that it will also lead to under-investment in vehicles, which in the case of contract carriers cannot in practice be remedied by requiring carriers to hold unremunerative stand-by capacity. Finally, price stabilization to dampen the effect of unpredictable variations of demand will almost inevitably reduce the efficient differentiation of contract carrier prices in response to systematic variations of demand. Imposed rate schedules (price limits or fixed rates) in practice can be differentiated only to a limited degree and can be adapted to structural changes only after a time lag. These disadvantages of price stabilization constitute a strong case against rate regulation for contract carriers.

1/ See Chapter VIII, para. 8.
37. The general conclusion is that the alleged instability of prices is not a special aspect of the road transport industry requiring special public regulation to ensure maximum economic efficiency. In some markets, notably the joint carrier services, the market itself will somewhat stabilize prices to avoid the costs of perfect pricing. Beyond that, none of the four types of demand variation considered justifies a stabilization of prices to prevent misdirected long-term decisions by carriers or users. Wherever desirable and feasible, an improvement in the flow of information — for example, regular publication of price indices with information on seasonal and other systematic patterns — would seem to be both far less costly to administer than price regulation and more efficient in increasing the transparency of the market.

f. Summary

38. The alleged special aspects of the road transport industry are for the most part neither very special nor particularly relevant to the question of regulation. The relative ease of entry into the industry might constitute a case for regulation during a depression, but not in an expanding economy. The elasticities of demand and supply in the road transport industry are special only in that the time elasticities tend to be low because the product is not storable. This creates peak-load situations, but they do not preclude the efficient operation of competition, except to the extent that perfect pricing is impracticable or undesirable. The prevalence of joint costs in the road transport industry raises no relevant problems. Market imperfections may indeed be relatively important in road transport, but they are remedied better by improved information and transparency of the market than by regulation. The same holds for the alleged instability of road transport prices, which poses a problem only when it might lead to misdirected long-term decisions by carriers or users. The problem is of minor importance except in the case of scheduled carriers, which tend to have more or less fixed rates anyway. When needed, the appropriate remedy would again be one of improved information rather than price regulation. We conclude that, outside the case of scheduled carriers, the so-called special aspects create no obstacles to a reasonably efficient operation of unregulated competition in the road transport industry.

2. Competition and the Scheduled Carrier

39. We have shown in Part One that scheduled carriers will incur a deficit when they are forced by public service obligations to hold adequate stand-by capacity. 1/ Under these conditions, unregulated competition between scheduled and unscheduled carriers is clearly inefficient, unless scheduled carriers are somehow compensated for this loss. The major policy options available to do this can be classified as follows.

1) Restrictions imposed on competing unscheduled carriers; 2/
2) Legal monopoly and cross-subsidization;
3) Public subsidy of scheduled carriers;
4) A system of two-part (or multi-part) pricing for scheduled carrier services.

40. The first group of policies does not logically answer the problem posed. If the problem were that the nonscheduled carriers (joint and contract carriers and transport on own account) fail to pay their full social cost but scheduled carriers do, the nonscheduled carriers should be regulated, preferably through compensating levies, possibly by restrictive licensing. But the point at issue here is rather that scheduled carriers may not be able to provide sufficient service and still recover their costs, as long as they are unwilling or unable to charge users for the timing and capacity guarantees they give. The logical answer to this problem is either a public subsidy or a better charging system. To be sure, restrictions on nonscheduled carriers might correct the distortion of competitive relationships, but only at the cost of raising the total price level of transport services above its most efficient level and possibly creating other negative secondary effects on economic efficiency.

41. Similar fundamental objections can be raised against the second group of policy options. A legal monopoly will allow cross-subsidization of certain scheduled services which, although desirable for economic efficiency, generate insufficient revenue to cover the cost of investment and operation. Cross-subsidization inevitably raises prices in the markets where competition is restricted or eliminated. For purely logical reasons, this policy is as inappropriate as restricting competition by nonscheduled carriers, yet in practice these two policies are the most prevalent. We therefore examine them first even though, as a matter of economic logic, they should be discussed only in last resort.

1/ Our conclusion depended on the reasoned assumption that price elasticities of demand for road transport are lower during peak than during off-peak periods (see Chapter VIII and Chapter VI, para. 14).

2/ In the following, the term restriction will mean both quantitative restriction (licensing) and special levies.
a. **Restriction of Nonscheduled Competitors**

42. In practice, the restrictions that are imposed on nonscheduled carriers for the protection of scheduled carriers take many different forms. But almost all systems appear to be based on three devices:

1. isolating the market for joint carrier services (scheduled as well as nonscheduled);
2. restricting nonscheduled joint carriers;
3. restricting individual carriers (contract carriers, including taxis, as well as transport on own account, including private automobiles).

The first may serve to indirectly protect the scheduled carrier by fencing off the entire joint carrier market from competition by carriers who also operate in other markets. The second restricts competition by the scheduled carriers' immediate competitors, whereas the third does the same with respect to their indirect competitors, the individual carrier. We must remember that their purpose in the context of our present analysis is solely to correct the distortions of economic efficiency which are due to the inability (or incomplete ability) of scheduled carriers to charge their users for the special guarantees they give in scheduled service and standby capacity.

43. All measures to isolate the joint carrier market require at the outset an operational definition of joint carrier. Though the intricacies of definition may be problematic, the various legal systems all follow the same general approach, broadly speaking. Transport on own account (including private automobiles) is defined to exclude operations for hire and reward. Contract carriers (including taxis) are defined as carriers for hire and reward who are strictly limited in the number of consignments or passengers they can carry in one trip, or in the number of shippers they can work for. Everything else is considered joint carriage. On the basis of these definitions the joint carrier can be protected either by a ban on mixed operations (i.e., joint carrier operations and individual operations carried out by the same firm or with the same vehicles), or by a licensing system which reserves the right to supply joint carrier services to franchised carriers. 1/

44. A ban on mixed operations and the implied compartmentalization of the road transport market is, at least in theory, not consistent with the objective of economic efficiency because it prevents underutilized capacity in one market from being utilized to serve peaks or corners of

---

1/ It may be remembered that we use the term individual carriers to indicate contract carriers (including taxis) and transport on own account (including private automobiles).
the other market. In practice, however, the economic disadvantages may not be very important. Especially in passenger transportation, vehicles are already fairly specialized in one type of operation (e.g., taxis and private automobiles as contrasted to buses). Moreover, the organizational differences between the two types of operations may also tend to effectively separate the two markets, even without special legislation. By the same token, such legislation would not have much real effect. We conclude that the ban on mixed operations (joint and individual carriage by the same firm or with the same vehicle), while not entirely effective as a device to protect the joint carrier market, at least appears to cause few if any secondary distortions of economic efficiency.

45. The other means of fencing off the joint carrier market - a licensing system for joint carriers - is far more prevalent in practice. As long as its purpose is only to isolate the joint carrier market, a licensing system could be viewed in theory as a one-sided ban on mixed operations, and may seem to have a slight advantage over a two-sided ban because it allows underutilized joint carrier capacity to be used in the other parts of the road transport market.

46. The major problem in restricting nonscheduled joint carriers is to find the optimum compromise between maximizing the correction of the competitive relationships and minimizing the secondary distortions caused by such restrictions. This leads one to think in terms of a system which differentiates between those nonscheduled operations which directly compete with scheduled services and those that do not. But the borderline between directly and nondirectly competitive is very difficult to draw in theory, and a fortiori in practice, because it represents a compromise between two objectives neither of which can be easily quantified in operational terms. Should times and terminals coincide precisely before we designate two services as directly competitive? If a scheduled bus service runs once a day in the morning, should nonscheduled buses be allowed to ply the same route in the afternoon? If a scheduled bus stops at every other city block, should nonscheduled buses be allowed to pick up passengers at the intermediate blocks? These are only a few examples of the many questions the authorities will have to ask themselves, bearing in mind that the wider the interpretation of directly competitive, the greater the secondary distortions are likely to be.

47. Assuming the problem of delineation has been solved, the next question is the extent of the restrictions on the nonscheduled joint carriers. In theory, the maximum penalty should be related to the burden imposed on the scheduled carrier by holding unremunerative stand-by capacity. The imposed burden itself is difficult enough to determine, but an estimate of the distortions it imposes on specific competitive relationships will in practice be almost completely guesswork.

1/ These secondary distortions may take the form of avoidable delays (e.g., if nonscheduled services are eliminated), or of inducing users to shift location or means of transport.
48. Considering these difficulties it is no wonder that authorities have avoided any attempt to reach an optimum compromise. Instead, they have usually adopted the far simpler procedure of subjecting all non-scheduled carriers to a licensing system, and granting licenses only for services that are clearly not competitive with scheduled services. For example, nonscheduled joint carrier services in cities are almost universally prohibited, whereas chartered trips are almost always allowed. When there is a doubt, the authorities will usually tend not to grant a license, if only because the scheduled carrier holds very strong political trumps: the threat that a scheduled service will have to be discontinued if competition is allowed, forces the authorities either to grant a public subsidy or to incur the often considerable public wrath against discontinuance of a scheduled service.

49. The economic disadvantages of such highly restrictive practices are obvious. They deprive users of potentially very useful services, i.e., of filling gaps in the scheduled services at a cost that is low compared to individual transport, possibly using trucks or buses with a relatively small capacity such as minibuses. It is inefficient from an economic point of view to ban such services.

50. Furthermore, a complete lack of outside competition may leave the scheduled carrier with insufficient incentive to provide the maximum amount and quality of service consistent with economic efficiency and to carry through all possible improvements in the areas of quality and cost. Competition is a powerful force against the natural conservative tendencies that resist new technology and techniques of managements, especially important in an era of rapid technological progress. We have seen that competition among scheduled carriers, when it exists at all, is unlikely to be very effective. While methods such as close public control or public operation of scheduled carrier services can be as effective in enforcing maximum efficiency as active competition, they involve a social cost that could be avoided by utilizing the competitive mechanism.

51. In conclusion, the protection of scheduled carriers by restricting competing nonscheduled joint carriers has serious drawbacks, and a close examination of possible alternative methods is warranted. Unless these alternatives have similar disadvantages, this method would have to be rejected.

52. Restrictions imposed on individual carriers (contract carriers and transport on own account) to correct the competitive disadvantages of the scheduled carriers meet with the same kinds of problems as discussed above. But the difficulty of defining competing services and determining the adequate correction is far greater and the economic consequences of excessive restriction much more serious than in the preceding case, because the competitive relationships between scheduled and individual carriers are less direct and far more complex than those between scheduled and non-scheduled joint carriers. Individual transport services have a number of quality advantages which, depending on the requirements or preferences of the user and on the service offered by the scheduled carrier, will often
eliminate the joint carrier as a viable alternative, at least when prices reflect relative costs. In those cases, any restriction of individual services, particularly in the form of quantitative restrictions rather than specific levies, will cause appreciable economic inefficiencies. It would be well-nigh impossible to devise operational methods of determining the areas where individual and joint transport services are practical alternatives in the sense just indicated, and to determine the optimal compromise between the intended correction and the secondary distortions that are almost inevitably caused by such corrective restrictions.

53. When a policy of imposing restrictions on competing carriers takes the form of quantitative licensing, it has the additional drawback that political forces have a tendency towards excessive restriction. Existing road transport firms as well as their competitors (notably the railways) will almost always favor a strong restriction of entry and usually also a restriction of expansion by existing firms, for the simple reason that such restrictions raise their net revenue. The opposing interests — those of potential new entrants and of users — are rarely well-organized politically. 1/ From this point of view, a policy of compensating levies might be preferable, but, as with any method of corrective restrictions, the operational definition of the appropriate levies raises practically insoluble problems.

54. The conclusion stated above with respect to the policy of imposing corrective restrictions may be repeated here with even more emphasis. The disadvantages of applying such a policy to individual carriers are serious in theory and likely to be aggravated in practice by observable tendencies towards excessive restriction. Unless the alternative policies are equally imperfect from an economic point of view, the policy of imposing corrective restrictions must be rejected. As a corollary, the restrictions actually imposed on contract carriers and on transport on own account (as well as on nonscheduled joint carriers) cannot be justified on the grounds that economic efficiency requires that the competitive disadvantages of the scheduled carrier be corrected. Restrictions imposed for other reasons would have to be justified on their own merits. 2/

1/ The one area where quantitative restrictions are rarely, if ever, used in practice, is that of transport on own account (including private automobiles). Here, users' interests naturally dominate. The relative freedom of transport on own account probably explains the lack of strong organized opposition on the part of the users against restrictions on contract carriers.

2/ See Chapters XI-XIII, where we shall argue that the various reasons used to justify the restrictionist policies actually employed are inconsistent with the objective of economic efficiency and are also difficult to reconcile with other objectives.
b. Legal Monopoly and Cross-Subsidization

55. A scheduled carrier may meet competition, not only from unscheduled services, but also from other scheduled carriers operating in the same market. The revenue position of a scheduled carrier may be improved by restricting such competition. This would enable the carrier to render certain services and to hold stand-by capacity which, although desirable for economic efficiency, generates insufficient revenue to cover their costs. By creating a legal monopoly, the authorities enable the franchised carrier to earn monopoly profits on some operations which can be used to cross-subsidize nonpaying but desirable services, including the services of stand-by capacity. 1/ In practice, the monopoly position of the franchised carrier is almost always further strengthened by prohibiting unscheduled joint carriers to operate on routes that are subject to franchise. This has already been considered in the preceding section.

56. The creation of a legal monopoly must be supplemented with certain measures to ensure that the subsidized services are in fact rendered, and to prevent the monopolistic position from being abused. This can be achieved either by running the legal monopoly as a public service, or by granting it to a private carrier on a franchise basis, which imposes obligations regarding routes served, time schedules, rates, and fares. Considering the extensive public control required in the latter case, there would seem to be little difference between the two systems. The franchise arrangement may, however, present certain advantages if it stimulates efficiency by requiring a periodic review of the franchise. Conceivably each term of the franchise could be granted to the applicant who presents the most favorable offer, subject to sufficient guarantees of continuity and dependability. Moreover, a private carrier will tend to have more incentive to find and operate useful secondary services.

57. Whatever system is adopted, the basic idea is to create a monopoly which absorbs the deficits on certain services by cross-subsidizing with surpluses from other services. The creation of a legal monopoly, particularly if it covers all joint carrier services, scheduled and nonscheduled, is likely to have adverse effects on economic efficiency. We have discussed this matter at some length in the preceding subsection. Cross-subsidization is a fundamentally inappropriate solution to the problem we are dealing with. It attempts to solve one problem by creating another. The solution comes down to a system of levies on some scheduled carrier services in order to subsidize other such services. From this point of view it would be more logical and more efficient to grant outright public subsidies, which do not require the creation of monopoly positions and, since the burden of the corresponding general taxes is more widely spread, which will give

1/ Obviously, the term monopoly must be taken with a grain of salt. There are always indirect competitors left: alternative routes or times, alternative types of road transport (individual carriers), alternative means of transportation, etc.
rise to smaller economic distortions. 1/ We conclude that the system of legal monopolies and cross-subsidization has a number of serious economic disadvantages, both in absolute terms and as compared to a system of public subsidies. We therefore turn now to an examination of the latter alternative.

c. Public Subsidies

58. We have noted that a public subsidy is logically a far more appropriate method of compensating the scheduled carriers for the imposed burden they carry than the policy of imposing restrictions on their competitors, or that of creating a legal monopoly and forcing it to cross-subsidize nonpaying services. If carried out correctly, a public subsidy which just compensates the scheduled carriers for their imposed burden would avoid the disadvantages of such restrictions, which inevitably cause secondary distortions by raising the prices of transport services above their most efficient level. Public subsidies may cause secondary distortions of a different kind, as a result of the extra taxes that will have to be imposed to finance the subsidy. But the burden of taxation is far more widely spread than restrictions on direct competitors. The distortions of extra taxation tend to be marginal and will therefore have a relatively small aggregate effect on welfare.

59. In practice, the appropriate amount of subsidy is undoubtedly difficult to determine. But at least the basic criterion lends itself much more readily to operational definition than the corrective restriction to be imposed on competitors. The appropriate subsidy should be determined with reference to the burden carried by the scheduled carrier. The cost involved could in turn be estimated on the basis of such data as the rate of capacity utilization achieved by scheduled carriers compared to those of other carriers. This leaves a margin of error, possibly an appreciable one, and hence involves the risk that a subsidy might cover up inefficiencies in management rather than compensate for inherent competitive disadvantages. However, more or less objective criteria of efficiency can be applied, and procedures could be devised to reduce these risks (e.g., a periodic open bidding in which the right to operate certain guaranteed scheduled services for a future period is granted to the applicant who demands the lowest subsidy). Moreover, there is always a

1/ This will be true provided prices are efficient, so that small deviations produce only small surplus losses, or indeed no losses at all, when all prices are increased to the same extent.
countervailing pressure from the treasury to reduce the amount of subsidy. 1/

60. A more fundamental problem, which also underlies the previous two policy options, concerns the range of the scheduled services (routes, frequencies, etc.) and the extent of the guarantees (especially stand-by capacity) which should be sustained by public measures. In practice, these matters are now decided almost completely on a political level, i.e., as a politically determined compromise between conflicting interests. It is clear that such a political compromise will but rarely achieve results that are consistent with, or at least not too far removed from, some realistic standard of economic efficiency. Presumably, the policy of compensating subsidies will show a better score on this point than the policy of corrective restrictions. As we have argued above, the latter policy shows a clear bias in favor of excessive protection. This bias is not shown by a policy of compensating subsidies, since the local interests pushing for extended scheduled services are opposed by the taxpayers, represented by the taxing authority.

61. The political mechanism for specifying the amount and distribution of subsidies is in any case highly imperfect. Political forces do not represent the social costs and benefits of the project because their power is based on overall political influence and tie-ups with entirely irrelevant issues, and because votes are equal even if involvement differs widely. When local and regional services are in question, a policy of local or regional subsidies would seem clearly superior to one of subsidies by the central government. The former policy allows a much more direct comparison of benefits and costs, since the beneficiaries more nearly coincide with the taxpayers than is the case with subsidies by the central government. The next logical step is to look for methods of raising the required funds entirely by charges on the users of the scheduled services. Since these charges can be avoided by not employing the service, they would ideally reflect the benefits which the users derive from the service. This approach will be further pursued in the following subsection.

1/ A procedure along these lines is being worked out by the European Economic Community. Regulation number 1191/69 of the Council of June 26, 1969 (Official Gazette No. L 156 of June 28, 1969) obliges member-states to compensate carriers for imposed public service obligations. The procedure is set in motion by an application on the part of the carrier for authorization to abandon the service involved, or to raise the controlled price. If the authorities decide to decline the request, they must compensate the carrier, according to complex calculations the principles of which have not yet been fully worked out. Before they grant the compensation, however, the state must investigate alternative possibilities of ensuring adequate provision of the services involved, such as replacing a railway branch line by bus service.
62. In conclusion, the policy of granting a public subsidy to the scheduled carriers appears to be clearly superior, on the theoretical as well as the practical level, to a policy of imposing corrective restrictions on the scheduled carriers' competitors or of creating a legal monopoly. The fundamental problem then becomes the criteria and the procedure for determining which scheduled services are to be maintained by subsidy. While local or regional subsidies would be preferable to subsidies by the central government, even they will not ensure that decisions are based on a confrontation of correctly evaluated social costs and benefits. This drawback of the subsidy system leads to a consideration of the last option, two-part pricing.

d. Two-Part Pricing

63. The basic reason for protecting scheduled carriers is their inability to differentiate prices sufficiently. Certain services tend to be undervalued compared to the efficient price, and the capacity involved may yield insufficient revenue to cover the total cost of operation and investment. In the absence of public subsidies or cross-subsidization enforced on the basis of an exclusive franchise, the investment will not be undertaken and the services will not be rendered. We emphasize once more that we are still considering these questions in the framework of economic efficiency as the sole objective of policy. In other words, public service obligations imposed on scheduled carriers for purposes other than economic efficiency are disregarded until a later stage of the analysis. The sole criterion of whether certain services are to be performed or a certain reserve capacity held is the comparison of the social cost and the money-value which the users attach to the services or to the availability of standby capacity.

64. One of the basic problems we encountered when we examined the preceding policy options was that the value users attach to service had to be estimated indirectly. The indirect evaluation of benefits, a political process sometimes aided by market research, may easily be influenced by pressure from special interest groups (users and other local interests that benefit from the protected services, versus taxpayers, users, and suppliers of restricted competitive services, etc.). In the case of public subsidies, budgetary limitations create pressure to underestimate.

65. We are led to look for a solution which would charge the users directly for the deficits on the peak capacity, in addition to the regular per-unit prices for services rendered. The additional payments could not be a surcharge on regular prices because the carriers' problem, after all, is their inability to charge correct efficient prices, and because a general surcharge on all services would raise the prices of some services above their efficient level and distort the carrier's competitive position. One would have to resort to a two-part (or multi-part) pricing system, in which the additional payments take the form of a fixed charge on the user, independent of the amount or the timing of the specific services rendered. The system is sometimes, quite appropriately, referred to as the club.
principle: every potential user would have to pay a fixed sum, comparable to a membership fee, to obtain scheduled services at the normal rates. 1/

This system has the advantage that it is, to some extent, self-regulating. Services will be performed and capacity maintained only if the users are expected to pay for them out of the combined revenue of the fixed-sum fees and the prices paid per unit of service. We mention in passing another advantage not strictly relevant here: the system is neutral with respect to the distribution of income because those who benefit from the scheduled services are made to pay for them.

66. There are a great many problems and possible disadvantages. One of the basic problems is the determination of the fixed charge. An undifferentiated charge would impose a relatively heavy burden on the occasional user and may therefore discourage him from joining the club at all. The same holds for other marginal users. If they are willing to pay the per-unit price of the service but not the fixed charge, they are effectively excluded from the scheduled carrier market. This represents an economic distortion, except when the actual per-unit price is less than the efficient price, i.e., when marginal users ride the scheduled carrier at times of unforeseen peak demand. Since unforeseen peaks are likely to be caused largely by occasional users, the discriminatory effects of the fixed charge might not be a bad thing. 2/

But unfortunately, occasional users may utilize scheduled services at other times. Moreover, the fixed charge may also exclude a regular but marginal user who does not utilize the service at times of unforeseen peak demand. Consequently, the problem remains that an undifferentiated fixed charge will distort some choices and, where it acts as a barrier, will reduce the scheduled carrier's revenue.

67. This effect can be mitigated by differentiating the fixed charge. Most of the systems of differentiation, whether practiced or suggested, apply to passenger transportation, where the problem primarily occurs. Accordingly, we limit the following comments to passenger services. In practice, the most prevalent type of differentiation is the quantity discount: season tickets, commuter tickets, etc. To the extent that the fares are at least equal to the efficient price, and the discounts are greater than the saving of administrative cost, the system can be regarded as one of differentiated fixed-sum charges. For occasional rides, the fixed-sum

---


2/ It may still be a suboptimal situation in terms of economic efficiency, since the value of the service to the excluded occasional user may be higher than the value of the service to some regular users.
charge is equal to the difference between the price of a single ticket and the efficient price, while for more regular users the fixed-sum charge would be lower per unit of service.

68. The major disadvantage of this system is that season tickets, commuter tickets, etc. are used primarily at peak hours, and thus their use artificially encourages peak travel and penalizes off-peak travel. For peak services it is not even a true fixed-sum charging system, since the fares are probably below the efficient price of these services. Any efficient system would have to be based on the efficient prices, and hence would have to differentiate basic fares at least between peak rates and off-peak rates. The fixed-sum charges would have to be superimposed on these basic rates, so that the actual price paid per unit of service is never lower than the basic (peak or off-peak) rate. Conversely, the fixed-sum charge should not discriminate against off-peak services. One could even make a case for eliminating the club membership fee for off-peak rides, as the scheduled carrier's deficit stems primarily from the need to hold standby capacity for unforeseen peaks.

69. We shall not go into the many possible systems of fares and differentiated fixed charges. We simply conclude that the relative merits of this policy compared to public subsidies depend on the advantages of reducing the political element in scheduled carrier operations and the disadvantages of providing less than the optimum capacity when the carrier cannot raise enough revenue to cover the cost of the optimum capacity, even with a differentiated fixed charge. 1/

e. Summary

70. Two major conclusions stand out. One is that the market of scheduled services is unlikely to satisfy the conditions of economic efficiency without public regulation of schedules, routes, and rates. Public regulation or supervision of schedules and routes may be needed to obtain efficient timing and a coherent total network of scheduled services. Some control over prices may be required to compensate for the generally very imperfect competition among scheduled carriers, although the case for price regulation is substantially weakened whenever competition from unregulated carriers (joint, contract, and private) provides sufficiently close transport alternatives for all groups of users.

71. The second conclusion is that scheduled carriers tend to run a deficit when they charge efficient prices and provide all the peak- and

---

1/ It should be recalled that we have assumed in this chapter that all competing means of transport do cover their social costs out of revenue. If this is not the case - e.g., if private automobiles do not pay the social cost of travel in the cities - there would be a different argument for public subsidies which we shall consider in Chapter XII.
standby capacity that is justified by economic efficiency. Even if we disregard public service obligations derived from objectives other than economic efficiency, scheduled carriers will generally not be able to cover all their costs out of revenue at the efficient levels of output, prices, and investment.

72. We have argued that special measures to correct this deficit should not consist in protection of the scheduled carriers by means of restrictions imposed on their competitors. We have also rejected the related policy of creating a legal monopoly and covering the deficit by means of internal cross-subsidization. The two options that remain are public subsidization and two-part pricing by the carrier. The latter option is theoretically superior since it provides a market-determined measure of the limits to which users are willing to support the scheduled services.

73. The practical possibilities and limitations of two-part pricing require extensive research. There is no reason to reject the idea a priori, as is so often done. The difficulties involved are certainly not negligible, notably the problems associated with an appropriate differentiation of the fixed charge, but the possibilities of two-part pricing do not seem to have been sufficiently investigated. There is a need for an extensive study of the theoretical basis and the practical feasibility of two-part pricing methods for scheduled carriers both of passengers and of freight, long-distance as well as metropolitan.

74. If and to the extent that two-part pricing turns out to be impractical, public subsidies remain the best possible alternative. It has been argued that, whenever possible, funds should be obtained from local taxes and appropriated as openly as possible, preferably by special vote, in order to prevent subsidization of inefficient operation or excessive services. Open bidding for the franchise might be another way to avoid the possible disadvantages of public subsidies.

75. These comments also apply to the case of the "thin" market, in which demand for transport is so low that one or very few firms can serve the entire market. Regulation may be needed on the one hand to prevent monopolistic practices and on the other hand to ensure that all services are supplied which satisfy the conditions of economic efficiency. In the case of a "thin" market, efficient output, pricing, and investment may involve a financial deficit which raises the problems we have just summarized with respect to the scheduled carrier. We repeat, however, that the case is not very important in the road transport industry, since the indivisible units of supply are relatively small and economies of scale

---

1/ If restrictions are justified on other grounds, such as inadequate road-pricing, and if all other policy options are impracticable or politically unfeasible, the problems of second-best policies appear. These will be discussed in Part Three.
are not very substantial.\footnote{The one really important case in which competition fails to adequately regulate the market is that of the scheduled carriers.}

3. Competition and the Contract Carrier

76. We have seen that the two major reasons unregulated competition in the road transport industry may not be fully efficient - imperfect pricing and indivisibilities - arise in particular with regard to the scheduled carrier. We have attempted to show in the preceding section that restriction of competing carriers is an inefficient and inferior means of solving the difficulties of the scheduled carrier. The presumption that unregulated competition is consistent with economic efficiency still stands for all other parts of the road transport industry, in particular for the contract carrier (including taxis), which is the subject of this section.

77. The efficiency of unregulated competition in the contract carrier market has been disclaimed for a number of reasons which largely correspond to the alleged special aspects of the road transport industry. We shall apply the results of our earlier discussion of the special aspects to the contract carrier market. The points to be discussed are the overinvestment or excessive competition thesis, the inadequate pricing thesis, and the inadequate size of firms thesis. The last subsection before the summary will contain a few comments on the special problems of terminal facilities, including taxi stands.

a. Overinvestment or Excessive Competition

78. The alleged inherent tendency in the road transport industry towards excessive capacity has been discussed at some length in section 1. We have shown that the case rests on very shaky grounds, since it implies a persistent misjudgment of market conditions by existing or potential carriers. We have also noted that the short economic life of vehicles and the short gestation period of investment in vehicles imply that capacity can be adjusted rather rapidly to downward as well as upward shifts in demand.

79. Our general conclusions were the following. First, there might well be a good case for improving information and possibly for imposing certain minimum standards of professional knowledge, ability, and perhaps financial involvement on prospective entrants. These subjective conditions of entry should be no more exacting than is strictly necessary in order to ensure a reasonably safe and rational operation of a road transport firm; they might conceivably have to be differentiated for long-distance freight operations, local delivery services, and taxis. Second, the overinvestment thesis does not establish any case for restrictions on entry or on the expansion of capacity. Moreover, such restrictions

\footnote{See Chapter V, section 4.}
are unfair to the barred prospective entrants and may create a danger, very apparent in practice, of abuse to protect vested interests (existing road carriers and competing modes of transport). These conclusions apply both to freight operations and to taxis.

80. In this light, any facts that could be adduced will not change the picture much. In unprotected markets, the earnings of road carriers do tend to be low, but it is hard to see how this could be interpreted as more than evidence of the nonpecuniary advantages that compensate the road hauler or taxi operator for low money income. Nor are the facts on bankruptcies very illuminating. Aside from the great depression, which clearly does not provide much relevant information about market operations under normal conditions, the figures do not show that, without restrictive regulation, the road transport industry is subject to a dramatically high rate of bankruptcies. Even if they did it would only prove that dynamic competition in the road transport market tends to weed out inefficient firms. 1/

81. The data on excess capacity must be interpreted very carefully, as the nonstorability of transport services and the frequent inequality of demand in opposite directions of travel necessarily create underutilization of capacity during off-peak periods and in the back-haul direction. This type of underutilization does not imply excess capacity. There is excess capacity in a meaningful economic sense only if the total earnings of the carrier, over a period covering all relevant fluctuations, are such that he would not continue to operate the same capacity if market conditions during this period were to persist. This in effect brings us full circle, back to the unlikely argument of persistent ignorance.

b. Inadequate Pricing

82. Inadequate pricing can be interpreted in two ways. It can be taken to mean that prices are sometimes below the efficient prices of output, at the existing level of capacity, or that the discounted net total revenues of the carrier, at the prices considered, are below the level that was expected at the time of the investment in capacity. The first interpretation is inconsistent with the whole concept of an unregulated competitive market. On the one hand, if we disregard the unlikely case of commercial behavior that is manifestly self-destructive, no carrier will allow prices to fall below his short-run marginal cost of operation, since it is clearly better not to offer the services at all at that price. There is surely no evidence that prices ever fall below that level. On the other hand, demand forces will tend to push the price above marginal

1/ See footnote 1/ to para. 9 above for references to empirical studies and data on bankruptcies in Britain and the Netherlands.
cost until demand equals available capacity. 1/ Price rigidities may keep prices below the efficient peak-load level, but this will be compensated by insufficient downward flexibility so that on average prices will not be inadequate. The second interpretation of inadequate pricing is really the overinvestment thesis. The effects of the two phenomena are defined in the same terms, namely inadequate net earnings. Moreover, in an unregulated competitive market the inadequate earnings of the carrier can only result from excessive investment and not from an autonomous deficient pricing policy of the carriers. Consequently, we come back to the case of excessive investment, which we have already rejected.

c. Inadequate Size of Firms

83. On general grounds it would seem unlikely that there are important unexploited economies of scale in the motor carrier industry. If such economies did exist, a large firm would be able to systematically undercut its less efficient small competitors. Since we do observe the continued existence of small firms, there is a strong presumption that any economies of scale are insignificant or are largely offset by other diseconomies of scale. On these grounds, there would seem to be no logical case for regulation to increase the size of firms. As we have seen, the available facts on economies of scale, if not completely conclusive, argue very strongly against their being at all significant in the road transport industry, with the possible exception of scheduled carriers. 2/

d. Terminal Facilities

84. Terminal facilities, including taxi stands, are special in two respects which may support some public regulation. In the first place, terminals are probably subject to significant economies of scale, in the sense that larger units carry relatively lower investment and possibly operating costs than smaller units. This holds especially for freight terminals which serve as regional markets for freight transport services. There are obvious advantages in concentrating at a central location freight forwarding, long-distance transshipment, and transshipment for local distribution and from local pick-up. In order to preserve competition in the road transport industry, the public authorities would have to prevent vertical integration of transport operations and terminal operations. They may also have to regulate terminal operations to prevent monopolistic practices (excessive charges, discrimination between transport firms, etc.). Moreover, economic theory shows that, if terminal facilities are indeed subject to economies of scale, efficient operation and investment

1/ See Chapters III and IV. If we take account of quality deterioration, profit maximization by the carrier will raise prices to the efficient level.

2/ See Chapter V, section 3, especially paras. 15 and 16, and Chapter VIII, section 3.
will lead to a financial deficit. Whether the economies of scale are sufficiently important to warrant special measures (two-part pricing, public subsidies, etc.) rather than a simple pro-rata increase of the efficient prices is a question of fact and a matter of policy. Since the issue does not directly concern our subject, we shall not go into it.

85. In the second place, the location of a terminal may well be of legitimate concern to the public authorities, especially when it is a focal point for large traffic streams. This holds in different degrees for both freight terminals and taxi stands. Public regulation of terminals may therefore have to cover location. This adds no new dimension to the regulation of freight terminals, which in any case tend to be located at points of low traffic congestion and outside metropolitan areas. In the case of taxi stands, however, the control of location can be applied to effectively restrict entry or capacity. One might attempt to justify such a policy on the grounds that road space in metropolitan areas is scarce, and must therefore be rationed. The reasoning is spurious, not only because it depends on the assumption of inadequate road pricing, which we have assumed not to obtain, but also because it does not establish a case for discrimination against taxis. Economic efficiency requires that the scarce road space in metropolitan areas be distributed not by restrictive licensing, but by appropriate, nondiscriminatory charges for its use, both for driving and for parking. We shall come back to this question in Chapter XII.

e. Summary

86. There appear to be no valid reasons for economic regulation of contract carriers (including taxis) beyond the imposition of certain qualitative conditions of entry, which ensure reasonable standards of professional knowledge and ability. In particular, the theory that the contract carrier market is subject to excessive entry, excessive investment, and excessive competition lacks all logical and empirical foundation. The same holds for the internally inconsistent and equally unsubstantiated thesis that competition somehow prevents firms from reaching optimum size. Unregulated competition is workable and will tend to ensure economic efficiency in the contract carrier market. We have already shown that the protection of scheduled carriers should not involve restrictions imposed on their competitors. The operation of the competitive market can be improved by providing adequate information on market data, and competition may have to be protected by antitrust policies, including the prohibition of vertical integration of transport firms and operators of terminal facilities. But these policies do not involve restrictive regulation of the road transport industry.

4. Competition and the Private Carrier

a. Regulation of the Private Carrier

87. The private carrier market includes both transport on own account and private automobiles. Since there is no competition among private carriers, regulation can only be concerned with the competitive
relationships between private carriers and other carriers. Indeed, the case for regulation of private transportation is usually made to rest on an alleged private car bias and a corresponding bias of firms in favor of transport on own account. The bias is said to derive from four possible sources, namely:

1. ignorance on the part of the private carrier,
2. inadequate road pricing or other external effects, such as air pollution,
3. the proposition that private carriers unfairly shift the burden of peak demand to other forms of transport,
4. differences in pricing policies.

88. Ignorance of individual operators is always a highly questionable basis for regulation. Especially in transport, where individual requirements are very diverse, it is far more reasonable to presume that the individual is best placed to choose the means of transport best suited to his particular needs. Cost calculations on a ton-mile or passenger-mile basis are completely meaningless as a standard of comparative economic efficiency. Private transportation has quality advantages which are evaluated differently by different firms and individuals, depending on their requirements and preferences. Transport on own account, for example, may allow combined operations of all sorts, such as delivery, on-the-spot servicing, billing, and advertising. Private automobiles provide speed, convenience, and comfort. In conclusion, it is hard to see how the supposed ignorance of individual operators could argue for anything but an improved flow of information about relative costs and advantages of transport alternatives. 1/

89. Discussion of inadequate road pricing and other external effects is not in order in this chapter. These two problems will be taken up separately in Chapter XII, where we shall argue that restrictive regulation is generally an inferior corrective policy instrument.

90. It is said that private carriers tend to shift the burden of peak demand to other forms of transport. This may well be the case in many instances, but it will create a problem for these other forms of transport and will distort economic efficiency only if the other carriers are not charging efficient peak-load prices. As we have seen, the practical possibilities of perfect pricing, particularly in the sense of full adaptation of prices to unforeseen shifts in demand, may well be limited in the case of the scheduled carriers. But we have also shown that the

---

1/ For a similar conclusion, see Great Britain, Ministry of Transport, Carriers' Licensing, Chapter 11 and Bayliss, European Transport, pp. 30-32 and 115-120.
appropriate solution to this problem is not to impose restrictions on competing carriers (in this case on private transportation), but to improve pricing techniques, possibly by introducing some kind of two-part pricing scheme, or, failing that, to subsidize the scheduled carriers.

91. If differences in pricing policies are interpreted as differences caused by inefficient pricing practices of other forms of transport, there is no case for regulation of private transportation. As we have said, imperfect pricing by one type of carrier does not justify restrictive regulation of competing carriers, except possibly as a second- or third-best solution. 1/ A more sophisticated interpretation of differences in pricing policies is based on the observation that the use of private transportation will be costed by the firm or the individual concerned at its marginal private cost but will exclude any marginal scarcity rents or crowding charges. 2/ Since these rents and charges are included in the efficient prices of other transport services whenever capacity is not underutilized, there would be a bias in favor of private transportation. 3/

92. The error in this argument is readily apparent when we consider the criteria of investment in private vehicles. The user will compare the discounted total cost of obtaining and running the private vehicle, and the discounted value of the services to be rendered by it. Private vehicles will be obtained as long as the discounted net benefits are positive and exceed the corresponding net benefits obtainable from alternative forms of transportation. The private optimization of investment in private vehicles will usually provide insufficient capacity to satisfy all the user's transport needs at all times. When private capacity is insufficient, the implicit supply function of private transportation becomes completely inelastic. The implied price of private transportation is then no longer equal to marginal cost, but to marginal cost plus a scarcity rent which limits demand to the available capacity. This leads to the conclusion that the alleged bias in favor of private transportation, based on apparent but in fact nonexistent differences in pricing policies, does not justify regulation of private transport.

b. Restriction to Own-Account Operations

93. One final question remains: should private vehicles be allowed to perform other than private transport services? In most countries, this is prohibited for a variety of reasons, mainly because it would supposedly threaten the stability of the other markets. In discussing the question,

1/ Cf. section 2-a above.

2/ See Chapter III.

we shall disregard the noneconomic forms of regulation (technical requirements of vehicles, professional ability of vehicle operators, and other safety requirements) which in some cases may effectively, but justifiably, bar private vehicle operators from the other markets. For the same reason, we shall also disregard the qualitative conditions of entry imposed on all operators in those markets. The issue here is only the restriction of private carriers to own account operations.

94. To begin with, such compartmentalization of submarkets is inefficient. It implies that vehicles which happen to be underutilized in one submarket cannot be employed in other submarkets where demand may be high relative to available capacity. Pooling of reserves always requires less total capacity and hence produces a saving of investment, unless fluctuations happen to be perfectly correlated, which is a very unlikely situation.

95. But what of the destabilizing effect? An appeal to stability is always slightly suspicious, since it all too often serves as a euphemism for protection of vested interests. "Pirating" by private vehicle operations - another such emotive term - may be undesirable to the victims, but there is no conceivable economic reason why capacity should be forced to remain idle just to please the professional carriers. True, such "pirating" will reduce their earnings and hence reduce the volume of capacity that can be profitably employed. But that is precisely its economic merit from a national point of view: it reduces the total vehicle capacity needed to perform a given volume of road transport services. As to the alleged destabilizing effect, "pirating" will tend to dampen the peaks, since it can only siphon off some peak demand, never increase it. On the other hand, it is unlikely to worsen underutilization during slack periods, since market prices during slack periods are not conducive to the entry of private operators. We conclude that economic efficiency does not support and is in fact inconsistent with the restriction of private carriers to own-account operations.

5. Summary

96. We shall recapitulate only the principal conclusions of this chapter, since the subjects treated have already been summarized separately. A brief review of the so-called special aspects of road transport has added no new elements to the theoretical analysis of Part One. The only major market in which regulation may be required to ensure economic efficiency is that of scheduled services. We have shown that scheduled carriers may have to be subjected to regulation of schedules and possibly of rates. Since efficient pricing, output, and investment policies will generally imply a financial deficit for scheduled carriers, they will have to use special pricing techniques (two-part pricing) or, if this is not feasible, they may have to be publicly subsidized. Protecting scheduled carriers by restricting their competitors has been shown to be inconsistent with economic efficiency. Outside the area of scheduled services, competition is in general perfectly capable of ensuring efficient pricing, output, and investment policies, provided that sufficient information is made
available to all parties. Competition may have to be protected by antitrust policies, and certain reasonable minimum standards of economic competence (subjective conditions of entry) may have to be imposed on prospective entrants. But beyond these measures, which are not properly economic regulation in the sense of price control or control over capacity or entry, the market tends to operate efficiently without public regulation.
XI. REGULATION TO ENSURE EFFICIENCY IN THE TRANSPORT INDUSTRY

1. This chapter deals with regulation of the road industry as a means of promoting the economic efficiency of the transport industry as a whole. In order to isolate the issues, we shall assume:

   (1) that the organization of the road transport industry itself is internally efficient in the sense described in Part One; and

   (2) that all prices outside of the transport industry are also efficient.

What remains to be investigated is the relationship between the different modes of transport, and its possible implications for the organization of the road transport industry. The problem is usually presented under the heading of "transport coordination", as in section 1 below.

2. When applied to road transport, the problem reduces in effect to the rail-road issue, since the economic relationship between road transport and modes other than rail are of negligible importance for the problem in hand. There is no doubt that restrictive regulation of the road transport industry has in practice been inspired to a large extent by the desire to protect the railways. Within the confines of this paper, we cannot handle the entire, complex railroad problem, but we can very briefly examine some of the major points which are directly relevant to our purpose (see section 2).

3. Assuming that railway protection can be justified, we would wish to investigate whether restrictive regulation of road transport is an efficient means of correcting the competitive disadvantage of the railways, compared to direct subsidies. As in the other, similar cases we have discussed already, economic analysis leads to the answer that protection by means of restriction of competitors is in general a relatively inefficient policy instrument. 1/ The authorities may however decide to require budgetary equilibrium of the railways, without compensating them sufficiently for their competitive disadvantage. Assuming that effective two-part pricing is impracticable for railways, 2/ the possibility of restrictive regulation imposed on road transport reappears. So far, we have not explicitly considered such second-best problems, primarily because it seemed more sensible to concentrate on first-best policies wherever they

1/ See Chapter X, section 2.

2/ The assumption may not be justified at all, but we cannot in this study go into the practical possibilities of two-part pricing of rail services. Suffice it to note that two-part pricing is at present not systematically put into practice by railways anywhere.
are not clearly impracticable or socially unacceptable. Governments may, however, have valid reasons to look for second-best solutions in this case, the most obvious one being the difficulties of obtaining public funds, a problem that is especially acute in developing countries. These issues will be briefly examined in section 3.

1. Transport Coordination

4. Transport coordination is a somewhat misleading concept. To many people it appears to connote a comprehensive public transport policy, aimed at minimizing the total cost of transport to society by enforcing a distribution of traffic among the different modes which ensures that each ton kilometer and passenger kilometer is produced at the lowest money cost. This naive goal is manifestly absurd. The objective of policy should be to maximize transport's contribution to social welfare, which implies that the value of the services rendered is as essential as their cost. Since the different modes of transport offer services that differ in a great many ways besides cost (attributes that are usually lumped together as quality of service), it is clearly ridiculous to look only at cost in deciding which mode should carry what traffic. The excess of value over cost, with the former largely dependent on quality, determines each service's contribution to welfare. Quality of transport (speed, reliability, comfort, and so forth) is valued differently by different users, for different purposes, and under different circumstances. We have argued before that only the user, aided by as much objective information as can be made available, can determine the type of transport that is at any time best suited to his particular needs. Freedom of choice by the user of transport is therefore one of the essential elements of an efficient transport policy. 1/

5. Freedom of choice by the user implies that the distribution of traffic among competing modes must be determined by the price mechanism. As long as we disregard external effects and objectives other than efficiency in transport, these prices should be based on the principles set out in Part One. To the extent that unregulated competition produces efficient prices and efficient investment, the most efficient division of transport will be brought about by the market. Transport coordination, in the sense of an active public policy other than the protection of competition, would be required only where competition fails to meet that standard. Having shown in Part One and Chapter X that, outside the area of scheduled carriers, unregulated competition generally tends to bring about economic efficiency in the road transport industry, we now consider whether an efficient division of transport between road and rail might not require regulation of the road transport industry.

6. Since unregulated competition tends to ensure internal efficiency in road transport, the reason for such regulation would clearly have to

1/ See Chapter I, section 3.
come from the railways. The analysis and the conclusions of Chapter X do not apply to the railways without important modifications, since the rail industry is not internally competitive. 1/ In particular, unregulated competition need not produce an efficient pricing and investment pattern. Even with regulation, railway policy may significantly deviate from the conditions of economic efficiency. The next section contains some comments on this point.

2. The Railroad Problem

7. As we have indicated, we will here confine ourselves to a brief examination of the two major reasons why public policy might accept or indeed produce certain deviations from efficient railway pricing and investment. 2/

(1) Budgetary equilibrium may be imposed on the railways, without adequate compensation for the deficit that the railways would run if they followed an efficient pricing and investment policy. Assuming effective two-part pricing to be impracticable, the deficit is due to the scheduled carrier obligations and to the fact that the railways are presumably subject to significant increasing returns to scale.

(2) A differential tariff and similar obligations (nonclosure of branch lines, regional and temporal equality of passenger rates in the face of substantial differences in the efficient prices, etc.) may be imposed to protect certain activities (agriculture), certain regions, or certain groups (special passenger rates for the disabled), or to promote certain other national interests (national harbors, exports, etc.).

We will consider whether these policies are acceptable and, in section 3, whether they warrant restrictive regulation of road transport.

a. Budgetary Equilibrium

8. It is very likely that the railways, with no effective two-part pricing, will run a deficit if they follow an efficient pricing and invest-

1/ Even where some internal competition exists, as in the U.S., the market is still only oligopolistic.

2/ Since we have assumed road transport to be fully efficient, we need not consider rail regulation designed to correct distortions of railroad competition due to, say, inadequate road pricing.
ment policy. 1/ The railways are in part scheduled carriers, especially in passenger transport. We have shown in Part One that, under certain realistic assumptions (imperfect pricing and a negative correlation between price elasticity of demand and utilization of capacity), the scheduled carrier will not be self-supporting at an efficient level of stand-by capacity. 2/ Also, although definitive data are not available on this very complex issue, it seems justified on general grounds to state that the railways show all three types of increasing returns we have distinguished. 3/ There are almost certain to be important economies of scale in providing track and other elements of infrastructure (signalling, electrification, marshalling yards, stations and freight terminals, etc.). The quality of service (mainly frequency) tends to improve as the scale of railway operations is increased. Finally, there are important indivisibilities in both railway operations and railway infrastructure which are surely relevant at a low level of traffic and possibly at higher levels. It seems very likely that the railways are subject to significant increasing returns to scale, and it is a well-known tenet of economic theory that efficient pricing and investment under increasing returns implies a deficit. 4/

9. Under these conditions, why should the public authorities impose budgetary equilibrium on the railways rather than pay for the deficit by a subsidy from public funds? Without going into the underlying issues in any depth, we present the three reasons most commonly advanced. One is that public funds may be limited and other demands more important than optimum rail output and investment. Secondly, insistence on budgetary equilibrium may be considered necessary to enforce management efficiency in the widest sense, since subsidies may in practice serve to cover up management inefficiencies. Thirdly, subsidies may be judged inequitable in that they shift the burden of the deficit from the users of rail services to the taxpayers at large.

10. The budgetary motive has strong practical appeal but rather weak theoretical foundations. If we disregard two-part pricing schemes for

1/ The definition of the deficit raises a number of difficult questions that are fortunately not essential to the present discussion. It should be noted, however, that past overexpansion of the railways may produce deficits in the accounting, but not in the economic sense. The assets concerned should be evaluated at their present value, not at their historic cost or their cost of replacement. For an extensive discussion of these questions, see M. Allais, et al., Options in Transport Tariff Policy, especially Chapter 24, section 4.

2/ See Chapters VI-VIII.

3/ See Chapter V.

4/ Cf. Chapter V, especially para. 4.
the railways, the imposition of budgetary equilibrium is equivalent to
financing the deficit by means of a specific tax on rail services. Theo-
retically, such a specific tax is unlikely to be the most efficient method
of financing the deficit; other methods may cause fewer distortions. In
practice, however, this may not be true. For one thing, the railways
might be able to reduce the distortion by differential pricing. The tax
authorities cannot in practice differentiate tax rates as finely and as
effectively as the railway administration can differentiate their prices,
especially when they employ individual contracts. There is also the
political danger, possibly quite serious, that a subsidy to the railways
may lead to a proliferation of claims for similar subsidies elsewhere,
especially when the rail subsidy is based on grounds that are as sophis-
ticated and as difficult to quantify precisely as increasing returns to
scale.

11. The institutional motive is equally strong on practical appeal
and weak on theoretical foundation. If the appropriate subsidy could be
objectively determined, there is no reason why a subsidy would impair man-
agement efficiency. In fact, in an imperfectly competitive situation, there
is no reason why a balanced budget should provide just the right pressure
for management efficiency. It may well be that potential profits are so
great that even the most inefficient and unprogressive management policies
might still ensure budgetary equilibrium. Conversely, in cases such as
the railways the obligation to balance the budget may force the railways
to tap all possible sources of monopoly profits, prevent them from under-
taking desirable investments, or even force them to abandon desirable ac-
tivities. 1/ However, when the subsidy cannot be objectively related to
quantifiable factors, it may well impair management efficiency. In par-
cular, a subsidy policy which more or less automatically finances rail-
way deficits is likely to reduce efficiency and cost-consciousness and
discourage innovation. Since the deficit is in practice very difficult
if not impossible to determine objectively and unambiguously, especially
when associated with increasing returns, and since efficient pricing and
investment policies are equally hard to specify and enforce, the institu-
tional case for budgetary equilibrium should not be lightly dismissed.
However, the problems associated with budgetary equilibrium might be greatly
reduced if a subsidy were granted on some objective basis not related to
the size of the deficit. 2/

12. The equity motive cannot be evaluated in strictly economic terms,
but it seems quite reasonable to accept as a general working principle
that he who benefits should pay, unless there are special reasons to
subsidize a particular activity. Any desired redistribution of income

---

1/ "Desirable" is interpreted to mean that social benefits exceed total
social cost.

2/ Professor Vickrey has suggested a subsidy expressed as a percentage
of revenues, or a fixed amount per unit sold. If the subsidy formula
can be made to appear sufficiently firm and resistant to pressures to
modify it, at least in the short run, managerial incentives may be
maintained almost as adequately as with the budget-balance constraint.
can usually be brought about more efficiently and often more fairly using the income tax, possibly including negative income taxes. There is no particular reason why the users of rail services should be subsidized, which implies that the principle of budgetary equilibrium for the railways may be presumed equitable.

13. We conclude that the case for budgetary equilibrium appears to be fairly strong on practical, institutional, and perhaps also on ethical grounds. The objections against public subsidies might, however, be less convincing for the part of the deficit that results from holding non-renumerative stand-by capacity in scheduled (passenger-) transport than for the part associated with increasing returns. The former might be capable of fairly objective quantification and its subsidization might therefore entail less danger of abuse and be less likely to invite subsidy claims from other industries. But even with a subsidy for unrenumerative stand-by capacity, the railways would have to absorb the deficit associated with their increasing returns, and some distortion of rail prices would result.

b. The Differential Tariff

14. The differential tariff, and the other public service obligations not based on considerations of economic efficiency, are another source of railway price distortions. There are strong arguments against using the transport industry to serve social objectives outside transport. Other, more direct instruments of regional, sectoral, social, and general economic policy would serve these objectives more effectively and without causing economic distortions in transport. 1/ In developing countries, however, these alternative instruments may not always be available and the pursuit of social objectives may require the imposition of public service obligations on the railways. It is difficult to see why the cost of the public service obligations should not be financed from public funds. There is no conceivable reason, either of economic efficiency or of equity, why they should be financed by the users of other rail services in the form of higher prices. 2/ For example, why should shippers of coal be obliged to pay high rates so that rail rates for farm products may be kept low? If agricultural protection is an accepted objective of national policy, it should be paid for openly out of general revenue and not by a hidden, nonappropriated tax on the nonagricultural users of rail services. In fact, the principle of public compensation to the railways for the cost of the public service obligations is beginning to be more generally accepted. 3/ The practical

1/ Cf. Chapter XIII.
2/ See Chapter X, section 2-b.
3/ See, for example, the regulation recently adopted by the European Economic Community which obliges member-states to compensate carriers for the financial burden of public service obligations imposed on them (Regulation of the Council No. 1191/69, Official Gazette No. L. 156 of June 28, 1969).
determination of the appropriate compensation to the railways may raise a number of very intricate questions, but these difficulties are the price society pays for the policy of indirect rather than direct support to certain groups. At least the compensation does not serve as a precedent for other claims on public funds. Consequently, compensation should be granted, which implies that the differential tariff need not distort other rail prices than those immediately affected.

15. We conclude that the first-best solution would be to abolish the railways' tariff obligations. If that conclusion is correct, we can disregard this source of distortion of rail rates when we discuss the merits of road regulation in connection with the rail problem. As long as the public authorities do impose tariff obligations on the railways, they should at the very least compensate the railways for the costs incurred. 1/ If they do, we need only consider the effects of the tariff obligations on the rail rates directly involved, and consequently on the competitive relationship between rail and road, only with regard to those particular services.

3. Road Regulation and the Railroad Problem

16. We have concluded in the previous section that the railways may be prevented from pursuing a fully efficient pricing and investment policy, principally because of the constraint of budgetary equilibrium imposed on the railways in spite of their scheduled carrier obligations and their increasing returns to scale, and because of tariff concessions imposed to serve extraneous policy objectives. This leads us to the central question of this study, namely whether competing road transport should be subjected to restrictive regulation as a second-best means of reducing the distortions in competitive rail-road relationships that would otherwise result.

17. Second-best problems are notoriously difficult to solve, both in theory and a fortiori in practice. They involve the minimization of the social losses from a price distortion in one activity (rail services) by imposing compensating price distortions on competing activities (road

---

1/ This point of view has been advanced very strongly by the Royal Commission on Transportation (Canada), Chairman M.A. MacPherson, as summarized in the following statements: "...the principle which we believe to be basic to achieving any long-run solution to the problems which beset railways in Canada and to the establishment of a greater degree of equity amongst the users of rail transport. The principle developed is that burdens, which are the result of obligations imposed upon the railways by tradition, law and public policy, be lifted.... Where these national obligations cannot be removed, remuneration should be found for the services performed to prevent distortions in resource allocation and distortions in pricing of rail services." (See the Commission's report, Vol. I, pp. 52 and 53.)
transport). The appropriate compensating distortion depends not only on the elasticities of substitution between the activities directly involved, which are difficult enough to determine as the modal-split studies in transport amply demonstrate, but also on the elasticities of substitution between the competing activity (road transport) and other activities. For example, a compensating tax on road transport services would affect the competitive relationship with transport on own account, and might affect decisions on location, storage policies, etc. A correct second-best policy must take account of all these secondary relationships, to the extent that they are significant, and determine which compensating measures would minimize the aggregate losses. It is generally conceded that the problem is insoluble in most actual cases, and quite certainly in transport, because there is simply not enough information about the relevant elasticities of substitution, neither on the margin nor for large shifts. Also, it is not true in such cases that an approximation to the correct compensating distortion is better than nothing, since it may well produce secondary distortions that are more harmful than the primary distortion whose effects it was designed to reduce. 1/

a. Budgetary Equilibrium

18. When we consider the distortion of rail prices caused by the imposition of budgetary equilibrium on the railways, we find that specific deviations of actual rail prices from the efficient prices are in practice extremely difficult, if not impossible, to determine. Even if the deficit itself can be estimated, which in fact has not been proved possible so far with any reasonable degree of reliability, we are still not much closer to determining the specific amount of mark-up on specific rail prices. But we need this data to determine the correct compensating constraint to be imposed on road transport. Furthermore, the compensating constraints must be specific with respect to routes, commodities, and perhaps even times of service, in order to affect those road services that compete with rail services at all, and in particular those that compete with the rail services whose prices are above the efficient prices. The practical possibilities are restricted to differentiations between routes (those parallel to railway lines and those not), with respect to distance (long-distance road transport, generally competitive with the railways, and short-distance transport, which is not), and possibly with respect to commodities carried (bulk goods, for which the railways are generally a close competitor, and

---

1/ It is often stated or implied that one need not account for secondary relationships when the elasticity of substitution involved is small compared to the elasticity of substitution in the primary relation (in our case, e.g., the effect of taxing road services on location as compared to its effect on the division of tariff between rail and road). This is not so. The social losses of a small effect on location may in the aggregate be far larger than the losses resulting from a relatively large effect on the division of traffic between rail and road.
other goods). Even with such differentiations, however, and partly because of them (see next para.), the restrictions to be imposed on road transport are bound to be very far from the correct second-best solution. In many cases, they might produce secondary distortions that are at least as harmful as the incorrect division between rail and road that would occur in their absence. This is particularly likely, considering that the railways will tend to impose the mark-ups for financing the deficit on precisely those services that have lower elasticities of demand, i.e., those that do not compete directly with road services.

19. The economic drawbacks of compensating restrictions to be imposed on road transport are particularly strong when the restrictions take the form of quantitative licensing, either of entry or of capacity. As we shall show in Chapters XVII-XIX, licensing systems are more harmful the more they compartmentalize the road transport market into noncommunicating submarkets. But this is precisely what an effective policy of compensating restrictions would have to do. Moreover, we shall also argue that licensing systems have a tendency in practice to become excessively restrictive, because the most vocal and powerful interests involved are all in favor of such restrictions: the existing road transport firms, their competitors the railways, and often also the treasury (with an eye to reducing the deficits and possibly producing a surplus for the state-owned railways). Excessive restriction of road transport not only produces possibly quite serious secondary distortions, it also undermines one of the very purposes of imposing budgetary equilibrium on the railways in the first place: excessive restriction of competitors causes exactly the same disincentive to management efficiency as excessive public subsidies.

20. We conclude that the policy of compensating restrictions to be imposed on road transport is on balance more likely to harm than improve economic efficiency. The secondary distortions are likely to be substantial on account of:

1. the serious practical difficulties in determining the specific rail rates affected by budgetary equilibrium, the extent to which they deviate from the efficient prices, and the correct compensating restrictions to be imposed on the specific competing road services,

2. the equally serious practical difficulties in differentiating the compensating restrictions correctly as a function of the specific elasticity of substitution between each group of road transport services and the corresponding group of rail services, and

3. the virtual impossibility of taking into account potentially quite important secondary distortions created by the compensating restrictions with respect to variables other than the division of traffic between rail and road (e.g., location).
Finally, we have argued that restrictive licensing is particularly likely to produce important secondary distortions because it tends to become excessively restrictive. All considered, the general case for compensating restrictions on road transport appears very weak indeed. It may well be preferable to renounce such policies entirely and instead permit the railways to minimize the harmful effects of the budgetary constraint by an appropriate differentiation of their prices. 1/ It is clear, however, that the extent of the price differentiation may have to be limited by public measures (maximum prices) in those cases where a relatively strong monopoly position of the railways would allow them to impose unacceptably high mark-ups on the efficient prices. While the definition of "unacceptably high" is difficult and the criterion largely ethical, maximum prices are a common feature of all existing rail transport policies and are therefore apparently not impossible to administer in practice.

b. The Differential Tariff

21. The case for compensating restrictions on road transport which is based on the differential tariff and other such public service obligations of the railways depends primarily on whether the differential rail tariff is an acceptable policy instrument in the first place. We have argued that it is not, except possibly in developing countries, when more direct policy instruments are not feasible. In any case, the railways should be compensated from public funds for the cost of the public service obligations, so that we only have to consider the distortion of competitive rail-road relationships on the particular groups of rail services affected by the public service obligations.

22. The most appropriate answer to the problem would appear to be a policy of nondiscrimination among competing modes of transport. Consider, for example, the case of a low rail rate imposed on certain commodities. To avoid distorting competitive relationships between rail and road, the transportation of these commodities by road should be subjected to an equivalent obligation. The principle, sound as it seems, is easier said than done. To begin with, the efficient rail prices are often very difficult to determine, and consequently so is the effective reduction which the imposed tariff has supposedly brought about. Moreover, road transport is generally a competitive industry. Since market prices tend to equal efficient prices and monopoly profits tend to be zero, a low tariff for certain commodities would simply drive the road carriers out of that

1/ The conclusion might seem to be in contradiction with our rejection of internal compensation in section 2-b of Chapter X. The contradiction is only apparent, because there we were comparing internal compensation with the first-best policy of either two-part pricing or a public subsidy. Here, however, we are considering differentiated mark-ups on the efficient prices as a second-best policy, given the constraint of budgetary equilibrium.
particular market. If they could be subsidized for carrying the protected commodities, however, it is hard to understand why direct subsidies on the commodities involved should be impracticable. In that case, it would be preferable to do away with the public service obligations of the railways and directly subsidize the commodities. Going back full circle, we must admit that there are probably cases in which rail rates are the most feasible instrument for pursuing certain extraneous policy objectives, while it is not possible to prevent a distortion of rail-road competition by imposing similar obligations on road transport.

23. The situation really amounts to special treatment of the railways, which are obliged to provide certain services below cost, but are compensated for the loss involved from public funds. The situation is not optimal from the point of view of economic efficiency, but it certainly does not establish a case for restrictive regulation of the road transport industry. It would be manifestly absurd to restrict or tax competing road transport services. Raising the price of competing road transport services by restrictive measures would not only increase the original distortion but would be clearly inconsistent with the very purpose of the differential tariff policy. For example, it would be inappropriate from any point of view to protect a railway line in an underdeveloped region by a restriction of competing road traffic, since the latter would inevitably push up road transport prices in the region and hence accomplish the reverse of what was intended.

24. The only conceivable case that could be made in the present context for restrictive regulation of the road transport industry would have to be based on the supposition that the railways are not compensated for the cost of their public service obligations. We have argued that such compensation should be given, but budgetary constraints may render this solution impossible. In that case, it could be argued that a general restriction of road transport — possibly with an exemption for the commodities or regions that are to be protected — would give the railways a stronger competitive position elsewhere and thus permit them to recoup the losses on the low rates for the protected commodities or regions. However, we come back to exactly the same issues we discussed under Budgetary Equilibrium in paras. 18-20, where we reached the conclusion that the second-best case for a policy of compensating restrictions on road transport is very tenuous indeed.

4. Summary

25. We have shown that there are three possible reasons for supporting the railways, apart from distortions in the pricing of road transport services themselves (resulting, e.g., from inadequate road pricing). They are:

(1) the obligation to practice efficient pricing, output, and investment, even though economies of scale imply that such policies will produce a deficit;
(2) scheduled carrier obligations, which oblige the railways to hold unremunerative stand-by capacity, especially in passenger transportation; and

(3) extraneous policy obligations such as social or regional policy.

26. For none of these reasons will the optimum solution involve restrictive regulation of the road transport industry. The deficit resulting from economies of scale and scheduled carrier obligations should ideally be covered by means of two-part pricing methods (the club principle), and the extraneous policy objectives should be achieved by direct methods, such as investment premiums for depressed areas, that do not involve a distortion of rail prices.

27. If the optimum solution is impracticable or unacceptable, second-best policies must be considered. From a strictly theoretical point of view, the second-best policy in all three cases would be to compensate the railways by public subsidies for the net burdens imposed on them. However, limitations of the public budget and, for (1) and possibly also (2), institutional considerations associated with the effects of subsidies on management efficiency, may wholly or partially exclude the subsidy solution. The policy options left are restrictive regulation of the road transport industry, and elimination of most regulatory constraints on the railways to allow them to recoup the losses by price differentiation.

28. Both of these third-best solutions have serious drawbacks. We have argued that the disadvantages of restrictive road regulation are not to be taken lightly, but no definitive conclusion is possible on general grounds. Considering the almost total lack of empirical data in this area, we will for the time being have to rely on pragmatic solutions tailored to the specific case. On this basis, our final conclusion is necessarily rather indefinite. Public service obligations imposed on the railways provide at most a weak third-best case for restrictive regulation of the road transport industry, when neither the optimum solution nor public subsidies are practicable or acceptable, and when road restrictions are judged less harmful to economic efficiency than differential pricing by the railways.
XII. EXTERNAL PRICE DISTORTIONS AND EXTERNAL EFFECTS

1. The analysis and the conclusions of the preceding chapters were based on the assumption that all prices outside the transport sector are efficient. This clearly does not hold in any strict sense. Monopolistic elements as well as simple inefficiencies exist in many sectors of the economy, while some marginal social costs and benefits of production or consumption are not included in market prices at all (e.g., air pollution). Therefore, some prices outside the transport sector are distorted (external price distortions), and some social costs and benefits are ignored when we consider only the market prices of production factors and of output (external effects).

2. When there are external price distortions, the prices of transport services may have to be adjusted to minimize the total economic loss resulting from these external distortions. We have mentioned in Chapter XI that these second-best problems are extremely complex. In practice, the appropriate corrections of transport prices are impossible to determine because they depend on the size of the separate distortions in all directly or indirectly related sectors of the economy and on all the relevant elasticities of substitution. At present, we have no means of obtaining all the relevant data. The distortions and the elasticities of substitution are extremely difficult to determine for any one product, the number of products is extremely large, and the data are subject to continuous change.

3. One school of thought concludes that the theory of economic efficiency and its implications for pricing are therefore meaningless in practice. This point of view would seem unnecessarily defeatist, as well as operationally useless as long as no alternative is presented. In point of fact, the theory of economic efficiency as presented in Part One would seem to offer at the very least a logical basis for analysis and policy. If each sector were to practice efficient pricing under the assumption that all other prices are efficient, all sectors would in fact operate efficiently. The assumption tends to be self-fulfilling when policy is consistently carried out on these lines. Moreover, there is a justifiable presumption in favor of accepting efficient pricing as a working hypothesis, or as a practical approximation, unless it can be demonstrated that the other sectors of the economy, particularly those closely linked with transport, show a marked bias. The attempts to prove that such a bias exists in the form of a systematic tendency toward higher-than-efficient prices are not entirely convincing. The incidence of general taxation surely does not prove the point, if transport is subjected to the same fiscal regime. Nor does the existence of higher than normal profits in certain sectors necessarily indicate that prices are distorted, since intramarginal rents
are perfectly consistent with marginal efficiency. 1/ Finally, it should be remembered that the price of transport is largely only a link in the production process. Even if other prices are on balance distorted upward, it is not a priori certain that the second-best solution for transport prices would also involve an upward correction. 2/

4. If we accept as a general working hypothesis that other prices are efficient, we are still under the obligation to determine in what respects, if any, the hypothesis does not hold, and what this implies for road transport policy. We shall disregard any possible deviations from efficient pricing in competing modes of transport, mainly rail, as we have considered them in the previous chapter.

1. **External Price Distortions**

5. It appears from the literature and from policy statements that two major kinds of external price distortions are judged particularly relevant. One is inadequate road pricing. We have been assuming that all factor prices were efficient. This is manifestly unrealistic for road pricing, one of the most important specific factors of production in road transport, and consequently a potential source of important distortions of competitive relationships between road and rail. The other kind of external price distortions derives from more general problems, such as capital and foreign exchange shortages, shortages of skilled labor and managerial ability, and surpluses of unskilled labor. In economic terms these shortages, which occur particularly in developing countries, could be considered as general factor price distortions. They may have important and specific implications for transport policy when they significantly distort competitive relationships between modes of transport, in particular between rail and road.

a. **Inadequate Road Pricing**

6. It is generally admitted that present systems of road pricing, in whatever guise they appear, are certainly not efficient. 3/ Present

---

1/ Namely in the case of decreasing returns to scale. Often, the argument is based on the mistaken notion that the efficient price equals marginal operating cost (i.e., that it excludes marginal social costs of quality deterioration and/or marginal scarcity rents - see Chapter III). Reasoning on this basis is invalid.

2/ If the prices of complementary factors are strongly distorted upward and those of substitute factors are not, the second-best solution may well be a downward correction of the prices of road transport services. The question is rather academic, since a situation in which transport prices are the only policy tool is surely rather unrealistic.

3/ For an excellent recent study on the subject, see Walters, *The Economics of Road User Charges*. 
charges on road users that might be considered as forms of road pricing include such diverse elements as vehicle license fees; specific taxes and import duties on fuels, vehicles and parts; tolls on roads, bridges and tunnels; and other specific taxes on transport services. It is quite unlikely that the cumulation of these different charges would approximate an efficient road pricing system. The first-best solution to this problem would be to impose levies on road users which correspond to efficient road prices. It is a matter of semantics rather than substance whether these policies are said to eliminate or offset an external price distortion. To distinguish these measures from other types of regulation we shall call them offsetting taxes or subsidies. 1/

7. The improvement of road pricing, in whatever form, would be preferable to, say, physical restrictions on road transport. The latter policy, like almost any measure that affects other variables besides the one to be corrected, would almost inevitably create secondary distortions, for example, by unintentionally discriminating against some category of road users. In addition, it has other drawbacks that we have mentioned in a different context (the difficulties of ascertaining the correct degree of restriction, the institutional dangers of excessive restriction, etc.). When efficient road pricing is impracticable or excessively costly, subsidiary measures such as physical restrictions may be considered, but should be accepted only if the secondary distortions they cause are clearly outweighed by the advantages of correcting deficient road pricing. We illustrate this with two examples of road pricing that are frequently presented as major policy issues: the generally admitted deficiency of road pricing during peak hours in metropolitan areas, and the supposed undercharging of heavy lorries relative to other road users.

8. Although much more efficient road pricing in the cities is possible than is at present practiced, there are limits to the degree of sophistication that can be achieved before the cost becomes prohibitive. These limits will vary with the gravity of the congestion problem. The social cost of congestion and the social value of efficient road pricing will tend to be higher, the greater is the physical congestion and the higher is the value of time lost. Given these limits, and given that the implementation of efficient urban road pricing takes considerable time, there may be a case for physical measures to supplement road pricing or to temporarily take its place. Examples are parking restrictions and limitations on certain types of traffic during peak hours. While these types of regulation of the road transport industry are potentially quite important to the urban congestion issue, they have only marginal relevance to the general problem we are concerned with in this paper.

9. The undercharging of lorries presents a different picture. Even if heavy lorries are undercharged relative to other road users, it

1/ See Chapter XV, section 1.
is hard to see how this establishes a valid case for anything but a correction of existing charging systems. This could be achieved at practically no administrative cost by, for example, raising the license fees for heavy lorries, which brings us back to offsetting taxes.

b. General Factor Price Distortions

10. If general factor prices are distorted, because of capital or foreign exchange shortages, shortages of skilled labor or managerial talent, or surpluses of unskilled labor, there is a clear case for offsetting taxes and subsidies. 1/ In the context of economic efficiency as the sole policy objective, it is hard to see why other forms of regulation such as restrictive licensing should be employed to counteract the effects of general factor price distortions. Restrictive licensing is certainly not easier or less costly to administer than offsetting tax measures. On the other hand, it will inevitably cause secondary distortions, if only because it is virtually impossible in practice to determine the effects of the general factor distortions on every type of road transport firm and the appropriate offsetting quantitative restrictions, and to put these highly complex restrictions into effect. Moreover, offsetting taxation, provided it is applied without discrimination to both rail and road, will correct the distortion of the competitive relationship. Restrictive licensing will be efficient in this respect only if it succeeds in counteracting the net effect of the factor price distortions on the competitive relations between rail and road. The difficulties of determining the correct degree of restriction are compounded by the difficulties of determining these net effects.

11. As an example, consider the proposition that road transport should be restricted in favor of the railways, because the foreign exchange requirements of the road transport industry are said to be higher per unit of service than those of the railways. For the sake of argument, let us accept the difference in requirements and the economic rationale behind the overvalued exchange rate. Let us further assume that the only purpose of regulation is to offset the distortion, i.e., to make the transport industry operate as if all imported rolling stock, parts, fuels, etc. were priced at the shadow rate of exchange that would reduce foreign exchange requirements to the desired level.

1/ These offsetting taxes and subsidies are equivalent to the shadow prices used in evaluating the social benefits of public projects when factor prices are distorted. See Walters, The Economics of Road User Charges, pp. 70-72. Market prices in developing countries are commonly corrected by making a domestic preference adjustment for the foreign exchange component and using a shadow rate of return above the market level. See the Final Report of the Committee on Transport Policy and Coordination, Government of India Planning Commission, 1966.
12. Restrictive licensing of road transport is clearly an inefficient means of achieving this end. Even if it were to succeed in restricting road transport by exactly as much as if the shadow prices were actually charged, it will still distort decision-making. For example, there would be no incentive for road carriers to economize on imported inputs nor to provide home-produced substitutes. Moreover, the assumption that the net effect of the restriction would be just right is highly unrealistic, considering the many difficulties involved and the many possibilities of political and administrative distortions. It would be preferable to employ offsetting taxes (import duties) which do not have these disadvantages. While restrictive licensing, as compared to offsetting taxes, has the alleged advantage of keeping prices down and indirectly easing the balance of payments problem, the scarcity of supply and the restricted competition which it creates will drive prices up, in principle to exactly the same level as they would have reached with offsetting taxation. Monopoly gains and inefficiencies due to the lack of competition will take the place of the offsetting taxes. This tendency can in turn be counteracted by price controls and some sort of rationing of road transport services, but such controls are costly, cumbersome, often ineffective, and inefficient in that rationing fails to satisfy the most urgent needs first.

13. It is true that both restrictive licensing and offsetting taxes can and often are abused, in the sense of being pushed far beyond the counteracting of factor price distortions. But offsetting taxes still have the advantage of being more transparent and therefore more readily subject to democratic control, and of being subject to automatic checks in the form of countervailing interests, which are largely absent in the case of restrictive licensing. We conclude that offsetting taxes (import duties) are preferable to other types of regulation as a means of correcting the factor price distortions caused by an undervalued currency.

14. A similar conclusion based on much the same reasoning holds for the other cases of factor price distortions. We make one final comment, concerning the shortage of entrepreneurial ability and the alleged implication that road transport should be restricted because it claims so much of this resource. Even if it did, which is highly debatable considering that the railways require much skilled ability as well, this might just as well support the reverse conclusion. Small-scale enterprise such as road transport might well be one of the most effective ways to elicit and develop entrepreneurship. Consequently, a restriction of road transport would hamper the dynamic development of entrepreneurial ability, which may well be one of the more important growth factors in developing economies. 1/

1/ See Chapter XIX, section 2.
2. **External Effects**

15. It is not appropriate here to go into the general analytical problems posed by external effects. Suffice it to state the economic theorem that in an industry such as road transport which is not subject to significant indivisibilities or economies of scale, only *marginal external effects* are relevant. There is no doubt that the marginal external effects of road transport are mainly negative. If we disregard congestion effects, which we have considered separately under the heading of inadequate road pricing, the principal external effects are air pollution and excessive noise. The social benefits often cited, such as those of improved access, are all intramarginal surpluses created by the road transport industry. They are therefore not relevant in the present context, essentially because they do not constitute an argument for increasing the output of road transport services beyond the efficient level, as determined on the basis of marginal social costs and benefits. Air pollution and excessive noise however, do enter into marginal social cost and are therefore fully relevant for efficient pricing, output, and investment.

16. Air pollution and excessive noise are analytically very similar to the factor price distortions we have discussed above. They could be regarded as factor inputs of the road transport industry which carry a price below their social cost; their price is in fact zero, whereas their marginal social costs may be quite substantial. For essentially the same reasons as were set out in the preceding subsection, the most efficient means of correcting the distortion is by directly offsetting it, i.e., by internalizing the social costs. This could be achieved either by offsetting taxes, or by prohibiting air pollution and noise above a certain level, which throws the costs of preventing these effects on the carrier. We need not go into the policy problems to conclude that external effects do not present a valid case for restrictive licensing in the road transport industry.

3. **Summary**

17. We conclude that it is generally more efficient to eliminate external distortions themselves than to counteract their effects by restrictive regulation of the road transport industry. For example, inadequate road pricing requires improvements in road pricing rather than restrictive licensing of road vehicles. In some cases, such as a shortage of foreign exchange, the correction may have to take the form of

---

1/ Intramarginal external effects, such as income generated, are a type of surplus that is not relevant for the *marginal investment criterion*. When there are no indivisibilities and no economies of scale, the marginal investment criterion is sufficient to determine the optimum investment policy, since total benefits automatically exceed total costs. (See Chapter V for the opposite case of increasing returns.)
offsetting taxes (import duties), because circumstances or policy considerations outside transportation dictate the preservation of certain factor price distortions, such as overvalued currency. It has been shown that such offsetting taxes are more efficient and less liable to abuse than restrictive licensing of road transport. In exceptional cases it may be inevitable, for practical reasons, to resort to physical restrictions. We have noted the case of road pricing in the cities: in some circumstances parking restrictions or other physical measures may be needed to temporarily replace or supplement the sophisticated forms of road pricing required for fully efficient utilization of metropolitan roads. Physical measures may also be required to control such external effects as air pollution. In no case, however, did we reach the conclusion that restrictive licensing would be an appropriate policy instrument.
137

XIII. OBJECTIVES OTHER THAN ECONOMIC EFFICIENCY IN TRANSPORT

1. Traditionally and almost universally, the road transport industry has been regulated not only to achieve economic efficiency in transport, but also for various other reasons. In this chapter we shall very briefly review what we consider to be the major points. In accordance with the purpose of this paper, we shall completely disregard the so-called noneconomic forms of regulation (technical requirements of vehicles, professional abilities of drivers, and safety regulations), and the general fiscal and social laws not intended to discriminate among sectors of the economy. This emphatically does not mean that these forms of regulation are regarded as unimportant in practice. They are potential sources of economic distortions in transport, because it is often very difficult in practice to draw the line between appropriate technical requirements or the nondiscriminatory application of general measures on the one hand, and specific economic regulation of transport on the other. However, the objectives of fiscal and social legislation are clearly outside the subject of this paper and as such out of order in the present chapter. We shall have occasion in Part Three to look at the practical problems on the borderline between economic regulation of transport in our sense and other government measures in transport.

2. A common purpose of regulation is to ensure an equitable income for the road carriers. Regulation of the transport industry is also often employed to achieve all sorts of policy objectives that do not directly or specifically concern transport. Regulation of this type may be referred to as the imposition of extraneous public service obligations on the transport sector. There is not much point in trying to list all these extraneous policy objectives, since the list would differ from country to country and our comments would be much the same on any of them. By way of example, we shall very briefly go into three specific cases that are probably the most common as well as the most important ones, namely regional policy in the widest sense, sector policy (in practice particularly aimed at protecting agriculture), and macroeconomic policy.

3. We shall not go into the subject of transport regulation for such purposes as general social policy (special rates for the aged and disabled, etc.), defense (subsidies for the availability of transport in case of war or other national emergencies), national integration (low rates to peripheral areas), balance of payments policies (low rates on export commodities), etc. These are primarily a matter of railway regulation. To the extent they are applied to the road transport industry, they do not seem to be as important in practice as the cases we have chosen. Their main relevance is indirect, i.e., via the effect of the distorted railway prices on the competitive relations between road and rail, which we examined in Chapter XI.
1. Income Policy for Road Carriers

4. There is no doubt that regulation of the road transport industry was originally motivated to a large extent by the desire to improve the incomes of road carriers. Most of the relevant legislation originated in the nineteen-thirties, when the depression forced carrier incomes down to a very low level indeed. The road transport industry, with its relatively low capital requirements and level of professional skill, offered one of the few opportunities for self-employment to those who could not find jobs elsewhere. In many countries the authorities attempted to protect existing carriers against the resulting flood of new entrants by throwing a fence around the industry in the form of restrictions on entry or restrictions on investment in new capacity.

5. We need not go into the question of whether such a policy is suitable and equitable in the special case of a general depression. Our tools and our knowledge of macroeconomic policy seem to have advanced sufficiently to make depressions of a comparable degree and duration very unlikely. At present, the problem has to be considered in a structural context. Is it desirable to raise carrier incomes above their efficient level and, if so, is regulation of the road carrier industry the most appropriate instrument? The analysis should take the efficient level of carrier incomes as a basis of reference. If and to the extent that incomes fall short of this level, the present policy objective coincides with that of economic efficiency. Its introduction would merely support the conclusions of the preceding chapters. We have shown that unregulated competition will in general bring about an efficient level of prices, of investment and, implicitly, of carrier incomes. Outside the special case of scheduled carriers, the only type of regulation that may be required to ensure economic efficiency is the institution of certain standards of professional competence (the so-called qualitative or subjective conditions of entry).

6. Should carrier incomes be raised above their efficient level by means of regulation? There is little to be said about this objective as such on the basis of economic analysis alone. We may, however, recall that any regulation which aims at raising the income of road carriers above the efficient level is inevitably inequitable to outsiders. 1/ Raising incomes above this level is possible only by means of restrictions on entry. Any attempt to do so simply by setting price floors above the efficient level will only lead to underutilization of capacity, and will not in fact raise

1/ See Chapter X, para. 7.
carrier incomes. 1/ Without restrictions on entry, there is nothing to keep outsiders from entering the market until they have depressed net incomes to the level they would have attained without the price floors. Consequently, quantitative restrictions on entry are an essential element of any policy that aims at improving the income position of carriers. It would seem difficult on general ethical grounds to reconcile the protection of existing carriers, no matter how justifiable in and of itself, with the obvious inequity to outsiders. When a relatively low money income in road transport is willingly and knowingly preferred to more lucrative employment that requires similar qualifications, why prevent those who apparently attach a high value to the nonpecuniary advantages of the profession from entering it? In their effect on outsiders, restrictions on entry are perhaps the most distressing example of transportation regulation acting as a source of institutionalized frustration. Less discriminating ways to correct the income distribution are available: in the long run, to raise the standard of education and professional training, in the short run, to use general taxation or general wage policy.

2. Objectives Outside of Transport
   a. Regional Policy

7. Regulation of transport prices, in particular the railways, has often been employed as an instrument of regional policy. Transport rates to and within depressed areas have been lowered by price ceilings to stimulate economic development in these regions. There is some doubt as to whether these policies have always been effective, since artificially low transport rates will not only serve to stimulate exports from the region and industrial settlement in the region, but may also retard the region's development by lowering its natural economic protection against competition from more advanced regions of the country.

8. However effectively rate regulation stimulates regional development, it has the inherent disadvantage of all indirect policy instruments: it tends to create secondary distortions, in particular by affecting the competitive relations among different modes of transport. While it is always possible in principle to largely offset such distortions by subsidizing the carriers for these public service obligations, in practice it is extremely difficult to find correct operational criteria.

1/ In this context we disregard direct income subsidies (deficiency payments) as a means of raising carrier incomes. They could hardly qualify as transport regulation. Such subsidies would probably also require restrictions on entry since, without them, new entrants will tend to depress net revenues in road transport close to the previous level, i.e., until net revenues plus income subsidies equal the income that is just high enough to attract the marginal carrier into the industry.
for such compensating subsidies. Certain distortions are likely to remain, in addition to a complex and costly machinery which inevitably creates many possibilities of error, ranging from simple miscalculation to fraud. Moreover, even correct compensating subsidies do not eliminate the secondary distortions that occur outside the transport industry, because regional development is stimulated not by subsidies on regional economic activity, but by artificially low prices on a single particular input factor.

9. More direct policy instruments which do not have these drawbacks are now available, such as direct subsidies for investment or employment in depressed areas, possibly combined with internalization of external dis-economies in highly developed areas. Given these alternatives, there does not seem to be much point in employing a clearly inferior instrument. We conclude that the objectives of regional policy do not justify regulation of the road transport industry, in the sense of a deliberate manipulation of efficient road transport prices to stimulate the economic development of depressed areas.

10. The argument may not be entirely applicable to less developed countries, where the alternative policy instruments just mentioned may not be feasible. 1/ But even in these cases it is primarily the railways and not the road transport industry which, for reasons of administrative convenience, are subjected to special public service obligations aimed at protecting underdeveloped regions. This raises problems of intermodal distortions which we have discussed before. The analysis led to the conclusion that restrictive regulation of road transport, and particularly quantitative licensing of entry or capacity, is in no case justified. 2/

b. Sector Policy

11. It is not uncommon for regulation of the transport industry to be employed as an instrument of sector policy, in particular to protect agriculture. Again, it is particularly the railways that have been subjected to public service obligations of this kind. In examining these public service obligations of the railways, one should distinguish very carefully between regulation that serves economic efficiency in transport and regulation to protect agriculture. The railways have in the past undoubtedly used monopolistic practices that were especially blatant in the case of farm products. Regulation of railway rates to counteract such

1/ However, it has been argued rather strongly by A.R. Prest in Transport Economics in Developing Countries (London: Weidenfeld and Nicolson, 1969) that the artificial lowering of transport prices is not an appropriate instrument of regional policy, even in developing countries (see pp. 32-37).

2/ See Chapter XI, section 3-b.
practices is entirely consistent with economic efficiency. 1/ The situation is different in road transport. Considering the generally very competitive character of the road transport industry, there is little reason to expect monopolistic elements in pricing, except in case of deliberate price fixing. But this is a matter of antitrust policy and has little relevance to the present problem.

12. Assuming road transport prices are efficient, and accepting the objective of agricultural protection, can regulation of the road transport industry be considered an efficient policy instrument? Much the same considerations apply, perhaps with even more force, as for regional policy. Regulation of the road transport industry is a very indirect policy instrument which is likely to produce all sorts of secondary distortions, particularly within the transport industry. Moreover, direct protection of agriculture through subsidies, import restrictions, minimum prices, and so forth, is in general perfectly feasible and no more difficult or costly than protection through transport. Even when this is not true, as may be the case in some developing countries, rail rates lend themselves more readily to manipulation than the prices of road transport services. 2/

We need not repeat the argument to conclude that the regulation of road transport has no place in sector policy, neither as a policy instrument in its own right, nor as a measure to prevent distortions between road and rail when railway rates are used as a sector policy tool. 3/

c. Macroeconomic Objectives

13. Macroeconomic policy may require regulation of the economy by measures to retard or stimulate expenditure, or by maximum prices designed to counteract cost-push inflation. To the extent that these measures are applied on a nondiscriminatory basis to all sectors, they are not at issue

1/ One should not, however, conclude too easily that a high rail price is discriminatory, i.e., higher than the efficient price. A relatively high price may validly reflect a peak-load situation (see Chapter III, section 3). Peak-load situations may be relatively important in agriculture, due to the seasonal character of agricultural production.

2/ One way of aiding agriculture through road transport measures is to exempt the haulage of agricultural commodities from restrictive licensing, a policy that is followed in the U.S., for example. This is really not a form of regulation but rather of deregulation, which tends to move the industry, at least in the submarket of agricultural commodities, towards economic efficiency in transport and not away from it. It presupposes general licensing in other areas of road transport, a policy that is not supported by economic considerations, if our analysis in the preceding chapters is valid.

3/ See Chapter XI, section 3-b.
here. But the transport industry often seems to be subjected to macroeconomic policy measures much more than other sectors of the economy. There is no economic justification for this except insofar as investment or pricing is already subject to government control for other reasons. Administrative convenience is not an argument to be lightly dismissed, but it is not an independent justification for regulation. Since we have not discovered any independent justification for control except perhaps in the case of scheduled carriers, the application of specific measures for anti-inflationary purposes could apply only to scheduled carriers, and even there its effectiveness is highly debatable. 

1/ In all other sectors, there would seem to be no case at all for regulation as a specific anti-inflationary measure. 2/

3. Summary

14. The summary of our comments on the extraneous policy objectives can be very brief. None of these objectives appears to justify specific economic regulation of the road transport industry. If regulation of transport is nevertheless employed as an instrument of these extraneous objectives, it should be applied in the way that least reduces economic efficiency in transport. The choice of the specific instruments of regulation to be employed will be considered in Part Three.

1/ We cannot discuss the issue here, but there are two good reasons for serious reservations about rate control as an anti-inflationary device. For one thing, scheduled carrier rates certainly do not act as an inflation-leader. Secondly, in practice, scheduled carriers are either subsidized or are just paying their way. A price ceiling that prevents them from following cost increases will simply drive them into the red and force the government either to accept disruption of service or to finance the losses. Both alternatives are inflationary.

2/ For a recent discussion of price regulation in transport as an anti-inflationary device, see George W. Wilson, "Transportation and Price Stability," American Economic Review, May 1959, pp. 261-269. He states: "If society would refrain from treating transport either as a tool to effectuate goals better achieved by more general policy options now available or as an especially critical industry needing the panoply of uncoordinated policies currently associated with it, I am sure that discussions of the role of transport in such things as development, price stability, and so on would become as meaningless as the role of any other industry in such processes."
PART THREE

THE INSTRUMENTS OF REGULATION

XIV. INTRODUCTION

XV. SPECIFIC TAXES AND SUBSIDIES

XVI. RATE REGULATION

XVII. ENTRY RESTRICTIONS

XVIII. CAPACITY RESTRICTIONS

XIX. THE SOCIAL COST OF EXCESSIVE RESTRICTION
1. In Parts One and Two, we have found no valid reasons for economic regulation of road transport except in a few specific areas, notably the scheduled services. Why, then, bore the reader with an analysis of different regulatory instruments? Unfortunately, most countries do apply economic regulation. A recommendation to abolish most existing regulatory practices in the road transport industry may be entirely justified but quite unrealistic for some time to come, considering the many and powerful vested interests supporting the status quo - the existing road carriers, the railways, the licensing authorities - and the conventional wisdom of political savants who profess to fear instability resulting from change, particularly if that change is in the direction of dynamic competition.

2. Therefore, reality compels us to briefly review the major groups of regulatory instruments. In this part, we present some general indications about their possible functions and specific disadvantages, in order to determine which kinds of regulation are the more harmful to economic efficiency and should be abolished or replaced.

3. We shall leave aside the details of the application and administration of regulation, which can be fruitfully studied only in the context of a specific legal, institutional, and economic framework. As before, we deal only with the economic regulation of road transport; all instruments serving other objectives such as safety will be ignored. Nor shall we go into the specific application to road transport of general measures (e.g., fiscal or social policy), to the extent that these measures do not deliberately discriminate between road transport and other sectors of the economy. The only exception is the brief discussion of antitrust policies and information policies in the present introductory chapter. Such policies, when they are effective, may obviate the necessity for some specific regulatory measures. While the same would seem to hold for many other policies such as the enforcement of social legislation and road pricing, they are of less general importance. Antitrust measures and information policies, however, affect both the entire structure of the road transport industry and the operation of the competitive system.

4. The four main classes of regulatory instruments to be examined are: specific taxes and subsidies (Chapter XV), regulation of prices (Chapter XVI), restrictions on entry (Chapter XVII), and restrictions of capacity (Chapter XVIII). In discussing them, we shall focus on their principal objective or objectives, their effectiveness in terms of the objectives, and their impact on economic efficiency. We shall rely very heavily on the analysis of Parts One and Two in examining the relationships between instruments and objectives, but we hope that by citing references in the previous chapters rather than repeating the arguments, we shall be able to shorten the present discussion considerably without undue inconvenience to the reader.
5. The instruments of regulation which fit into none of the four main classes just mentioned are a rather motley group and are usually introduced for purposes other than the economic regulation of road transport. Examples are unnecessary physical obstacles, discriminating import restrictions, discriminatory transport policies of marketing boards and other public agencies not primarily concerned with transport, excessive restrictions on entry into port property or into cities, racial discrimination, and so forth. Since such policies may often be hidden behind their primary purpose or excuse, they may escape effective democratic control. For example, leaving roads in bad repair may be argued on budgetary grounds, even though the users would accept increased road taxes. Maintaining physical obstacles such as rain gates for unnecessarily long periods may be shrugged off as administrative tardiness rather than deliberate abuse. Discrimination in import restrictions is often very difficult to prove and discrimination in general revenue taxation even more difficult, since it is confused by the complexities of road pricing and by the contention—often at least partly justified in the case of developing countries—that transport provides one of the few practical objects of taxation. Even when the method of taxation is clearly very burdensome to road transport, as in the case of local transit taxes, reasons of administrative convenience or of equity may always be used to rationalize the measures whose avowed primary purpose could in fact be achieved by other means as effectively and with less distortion to road transport. Since a study of these many miscellaneous forms of regulation would be useful only in a specific context, our analysis of regulatory instruments will be limited to the four main classes we have mentioned.

6. In the last chapter of this Part, we shall attempt to indicate some general effects of restrictive regulation on economic efficiency. No less than a comprehensive case study of the application of economic regulation to road transport, in the context of the transport sector and of the country's or region's whole economy, could provide a concrete evaluation. Since this paper is limited to the general problem, it cannot deal with questions requiring specific data. In particular, it will not be possible to rank unambiguously the regulatory tools according to their effects on economic efficiency, since the ranking would depend on the policies' applications. For example, a system of excessively high minimum rates may well be more harmful to economic efficiency than a liberal licensing system, even though licensing systems will as a rule be more restrictive than rate control. We shall, however, attempt to give enough general indications on the economic effects to permit a qualitative judgment about the different types of regulation and facilitate further research into their quantitative effects.

1. Antitrust Policies

7. The main conclusions of Parts One and Two all depend on the assumption of workable competition in the road transport industry. In general, competition will be workable, provided there are no significant economies of scale over the entire range of output and no restrictive agreements among firms. We have discussed the first point in Chapter V,
where we conclude that the road transport industry, with the possible exception of scheduled carriers, does not exhibit significant increasing returns to scale. Even though in many, if not most, countries restrictive licensing tends to favor the large firms, small firms continue to survive. The same is true in the few areas where a large and fully developed road transport industry is not subjected to restrictive licensing, such as interstate road haulage in Australia. 1/ It could be argued that the small firms often do not directly compete with the large firms, since they operate partly as subcontractors to large firms and partly in special submarkets where they enjoy advantages of location, knowledge, specialized service, etc. Nonetheless, competition from small firms in the submarkets served mainly by larger firms is always possible because the large firms have no significant cost advantages. Actual or potential competition is generally effective enough to ensure competitive policies in road transport, provided it is not frustrated by restrictive practices.

8. In order to protect workable competition, the authorities might have to pursue an active antitrust policy that effectively bars restrictive practices. As we have noted, in the absence of restrictive regulation, entry into the road transport industry tends to be relatively easy. 2/ Effective restriction of competition by private agreements would therefore seem rather unlikely. Any such agreement would soon be frustrated by outsiders, unless their entry could be prevented by boycott agreements between established firms and shippers or suppliers. Since shippers obviously have no interest in supporting a restriction of road transport, such boycott agreements could only be concluded with suppliers. 3/ It seems rather


2/ Chapter II, section 1.

3/ If the shipper is a public agency (a marketing board), it might support a restriction of road transport as a matter of public policy (rail protection). We argued in para. 5 above that such indirect forms of regulation are highly undesirable and should therefore be abolished.

The reverse of such restriction is said to occur when large private shippers (oil companies) support trucking in order to avoid being locked in by the railways. It is doubtful, however, whether this practice really exists to a significant extent. Given the ease of entry into the for-hire trucking industry and the availability of private trucking, the railways would have to be very short-sighted to overcharge large regular shippers and the shippers would not need to support trucking in defense. The whole argument may well rest on the familiar error of comparing rail and truck rates without considering any differences in the quality of service.
unlikely that the suppliers of vehicles could have an interest in supporting a road transport cartel. 1/ Support of the cartel by labor unions, which could be in the unions' interest if the cartel were to raise drivers' wages, will not be very effective considering the prevalence of one-man firms. The only boycott possible would appear to be by large terminals which are owned or controlled by a single road transport firm or group of firms. 2/ An active antitrust policy might be needed to either prohibit such vertical integration or prevent monopolistic practices, including the support of road transport cartels, by the terminals.

9. Competition within the road transport industry could also be distorted by integration between road and rail. In many countries, the railways operate extensively in the road transport industry (truck ing as well as passenger buses). Vertical integration of complementary road and rail operations per se need not present any problems and may indeed contribute to efficiency in transport. 3/ The dangers lie in the close

1/ This would presuppose an agreement among the suppliers themselves. Given such an agreement, they would be better off setting their own cartel-price of vehicles and not supporting the road transport cartel.

2/ See Chapter X, section 3-d.

3/ The case for integration of modes, as applied to India, has been argued very forcefully by Wilfred Owen in Distance and Development; Transport and Communications in India, Washington, D.C.: The Brookings Institution, 1968: "The establishment of regional transport companies operating all types of transport may eventually provide the answer to the current fragmentation of transport supply....At the very least, the railways should be permitted and encouraged to operate their own truck fleet for local pickup and delivery services, for branch line services, and for supplementary over-the-road services." (pp. 144, 148).

One should consider these statements in the context of Indian regulatory policies, which tend to be highly restrictive (strong rail protection), very vexatious in some respects (local duties), and lacking in unified principles (licensing is subject to state control for intrastate transport and to bargaining between states for interstate transport). As a general proposition, Owen's statement that physical integration is the most appropriate method of providing adequate transport coordination (p. 140, op. cit.) is certainly not supported by our analysis.

However, there are economic advantages to be gained by some rail-road integration, particularly where the services are complementary (local delivery and pickup, container services). It may also be easier to abandon unremunerative rail services (small consignments, branch line services) if the railways can themselves provide substitute services by road.
links that exist in most countries between the railways and the national government. Trucking activities of the railways might be considered a much needed source of financial revenue for the railways, adding to the political pressure to restrict entry into the road transport industry.\(^1\) Public subsidies to the railways might indirectly benefit the subsidiary road transport firms, which would distort competition between these subsidiaries and the independent road transport firms.\(^2\) The most radical way to forestall such dangers would be to disallow road transport operations by the railways or rail subsidiaries, but this would discard the very real advantages of the vertical integration of rail and road.\(^3\)

It may be preferable to adopt a more flexible policy which allows the railways to operate road services, provided the railways' and their subsidiaries' accounts are kept strictly separate.

10. Aside from these special cases (terminals and rail subsidiaries), and still assuming the absence of restrictive regulation, there would not seem to be much need for an active antitrust policy in the road transport industry. However, the picture changes entirely when we no longer assume the absence of restrictive regulation. If the expansion of capacity or the entry of new firms is restricted by public policy, there is danger that private restrictive practices will be added to public regulation. Such private agreements can be effective only when the threat of outside competition is eliminated or reduced. Antitrust policy could be given the task of preventing such private restrictive practices, but if our previous conclusions on this point are correct, the best policy would be to do away with the restrictive regulation. The direct disadvantages of restrictive regulation would be eliminated along with the private restrictive practices and an active antitrust policy would no longer be needed.

11. So far, we have not considered the case of scheduled carriers. We have indicated in Chapter VIII that scheduled carriers may be subject to significant economies of scale, and that for other reasons as well (the possibility that schedule competition is unstable) unregulated competition among scheduled carriers may not ensure economic efficiency. This does not imply there is no competition in the scheduled carrier market. For one thing, there is no reason to assume that the economies of scale are such that economic efficiency always requires the concentration of all scheduled services for a particular network in one firm. The case of scheduled airlines shows that competition among scheduled carriers is in principle quite possible, although some regulation of schedules (and hence of entry) may be needed to prevent instability.

---

\(^1\) This seems to be one of the forces that maintain the very strong restrictions imposed on the road transport industry in South Africa.

\(^2\) The point has been made by W. Hughes in "Aspects of Motor Carrier Regulation," Canadian Transportation Research Forum Papers, 1965.

\(^3\) See footnote \(^2\), previous page.
12. One of the most effective means of inducing economic efficiency in scheduled carriage would be to introduce as much effective competition as possible by a flexible licensing policy. 1/ Competition from unscheduled carriers may be another effective spur to the economic efficiency of scheduled carriers. We have argued on theoretical grounds that aid to scheduled carriers, which is desirable from a welfare-economic point of view, should not take the form of restrictions imposed on their competitors. 2/ If there is no restrictive regulation of unscheduled carriers, there would be little danger of collusion between them and the scheduled carriers. If for some reason the unscheduled carriers are restricted, an active antitrust policy to prevent collusion might be needed, although a relaxation of the restrictive regulation itself seems far more effective and appropriate. The argument is entirely similar to that presented in para. 10.

13. Even with these safeguards there may still be special cases—"thin" markets or corners in the market—where scheduled carriers enjoy a virtual monopoly. In such cases regulation, e.g. maximum prices, may be the only means of preventing undesirable restrictive practices, especially in the form of excessively high prices. 3/

14. We conclude that antitrust policy has a rather limited function in the road transport industry, provided restrictive regulation does not stand in the way of effective competition. The best antitrust policy is a policy of deregulation. In the absence of restrictive regulation, there may be a place for active antitrust policies in two special cases: scheduled carriers and terminals. If, however, restrictive regulation is retained, even at the risk of creating monopolistic market structures, an active and comprehensive antitrust policy may be needed in the road transport industry to prevent private restrictive practices. Economic analysis would point towards the simpler and probably more effective solution of relaxing the restrictive regulation.

2. Information Policies

15. Competition can operate effectively only when sufficient information is available to users and producers. As we have noted, the road transport market is relatively complex, since the services are strongly differentiated with respect to routing, timing, speed, reliability, comfort, and so forth, and because prices tend to vary rather markedly over time due to the variability of demand and the nonstorability of transport services.

1/ See Chapter VIII, section 5, and Chapter X, para. 59.

2/ See Chapter X, section 2.

3/ It may be recalled, however, that in the great majority of cases, the overriding problem of the scheduled carriers is their weak economic position rather than excessive market power.
Special provisions may therefore be needed to ensure the market is transparent enough that users can make short-term and particularly long-term decisions (on storage facilities, location, transport on own account) with full knowledge of the relevant facts. Carriers need to be able to make long-term decisions on investment in vehicle capacity, including decisions on entry.

16. We have noted that a lack of sufficient information may seriously impair the efficiency of unregulated competition. 1/ We may repeat the observation made in the same context, that regulation is no substitute for information. If regulatory policies are to promote economic efficiency, precisely the same kind of information is required as for an efficient operation of the market without public regulation. Users and the carriers will still require sufficient information even with regulation, unless it is so strict as to virtually freeze the market into an imposed pattern of prices, output, and investment. The latter is highly unrealistic, clearly undesirable, and in fact impossible to achieve considering the inevitable fluctuations of quality, or, with imposed physical standards, the fluctuations of availability. The only point at issue is the effective dissemination of information: the higher the transparency that can be achieved, the less justification there is for regulation to correct private decisions.

17. For the carriers, it would seem quite possible to achieve enough transparency to ensure a pattern of decisions that is on balance at least as efficient as would be obtained through public regulation. It should be remembered in this context that decentralized decisions of individual operators are made with the advantage of specialized knowledge about local circumstances, special requirements of certain users, and particular conditions prevailing temporarily in specific submarkets. This type of specialized local knowledge is especially important in transport, with its many submarkets and its variable demand and supply conditions. It is much easier for the public authorities to pass down information on systematic and general market tendencies, which they are well placed to obtain, than to pass up information on such specific, highly diverse, and often very variable data which only the individual carriers can effectively observe and translate into timely action. Consequently, there is a very strong general case for an active policy of information to the carriers. In the road transport industry this policy would appear to be far superior to regulatory policies. Regulation inevitably creates inefficient rigidities: it is simply not very practical for carriers to transmit information to the authorities, who then must formulate and impose fully adapted regulatory measures on the individual carriers.

18. We have already indicated the major methods of information that are available. 2/ One is the regular publication of data on systematic

---

1/ See Chapter X, section 1, passim.

2/ See Chapter X, section 1.
tendencies in transport: seasonal indices, trends, and perhaps cyclical developments. A complementary method is the organization of open markets: freight bureaus, clearing houses, etc. 1/ We need not go into the practical details to conclude that these measures are perfectly feasible and effective.

19. To a large extent, these comments apply to the decisions and the information of users as well. However, the amount of information that can be absorbed by a small individual user (occasional passengers, small consignments) is necessarily limited. In those cases, full flexibility of prices may confuse the user's understanding of the underlying pattern of prices, which might induce incorrect long-term decisions. A certain rigidity of prices, in the form of preannounced rate schedules, may be preferable in order to avoid such errors, even if it involves a cost in less than fully efficient short-term decisions. We have discussed the matter already in the context of the scheduled carrier problem. 2/ Our general conclusion is that active information policies are very important to the efficient operation of the road transport industry and are preferable to regulatory measures designed to correct the consequences of inadequate information.

1/ Quite a few authors maintain that the organization of clearing houses is the only measure needed to achieve an efficient organization of the road transport industry. See Chisholm, "Economies of Scale in Goods Transport? Off-Farm Milk Collection in England and Wales."

2/ See Chapter VIII, section 2, especially para. 8; and Chapter X, section 1-e.
XV. SPECIFIC TAXES AND SUBSIDIES

1. Specific taxes and subsidies may be offsetting in the sense that they are designed to correct distortions of factor or output prices, like fuel taxes in the absence of road pricing. A second purpose of specific taxes and subsidies is to regulate competitive relationships among carriers, given that factor and output prices are efficient. An example is a subsidy to scheduled carriers to compensate them for keeping unremunerative standby capacity. The road transport industry may also be subjected to specific taxes for general revenue purposes (local, regional, or national).

1. **Offsetting Taxes and Subsidies**

2. Specific taxes and subsidies are in general the most appropriate means to correct distortions of factor or output prices, because they tend to restore efficient prices. In fact, when they serve this purpose, specific taxes and subsidies may often be interpreted as economic prices, pure and simple. Obvious examples are taxes that take the place of prices for road usage, and subsidies which serve as payment for public service obligations. Essentially the same holds for taxes that serve as payment for external damages like air pollution, or as a correction of undervalued imports. Offsetting taxes and subsidies are generally preferable to other methods of correcting external distortions, because such other methods do not restore efficient pricing and will usually create secondary distortions. An example is restrictive licensing of road transport: it does tend to push up prices of road transport services, but hardly in any systematic relationship to proper road pricing. At the same time, it tends to distort relations between types of vehicles and road users.

3. There are obviously cases in which the appropriate offsetting taxes or subsidies are very difficult to determine, but the same holds a fortiori for any other method of correcting the same external distortions. Objecting against offsetting taxes on the grounds that they are difficult to determine, while accepting a rough and ready alternative, only reveals inconsistent thinking or at best a tendency to follow the line of least political resistance. A valid case for other methods can be made only if it is shown that offsetting taxes or subsidies cannot, or cannot at reasonable cost, be applied as effectively and selectively as the other methods. Certain physical restrictions such as rationing the use of road space by restricting parking on certain streets at certain times, or prohibiting air pollution beyond a certain limit can be justified on this basis. But such measures can easily be carried too far, as the lack of serious road pricing efforts so clearly demonstrates. The general case for correct pricing, and hence for offsetting taxes and subsidies rather than physical measures, is very strong. It would be helpful if the burden of proof could be imposed on those who advocate other policies.

4. We note in passing that specific taxes and subsidies serve as economic prices only for the road transport industry, i.e., only for one side of the market. For example, a subsidy which compensates for public
service obligations, imposed for extraneous policy objectives such as agricultural protection, may restore the proper price to the transport industry, but it will not eliminate the distortion in users' decisions. Since this distortion is inherent in the use of public service obligations to fulfill extraneous policy objectives, it cannot be considered a disadvantage of compensating subsidies themselves, but rather of employing indirect policy instruments (low transport rates for farm products) rather than direct methods (agricultural subsidies). 1/

5. Difficulties of varying degree often arise in determining and applying the efficient offsetting taxes and subsidies. The costs of collection may be high when the taxes are strongly differentiated. The problem is then to find the optimum compromise between these costs and the cost of less than fully efficient pricing. Road pricing is one area where such a compromise will have to be found. But these practical problems do not establish a case against offsetting taxes and subsidies, unless other methods are shown to be superior in all respects: effectiveness, cost of application, and secondary distortions.

6. We cannot go into the many conceptual and practical problems associated with each of the many types of offsetting taxes and subsidies. 2/ We note, however, that it is all too easy in practice to abuse the system, i.e., to hide extraneous objectives under the cover of offsetting taxes and subsidies. Examples of such abuse are legion, both of taxes and of subsidies. Taxes on road users are often justified as road pricing, even when they are clearly excessive for that purpose; subsidies to the railways are rationalized as compensation for public service obligations, even though the same services would have been produced with a lower subsidy, and so forth. In many cases, the hidden objectives may be quite respectable and may even be good economics, but this roundabout approach to them surely does not contribute to a coherent, democratic determination of priorities in the public sphere, nor to a rational choice of instruments. Far more objectionable and harmful are the instances of abuse, when taxes or subsidies presented as promoting economic efficiency in fact only favor certain private interests at the expense of others, with no underlying social consensus on their equity. 3/

1/ See Chapter XIII.

2/ On the question of road pricing alone it would take a lengthy paper just to review the literature and empirical research. It must suffice to refer the reader to the excellent recent study by Walters, The Economics of Road User Charges.

3/ Examples range from the special tax on own-account transport in Germany, based on the incorrect theory that private transport enjoys an unfair competitive advantage vis-a-vis public transport (see para. 20 below), and the vexatious local taxes on transport in India, to the taxes, or rather kickbacks, levied by regulatory agencies and marketing boards.
7. There are several possible ways to reduce the danger of such abuse. Firstly, the tax or subsidy should be linked as closely as possible to the activity it is restricting or stimulating, so that it is clear how much is being levied or appropriated and for what purpose. This implies, for example, that aid to depressed regions should be granted in the form of direct subsidies (e.g. fiscal incentives) rather than low transport prices enforced by imposing public service obligations on the carriers. 1/ Secondly, the public authorities should be required to justify the proposed rates of the offsetting taxes and subsidies with quantitative estimates. This could serve as an effective political check against abuse. Thirdly, the proposed schemes should be subjected to the test of nondiscrimination. For example, a tax on imports for balance-of-payments purposes does not in itself justify discrimination between different types of imports. The same would hold for taxes imposed on account of air pollution.

8. Finally, an effective check against abuse can in some cases be imposed by channelling the revenue from offsetting taxes to the specific purpose of the tax. For example, the revenue from road taxes could be earmarked for road expenditure, and the revenue from pollution taxes for pollution control. Similarly, subsidies could be financed as much as possible by levies on those who benefit (local taxes to finance the compensation for local public service obligations).

2. Regulatory Taxes and Subsidies

a. Subsidies

9. We have found only two major arguments for subsidies to road transport, apart from offsetting subsidies. In the first place, economic efficiency may require subsidies to scheduled carriers to enable them to maintain adequate stand-by capacity in case two-part pricing schemes are not practicable. In the second place, subsidies may be granted to compensate the carriers for other public service obligations imposed on them for extraneous policy purposes (this also applies primarily to scheduled carriers). We have argued that the imposition of public service obligations for extraneous policy purposes is in general inferior to other, more direct measures, but there may be cases when the latter are not feasible in practice or are politically unacceptable. 2/ In both cases, it is extremely difficult in practice to determine the correct amount of the subsidy, and in particular to avoid covering up inefficiencies of operation and management or inducing overextension of scheduled services. One way to guard against such inefficiencies would be to grant and renew the subsidy on the basis of periodic open bidding for public service contracts. 3/

1/ See Chapter XIII.
2/ See Chapter XIII.
3/ See Chapter X, section 2, especially paras. 56 and 59.
b. Taxes

10. Restrictions, whether in the form of taxes or other devices, are far more prevalent than subsidies. It has been argued that, if for any reason restriction is desired, a general, nondifferentiated tax would be the most appropriate instrument. 1/ Disregarding at this point the problem of defining the appropriate tax base, we may note that the tax instrument would indeed appear to present a number of advantages, in particular as compared to quantitative licensing systems. 2/

(1) The tax instrument tends to exclude the least efficient firms, and to admit outsiders who can achieve above-average returns by special effort, ability, or innovation. As a consequence, it tends to be far more dynamic than quantitative licensing systems that generally will not and cannot effectively discriminate between firms on that basis. In fact, they often show a bias in favor of established firms, as evidenced by "grandfather rights" and other such clauses and practices. 3/

(2) Since no administrative discretion is involved, there is no danger of arbitrary decision, favoritism, or corruption.

(3) It does not involve the free gift of a possibly quite valuable asset (the license) to the licensee, nor the unfair discrimination against outsiders.

(4) Unlike most licensing systems, it does not impair the efficient utilization of capacity, since the tax does not restrict the carrier to a particular submarket (as defined by region, route, commodities, etc.).

We note that these points are similar to the familiar case in the context of international trade for tariffs rather than quotas as instruments of import restriction.

1/ Cf. Kolsen, Road-Rail Competition, Chapter 12, and Munby, "The Economics of Road Haulage Licensing."

2/ For a definition of quantitative licensing systems, see Chapter XVII, paras. 1-4.

3/ The exorbitant market prices paid for licenses in some countries (on the black, "grey", or "white" market, depending on the legislation concerning transfer of licenses) is an indication of the highly restrictive tendencies of quantitative licensing. On this point, see Chapter XVIII, section 2, especially para. 23.
11. These advantages of the tax instrument are important and real, but our presentation is oversimplified and overstated. It rests on the assumption that the purpose of regulation is simply to restrict road transport, though we know from our discussion in Part Two that this need not be the case. The objectives underlying restrictive regulation of road transport are in fact very complex and diverse, and each may require a different specific measure. Without again going into the merits of the many possible objectives of restrictive regulation, we briefly review the main categories and their associated policies.

12. In the first place, regulation may be designed to protect other carriers (scheduled road carriers, railways). We have argued that the restriction of nonscheduled road carriers is less efficient than other methods such as two-part pricing or public subsidies. 1/ However, if these other methods are for some reason excluded, there is no alternative to imposing restrictions on the nonscheduled road carriers. In that case, taxes have all but one of the above-listed advantage over licenses: to prevent unnecessary restriction of road transport, the tax should not be applied uniformly, but only to those road transport services that are in fact competing with the carriers to be protected.

13. A second possible objective of regulation is to raise the incomes of road carriers. A tax is clearly an ineffective instrument for this purpose, whereas restrictive licensing is effective. 2/ Finally, restrictions may be imposed to compensate for external price distortions (inadequate road pricing, air pollution). In this case, taxes are preferable to licensing as we have shown in the previous section. But the offsetting taxes should clearly be specific with respect to the external price distortions to be offset; in other words, a corrective road tax should be applied specifically to congested roads. We conclude that taxes are indeed superior to licensing as an instrument of restriction, except if the objective is to raise carriers' incomes, and that in all cases, the tax should not be uniform, but should be appropriately differentiated.

14. This last comment may at first seem to invalidate one relative advantage of taxation over licensing mentioned above, that taxes do not impair the efficient distribution of capacity among different submarkets. But even if restriction by taxes requires differentiation, it still has the advantage of greater flexibility. If a temporary scarcity develops in a highly taxed market, the price will tend to rise, attracting carriers from other submarkets who can now operate profitably even with the tax. The flexibility of movement among submarkets clearly contributes to economic efficiency, even though full efficiency cannot be attained because

1/ See Chapter X, section 2.

2/ For a critique of the objective itself, based on its inherent ethical inconsistency, see Chapter XIII, section 1.
of the differentiated tax rates. A licensing system can hardly be as flexible and does not permit the highly useful short-run "arbitration" between submarkets; therefore, it is inferior to taxation on this count.

15. One last point remains. It can be argued that in practice taxes cannot be differentiated as effectively as licenses. For example, experience shows that is quite feasible to apply a system of restrictive licensing to those specific categories of road transport services that compete directly with the railways; a license can be required for certain routes, for distances beyond the short-haul, or for certain classes of commodities. It might well be more difficult to effectively apply a system of differentiated taxes.

16. Whether or not the argument is correct in fact, it is largely irrelevant. A specific tax on certain types of services may be impracticable, but this does not exclude a payment for the right to perform certain services, defined by route, region, distance, commodities carried, and so forth. If it is possible to subject these specific services to licensing, it is also possible to sell the licenses at a market-clearing price on the open market, which in effect turns the licensing scheme into a tax scheme. In order to avoid semantic confusion on this point, we speak of quantitative licensing when we wish to exclude licenses that have the economic effects of taxes. 1/ The tax has all four advantages over quantitative licensing mentioned above. In particular, it is more flexible, especially if licenses can be bought for short periods of time, permitting the temporary overflow of capacity from one submarket to another.

17. We are led to conclude that taxes are in general superior to quantitative licensing as an instrument of restrictive regulation in the road transport industry. This leaves us with a number of questions regarding the type of tax or taxes to be employed: taxes on fuels, on vehicles, on particular attributes of vehicles such as weight per axle, on ton kilometers and passenger kilometers, on revenue, etc. The choice will depend on the objectives to be served. For example, the offsetting taxes appropriate to replacing road pricing will be entirely different from taxes designed to protect the railways. Practical feasibility and costs of application and enforcement will also influence the choice. The determination of the tax scheme that represents the best feasible compromise between the objective(s) to be served and the cost of applying and enforcing the tax is a problem we cannot here discuss in depth. But

1/ Note that the difference between quantitative licensing and restriction of entry by taxation in the form of permit fees is not just the payment of a license fee, for quantitative licensing often involves the payment of a fee as well. The essential difference is that the tax system allows anyone to purchase as many licenses as he wishes at the going rate, whereas quantitative licensing imposes certain limits on the number of licenses to be issued.
these problems do not detract from our conclusion. With the exception of raising the incomes of established carriers, anything a license can do, a tax can do better. Any restrictive licensing system can be upgraded into a tax system by selling the licenses on the open market. The resulting gain in economic efficiency will be greater if licenses can be bought for short as well as long periods, which will permit capacity to adapt to short-run variations in demand by allowing the overflow of capacity between separately regulated submarkets. 1/

c. The Tax Base; Private and Public Transport

18. One of the most difficult problems in regulatory taxation, as in offsetting taxation, is defining the appropriate tax base. 2/ The tax can be imposed per vehicle, per unit of capacity, per vehicle mile, per ton mile or passenger mile, as a proportion of gross receipts or net revenue, etc. Moreover, one must consider whether private transport should be included and, if so, on what basis. As always, the answers to these questions depend primarily on the purpose the taxation is to serve. If we disregard the external price distortions, which would carry us into the area of offsetting taxation (road pricing, etc.), we are left with rail protection and the protection of scheduled road carriers as the main objective of regulatory taxation. Given this objective, the structure of the tax should be designed to minimize the distortion to other economic relationships.

19. The most appropriate tax base would seem to be the market value of the service performed. 3/ Such a tax on gross receipts (sales tax) imposed on nonscheduled road transport serves to favor the railways and the scheduled road carriers without introducing any distortion in other economic relationships. In particular, it is neutral with respect to types of vehicles, patterns of vehicle utilization, efficiency of the firm, and other factors not related to the purpose of the tax. The tax might be differentiated according to whether the services to be taxed are directly competitive with the services of the carriers to be protected, as already discussed above. It is clear that in principle the same tax should be imposed on transport on own account and private automobiles.

1/ A similar case is made by Hughes in "Aspects of Motor Carrier Regulation": "The preferred method of entry control is the rationing of permits by taxation, or permit fees...." We need not agree with the author's defense of entry control to support his arguments in favor of taxation rather than quantitative licensing as an instrument.

2/ With reference to offsetting taxation, see Chapter XII, especially the difficult problems associated with road pricing (section 1-a).

3/ Cf. Kolsen in Road-Rail Competition, pp. 177-9, who argues that a ton-mile tax is preferable to a vehicle tax as proposed by Munby in "The Economics of Road Haulage Licensing."
Since gross receipts are not available as a tax base, one might approximate fiscal neutrality between private and public transport by taxing the former at the same rate, but on the basis of cost rather than receipts.

20. It is often argued that private transport should be subjected to a specific tax to correct an alleged distortion of competitive relationships between private and public transportation. 1/ Supposedly, shippers use private transport to carry their base load and shift their peak loads onto the public carriers, thereby placing the latter at an unfair competitive disadvantage. Such non sequiturs may be good politics but they surely do not make much economic sense. Both types of carriers have an equal competitive advantage with respect to the base load. The public carrier has a clear competitive advantage with regard to peak loads: while the private carrier would have to charge the entire cost of extra required capacity to his own peak loads, the public carrier may be able to use extra capacity in other operations. The only case in which such a tax on private transport might be justified is when public carriers cannot charge adequate peak-load prices yet must hold sufficient capacity for these peak loads. This is the case of the scheduled carriers which we discussed at great length in Parts One and Two. While this case may justify a tax on private and nonscheduled public transport alike, it can never be invoked in favor of a discriminating tax on private transportation. 2/

3. General Revenue Taxes

21. We have implicitly touched on problems of public finance in Part Two, when we said that a policy of granting public subsidies to scheduled carriers may run into practical difficulties due to budget constraints. 3/ We mentioned that the question tends to be particularly serious in developing countries, since sources of general revenue may be quite limited. By implication, it could be argued that transport is one of the few practical objects of general revenue taxation, and that taxes on transport should be accepted for general revenue purposes. 4/ We cannot seriously examine the

1/ The general economic problems associated with competition between private and public carriers have been discussed in Chapter X, section 4.

2/ Such a tax might be proposed as a substitute for minimum prices, which cannot be applied to private transportation. See, however, Chapter X, section 2-a where we reject this argument.

3/ See Chapter XI passim.

4/ Import duties and excise taxes on vehicles, parts, and fuels do in fact play an important role in many developing countries. For some detailed figures, see Prest, Transport Economics in Developing Countries, pp. 83-91.
issue without going rather deeply into the theory of public finance and its application to specific sectors such as transport, and without going into the practical problems of taxation in different types of economics. Since this is clearly out of the question in the context of this paper, we will limit the discussion of the problem to some general comments based on general economic considerations.

22. The first general proposition concerns the structure of the tax. If transport is to be subjected to specific taxes for general revenue purposes, the taxes should be as neutral as possible: they should not discriminate among alternative techniques (road vs. rail, heavy vs. light vehicles, for-hire v. private transport), nor among submarkets (defined by region, route, distance, commodities carried). Tax neutrality in this sense implies that the relative prices of different transport services should not be affected by the tax. A first approximation of the appropriate tax would appear to be a simple uniform percentage levy on total sales. Alternatively, all factor costs (fuels, vehicles, labor; fixed equipment in the case of the railways and road prices in the case of the roads) could be taxed at a uniform rate.

23. The problem becomes conceptually far more difficult when it is not feasible to tax sales or cost, and physical units must be taxed: units of service, however defined, units of capacity, or units of other factor inputs. Since the whole question of general revenue taxation is outside the scope of this paper, we can only mention these problems without attempting to solve them. We note, however, that most existing specific taxes on road transport, such as fuel taxes and vehicle taxes, certainly do not satisfy the conditions of tax neutrality.

24. The second general proposition concerns the manner in which the tax is levied. Methods which impose a high cost either on the public authorities or on the carriers are clearly inferior to methods which involve lower social costs, assuming the revenue and the economic impact of the taxes are equivalent. From this point of view local levies, such as the Indian octrois, are particularly undesirable. A review of actual tax procedures would undoubtedly reveal a great number of other instances in which the efficiency of the tax can be improved without losing revenue and without affecting the economic impact of the tax. While we cannot here elaborate on these problems of fiscal administration, they should be given close consideration in any practical review of road transport regulation.
XVI. RATE REGULATION

1. We shall examine the different forms of rate regulation in section 4 of this chapter, but we shall first briefly review its avowed purposes as derived from the objectives discussed in Part One. Rate regulation will serve either as a ceiling or as a floor to free market prices. If we take the two traditional arguments for rate control, namely, excessive rates in monopolistic situations and uneconomic rate cutting in case of excessive competition, the former would imply a need for maximum prices, and the latter would require minimum prices. The two functions of rate control are quite distinct and we therefore discuss them separately: maximum rates in section 1 and minimum rates in section 2. The special problems of rate control in the case of scheduled carriers will be examined in section 3.

2. The distinction of maximum and minimum rate regulation does not necessarily imply that the two should never be applied simultaneously. In practice they often are, either in the form of fixed tariffs which permit no deviation in either direction, or in the form of bracket or fork tariffs that allow prices to vary only within the prescribed margin. Such two-way price limits may sometimes be simply a political device, which makes it possible to present the tariff as a fair compromise between the conflicting interests of carriers and shippers, even though in fact only one-half of the tariff has any operational significance. 1/ There may also be valid economic reasons for two-way price control, though at first sight this appears unlikely because the purposes of maximum and minimum rates are associated with mutually exclusive market structures, one of insufficient and the other of excessive competition. Let us begin with a brief examination of the general argument for two-way price control based on the objective of stability.

3. We have discussed the economic merits and drawbacks of rate stabilization at some length in Chapter X, where we came to the conclusion that its merits are few and its drawbacks many. 2/ On the one hand, stability is an emotive term which suggests the absence of undesirable instability, though in fact it often means an inefficient rigidity of prices. To the extent that rate control is effective, it will necessarily lead to a disequilibrium in a competitive market between demand and supply which will manifest itself as excess demand, or as underutilization.

1/ See the proposals for a bracket-tariff system worked out in the European Economic Community and the Critique of this system in Allais, et al., Options in Transport Tariff Policy, Chapter 32, and in C.J. Oort, "Bracket Tariffs - The Proposed System of Rate Regulation in the European Economic Community," Transportation Journal, Fall 1967, pp. 29-34.

2/ See Chapter X, section 1-e.
of capacity. This in turn leads to a deterioration of services (in particular, delays) or wasted capacity. On the other hand, the costs of perfect adaptation of prices to each and every change in demand conditions will sometimes exceed the benefits, particularly in the market of scheduled services. But in such cases it is in the interest of the carriers themselves to limit the flexibility of prices. Consequently, there would seem to be little or no case for public rate control in order to enforce stability or rigidity of transport prices beyond that brought about by the market.

1. Maximum Rate Regulation

4. The traditional arguments for maximum rates in transport are twofold. It is said that free market prices may be excessive either because of monopolistic elements in the market, or because of temporary deficiencies in supply. In the absence of severe quantitative entry restrictions, the former is very unlikely to occur in the road transport industry, except possibly in the special case of very "thin" markets and of scheduled carriers. If entry into the road transport industry is severely restricted, it would clearly be inconsistent for the public authorities to impose maximum rates to contain the inevitable effect of such restrictions on prices. The appropriate policy would be to relax the restrictions themselves. Consequently, the first of the traditional arguments for maximum rate control does not really apply except possibly in the special case of the scheduled carriers, to be examined in section 3.

5. The other argument is of equally limited relevance. In a competitive market, temporary deficiencies in supply - which in road transport are usually due to temporary peaks in demand - will indeed be reflected in relatively high prices. But maximum rates are not justified unless it is proved that the adaptation of prices to prevailing scarcities is somehow more harmful than the effects of maximum rates: excessive deterioration of quality (especially delays) and/or shortages requiring physical rationing with its attendant inefficiencies and inequities. We have already discussed and rejected the latter proposition in the more general context of rate stabilization. 3/

1/ See Chapter VI, section 1, Chapter VII, section 3, and Chapter VIII, section 2.

2/ Chapter XIV, section 1, (paras. 10-14). The same position is held by the Royal Commission on Transportation (Canada), which argues that there should be no maximum rates for trucking unless entry is limited, and that "...the remedy for limited entry is regulatory relaxation." (Vol. II, p. 114).

3/ See Chapter X, section 1-e.
6. Maximum rate regulation might also be employed to promote certain objectives of social, regional, or sector policy. We have argued in Chapter XIII that rate control is neither an efficient nor an effective means of promoting such extraneous policy objectives. It is not efficient because it introduces distortions in transport which other more direct means of attaining the objectives do not produce. It is not effective because in a competitive market such as the road transport industry the imposition of maximum prices will inevitably lead to a reduced volume of output or a lower quality of service.

7. These effects could be offset by compensating the carriers for the loss of revenue resulting from the maximum prices. But compensation for public service obligations encounters other difficulties. Economic theory and practice show it is very difficult to find correct, operational criteria for such compensation. The theoretically correct compensation would have to be based on the difference between the imposed tariff and the notoriously elusive and volatile efficient price. Various measures have been proposed, such as differential cost, "fully distributed" cost, and "normal" rates on comparable services. None of these are very satisfactory and all tend to produce some distortions in transport. In any case, once the idea of compensation is accepted, it is hard to see why the funds involved should not rather be used to directly subsidize the groups (regions, sectors) concerned. Once more, we come to the conclusion that rate control is not an appropriate instrument to achieve extraneous policy objectives.

8. Maximum prices as instruments of anti-inflationary policy have also been discussed in Chapter XIII. We reached the conclusion that, whatever the merits and drawbacks of price policy as such, there is no economic justification for singling out road transport for anti-inflationary price control. The road transport industry can hardly be considered an inflation leader. Unlike the monopolistic industries, it is not in a position to autonomously set in motion or strengthen an inflationary process by the cost-push mechanism, and will tend to follow inflationary developments of whatever type just like any other industry. When the industry or certain parts of it (e.g. scheduled carriers) are already subjected to price control for other reasons, it may be administratively convenient to turn these controls to macroeconomic use. Moreover, it may be very difficult politically to grant price increases to regulated sectors when the economy at large is subjected to some form of price control. But it is precisely in these cases that the merits of price control as an anti-inflationary device are particularly dubious. The resulting losses to the carriers will usually have to be offset by public subsidies whose inflationary effects may well cancel out the benefits of a lower price.

9. Moreover, anti-inflationary price control in practice takes the form of freezing prices at a preexisting level. Even if some corrections are allowed, the method inevitably implies that the structure of prices is also frozen. This is especially harmful in dynamic sectors such as the road transport industry, where efficient prices are highly variable.
10. In conclusion, the case for maximum prices in the road transport industry appears to be based on rather weak economic foundations, with the possible exception of the special case of scheduled carriers, to be considered in section 3. Each of the alleged purposes can be served more efficiently and often more effectively by other means. Maximum prices tend to produce secondary distortions, and may even affect the road transport services themselves by lowering the quality of output. Moreover, it is in most instances very difficult, if not impossible, to establish operational criteria for maximum prices that make any economic sense.

11. Finally, effective control of maximum prices is very difficult outside the area of scheduled carrier services. The large number of carriers and of different services complicates tremendously the effective policing of maximum rates, while in many cases both parties will have an incentive to disregard the maximum price, the carrier wanting higher revenue and the shipper higher quality service, especially in terms of priority. Experience in many countries, including some with highly developed administration, shows clearly that under these conditions it is virtually impossible to prevent widespread evasion.

2. Minimum Rate Regulation

12. The alleged tendency towards excessive competition in the road transport industry is supposed to lead to prices which are too low for some or all the objectives discussed in Part Two. The principal reasons advanced for minimum rate regulation are: to prevent prices from falling below the efficient level, to protect scheduled road carriers and the railways, and to improve the incomes of road carriers. The objectives themselves as well as the function of minimum price regulation in achieving them have already been discussed at various points throughout Part Two. The following discussion will serve mainly to bring these points together.

a. Economic Efficiency in Road Transport

13. It is a conventional wisdom of transport economics that no service should be supplied at a price below its marginal social cost and that therefore a minimum price equal to marginal social cost is required to ensure economic efficiency. The discussion usually centers on whether marginal cost should be interpreted as short-run or long-run marginal cost. The issue has become so thoroughly confused that it may be useful to repeat a few of our theoretical findings on this point to place the discussion in the proper perspective.

14. To begin with, let us eliminate the problem of external price distortions and external effects. Minimum prices are clearly a very inappropriate method of correcting the prices of road transport services for deficiencies of, for example, road pricing. 1/ Secondly, long-run

1/ See Chapter XII, section 1 and Chapter XV, section 1.
marginal cost is a completely useless concept for transport and other products which do not satisfy a number of special conditions.\footnote{1} Thirdly, marginal cost is not something one can calculate once and for all from variable cost elements. It normally also includes either a marginal rent or a marginal cost of quality deterioration, both of which depend entirely on the level of demand relative to available capacity.\footnote{2} Finally, the logic of the conventional wisdom is faulty: the fact that prices should not fall below marginal cost surely does not imply the need for a corresponding minimum price, unless it is shown that the market would otherwise tend to establish prices below that level.

15. On all these counts, the case for minimum rate control to promote economic efficiency collapses. A carrier might accept business at prices which include little or no remuneration of durable assets, but it is hard to conceive of anyone producing at prices below marginal operating costs. A price floor at that level neither is useful nor makes any economic sense, because efficient prices are normally far higher than marginal operating cost. Minimum prices equal to the efficient prices are also useless, because the market is a self-regulating mechanism which tends to keep prices at the efficient level, as defined in Part One.\footnote{3} They are also completely impracticable, because they would have to include the marginal rent elements (or the marginal costs of quality deterioration) which depend on demand. Given that the demand for transport services is highly variable over time, minimum price regulation would have to be highly complex to avoid the economic inefficiencies which result from an insufficiently differentiated system of minimum prices. In practice, the minimum prices would inevitably be too high at some times, and would therefore cause inefficient underutilization of capacity.

16. Market prices are often judged to be too low, not with respect to the criterion of economic efficiency set out in Part One, but in the sense of affording an insufficient return on investment. Emotive terms such as "predatory pricing" should presumably be interpreted in this sense.

\footnote{1}{The only way to make any economic sense of long-run marginal cost is to define it as the efficient price of output (i.e., marginal operating cost plus either a marginal rent or the marginal cost of quality deterioration) such that, if the price and the utilization of capacity were constant over time, discounted revenues would just suffice to remunerate the variable and the durable assets and to provide a net income that induces neither net withdrawals from nor net entries into the industry. Considering the underlined condition, the concept is obviously of no relevance to industries such as transport in which demand varies greatly over time.}

\footnote{2}{See Chapter III.}

\footnote{3}{See Chapter IV.}
In fact, the problem has nothing to do with pricing as such, but with investment. Once a certain capacity is available, aggressive pricing which ensures its optimum utilization is perfectly efficient from a general economic point of view. If capacity is judged to be excessive in the sense that the resulting market prices afford an insufficient return on investment as compared to alternative investment opportunities, the problem is not inadequate pricing, but excessive investment in the road transport industry. We have argued that the issue of excessive investment is hardly relevant to modern economic conditions. But even if for the sake of argument we admit excessive investment, minimum rate regulation remains a completely ineffective policy instrument. Without restrictive regulations of investment, minimum prices in excess of the efficient prices will aggravate not only the underutilization of existing capacity but also the underlying problem, by inducing additional investment. Given that transport firms are satisfied with a certain prospective rate of return, a minimum price which exceeds the efficient price will induce additional investment until the rate of return has been reduced to the original level through lower capacity utilization. With restrictive regulation of investment, minimum prices are useless, since the market will push prices up because of the ensuing scarcity of capacity.

b. Protection of Scheduled Road Carriers and the Railways

17. Minimum prices which exceed the efficient prices of road transport services may serve to protect scheduled road carriers and the railways. We have argued that such protection may be justified on economic grounds, but that restrictions are a comparatively inefficient means of achieving the objective. It raises the price of all transport services, while economic efficiency requires only that the scheduled carriers be enabled to operate without a loss at efficient prices and efficient levels of capacity. Two-part pricing and public subsidies are better methods of protecting the scheduled road carriers and the railways. If these instruments are not available, because, for example, two-part pricing is considered impracticable and budgetary constraints do not allow the extensive use of subsidies, the next best policy would be to impose a tax on the unscheduled road carriers, possibly in the form of license fees. Although inferior to the other instruments, because they raise the level of transport prices above their efficient level, such taxes avoid many of the other drawbacks of minimum prices that we have mentioned before.

1/ See Chapter X, sections 1 and 3-a.

2/ Obviously, the restrictions will only raise the average level of prices, but will not prevent prices from occasionally falling to a low level. The latter may be judged undesirable for other reasons (see para. 20 below), but it does not stand in the way of an adequate return on investment, which is the sum of all discounted net revenues earned during the entire economic life of the assets concerned.
particular the insensitivity to market conditions and the tendency to produce inefficient underutilization of capacity. 1/

18. The need to impose minimum prices on the scheduled carriers' competitors is often based on the charge that otherwise, competitors would engage in "predatory pricing" and that they would tend to "cream off" the scheduled carriers' more remunerative traffic. We have argued that this proposition is true only to the extent that the scheduled carriers are forced to hold nonremunerative standby capacity, and that the appropriate policy is not the restriction of competitors, but two-part pricing or subsidies. "Creaming off" is highly desirable as a correction of inefficiencies or discriminatory pricing by the scheduled carriers. There is surely no economic justification for protecting such practices by penalizing the users. Moreover, a minimum price imposed on the scheduled carriers' competitors would inevitably induce the overexpansion of transport on own account, which cannot be subjected to minimum prices. This could in turn be counteracted by imposing a special tax on private carriers, but once the idea of a regulatory tax is accepted it would be far better to apply it to all nonscheduled carriers indiscriminately, which brings us back to the solution presented in the preceding paragraph.

c. Improvement of Road Carriers' Incomes

19. For reasons presented above, minimum prices alone cannot, in the long run, effectively raise carrier incomes. Given free entry, carriers will be attracted into the industry until net incomes are reduced to the level which existed before minimum prices. Consequently, minimum prices must necessarily be supplemented by restrictive regulation of entry or capacity. The issue then becomes whether minimum prices can improve the incomes of road carriers if they are superimposed on a system of entry or capacity control. It would clearly not be rational as a means of raising the level of carrier incomes in the long run, since the market will itself push up prices when capacity is restricted. 2/

1/ See Chapter X, section 2, Chapter XI, section 3, and Chapter XV, section 2.

2/ This conclusion might have to be modified in the case of a structural decline in demand (or a rapid technological improvement in the face of a slow rise in demand), coupled with limited mobility out of the declining industry into other occupations, a situation we find in agriculture, for example. Under these conditions, and given a sufficiently low price elasticity of demand, minimum prices may help to maintain incomes. The case obviously does not apply to the road transport industry, which is a rapidly expanding sector and one that does not exhibit the specific immobilities of agriculture, while the long-run price elasticity of demand for road transport tends to be relatively high considering the many direct and indirect substitutes (other modes, transport on own account, changing location, etc.).
20. The usefulness of minimum prices as instruments of income policy is therefore restricted to the case of short-term fluctuations, which can be classified as systematic (hourly, daily, seasonal), occasional, or cyclical. 1/ The first two are irrelevant for income policy, as there is no conceivable reason why carrier incomes should be stable over short periods, provided the total income level over a year is adequate. From cyclical variations we exclude severe general depressions, and we assume an underlying structural expansion of the demand for road transport. Both assumptions seem realistic under present conditions. This leaves the case of a slower growth rate of demand than expected. Such a decline in the growth rate of demand could be a serious matter only if the economic life of the durable assets were long, so that any overinvestment induced by overly optimistic expectations could depress the market for a relatively protracted period. This condition simply does not hold for the road transport industry (as contrasted to inland shipping or construction, for example). In road transport, any overinvestment tends to be corrected rather rapidly by the natural depreciation of vehicles and the expansion of demand. Losses from overinvestment will be limited and, assuming an adequate long-term income level, should be absorbed by the carriers as a normal entrepreneurial risk that is in any case considerably smaller than in most other trades. Considering the serious drawbacks of minimum price regulation from the point of view of economic efficiency, we conclude that the relatively limited and debatable function of minimum prices in protecting carrier incomes does not justify such regulation.

D. Conclusion

21. In sum, minimum price regulation tends to be ineffective and inefficient. Its alleged purposes can be served better by other means. Moreover, minimum prices are at least as difficult to apply and control as maximum prices. Their correct economic definition is very complex, very elusive, and hence totally impractical for policy purposes. An operational approximation leads to minimum prices that are either so low they are useless or so crude they produce important inefficiencies. Effective control is hampered by the quantity of individual carriers and different products, and by the fact that both parties have an interest in evading the regulation: the shippers, to obtain a lower price and the carriers, to get more business. Again, experience in many countries shows that the effective control of minimum price regulation is very difficult indeed.

3. Regulation of Scheduled Carrier Rates

22. As far as we know, rates of scheduled carriers, particularly bus services, are universally regulated. Apart from the rather unconvincing macroeconomic reasons that we mentioned in para. 8 above, the main arguments for regulation of scheduled carrier rates are based on the imperfections of the scheduled carrier market and the objectives of social or

1/ See Chapter X, section 1-e.
regional policy, including city planning in the case of metropolitan bus services.

23. We have shown in Part One that scheduled carriers tend to be either monopolists or oligopolists in their particular submarkets. 1/ In the case of a monopoly rate regulation may be needed to prevent discrimination. An excessive general level of rates is possible only with restrictive regulation of competitors and can therefore be corrected easily by relaxing the restrictions. But allowing competition from unscheduled carriers does not necessarily prevent the scheduled carriers from practicing some rate discrimination; rate control may therefore be needed to check discriminatory rate setting. 2/ In an oligopolistic market situation, as when several bus companies operate in the same area, rate control and control of schedules may be required to maintain a certain stability of rates which we have shown in Chapter VIII to be a rational objective of scheduled service.

24. Regulation of road transport is in general not a valid instrument of social or regional policy, since available direct policy instruments are more effective and more efficient. 3/ There may, however, be cases where these other instruments are not practicable and manipulation of scheduled carrier rates is, because these rates are being regulated anyway. This is particularly the case in city planning. However, in judging the efficiency of rate regulation as an instrument of city planning, the authorities should be very careful not to underestimate the economic costs of the distortions in transport rates (inadequate distance tariffs, insufficient peak-load pricing, etc.). 4/ One has the very definite impression that present rate policies, especially in the cities, have

1/ See Chapter VIII, section 5.

2/ We shall duck the difficult problems associated with the definition of discrimination. Theoretically, the correct interpretation is simple; price discrimination occurs when prices charged to different users are not proportioned to the corresponding efficient prices. But the problem of finding an operational criterion is as difficult as that of defining the efficient prices themselves in operational terms. The issue is further complicated by the many different ways in which the term discrimination is used, or rather abused, in practice. A wide variety of spurious bases of "equality" (e.g. equal rates per passenger-kilometer, regardless of time and place) can be used to characterize almost any given price pattern as "discriminatory".

3/ See Chapter XIII, section 2.

4/ See Chapter III, section 3, Chapter VI, section 1, and Chapter VII, section 3 for the cost of imperfect pricing.
largely ignored the economic aspects and been based far too much on politically defined concepts of "equality" or "discrimination". Such policies are often quite harmful to economic efficiency. They should be critically examined on the basis of their cost in economic terms, their benefits in terms of other objectives, and the economic cost of alternative instruments that may be available to attain these other objectives.

4. Rate Regulation in Practice

25. The preceding observations have led to the conclusion that, except for scheduled carriers, which pose special policy problems in any case, rate regulation is an inefficient instrument for achieving the major policy objectives. 1/ The scheduled carrier problem aside, there is little point in making a detailed examination of the many different forms of rate regulation practiced. All forms of rate regulation are bad, and the more restrictive they are, i.e., the more they cause prices to deviate from the efficient prices, the more harmful they will be. Thus, two-way price limits are worse than maximum or minimum prices, fixed tariffs are worse than bracket tariffs, and any possibility of deviating from the tariffs should be welcomed. In the same vein, rates that are imposed by public authorities tend to be worse than rates filed by the carriers for prior approval, which in turn are worse than a system involving only the filing or publication of rates with the possibility of administrative review, ex officio or on complaint.

26. The regulation of rates is subject to various pressures: the interests of established carriers and of their competitors; the interests of shippers, of landowners, of public agencies, etc. Unfortunately, the influence of economic efficiency as a policy objective is generally rather weak. One can hardly blame economic theory for this, since its major implication is that rates should not be regulated, on the one hand because the road transport market tends to establish efficient prices by itself, and on the other hand because the efficient prices are complex and volatile. Because economic efficiency does not provide clear and operational criteria for rate regulation, regulatory agencies have generally relied on concepts such as just and reasonable in defining their criteria. Since what is just and reasonable depends on one's point of view, the setting of rates must include an investigation of the many different interests concerned. Such procedures require extensive administrative machinery; the decision usually takes a long time. The former is as costly as the latter is inefficient in a dynamic market such as the road transport industry. The files of the U.S. Interstate Commerce Commission and a great many other regulatory agencies throughout the world are silent witnesses bearing weighty evidence to these problems.

27. Moreover, when the authorities rely on proposals made by the carriers themselves, an almost inevitable practice, there is clearly a danger that the regulation of rates will deteriorate into a government-supported price cartel that serves to ensure a "reasonable" income to the least efficient carrier. This tends to thwart all competitive pressure towards efficiency, invention, and dynamic marketing. Moreover, since minimum price regulation requires the quantitative control of entry or of capacity, the problem is aggravated by the drawbacks of quantitative licensing, which we shall examine in the next two chapters.

28. Experience shows that enforcement of effective rate regulation is severely limited by the complexity of the market, the number and range of products, the large number of individual producers, the variability of demand, and the nonstorability of the product. Either the regulated rates are so simplified in relation to the underlying economic forces that strong market pressures to evade are created, or the regulation is so complex that it is unenforceable. From a strictly economic point of view, evasion might be considered a useful correction of the effects of regulation, but in a broader sense it must be judged a destructive element in any society based on law. The difficulties of enforcement tend to elicit exaggerated and sometimes even extralegal sanctions, such as the suspension or repeal of operating permits. Such practices may increase the efficiency of enforcements, but they are hardly the sign of a sound system.

29. Most of these problems are far less serious for scheduled carriers. We have shown that economic forces naturally tend to establish rate schedules. Consequently, there is not the basic conflict between regulated rates and market prices that exists in the case of contract carriers. Moreover, the scheduled carriers are usually rather large and are so closely tied to the public authorities that private management and public regulation often become confounded. Even when scheduled carriers are not nationalized, the public service obligations imposed upon them and the compensations granted by the public authorities inevitably create a relationship that facilitates regulation. Finally, enforcement of rate control is no problem because the firms tend to be relatively large while the individual contracts are small and many: systematic evasion of regulated rates would require the collusion of so many employees and so many clients as to be virtually impossible, while small-scale graft within the organization is not a problem that is specific to transport.

30. The major problem is the determination of rates. It is as much a problem of management as of control. The right compromise between sophistication and flexibility of rates on the one hand, and the need for a transparent and predictable rate structure on the other hand is hard to find; the problem needs a great deal more applied research. So far, constraints on the rate policies of scheduled carriers seem mostly to have taken the form of suppressions of rate differentiation (with respect to

1/ See Chapter VIII, section 2.
distance, peak-hours, etc.), and delays in rate adjustment. The former is usually justified by public service arguments, but it is very doubtful whether the considerable social costs of such artificial rate equalization are justified by the interests involved. Economists have long pressed for a critical review of these rate policies. So far their success has been limited, due no doubt to the understandable political unpopularity of any basic change in the rate structure of public transport. As to delays in rate adjustments, we have argued that freezing public utility rates is about the least effective form of anti-inflationary price control. All considered, a critical review of rate regulation of scheduled carriers would appear to be long overdue in many countries.

5. Summary

We conclude that rate regulation should be abolished for all road transport services, with the exception of the scheduled services. In general, rate control serves no useful purpose, least of all economic efficiency, and it involves a high cost of application and enforcement. 1/ All its alleged functions, including the transparency of pricing, can be attained by other means that are less costly in terms of economic efficiency and administrative effort, while they are often even more effective. In the case of scheduled carriers, some control over rates may be needed to guard against instability of oligopolistic markets and perhaps against price discrimination by monopolistic carriers, although the latter can often be checked more effectively by allowing sufficient competition. Control of scheduled carrier rates may be a legitimate instrument of policy objectives other than economic efficiency (public service obligations), but each such case should be critically examined, since present policies undoubtedly tend to give too much weight to these other objectives and too little to the national interest in economic efficiency.

1/ Most transport economists come to a similar conclusion. See, for example, Allais, et al., Options in Transport Tariff Policy; W. Hamm, Preise als verkehrspolitisches Ordnungsinstrument, Heidelberg: Quelle & Meyer, 1964; Meyer, Peck, Stenson, and Zwick, Competition, pp. 250-252; Kolsen, Road-Rail Competition, Chapters 10 and 11; Walters, "Economic Development and the Administration and Regulation of Transport"; Great Britain Ministry of Transport, Carriers' Licensing; and Canada, Report of the Royal Commission on Transportation.
XVII. ENTRY RESTRICTIONS

1. The entry restrictions we are concerned with here are clearly very different for scheduled and for other carriers. The first two sections will be devoted to qualitative and quantitative entry restrictions on the latter group, while we shall examine the specific aspects of the scheduled carriers in section 3. We shall exclude taxation even if it takes the form of license fees, provided paying the fee is the only condition of entry. 1/ We shall also continue to disregard noneconomic forms of regulation, such as entry requirements that bear upon the technical qualifications of drivers and vehicles.

2. Qualitative entry restrictions, often referred to as subjective conditions of entry, set certain minimum standards for the personal qualifications of the carrier (other than those that concern his technical abilities). They are primarily designed to prevent unsuccessful ventures by those who have insufficient knowledge of the road transport business (professional qualifications). Some countries also require that the prospective carrier commit a minimum percentage of own funds, to further discourage irresponsible ventures (financial qualifications). Finally, some laws dictate that prospective carriers may have no criminal record, either in general or for specific offenses (moral qualifications).

3. In principle, qualifications for entry are not designed to limit the number of entrants, on the basis of public convenience and necessity, earnings, or any other criterion derived from the situation in the market. Anyone who qualifies is admitted to the profession. Standards could, of course, be manipulated to serve regulatory purposes, but such abuse does not appear to be common: most countries have a quantitative licensing system as well as subjective entry conditions.

4. Quantitative restrictions are designed to limit the number of firms, for various possible reasons. The most common justification is the danger of excessive entry, which we have discussed in Chapter X. Entry may be judged excessive in terms of economic efficiency, either because it allegedly leads to frequent misinvestments and bankruptcies, or because it prevents the development of sufficiently large firms. When restrictions on entry imply a restriction of total capacity - which need not be the case - they may also serve to protect competing carriers (scheduled road carriers and/or the railways). Finally, entry restrictions may be designed to protect existing road transport firms from open competition from new entrants.

1/ See Chapter XV, section 2-b.
1. Qualitative or Subjective Entry Conditions

a. Professional Qualifications

5. The relative ease of entry into the road transport industry and the complexities of a price structure which differentiates among submarkets and time periods may justify the imposition of certain minimum standards of professional competence. Although it is unlikely that misjudgment will be common and persistent enough to create a systematic tendency towards excessive entry, an attempt to prevent the social and economic losses resulting from individual errors may be worth the administrative cost. \(^1\) Improvements in the flow of information may not alone be sufficient to prevent foreseeable failures, if the information does not effectively reach the carrier because of his insufficient professional qualifications. The entry conditions usually include a minimum of knowledge about the transport market and about costing techniques, tested by requiring either a diploma or successful experience in a related field. \(^2\) The qualifications must be met by all those who are effectively in charge of a road transport firm. Certain practical difficulties arise in preventing evasion through the use of strawmen, but workable solutions can be and are in fact applied.

6. The level of professional competence required as a condition of entry should clearly not be excessive, in relation either to the real needs of the road transport business, or to the general level of professional competence in the country. We have found no clear evidence that excessive professional qualifications have been used as a cover for a policy that really aims at restriction rather than competence. The stricter conditions that are sometimes applied to long-distance carriers relative to short-distance carriers might be an indication of rail protection, but it is difficult to reach a definite judgment without close investigation of the specific laws and practices involved.

b. Financial Qualifications

7. The requirement that the prospective carrier meet certain financial conditions is variously defined in practice, but its essence is always a sufficient involvement of the carrier's own capital. The purpose of the requirement is to prevent irresponsible ventures and to promote the quality of road transport services. Minimum standards of financial involvement may prevent fly-by-night operators from making a quick profit by cutting

---

1/ See Chapter X, sections 1 and 3.

2/ The latter system is applied in Belgium, for example, where long-distance licenses are automatically granted after successful short-distance operation, which is not subject to license, over a period of three years.
corners on safety standards and other aspects of quality. Although sub-
standard performance is normally self-defeating, at least in the long run,
the relative ease of entry into the road transport industry and the special
dangers of inadequate quality may justify preventive measures.

8. It is debatable, however, whether financial requirements are
very effective. If they are applied only as a condition of entry, the
licensee can always withdraw his capital from the road transport business
as soon as a license has been obtained. On the other hand, if failure to
meet the condition should be a reason for revoking a license or not re-
newing it upon expiration, the system would tend to aggravate the problems
of a carrier who happens to be in financial difficulties. Experience shows
that financial entry conditions are in fact practically meaningless except
when they are tied to capacity licensing. 1/ It may well be better to
attack the main source of the problem, i.e., that vehicles can often be
bought on very easy terms. Instead of imposing financial entry conditions
on the road transport industry, the authorities might tighten regulations
on installment credit.

c. Moral Qualifications

9. In some countries, the entry conditions include the absence of
a criminal record, either in general or with regard to specific transport
felonies. We shall not go into the basic moral and legal issues involved
in adding administrative penalties to a court conviction, often without
due process of law. The moral qualifications concern economic regulation
only to the extent that any licensing system strengthens the administra-
tion's hand in the enforcement of economic regulation, if the license
can be revoked or not renewed when a carrier has failed to observe the regula-
tion. Many different procedures are applied, ranging from almost complete
discretionary powers by the regulatory agencies to systems with elaborate
legal safeguards and avenues of appeal.

10. But whatever the procedure, it would not seem a sound principle
to make the renewal of a license administratively conditional upon the
carrier's observation of the law. It would be far preferable if such
penalties were to be imposed by the courts only, as part and parcel of
the original conviction itself, rather than having that conviction being
used out of context by the regulatory authorities as grounds for not grant-
ing or for revoking a license.

1/ In the case of capacity licensing (see Chapter XVIII), a failure to
meet the financial conditions need not involve the carrier's entire
business, but may lead the authorities to reject applications for the
expansion of capacity. The penalty in this case is more credible and
hence more effective than financial entry conditions alone.
d. Conclusion

11. We conclude that the imposition of appropriate conditions of professional competence is probably a useful policy in the road transport industry, that financial entry conditions are of doubtful practical value, and that the moral qualifications are subject to serious criticism. As a final comment, it is hard to see why qualitative entry conditions should be applied to private carriers. The way in which a firm organizes its own transport requirements is but one link in the process of production. There is no conceivable reason why that one part of the firm's activities should be subjected to conditions of professional competence and financial involvement, nor is there any practical means of doing so.

2. Quantitative Entry Restrictions

12. The system of quantitative entry restrictions consists in assigning operating rights; it does not regulate the number of vehicles to be used by a licensed carrier. Very few countries apply the system, the only major example being the United States. For this and other reasons, we shall not examine entry control in any detail. In any case the system is on almost all counts inferior or at best equivalent to capacity licensing. To show this, we will review the list of policy objectives to be achieved by economic regulation of the road transport industry. We first make a few comments on the general characteristics of entry control.

13. Since entry control leaves the licensed carriers free to acquire as many vehicles as they wish, there is no a priori reason why the market should behave differently with entry control, except that the size of the individual firms will be larger. If a sufficient number of firms is licensed to make competition possible, all the evils attributed to it could still occur: "overinvestment", "predatory pricing", "excessive competition", etc. Thus, unless the sole purpose of entry control is to increase the size of the road transport firms, the system can be effective in preventing these alleged evils of competition only if it separates the road transport market into noncommunicating submarkets by licensing carriers only for particular types of operations. Experience confirms this line of reasoning: in the United States, operating rights are assigned for specific routes, commodity classes, etc. In this manner, a few firms compete in a narrow field, supposedly inducing what is euphemistically called "responsible behavior" on the part of the licensed carriers. Such oligopoly situations tend to produce tacit agreements among the firms to maintain the existing market structure, each firm being afraid to undercut its competitors for fear of reprisals.

14. Systems involving licenses that are restricted to specific types of operations are extremely inefficient. \(^1\) For one thing, they require

\(^1\) The case against such licensing systems has been argued particularly strongly by Kolsen in Road-Rail Competition, especially p. 176 ff., and by Walters in "Economic Development and the Administration and Regulation of Transport".
elaborate administration and enforcement machinery, as confirmed by practice in the United States. 1/ Even more important, the restricted validity of licenses prevents temporary excess capacity in one submarket from being utilized in others. In particular, it may stand in the way of combined operations that more effectively utilize a given capacity, a point that is especially important in "thin" markets; complementary operations on routes or in regions for which a firm's license is not valid; and efficient utilization of capacity on the backhaul, which may involve other commodities than those for which the carrier is licensed. As a consequence, the system of restricted operating permits tends to create overcapacity, a rather curious result for a policy based on the premise that unregulated competition would produce excess capacity. Also, it is clear that the system will set up very strong inducements for firms to merge, as has indeed occurred in the United States. The system thus tends to correct the compartmentalization of the road transport market, but at the cost of the many problems produced by concentration. 2/

15. So far, we have only considered the specific drawbacks of entry control. Let us now consider its effectiveness or lack thereof with respect to the various possible objectives of regulation. The exercise may seem superfluous because one could argue that entry control is in any case inferior to capacity licensing: anything entry control can do capacity licensing can achieve as well, while the reverse is not so. Entry control cannot prevent overinvestment and excess capacity; in fact we have seen that it tends to induce overcapacity. Entry control has all the inherent limitations and disadvantages in equity and efficiency of an all-or-nothing device, while capacity licensing can be graduated.

a. Efficiency of the Road Transport Industry

16. We have argued in Parts One and Two that it is hard to find any reasonable economic justification for quantitative entry restrictions. There is no logic to the excessive entry thesis, nor is there any conclusive empirical evidence to support it. But even if excessive entry were a problem, the logical first step would be to improve the flow of information to the prospective carriers, by publishing market trends, for example. If that is still insufficient, the next measure should be to impose subjective entry conditions requiring a minimum of professional knowledge on

1/ See Meyer, Peck, Stenason and Zwick, *Competition*, p. 214 ff. The difficulties of administration and enforcement are aggravated by the possibilities of finding loopholes in so complex a set of regulations. Examples are "buy-and-sell" operations, "Gray area transportation", etc.

2/ In any case, the observed concentration is not evidence of economies of scale in the road transport industry. In fact, the regulation-induced concentration can be judged on its economic effects only if we have independent data on the economies or diseconomies of scale.
the part of the new entrants. Given these measures, there is no conceivable reason why the public authorities should be better placed to judge the commercial chances of a prospective carrier than the applicant himself. On the contrary, it would be very difficult for the authorities to separate the probable failures from those new entrants who would contribute to the efficiency and the development of the industry by improvements and innovations in production, organization, and marketing.

17. In practice, the criterion will be some definition of the need for the services to be supplied by the new entrant. In the terminology of the United States' system, they must serve public convenience and necessity (common carriers) or be consistent with the public interest (contract carriers). When it is deemed that the established carriers adequately satisfy existing demand, the application is denied; sometimes the established carriers are even given the opportunity to supply the services themselves before a new operating license is granted. It is clear that such practices are not conducive to economic efficiency or progress. By eliminating or at least reducing the pressure of outside competition, the system creates a disincentive to cost reduction, improvement, innovation and the opening up of new markets. It will inevitably induce a tendency towards economic and technological stagnation of the live-and-let-live type, possibly aggravated by active collusion among the fixed and restricted number of firms in any given submarket.

18. Entry restrictions may be quite effective in increasing the size of road transport firms, but capacity licensing could achieve the same thing by giving priority to established firms. Moreover, there is no clear evidence of economies of scale in the road transport industry (with the possible exception of scheduled carriers, which we disregard in this section). 1/ Even if such economies did exist, it is hard to see why the market's inherent tendency towards concentration should be strengthened by regulation, perhaps far beyond its economic optimum. Overconcentration not only may push firms into the range of diseconomies of size, but also produces new problems of market power which require additional regulation.

b. The Protection of Scheduled Carriers and Railways

19. As a means of protecting competing carriers, quantitative entry restrictions are either ineffective or inefficient, or both. We have shown in Part Two that the protection of one sector by restricting another is always an inefficient method. 2/ If nonrestrictive methods such as two-part pricing or public subsidies are not available, the least harmful policy would be to impose special taxes on the nonscheduled road carriers. 3/

1/ See Chapter V.

2/ See Chapter X, section 2-a.

3/ See Chapter XV, section 2-b.
In addition to these general arguments, there are specific objections against entry restrictions. They tend to be ineffective, since they do not prevent the expansion of capacity by licensed firms. Given active competition among licensed carriers, capacity will be increased and prices will fall to the same level as would prevail without entry control, except that outside competitors are barred from entering the market. Consequently, entry control can be effective in providing protection to the railways and scheduled road carriers only by inducing private restrictive practices or by keeping out more efficient carriers. Neither policy is very attractive from any point of view, least of all that of promoting economic efficiency.

c. The Protection of Carrier Incomes

20. The same comments hold for this as for the first two objectives: entry control is ineffective in raising carrier incomes, or inefficient, or both. In addition, entry control suffers from an internal inconsistency we discussed in Part Two, that any advantage awarded to established carriers is counterbalanced by the inequity to outsiders. 1/ The inequity is especially pronounced because entry control, unlike capacity licensing, is an all-or-nothing policy. Those who are refused an operating permit are totally excluded from the market.

d. Conclusion

21. Entry control tends to be less effective, more inefficient, and more inequitable than capacity licensing. Even if quantitative restrictions have some function, a proposition we have seriously questioned, entry control should still be rejected. This conclusion would not hold if capacity licensing were to be applied in a highly restrictive or strongly discriminatory manner, and quantitative entry control very loosely. Moreover, many mixed forms are possible (capacity licensing which gives a preference to existing carriers). The conclusion is presented only as a general statement on the comparative disadvantages of the two systems in their "pure" forms, given that they are applied in an equally restrictive manner.

3. Scheduled Carriers

22. Our previous comments on the scheduled carrier problem imply that regulation of entry in that market will be required as part of a system of public controls and obligations and perhaps public subsidies. The essential function of scheduled carriers is to provide a guarantee of performance at certain times, on certain routes, and at certain prices; changes can be made only after delays that allow the users to make the necessary adjustments. Scheduled services are of particular importance in passenger transportation (metropolitan and intercity bus services), since the scheduled timing of service is generally less crucial for small freight consignments.

1/ See Chapter XIII, section 1.
23. Entirely unregulated competition, in particular free entry of scheduled carriers, is not possible under these circumstances. A scheduled carrier must make long-term commitments which would be institutionally difficult to arrange as an obligation to its many individual customers. 1/ Almost inevitably, public authority will have to contract on behalf of the users for a certain package of services over a certain period of time. The borderline between this procedure and regulation is rather vague, especially with regard to the guarantees that the contracting carrier will have to provide concerning his future ability to carry out his obligations. Such guarantees are very similar to the subjective entry conditions we discussed above, except that the requirements for professional competence and sound long-term financing will have to be more strict than for nonscheduled carriers. In addition, the public authorities will have to exercise certain unambiguously regulatory powers, in particular with regard to competition among scheduled carriers on timing, routing, and perhaps rate-setting. We have argued in Chapter VIII that in such a market unregulated competition may not be able to ensure a stable optimum situation.

24. Scheduled services do not necessarily call for quantitative entry control. While it is more convenient for the public authorities to deal with a few scheduled carriers than with a large number, and restricting their number simplifies the coordination of routing and timing on both single and connecting routes, market forces may themselves lead to concentration of scheduled services for precisely the same reasons and because of the economies of scale associated with the pooling of stand-by capacity. One gets the impression that the regulation-induced degree of concentration in scheduled bus services is higher than would be accounted for by these economic advantages. An admittedly rather lateral indication is the far larger number of scheduled airlines that continue to coexist in the same network. The direct evidence on economies of scale in the case of scheduled buses is inconclusive, so that we cannot reach a definite conclusion on this point. 2/ The public authorities have generally tended either to operate them as a public service or to reserve operating rights to one or very few companies in any one area.

25. The market mechanism might be usefully employed to determine the most efficient degree of concentration. Separate operating contracts for separate services might be offered on the open market, the contract being granted to the highest bidder (or, if the contract involves a public subsidy, to the firm that asks the lowest subsidy). As we have suggested

1/ A two-part pricing scheme which involves a fixed payment for the service guarantee might go a long way towards solving some of the institutional problems, but it is doubtful whether the period for which the fixed payment is made could be long enough in relation to the desired period of guaranteed service.

2/ See Chapter VIII, section 3.
before, the same system could be used to maintain the pressure of competition in the direction of cost reduction, improvement, and innovation, by offering contracts for a limited number of years. Upon expiration, the contract would again be offered to the highest bidder on the open market. A certain priority might be given to the incumbent carrier in the form of a right to accept the contract at the lowest open bid, for example. In this manner, the system of entry restrictions, presumably inevitable in the case of scheduled carriers, can be made to serve economic efficiency. 1/

1/ See Chapter XIV, para. 12. It also seems more equitable than the traditional franchise system in that every applying firm has a chance to obtain the contract on the basis of his public offer. For the same reason it reduces the danger of arbitrary decisions, favoritism, and graft.
XVIII. CAPACITY RESTRICTIONS

1. Capacity restrictions involve public control over expansions of vehicle capacity. In theory, the system could also be used to effect a reduction of capacity, if licenses were not automatically renewed upon expiration. In practice this does not occur, except as a penalty for non-observance of certain laws or regulations. 1/ Capacity restrictions will not be applied to scheduled carriers, since they tend to under-rather than overinvest in capacity. 2/ Consequently, this chapter will deal only with the nonscheduled carriers. Capacity restrictions may be firm-oriented or market-oriented. The first system will be briefly reviewed in section 1. The second system, which is far more prevalent, will be examined somewhat more extensively in section 2.

2. Firm-oriented licensing systems are applied with reference only to the position of the individual firm, whether existing or new. If the firm's past or prospective market position warrants an expansion of capacity or the introduction of entirely new capacity, the license is granted, regardless of the overall situation in the specific submarket it serves, in the road transport market as a whole, or in other modes of transport. Only the prospects of the individual applicant, as evaluated by the licensing authority, are relevant. Consequently, firm-oriented licensing is not a system of quantitative restrictions as we have defined the term. 3/

Market-oriented licensing systems, on the other hand, are clearly a quantitative form of restriction. They are designed to control the expansion of total capacity, either in the road transport industry as a whole (when licenses are general), or in the separate submarkets (when licenses are restricted to certain routes, regions, distances, commodity classes, etc.). In addition to the control of total capacity, market-oriented licensing systems also require a rationing scheme to distribute capacity among the individual applicants who, by the definition of restrictive licensing, will always demand more capacity than is to be licensed.

3. In theory, the two systems could be very similar. Firm-oriented licensing could use criteria derived from industry objectives, as when a rate of return on investment is imposed as an individual licensing criterion, effectively restricting capacity to the desired overall level. Market-oriented licensing could distribute the imposed capacity total according to the same individual licensing criteria. In practice, however,

1/ On this practice, see Chapter XVII, section 1, especially paras. 9 and 10.

2/ See Chapter VIII. When subject to minimum rate regulation, scheduled carriers notoriously overinvest, but the obvious remedy in this case is to abolish the minimum rate regulation.

3/ See Chapter XVII, especially para. 3.
the systems are very different. For reasons that will be discussed in the following sections, market-oriented licensing tends to be far more restrictive than firm-oriented licensing.

4. Mixed systems of many kinds are possible, and are frequently found in practice. Licensing systems that are basically firm-oriented may contain market-oriented elements, for example, the possibility of temporarily halting the issue of new licenses during a recession of demand. Capacity licensing may act as a restriction of entry: in a firm-oriented licensing system, by imposing on new firms a heavier burden of proof than on existing firms; in a market-oriented licensing, by discrimination between new entrants and established carriers in the distribution of licenses. Such mixed systems will not be examined explicitly, since their analysis can easily be derived from our analysis of the separate systems.

5. The purpose of capacity licensing may be one or a combination of the familiar policy objectives of restrictive regulation, i.e., to prevent ill-judged investment decisions by carriers, to protect competitors (scheduled road carriers, railways), to improve the income position of road carriers, and to compensate for external distortions such as inadequate road pricing. We shall not again go into the pros and cons of using restrictive regulation in the road transport industry for these purposes, nor do we need to discuss the links between each of these objectives and capacity licensing.

1. Firm-Oriented Licensing Systems

6. As far as we know, firm-oriented quantitative licensing is applied in an almost "pure" form only in the Netherlands. 1/ The system is usually justified primarily on the basis of an alleged tendency towards overinvestment in the sense of the first objective above. This implies that the system would serve mainly to protect the carriers against ill-judged investment decisions which they would themselves regret afterwards. It is difficult to see the rationale of licensing systems based solely on

1/ The Dutch system is not entirely "pure" because it does include the possibility of a temporary suspension of the issue of new licenses when the market is severely depressed. However, this instrument has been used only once in the last twenty-five years, and then during a relatively short period of time (about half a year).

One of the most complete and yet very concise descriptions of transport regulation in the Common Market countries is contained in the loose-leaf publication of the European Economic Commission, Régime juridique des transport ferroviaires, routiers et fluviaux dans les États membres de la Communauté économique européenne ("Legal Regulation of Rail, Road and Water Transport in the Member States of the European Economic Community"), published in all languages of the community and regularly updated. See also the excellent description and comment in Bayliss, European Transport.
this consideration if, as is the case in the Netherlands, subjective entry conditions already require a minimum of professional ability and financial involvement. One would have to show that carriers frequently overestimate future returns, that the authorities are better placed to judge a firm's future prospects than the carrier himself, and that there are specific reasons to replace the normal market system of positive and negative incentives with preventive controls. Apart from the unsubstantiated transport lore that seems to dominate much of the political debate in this area, there is little or no experience to support these contentions. Viewed as an alternative to subjective entry conditions (coupled with an adequate flow of information to the carriers), firm-oriented licensing systems are clearly an inferior instrument, since they replace individual judgment and responsibility with decisions of a public authority which is not financially involved. As a supplement to these other measures, licensing is at best superfluous.

7. A sound justification of the system must rest on other reasons, such as the improvement of carrier incomes or the protection of the railways. Given that restriction of capacity is desired, firm-oriented licensing is not a bad instrument. Firm-oriented quantitative licensing shares many of the advantages of taxation over market-oriented licensing. Compared to quantitative restrictions (whether of entry or of capacity), firm-oriented licensing leaves far more room for technical and economic improvement and innovation; it does not inherently discriminate in favor of established firms; it awards fewer discretionary powers to the licensing authority; it tends to be far less restrictive and consequently involves much less of a free gift to the licensee; and, finally, the procedure tends to be far less costly, cumbersome and delay-ridden than that of market-oriented licensing.

8. These points can best be illustrated by the licensing procedure. Carriers are granted a license for additional capacity, or for new capacity in the case of new entrants, whenever they can show that the investment can earn a return at least equal to the standard imposed by the licensing authority. The case is relatively easy to establish, since the same sort of evaluation will have to be made by the carrier himself. It can be substantiated in various ways: past performance, declarations by prospective shippers, etc. Note particularly that profitability is accepted as a basis for granting a license, even if it is to be achieved by encroaching on other carriers' traditional markets. The system thus keeps the industry open to dynamic improvements in production, management, and marketing, and introduces no inherent bias in favor of established carriers.

9. It is markedly different in these respects from market-oriented licensing systems that are invariably based on some criterion of need. As we shall see in the next section, market-oriented licensing systems usually involve the established carriers' (including the railways) right

1/ See Chapter XV, section 2-b, especially para. 10.
to object against a license being granted, on the grounds that they already provide the needed services, or even that they are willing to do so in the future. It is obvious that this system introduces a heavy bias against dynamic improvements and in favor of established firms; that the system will generally involve lengthy, cumbersome, and costly procedures; and that it will tend to be far more restrictive than firm-oriented licensing systems. The latter follows from the dynamics and the impartiality of the profitability criterion: established carriers will be far less interested in a strongly restrictive policy when it is applied to them as well than when it only hurts outsiders. The Dutch example confirms these liberal tendencies of the firm-oriented licensing system. 1/

10. As compared to restriction by taxation, the firm-oriented licensing system may show a certain bias against dynamic firms that expect to create new markets by special effort, ability, or innovation. Established firms in traditional markets can prove their case with reference to past performance, but new firms inevitably tend to be judged on the basis of some kind of industry-average. Firm-oriented licensing also effectively discriminates against outsiders in another sense, in that it excludes those who would be willing to operate at a lower rate of return. However, both disadvantages are mitigated in practice by the possibility of buying and selling licensed firms.

11. Taxation has only two advantages over firm-oriented licensing. First, it is free of discretionary administrative power, inherent in the evaluation of prospective returns by the licensing authority, and hence is free from the possible danger of administrative bias in favor of established firms. Second, under taxation, insiders do not receive the value of the license as a free gift from the authorities: it is "creamed off" by the license fee. This point may, from one point of view, be considered an advantage rather than a drawback of firm-oriented licensing: it is obviously more effective than taxation in raising carrier incomes, though it is only the insiders who benefit. For other questions, especially that of general versus restricted licenses, we refer to our discussion of the tax instrument, since the relevant considerations are the same. 2/

1/ Probably the best evidence of this is the fact that in the Netherlands a license has a market value at, or close to, zero. Licenses are usually transferred as part of the business, which introduces a margin of uncertainty as to whether the price contains a payment for the license as well as payment for physical assets and goodwill. However, the figures clearly show that the element of payment for the license must in fact be zero or negligible. Compare this situation with the substantial prices paid for licenses in the market-oriented systems discussed in section 2.

2/ Cf. Chapter XV, section 2-b, especially paras. 11-15.
12. Given a firm-oriented licensing system, should it be applied to private as well as public carriers? 1/ To the extent that its purpose is simply to prevent ill-judged investment decisions, there is clearly no reason why it should. Like qualitative entry conditions, licensing does not really protect the private carrier against mistaken investment decisions as long as all other stages of the firm's total process of production are free of control: if the private carrier wishes to overinvest in vehicles there is no more reason to prevent him from doing so than from overinvesting in any other assets. It is, of course, true that any restriction of private transport will improve the position of public carriers, but this is hardly an adequate justification for licensing of private transportation.

13. The only case that can reasonably be made is to subject private transport to the same degree of restriction as public transport, provided it obtains the same rights. It makes no difference in this respect whether the restriction is based on the objective of improving carrier incomes or that of protecting the railways and the scheduled road carriers. In either case, the logic of the firm-oriented licensing system clearly implies that if it is applied to private carriers, they should be allowed to operate on the public carrier market. By subjecting private carriers to the licensing system, they in effect become public carriers. Since public carriers are allowed to prove the need for additional capacity even if it involves encroaching upon the market of other firms, private carriers should be allowed to do the same.

14. Consequently, two alternative systems are conceivable: either private carriers are not subjected to licensing but are restricted to own-account operations, or they are subjected to licensing on the same basis as public carriers but can no longer be restricted to own-account operations. The second alternative, which implies the elimination of all differences in treatment between the two types of carriers, would seem to be the most rational solution, unless the licensing criteria are so restrictive that complete freedom of own-account operations acts as a useful corrective. If this is the case, the licensing system logically should be revised, but political realities may make this impossible. The same situation occurs for market-oriented licensing systems that tend to be excessively restrictive. Consequently, it may often be preferable to opt for nonregulation of private transport with a restriction to own-account operations. This is in fact the most prevalent solution.

15. We conclude that firm-oriented licensing systems are superior to market-oriented licensing, whether of entry or of capacity, on all counts.

1/ Obviously, the question applies only to private trucking. Private automobiles could not in practice be subjected to a licensing system without prohibitive administrative cost and unacceptable encroachment on individual freedom. For a general discussion of the own-account problem, see Chapter X, section 4.
except the protection of inefficient established firms. Given that a re-
strictive policy is required at all—a proposition we have seriously
questioned—firm-oriented licensing is better than, or next-best to
taxation, depending on the relative importance attached to increasing
carrier incomes versus preventing discrimination against outsiders and
discretionary administrative power. The licensing system should be ap-
plicated to private carriers only if they are given the right to operate on
the public carrier market.

2. Market-Oriented Licensing Systems

16. As the term indicates, market-oriented licensing systems derive
their licensing criteria from the present or prospective situation in the
transport market, in particular the relation between demand and available
capacity. These systems are by far the most common form of capacity re-
striction. In one form or another they are applied in most countries of
Western Europe (e.g. France, Germany and Great Britain). A great many
developing countries have also adopted the system, having either retained
it with modifications from their colonial past or introduced it on their
own initiative. In both cases, the British system has apparently served
most often as the main model, but even within the group of systems that
have this common root, actual policies differ quite widely. It is neither
possible nor very useful to discuss these systems in detail. We shall
limit our comments to a few major aspects.

17. For convenience, we distinguish between two major subtypes,
quota systems and proof-of-need systems, to be discussed in subsections
a and b respectively. Under a quota system the licensing authorities
establish the total quantity of service, or number or capacity of vehicles,
for which licenses are to be issued and distribute the quota among the ap-
plicants. A proof-of-need system requires the individual applicant to
prove that the expansion of his fleet is in the public interest, considering
the demand for his services and the available transport capacity of his
competitors. At first sight, the proof-of-need system may seem similar
to the firm-oriented system discussed in section 1, but we shall see that
it is in fact quite different.

18. An important feature of licensing systems is the scope of the
market for which the license is valid. We discuss this feature in sub-
section c. At one extreme we find the perfectly general license, valid
for all types of transport operations over an extended period of time,
and at the other extreme the trip permit which specifies the exact single
service to be performed. In subsection d we briefly discuss the various
units of capacity that are used in different licensing systems, and the
position of private transport.

a. Quota Systems

19. The quota system tends to rely heavily on administrative decisions.
The public authorities set the quota on the basis of their assessment of
the need for additional capacity, in the light of whatever policy objectives
the licensing system is to serve. A quota system of this kind is applied in France and in Germany. 1/ In both countries, separate quotas are set for long- and for short-distance transportation, the former being determined on the federal level and the latter on the regional or local level. The decision will usually be reached after consultation with advisory boards representative of the various interests, and is sometimes subject to political approval. Public enquiry procedures on individual applications clearly do not fit into the quota system. Considering the global approach of the quota system, it is understandable that the licenses are in practice completely general, except for the distinction between long- and short-distance transport and the total exemption of some categories of services.

20. The criteria for determining the quota depend on the objectives which the licensing system is to serve. In theory, various indicators could be used, such as the development of total demand for transport services, the demand for road transport, the economic position of the railways, the utilization of vehicle capacity, the net income position of road carriers, the market price of licenses, and so forth. In practice, however, the decision appears to be more often the outcome of conflicting political pressures from the different interests involved.

21. This is quite understandable and perhaps even inevitable, not only because the determination of objectives is necessarily a matter of compromise, but also because the total capacity needed to serve a certain demand is not a hard-and-fast quantity that can be established objectively. Due to the nonstorability of transport services, the utilization of capacity is never 100 percent. Variations of demand over time and the inequality of demand in different directions inevitably produce some underutilization. It is difficult enough statistically to determine the effect of all these variable elements and to express them in a "normal" load factor, but it becomes largely a matter of judgment when we also take account of the fact that the utilization of capacity has an important influence on the quality of service. Ceteris paribus, the higher the utilization of capacity, the lower the quality of service (especially delays). 2/ If one adds to this the fact that statistical data on demand and available capacity are often very inadequate, and that the modal split between rail and road depends on largely unknown user preference and deliberate policy, one gets an impression of the extremely shaky economic grounds on which quotas could be established. Given all these complicating factors and the resulting difficulties in establishing clear criteria that can be judged on general principles of national welfare, it is indeed not surprising that the decisions on the quota tend to be strongly influenced by political wrangling in the small circle of directly interested parties.

1/ See the sources quoted in the footnote to para. 6 above.

2/ See Chapter III, section 2.
22. Nor is it surprising that quota systems should often have a very restrictionist bias. In the first place, the need for additional capacity tends to be judged on technical rather than economic considerations. Anything less than full utilization is grudgingly accepted only to the extent that is technically inevitable, very little if any weight being given to the quality advantages of larger capacity reserves. Moreover, available capacity tends to be interpreted in terms of tons or seats, regardless of the quality differences between rail and road: since the railways usually have surplus capacity, this clearly tends to reduce the calculated need for additional road vehicles. In the second place, by concentrating on total capacity, the system tends to neglect dynamic factors. Firms using new techniques of production, management, or marketing need additional capacity to create new markets or to replace their less efficient competitors. 1/ Thirdly, the tendency to excessive restriction is also due to the strongly one-sided political pressures that the existing road carriers, the railways, and the treasury (the latter because of railway deficits) bring to bear upon the licensing authorities. Shippers' interests are usually too scattered and often too small to provide much countervailing pressure, while they can often escape the effects of excessive restriction by employing transport on own account.

23. These general considerations are confirmed by the facts, as illustrated in the situation of France and Germany. Primarily designed to protect the national railways, the quota systems are extremely restrictive in both countries. Probably the best indication is provided by the market price of licenses: in both countries, the current price for a general long-distance license is of the order of $20,000 per vehicle. 2/ On the other hand, the situation in Italy, which nominally also has a quota system, does not exhibit these strongly restrictive tendencies. In fact, there is some doubt as to whether the Italian quota system has any real significance, other than providing a convenient handle for enforcing safety requirements and the like. It should perhaps not be considered a quota system at all, and hence not an exception to the observation that in practice quota systems tend to be highly restrictive.

1/ Compare with the firm-oriented system in section 1 above that explicitly allows for this factor.

2/ This figure should be regarded as a very rough indication. On the one hand, it may overstate the price of the license because it includes payment for goodwill (which, however, tends to have little value without restrictive licensing, as shown by figures of countries without licensing). On the other hand, the French figure in particular is probably too low, since it is derived from fiscal data. It should be noted also that the figure fluctuates over time, and that it is considerably less for short-distance licenses (about $7,000 in Germany). This clearly reveals the motive of rail protection, since rail-road competition is largely concentrated on long-distance transport.
24. The procedure for rationing the total quota among the individual applicants is one of the most difficult aspects of the quota system. We have argued before that the public sale of licenses would seem to be the most equitable and efficient method. \(^1/\) As far as we know, this system has been put into practice only in Lebanon. Other rationing systems are likely to be inefficient, either because they are based on economically irrelevant priorities (e.g., first-come-first-served), or because they are biased (e.g., in favor of established firms, certainly the most prevalent bias). The licensing authorities could be given discretionary powers to distribute the licenses in accordance with the "public interest" – whatever that implies in this context – but it is hard to see why this should be more economically efficient than rationing by the market. Moreover, the discretionary power to grant public favors of considerable value puts an enormous strain on the integrity of the administration; it is extremely difficult to prevent it from causing favoritism, graft, and even corruption.

b. Proof-of-Need Systems

25. In the proof-of-need system, the total number of licenses to be granted is not determined explicitly, but results from separate decisions on individual applications. There is no problem of distributing the total quota among individual applicants. The procedure usually followed is one of public enquiry, in which all interests have the right to be represented. In practice, this tends to give by far the strongest weight to opposing interests, since all competing road transport firms as well as the railways will usually attempt to block the issue of a license, while behind the scenes the treasury will often exert pressure on the licensing authorities to restrict road transport in favor of the railways. Only the shippers will generally be in favor of the expansion of capacity, but they tend to exert little effective pressure, because they often have many alternatives, including private transport, and because they are seldom adequately organized on the level of the specific submarket served by any particular road transport firm.

26. The burden of proof is always on the applicant, who not only has to show that there is a market for his services, but also that existing facilities are insufficient or unsuitable to satisfy the demand. Competing carriers, including the railways, are given the opportunity to discredit the applicant's claims. In some cases an application may be rejected simply on the basis of a competing carrier's promise to supply the services in the future.

27. Although the proof-of-need system seems somewhat similar to the firm-oriented system in that both involve licensing on the basis of individual application, the two tend to be quite different in their economic

\(^1/\) See Chapter XV, section 2-a.
effects. Unlike the firm-oriented system, the proof-of-need system requires the licensing authorities to take account of the services that competing firms (including the railways) are already supplying, and possibly of the existing capacity that could be used to supply the services on which the application for new capacity is based. Consequently, the proof-of-need system has a tendency to be far more restrictive than the firm-oriented licensing system. What little evidence there is seems to bear this out. The British figures on black market prices of licenses are remarkably close to those quoted for Germany and France, namely about $15,000 for a general license ("A" license) for a 20-ton truck, some five years ago. 1/ This should be compared to the negligible or non-existent price of licenses under the Dutch firm-oriented system.

28. There is no particular reason why proof-of-need systems should be inherently either more or less restrictive than quota systems. The actual impact of licensing differs markedly from country to country, depending on the features of the transport system as determined by history and geography, on the political power relationships, and on the prevailing economic doctrines. Even the most superficial examination shows that market-oriented licensing systems, in developed and developing countries alike, exhibit a wide range of restrictiveness regardless of the procedures followed. The same thing holds for the bias in favor of established firms.

29. The different procedures associated with the quota system and the proof-of-need system are, however, reflected in some important systematic differences between the two. The public enquiry procedure tends to be lengthy and cumbersome, and hence costly both to society and to the individual applicant. 2/ A large administrative and quasi-judicial apparatus is required to collect the necessary data, to check the various statements, and to pass final judgment. In addition, the applicants and their opponents may have to incur considerable expenses of data collection and legal counsel to support their case. This may effectively discriminate against small firms and new entrants.

30. Perhaps more important is the tendency in the proof-of-need system to restrict the license, either by law or in practice, to the specific operations indicated on the original application. In Great Britain, for example, a 1953 act made it possible for public carrier licenses ("A" licenses) not to be renewed when the carrier had used the vehicle for purposes other than those stated in his application. In many other countries the law explicitly provides for licenses that are restricted to specific types of operations. Because of its importance, the question of general versus restricted licenses will be examined in some detail below.

1/ See Great Britain, Ministry of Transport, Carriers' Licensing, p. 60.

2/ A very vivid description is contained in a 1967 University of Malaya master's thesis by Kho O Siew Mun, "Licensing of Goods-carrying Motor Vehicles in Malaya."
c. General versus Restricted Licenses

31. We have argued before that the system of restricted licenses is extremely inefficient. 1/ It divides the road transport market into non-communicating compartments, thus preventing a rational utilization of the total available capacity. Examples of the resulting inefficiencies are not hard to find. Severe restrictions on long-distance road haulage, designed to favor the railways, will often result in the extremely wasteful transshipment of long-distance consignments at district borders. This appears to occur quite frequently in India, for example, where permits for road haulage over 300 miles are very difficult to obtain on account of the strong rail preference built into the regulatory system. 2/ The separate regulation of freight and passenger services, as in Tanzania, excludes combined services like the "mammy wagon" that perform useful economic functions in other countries. The restriction of licenses to certain routes, certain commodity groups, or certain shippers, as practiced in many developed and developing countries, causes even more inefficient utilization of capacity, especially in relatively small markets. In addition, the more specific the licenses, the more cumbersome and costly the administration, and the more difficult the enforcement.

32. On the other hand, systems involving restricted licenses may be more effective than general licensing systems in terms of policy objectives other than economic efficiency in the road transport industry. 3/ As we have earlier explained, restrictive regulation of road transport, and in particular quantitative licensing, is not a rational instrument either to protect the railways or to improve the incomes of road carriers. However, given that the authorities wish to employ capacity restrictions, one might still examine the relative advantages and drawbacks of general versus specific licensing in terms of these other objectives.

33. Restricted licenses may be considered more effective than general licenses as instruments of rail protection. They allow the authorities to apply restrictive regulation selectively to those road transport services that compete directly with rail services, resulting in a high degree of protection for the railways without unnecessarily restricting other road transport services. The quota systems that we observe in practice accomplish this to a limited extent by restricting licensing of long-distance much more than of short-distance transport. 4/ The proof-of-need system is capable of much finer discrimination: the railways could be given the

1/ See Chapter XVII, section 2, para. 14.

2/ See, for example, Owen, Distance and Development; Transport and Communications in India.

3/ Cf. Chapter XV, section 2, paras. 11 and 12.

4/ See the note to para. 23 above.
right to oppose licenses being granted for those specific operations which they themselves provide or could provide. The most blatant example of rail protection in a proof-of-need system is provided by South Africa, where the railways and their large road transport subsidiary are always given first option for a license, while the road hauler must in effect secure permission from the South African Railways for any particular operation. In addition, private trucking is highly restricted in all areas where it competes with the railways. 1/

34. A system of restricted licenses might also be more effective than general licensing as an instrument of improving carrier incomes. If the mobility of carriers among submarkets is limited, each submarket would have to be regulated separately to prevent incomes in specific areas from falling below the desired level as a result of unfavorable demand and supply conditions in that particular submarket. This is not likely to be important except for very large areas or types of services requiring highly specialized vehicles. Compared to most other industries, mobility is very high in road transport and with minor exceptions neither the equipment nor the professional qualifications is specific to particular locations or particular functions. Without restrictive regulation, submarkets tend to communicate rather freely. This implies on the one hand that incomes would not diverge very much so that separate regulation is unnecessary from an equity point of view, and on the other hand that separate regulation would impair economic efficiency by preventing the overflow of capacity from less remunerative to more remunerative submarkets.

35. The preceding comments do not permit a definitive conclusion. The main argument against restricted licenses is that they tend to be very inefficient, since they prevent a rational utilization of available vehicle capacity. 2/ The main argument in their favor is that they may more effectively protect the railways without unnecessarily restricting other areas of the road transport market. This argument depends heavily on the proposition - which we have shown to be untenable - that other instruments of rail protection are not available or are somehow inferior to quantitative restrictions imposed on road transport. The choice of a second-best or even a third-best solution can only be made on the basis of specific data. 3/


2/ The inefficiency of restricted licenses has been emphasized in particular by Kolsen, Road-Rail Competition, pp. 152-157, by Walters in "Economic Development and the Administration and Regulation of Transport," and in Great Britain, Ministry of Transport, Carriers' Licensing, p. 59.

3/ We have discussed various preferred solutions in the preceding. They include two-part pricing, subsidies to the railways, and taxation or firm-oriented licensing of road transport.
36. In general, we can only say that the strong compartmentalization of the road transport industry observed to be associated with some licensing systems seems unlikely to be the optimum compromise among the conflicting interests. A general system that differentiates only between major categories of services (e.g. long- and short-haulage) might be preferable. From this point of view, the quota system may present certain advantages over the proof-of-need system. But it would seem to be far more important to investigate the practical possibilities of systems that do not involve quantitative licensing at all, or that require less restriction, than to concentrate on the choice of third-best solutions.

d. The Application of Licensing: The Unit of Capacity and Private and Public Transport

37. Licensing systems do not always specify the units of capacity in the same terms. Usually capacity is designated in tonnage or seating capacity, but in some cases the number of vehicles is licensed, as in Germany, or the number of trips, as is common in international transport. Licensing in terms of vehicles is inefficient, since it produces a bias in favor of large vehicles. Licensing of trips is not properly a form of capacity licensing at all. Especially when the permits are granted for a single transport operation only, as is the case for long-distance road haulage in India and South Africa, the system will obviously inhibit the growth of a sound road transport industry. Rational investment decisions are hardly possible on the basis of occasional trip permits.

38. The question of whether the licensing system should apply to private as well as public carriers has been discussed in the previous section. 1/ The same reasoning applies in the present context. In principle, private transport should be subjected to the same degree of restriction as public transport, provided it obtains the same rights. In practice, we might consider two alternatives: either private carriers are not subjected to licensing at all, but restricted to own-account operations, or they are subjected to licensing on the same basis as public carriers, but are no longer be restricted to own-account operations. We have argued in the previous section that the latter solution is the more logical one in theory, but that in practice the former may be preferable when the licensing system is too restrictive. Since the market-oriented licensing systems discussed here do in fact tend to be very restrictive, freedom of private trucking is probably the best solution because it acts as a corrective and a restraint for the restrictive regulation of public transport.

1/ See paras. 12-14 above.
XIX. THE SOCIAL COST OF EXCESSIVE RESTRICTION

1. Our analysis of regulatory tools has led to the general conclusion that all restrictions, beyond those required to offset external distortions and possibly those designed to ensure a minimum of professional competence, involve a social cost. Restrictive regulation beyond this level, to be designated as excessive, has turned out to be either ineffective in terms of the objectives considered, or inferior to alternative policy instruments. In this chapter, we shall present a few observations on social cost of excessively restrictive regulation.

2. We shall pay special attention to the two classes of regulatory policies that almost inevitably involve excessive restriction, namely quantitative restrictions and rate control. We have noted that they are frequently quite ineffective in terms of the very objectives they are supposed to serve, except possibly in the case of scheduled carriers, which may require some regulation of schedules, entry, and rates. Outside the scheduled carrier area, quantitative restrictions and rate control are always far more detrimental to economic efficiency than other instruments, such as qualitative restrictions or taxation, that are no more difficult to put into practice.

3. The extent of social loss due to excessively restrictive regulation will depend on the specific features of the regulatory system: the effective constraints it imposes on entry, capacity, or prices; the distortions it causes within the road transport industry as a result of discrimination between and compartmentalization of submarkets, and so forth. Moreover, social loss will depend on the structure and size of the transport system, as well as the economic and political framework in which it operates. The variables are so numerous, diverse, and complex that no simple formula can be presented to measure the social cost of excessive restriction. We shall simply enumerate what we believe to be the principal effects of regulation, and present some comments on each point. Unfortunately, no serious attempts have been made to measure the benefits that society would derive from abolishing excessive restriction in road transport, so that our discussion will perforce lack all quantitative indications, except for some very rough guesses.

4. The term social cost is used to emphasize that we are not concerned solely with the direct cost of the regulatory process itself or with the cost of regulation to particular groups, such as the shippers or the carriers. In principle, we want to include all costs to society—changes in real national income, resources saved—that would result if all excessive restrictions were abolished. The effects of regulation on economic efficiency will be studied under three headings: the static effects, dealing with what is often called allocative efficiency (section 1), the dynamic effects of reducing competition (section 2), and the direct costs of the regulative process (section 3).
5. We shall not examine the effects of regulation outside the area of economic efficiency, where economic analysis can contribute little, except to mention here a few points we have touched on in the preceding chapters. Restrictive regulation, and especially quantitative licensing of entry or of capacity, tends to discriminate against outsiders, often against small firms, and not infrequently against the most law-abiding carriers. Restrictive regulation is at best very incompletely enforceable in an industry composed of a great many individual firms producing an endless variety of different services. There are correspondingly large possibilities of finding and using loopholes in the law or of actually violating it. The discretionary powers of licensing authorities, involving the free gift of assets that are more valuable, the more restrictive is the regulation, put a severe stress on public integrity. The disruptive effects of such temptations on civil, administrative and political morale should not be underestimated. 1/

1. The Static Effects

6. Restrictive regulation inevitably raises the price level of road transport services. 2/ This is often in fact the main immediate goal of regulation, either as a matter of transport coordination or in order to raise carrier incomes. Taking the objectives for granted, we may still examine the secondary effects of restrictive regulations on economic efficiency. They will depend on the instruments involved: rate control, entry restrictions, or capacity licensing. We have shown that rate control (minimum rates) alone will inevitably produce excess capacity, which represents a clear waste of economic resources. Even if the creation of excess capacity is avoided by imposing restrictions on capacity (or possibly on entry), the rise of road transport prices will still reduce economic efficiency by distorting economic relationships. The most

---

1/ The institutional problems of regulation (political influence, "captive agencies," etc.) have been studied extensively in the United States. See, for example, C.F. Phillips, Jr., The Economics of Regulation, Homewood, Ill.: R.D. Irwin, Inc., 1965, Chapter 18.

2/ See, for example, Nelson, "The Effects of Entry Control in Surface Transport" in Transportation Economics, pp. 381-422.
obvious example is the enormous growth of private transport that many countries have experienced as a result of restrictions imposed on public carriers. \(^1\)

7. A rise of road transport prices may also affect location, storage policies, and perhaps even the output of various commodities. In general, it will induce substitutions that reduce the need for road transport services, but increase the demand for other factors of production. Since road transport services would have been available to society at a lower price without restrictive regulation, these substitutions generally involve a social loss.

8. Another effect of restrictive licensing, observed especially in developing countries, is the overutilization of vehicles by cutting corners on safety requirements: speeding, overloading, inadequate repairs, etc.

9. Price control tends to cause rigidities in pricing, in the sense both of inadequate differentiation between peak- and off-peak prices, and of insufficient adaptation to unforeseen fluctuations of demand. We have discussed the point at some length in Part One, where we have shown that price rigidities, especially of the first kind, cause important social losses. \(^2\) The underutilization of capacity during off-peak periods, to the extent that it is due to inadequate price reductions, represents a clear waste. Similarly, the excessive deterioration of service (increase in delays) during periods of peak demand will cause social losses that could have been avoided by efficient peak-load pricing.

10. Rate control as well as licensing systems often discriminate between submarkets. Well-known examples are the especially severe restrictions often imposed on routes, commodities, or distances where road transport competes directly with the railways; the agricultural exemptions; and

\(^1\) It is generally recognized that restrictive regulation of public transport creates a bias in favor of own-account operations, and results in the inefficient utilization of capacity, due to the restriction of private vehicles to own-account operations. (See, e.g., Great Britain, Ministry of Transport, Carriers' Licensing, p. 61, and Bayliss, European Transport, pp. 30-32, 115-120.) Evidence of the bias is very clear when one compares the share of own account in total road transport operations for the different countries of the European Economic Community. Notwithstanding discriminatory taxation of transport on own account in France and Germany, the share of own account operations is considerably higher in the restrictionist countries (Belgium and Luxembourg, 68 percent; France, 66 percent, and Germany, 57 percent) than in the liberal countries (Italy, 50 percent and the Netherlands, 43 percent). (Source: Transport Statistics, 1967, Statistical Office of the European Communities.)

\(^2\) See Chapter VI, section 1, and Chapter VII, section 3.
the many unofficial exemptions resulting from the fact that enforcement and control are often much more inadequate in some areas than in others. 1/

Again, without passing any judgment on the objectives or the instruments, we may note that such discrimination tends to produce distortions both within the road transport industry and in related sectors. In addition to these fairly general forms of discrimination there are many special cases, such as restrictive licensing by vehicles rather than tonnage or seats, which discriminates in favor of large trucks. In every case, the discrimination is likely to cause distortions that represent a social loss.

11. Probably the most serious cause of static inefficiencies is the system of restricted licenses which divides the road transport industry into noncommunicating subsectors. The social cost of a system that prevents temporarily idle capacity in one sector from being utilized in another is clear and requires no further comments. Such a system is one of the most clear-cut illustrations of regulation achieving precisely the reverse - excess capacity - of what is presumably intended - the prevention of excess capacity. The worst offenders are the policies that impose the strongest restrictions in terms of commodity constraints, routes, or regions to be served. "No argument clouded by muddled thinking about joint costs can support a system which can and does result in empty trucks from A to B by one carrier, and empty trucks from B to A by another." 2/

Distance limits, and the restriction of private carriers to own account operations are other examples of policies that cause the same kind of inefficiencies. The associated waste of capacity is particularly serious for developing countries, where capital is relatively scarce.

2. The Dynamic Effects

12. Empirical evidence is accumulating that the economist's tendency to assume cost minimization is entirely unrealistic. A firm is not a lifeless computer that constantly minimizes the cost of every undertaking. The natural tendency is rather to maintain the established pattern of management, production, and marketing, unless the incentives are strong enough to overcome the resistance to change. A great many case studies show very clearly that enormous gains in productivity can be achieved without any

1/ "Restrictive licensing is forcing the industry to grow only in directions where controls are more lax, but this growth is, in many instances, merely a disguised form of the sector which is being repressed." (Khoo Siew Mun in "Licensing of Goods-carrying Motor Vehicles in Malaya," page 215.)

2/ Kolsen, Road-Rail Competition, p. 156.
change in the available technology or any increase in factor inputs. 1/ This implies that the original situation was one of suboptimal efficiency, due mostly to the use of outdated, inferior technology and insufficiently dynamic management. The absorption of new technology involves considerable effort, even when it is readily available. But in fact most knowledge is either too generalized or too specific to be immediately applicable to a firm's specific needs. It must be adapted, absorbed, and applied, all of which takes considerable time and effort. This may account for the sometimes quite astounding lag between invention and application, the "intellectual slack" that exists in any economy, especially in those developing economies where managerial talent is scarce.

13. In our rapidly changing world, economic efficiency is not a static concept. It is primarily a matter of constant adaptation to change, absorption of new knowledge, mobilization and adaptation of available knowledge to the particular needs of the firm, and the creation of new knowledge. Empirical investigations into the causes of economic growth show very clearly that dynamic efficiency in this sense is a far more important source of increases in real income than improvement of static efficiency. 2/

14. Dynamic efficiency requires strong incentives. One of the most effective incentives is the constant pressure of free and open competition. Restrictive regulation has an inherent tendency to weaken the pressure towards dynamic efficiency, by raising the income that established carriers can achieve without special effort, and by protecting them against

---

1/ The residual factor in productivity has been recognized as highly important in economic growth ever since modern economic theory began to seriously tackle the problem of growth. Although the many theoretical and empirical investigations on the subject do not agree on the exact contribution of the residual factor to total growth, they all come up with very high values, often exceeding the combined contributions of increased labor and capital inputs.

2/ Harvey Leibenstein, in a thought-provoking article, "Allocative Efficiency vs. 'X-Efficiency'," American Economic Review, June 1966, pp. 392-415, rightly stresses the fact that the economist's preoccupation with allocative efficiency may be misdirected, since the welfare gains to be derived from improving allocative efficiency may be trivial compared to the social losses due to suboptimal X-efficiency. The concept includes all dynamic factors such as motivation, incentive, organization and dissemination of knowledge, etc. Apart from macroeconomic data on the residual factor and ILO findings on the results of productivity missions to developing countries, he also mentions a less well-known but highly significant indication of the existing slack in X-efficiency, namely the fact that even in highly developed countries the rate of return on consulting in terms of increased productivity is on the average about 200 percent.
competition from other, more dynamic firms. 1/ The direct evidence of these effects for the specific case of transport regulation is limited, but certainly gives the impression that the social cost involved may be quite substantial. 2/ In the case of developing countries, restrictive regulation of road transport may have the added dynamic disadvantage of limiting entry into a profession that may be one of the most effective training-grounds of managerial talent. 3/

3. **Direct Costs of the Regulatory Process**

15. The direct costs of the regulatory process are the one element in the social cost of restrictive regulation that can be easily observed and estimated. They include, firstly, the public cost of administration (executive as well as judicial), of enforcement, and of control. Secondly, they include the costs to the carriers, indirect expenditure for application, processing, and possibly litigation, but also managerial effort and inventiveness absorbed in living with restrictive regulation, including the sometimes quite elaborate efforts directed at circumventing it. The resulting "prostitution of scarce managerial talent", as Walters has called it, may well be the most important direct cost of the regulatory process, especially in developing countries. 4/

4. **Summary**

16. Excessively restrictive regulation gives rise to social costs that may include some or all of the sources of inefficiency that have just been mentioned: misallocation of resources, waste of capital and managerial talent, management inefficiencies, technological stagnation,

---

1/ The point has been stressed in particular by G.W. Wilson in several articles, most recently in a paper for the International Symposium on Transportation Pricing, American University, 1969: "Regulation and Efficient Provision of Transport". A specific example is given by P.W. MacAvoy and J. Sloss in *Regulation of Transport Innovation; The ICC and Unit Coal Trains to the East Coast*, New York: Random House, 1967. The authors argue that ICC regulation retarded the introduction of unit coal trains in the U.S.

2/ See Wilson in "Transportation and Price Stability," where he estimates the cost of present transport regulation in the U.S. to be of the order of $3 to $4 billion per year. The Australian experience with deregulation of interstate transport points in the direction of substantial gains; see Collins, "The Transport Scene in Australia."

3/ The point has been made by Heinze in *Der Verkehrssektor in der Entwicklungspolitik* and by Hawkins in *Road Transport in Nigeria*.

and the absorption of resources by the regulatory process itself. Although the size of the social losses involved is hard to establish, even as an order of magnitude, there is some evidence that they are quite substantial. 1/ The objectives to be served could conceivably justify these costs, but our analysis of the relevant objectives and the alternative ways to achieve them has failed to bring out any convincing arguments for restrictive regulation of the road transport industry outside the area of scheduled carriers. 2/ Under these conditions, the social cost of restrictive regulation does indeed represent a net loss to society -- one which constitutes a measure of the benefits that society could derive from a more rational approach to road transport regulation.

1/ See the Wilson and Collins articles cited in footnote 2/, para. 14.

2/ Even in the latter case the regulation should be mostly promotional rather than restrictive: the main policy problem is to ensure sufficient stand-by capacity in the face of inadequate revenues from normal pricing (see Chapter VIII).
PART FOUR

CONCLUSIONS AND RECOMMENDATIONS

XX. INTRODUCTION
XXI. SUMMARY AND MAIN CONCLUSIONS
XXII. PROBLEMS OF TRANSITION
XXIII. SUGGESTIONS FOR FURTHER RESEARCH
XX. INTRODUCTION

1. A study of present regulatory policies in the road transport industry can hardly fail to leave an overwhelming impression of inefficiency. Restrictive regulation, whether of rates, entry, or capacity, is not only detrimental to economic efficiency but often totally ineffective in promoting other objectives it is supposed to serve. Almost all of the few serious economic studies of road regulation support this conclusion. As Kolsen has put it in the concluding chapter of his analysis, based on a careful examination of road regulation in Australia, England, and the United States,

"there is good reason for the belief that regulation frequently achieves results which are almost the very opposite to those stated... The conclusion that present regulatory methods are inefficient must be regarded as sustained from practically every point of view, except that of existing suppliers." 1/

An IBRD report on the economic development of Uganda concludes that

"it is the experience in most countries that regulation (licensing, etc.) is administratively difficult, expensive, unpopular except with the holders of monopolies, and unenforceable." 2/

A detailed study of road transport policy in Malaya leads the author to conclude that

"restrictive licensing seems to be neither effective nor really economically justifiable." 3/

In contrast, the liberalization of interstate haulage in Australia has, in the words of two independent commentators,

"in a remarkably short time contributed untold benefits to the Australian economy by permitting the freedom of choice to the user", while "dynamic competition from

1/ Kolsen, Road-Rail Competition, pp. 151 and 159.

2/ The Economic Development of Uganda, Baltimore: Johns Hopkins Press, 1962, p. 329. Prest comes to the same conclusion in his more general study, Transport Economics in Developing Countries (see especially p. 154).

the roads has been the cause of vast improvement in the standard and cost of railway operations on competitive routes.1/  

2. Very few quantitative data are available on the cost of restrictive regulation to the economy. The findings of particular case studies do not necessarily apply to other situations, since the economic effects of regulation will depend on the specific measures taken, the total transportation scene, and the economic, political, and institutional setting of the country considered. Any observations we have presented on the cost of restrictive regulation should be considered as generalizations to be adapted to the particular case under review. Those quantitative indications available point to a rather appreciable social cost from less than fully efficient use of resources, from resources wasted in application and control of the regulatory system and, probably most important to developed and developing countries alike, from reduced incentives to innovate, reduce cost and expand into new markets.2/ Moreover, barriers to entry unfairly discriminate against outsiders and curtail the functioning of road transport as one of the most effective schools of managerial talent in developing countries.

3. Our analysis has focused on economic efficiency, both as an objective in and of itself, and as a yardstick by which alternative means to achieve other objectives of transportation policy can be judged. How important is economic efficiency? It represents the boundary of the nation's ability to satisfy national objectives, public and private. Gains in economic efficiency increase the nation's potential for improving present welfare and promoting future development. They save resources for more effective use elsewhere. Economic efficiency is especially important to developing countries. Desperately dependent on scarce resources for development and growth, they can ill afford the inefficiencies of inappropriate transport regulation. On the other hand, they are fortunate in being able to start without the burden of overextended railways and traditional vested interests. As Walters has put it in his thoughtful paper,

"the experience of the developed countries suggests that regulation of rates, entry and operation in the transport industries has been an important cause of inefficiency and rigidity... This is the lesson of experience, and the cost of this lesson is much lower if learned at the early stages of development."3/

---


2/ See Chapter XIX. We recall Wilson's judgment that the social cost of restrictive regulation of road transport in the U.S. would be of the order of $3 to $4 billion a year (see his "Transportation and Price Stability").

XXI. SUMMARY OF MAIN CONCLUSIONS

1. Economic Theory and Regulation

1. In reviewing the application of economic theory to the road transport industry, we have run into three major problems.

   (1) Is the road transport industry subject to increasing returns to scale and, if so, what are the implications?

   (2) Is the competitive system capable of providing an efficient solution to the problem of quality differentiation in road transport?

   (3) Is the road transport industry subject to imperfect pricing and, if so, what are its implications for the efficiency of competition?

2. We believe we have shown that, outside the special area of the scheduled carriers, competition in the road transport industry is fully consistent with economic efficiency, both with respect to current operations (pricing and output of road transport services), and investment in vehicles. In the process, we have refuted a number of popular fallacies, such as the explicit or implicit notions that efficient pricing implies a deficit equal to the fixed cost of investment; that efficient pricing is ambiguous due to a choice between short- and long-run marginal cost; that prices should be established by some method of cost allocation; and that competition tends to drive prices down to marginal operating cost or to average variable cost. We have shown that efficient pricing, output, and investment policies are in fact perfectly unambiguous and determinate, and that competition, when it is feasible at all, tends to be efficient in this sense. 1/ It is the three problems enumerated above rather than the popular fallacies which merit debate. We shall summarize our findings with respect to these problems for the general case and for the special case of the scheduled carriers.

   a. The General Findings

3. Increasing returns to scale in road transport are of three kinds: indivisibility of the vehicle, economies of scale to the firm, and external economies (i.e., external to the individual firm, but internal to the industry). We have shown that indivisibilities are not a serious problem and do not stand in the way of workable competition, except in extremely "thin" (small and isolated) markets, of very limited practical interest. Economies of scale are more important. Costing studies and the observed survival of small firms in the absence of restrictive regulation indicate

1/ See Chapters III and IV.
that there are no significant economies of scale in road transport, except possibly for scheduled carriers. 1/ External economies of scale also occur only in the scheduled carrier market, where an increase in aggregate output will increase the frequency of service and improve its quality to all users. In general, increasing returns to scale are therefore important only for scheduled carriers and possibly in very "thin" markets which cannot support more than one or a few firms of optimum size.

4. **Variations in the quality of service** — comfort, handling, and especially speed — are particularly pronounced in road transport. Since the quality of the product can be varied almost continuously, the industry does not at first sight conform to the conventional competitive model: the individual firm is not a simple price-taker, but is able to determine its own price-quality combination. Nonetheless, closer analysis shows that the model does still apply, with a few modifications in presentation, and that competition is fully consistent with economic efficiency.

5. Perfect pricing, that is, full adaptation of prices to market conditions at all times and for all qualities of service, implies wide price variability in industries such as road transport, where demand is volatile and the product cannot be stored. This raises two questions. First, will competition bring about a pricing pattern as close to perfect as is practicable and desirable, considering the cost involved? We have found no convincing reason to reject this proposition. When competition is feasible at all, it appears to ensure excellent price responsiveness to market conditions. Second, should the variations of prices be limited in the interest of stability? In general, price stabilization is harmful to economic efficiency. It leads to a sheer waste of capacity when the price is higher than its optimum level (during off-peak demand), and to excessive deterioration of quality, especially delays, when the price is too low (during peak demand). In the special case of scheduled carriers, fairly extensive price stabilization may be both inevitable and desirable, especially when there are unforeseen fluctuations of demand. In general, however, competitive pricing comes as close to perfect as is practicable and desirable, and economic efficiency requires no limitations on the competitive flexibility of prices. 2/

6. Our general findings can be summarized as follows. Provided there is no distortion by factors outside the industry (e.g., imperfect road pricing) or by private or public restrictions, competition is perfectly consistent with economic efficiency in the road transport industry,

---

1/ See Chapter V and Chapter VIII, section 2. Brief reviews of empirical data on economies of scale in trucking and bus operations are given in footnotes to Chapter V, para. 15-16 and Chapter VIII, para. 13 respectively.

2/ See Chapters VI and VIII, and Chapter X, section 1-e.
except for scheduled carriers and very "thin" markets. Of these two exceptions, the scheduled carrier problem is by far the more important, since a market must be very small and isolated indeed to be able to support only one or a few carriers of optimum size. In such exceptional cases, the appropriate regulatory measures will usually consist in ensuring adequate service by imposing public service obligations on scheduled carriers, bringing us back to the scheduled carrier problem. The major policy conclusion is that economic efficiency does not require economic regulation of the road transport industry, except possibly in the case of scheduled carriers.

b. **The Scheduled Carrier Problem 1/**

7. Scheduled carriers exhibit significant economies of scale, both internal and external. Moreover, they are subject to relatively strong limitations on perfect pricing. For these reasons, competition among scheduled carriers may not always be workable, in the sense that the unregulated market may not produce an efficient output and investment pattern. In the absence of special rate policies such as two-part pricing, economies of scale lead either to suboptimal output and investment or, if public policy forces output and investment to the efficient level, to a deficit on the part of the carriers involved. Likewise, we have shown that, under the very likely assumption that there is no positive correlation between price levels and levels of output, the less than perfect flexibility of scheduled carrier prices will lead either to underinvestment in stand-by capacity or to a financial deficit for the carriers. These problems are aggravated when scheduled carriers are subjected to other public service obligations, such as tariff reductions to protect products or regions or adequate servicing of "thin" markets, without receiving adequate compensation.

8. We have argued that scheduled carriers should be regulated in order to ensure

(1) stability of performance, especially with regard to schedules and routes,

(2) efficient pricing and output policies in the context of an imperfectly competitive market, and

(3) adequate capacity to serve predictable as well as unpredictable peaks in demand, notwithstanding internal and external economies of scale and the limitations of perfect pricing.

9. The scheduled carriers' deficits should ideally be covered by a fixed charge, to be paid by the users for the right to use the services

---

1/ See Chapter VIII, and Chapter X, section 2.
of the scheduled carrier (the "club principle"). If such two-part pricing schemes turn out to be impracticable, public subsidies would be the next-best solution. Restriction of competitors (nonscheduled carriers, including private transport) has a number of important disadvantages which we have investigated separately for the different forms of restriction. Restriction of competitors should be rejected unless, as may be the case in developing countries, the budgetary difficulties of subsidizing scheduled carriers outweigh the drawbacks of restrictive policies.

10. We would not wish the preoccupation of this report with the scheduled carrier problem to lead to an exaggerated impression of its practical importance. Analytically, it is the major economic issue in road transport regulation for the simple reason that in all other respects economic regulation of the industry appears to have no economic justification. But the dominant position of the problem in economic analysis should not obscure the fact that a large part of the road transport industry is engaged in individual carriage: contract haulage, taxi service and private carriage. For individual carriage, our main conclusion has been that restrictive regulation is inconsistent with maximum economic efficiency.

2. The Objectives of Regulation

a. Internal Efficiency in the Road Transport Industry

11. Among the popular arguments for restrictive regulation, the two most prevalent are that road transport firms are subject to economies of scale, and that the road transport industry tends to excessive entry, excessive investment and, generally, excessive competition. The fact that these arguments are often presented together reflects the prevalence of politically inspired motivation, often dominated by private interests, over serious economic thinking. The two arguments are inconsistent: if road transport firms were in fact subject to significant economies of scale, we would observe a tendency towards concentration rather than excessive competition.

12. Moreover, as we have just recalled, the empirical evidence simply does not support the first argument, while the supposed excess of competition have never been convincingly argued or clearly demonstrated. Flexibility of entry and exit is undoubtedly conducive to efficiency, innovation, and dynamic development, while there is no clear evidence that the rate of bankruptcy is appreciably higher in road transport than in structurally comparable industries. The existence of a permanent reserve army of eager future bankrupts is one of the most incredible myths of our

1/ See Chapter X.

2/ For data on bankruptcies in road haulage, see Chapter X, section 1-a, especially para. 9, footnote 1/.
rich transportation lore. While the availability of relevant market information to the carriers might be improved and certain minimum standards of professional competence imposed on new entrants, restrictive measures can hardly be justified on the basis of presumed ignorance and total lack of learning from readily observable facts. In any case, the economic and social costs of short-run dynamic flexibility in the road transport market are relatively insignificant, considering the low investment in skills and durable assets and their ready transferability to other occupations.

13. Other arguments for restrictive regulation, excluding for the moment the protection of scheduled carriers, are equally unfounded. We have already mentioned that price flexibility, which is highly conducive to economic efficiency in industries such as transportation whose products are nonstorable, is often mistakenly labelled as instability. The type of cyclical instability that can result when durable assets have a long economic life and investment a long gestation period simply cannot and does not occur in the road transport industry. The prevalence of joint cost, especially of the haul and backhaul, similarly produces efficient price differentiation rather than instability, and it does not lead to overcapacity in any relevant sense. The theory of inadequate pricing can be traced on the one hand to the excessive investment thesis, on the other hand to mistaken interpretations of the marginal cost pricing principle and to the costing experts' understandable infatuation with cost data and neglect of demand aspects. Demand forces tend to establish prices that equate demand to available capacity, and to induce investment in new capacity only as long as the prospective rate of return is judged adequate by the investor. The supposed irrational preference for private transportation is equally irrelevant to the issue of regulation. To bar private carriage from the public transport market would create serious economic inefficiency.

14. The need for adequate and reliable road transport service is another often advanced argument for regulation. We have noted that economic analysis supports this contention, since scheduled carriers should indeed be regulated. Competition among scheduled carriers may have to be regulated to ensure stability of routing and time schedules. On account of their special characteristics (economies of scale and imperfect pricing), adequate provision of scheduled services may involve a deficit, and regulation may be needed to ensure that certain nonremunerative services in "thin" markets are performed and nonremunerative stand-by capacity is held. Further special measures are required to deal with the resulting deficit, but they do not involve restrictive regulation of the scheduled carriers' competitors except possibly as a last resort. 1/

1/ See Section 2 below.
b. **Transport Coordination 1/**

15. The legitimate desire for efficient transport coordination does not establish a case for public regulation. The all too prevalent preoccupation with cost data has often led very competent observers to incorrectly criticize unregulated market coordination for not ensuring transport at the lowest total cost to society. Defined solely in accounting cost terms, cost to society has no relevance to economic efficiency at all. When social cost is interpreted to include all elements of social benefit related to the quality of service, then it can be effectively translated into efficient choices only through market prices and freedom of choice by the user.

16. Aside from this issue, rail-road competition presents the same type of problem as competition between scheduled and nonscheduled road carriers. There are good reasons to aid the railways, because of both economies of scale and the public service obligations often imposed on the railways without adequate public compensation. Both factors are, on all available evidence, far more important for railways than for scheduled road carriers. The policy conclusions are similar: some form of two-part pricing would be the best solution, public subsidies to the railways a second best, and restrictive regulation of road transport only a final resort. The latter should be applied in the way which least impairs the industry's economic efficiency, and only to the extent that gains in transport coordination outweigh the cost of regulation and the social cost of likely indirect distortions and of reduced incentives to dynamic improvement.

c. **Other Objectives of Regulation 2/**

17. Other objectives that economic regulation of the road transport industry has served include the offsetting of external price distortions (e.g., inadequate road pricing or undervalued imports) and external effects (e.g., air pollution), and other extraneous policy objectives such as regional development. The most appropriate policy in all these cases is to employ direct instruments - proper road pricing, a tax on imports, prohibition of or payment for air pollution, direct incentives to regional development, etc. - rather than restrictive regulation of road transport. The offsetting taxes required by some of these direct measures cannot properly be called restrictive regulation of the road transport industry, since they serve to correct the distortion of prices of factor inputs or outputs.

18. In a very few cases, restrictive regulation may be an inevitable second best to offsetting taxes (e.g., physical parking limitations when proper road pricing is judged impracticable). The same would hold for

1/ See Chapter XI.

2/ See Chapters XII and XIII.
public service obligations imposed on the road transport industry to serve extraneous policy objectives. In the few cases where such measures might be justified because more direct instruments are not available, the road transport firms should be compensated for the cost involved. In any case, there is no call for restrictive regulation.

3. The Instruments of Regulation

19. If we disregard the special case of scheduled carrier regulation, the main instruments of economic regulation in the road transport industry fall into five groups. They are:

   (1) nonrestrictive policies: general economic measures applied without discrimination to road transport, offsetting taxes and compensating subsidies, information policies, antitrust policies;

   (2) qualitative policies: subjective entry conditions, firm-oriented licensing systems;

   (3) financial restrictions: regulatory taxes, fees for the unrestricted purchase of operating licenses;

   (4) rate control;

   (5) quantitative restrictions: quantitative entry control, market-oriented systems of capacity licensing (quota or proof-of-need).

20. Regulatory measures of the first two types are entirely consistent with economic efficiency, provided the subjective entry conditions are reasonably related to the requirements of professional competence in road transport and to the general level of education in the country, and that the firm-oriented licensing systems do not appreciably raise the rate of return in road transport above the market level. 1/ With these provisos, which appear to be generally satisfied, restrictive regulation may be defined to exclude measures under (1) and (2). The real issues all concern the other forms of regulation.

21. Regardless of the policy objective, we have found that the fourth and fifth groups of instruments - quantitative restrictions and rate control - are invariably inferior to financial restrictions, to nonrestrictive regulation, or to no regulation at all. 2/ They are inefficient, often ineffective in terms of the chosen objectives, imperfectly enforceable, and always costly. They tend to be inequitable and a source of arbitrary administrative power, if not corruption.

1/ See Chapters XIV, XV, XVII, section 1, and XVIII, section 1.

2/ See Chapters XVI, XVII, section 2, and XVIII, section 2.
22. Rate control, which in practice serves mainly as a price floor, leads to a waste of capacity in the short run, and is totally ineffective in raising carrier incomes in the long run unless it is coupled with restrictive licensing. Restrictive licensing tends to produce misallocations of resources, both inside and outside the transportation industry. It raises the price of public road transport services, induces an overexpansion of private transport, and leads to avoidable underutilization of vehicle capacity when the area of application of the license is restricted. The effects tend to be more serious the more restrictive the licensing system and the more strongly it compartmentalizes the total road transport industry, both in the number of submarkets and the rigidity of the separation (by route, region, distance, commodities carried, private and public operations, etc.).

23. Unfortunately, in practice the pressure of vested interests, especially the established carriers and the railways, very often tends to make quantitative licensing excessively restrictive, as is clearly witnessed by the very high price paid for licenses in countries with restrictive licensing systems. 1/ Perhaps even more important than the misallocation of resources is the fact that quantitative licensing acts as a barrier to dynamic development, innovation, improvement of technical and managerial efficiency, and expansion into new markets. Licensing systems are also inequitable since they almost always discriminate against newcomers and small firms. Finally, both rate control and quantitative licensing often involve considerable administrative costs to the regulatory agency and the carriers.

24. Our examination of the social cost and the inequities of the various regulatory systems has led us to conclude that the most urgent reform of present transport policies for nonscheduled road carriers is to abolish rate control and quantitative restrictions of entry and of capacity. 2/

25. The use of financial restrictions may be regarded as a valid second- or third-best policy, when other means of aiding the scheduled road carriers or the railways are not available. The provision of adequate and reliable service tends to impose a deficit on the scheduled road carriers and the railways, unless they are able effectively to practice two-part pricing. If and to the extent that two-part pricing turns out to be impracticable, public subsidies would be the next-best solution. Budgetary considerations may, however, block that policy as well. Under these conditions, restriction of competitors becomes the only practical policy.

1/ For some figures, see Chapter XVIII, especially paras. 23 and 27.

2/ See Chapter XIX.
26. We believe we have shown that financial restrictions are the least harmful to economic efficiency and the least inequitable. They preserve maximum flexibility and freedom of dynamic development, and they do not impose a high direct cost of regulation either on the administrative agency or on the carriers. Financial restrictions do not tend to be made excessive in response to pressure from established carriers, nor do they foster any of the inequities inherent in quantitative licensing systems.

27. The general propositions about restrictive regulation which we have just summarized apply in principle to both highly industrialized and developing countries. On a general level, there would appear to be only two systematic differences. First, the economic disadvantages of quantitative restrictions and rate control are likely to be especially serious for developing countries, since they cannot afford the luxury of inefficiencies and because they encounter special difficulties in enforcing restrictive regulation. Second, since budgetary limitations may be especially important in developing countries, the second-best solution of financial restrictions is more often appropriate than in industrialized countries, which can afford public subsidies to scheduled road carriers and railways.

1/ See Chapter XV, section 2-b, and Chapter XVII.
1. Given the main thesis of this report, that all sectors of the road transport industry with the possible exception of the scheduled carriers should be freed of restrictive licensing and rate control, what procedure of deregulation should be adopted? We will use the term deregulation as a shorthand expression for the elimination of the restrictions discussed in the previous chapter.

2. Sudden and complete deregulation is unlikely to be politically acceptable without measures to ease the transition. Nor would it be good economics if such a policy were to produce appreciable short-term disturbances which could have been avoided. When the restrictions have not been effective and regulation has been little more than an elaborate facade, no problems of transition occur and there is no reason not to abolish the regulation at once.

3. But when regulation has been effective, its abolition will induce expansion in the previously restricted sectors of the road transport industry. Four kinds of problems may arise.

   (1) The previously restricted sectors may expand, partly at the expense of the scheduled road carriers and the railways, which may have to contract operations.

   (2) Deregulation ends the protection of existing road transport firms and may create serious difficulties for high-cost firms.

   (3) Deregulation reduces the capital value of existing road transport firms, which may inflict serious inequities on the carriers involved, as when a high-priced license to operate becomes worthless.

   (4) Excessive short-term entry or expansion of capacity may take place, due to the lack of relevant experience on the part of prospective carriers in a market no longer protected by restrictive licensing, or due to the failure to anticipate the simultaneous entry of others.

4. Item (1) is a legitimate problem. To the extent that restrictive regulation was designed to provide justified compensation for the railways and the scheduled road carriers, deregulation will distort competitive relationships unless the resulting losses of the scheduled road carriers and the railways are simultaneously offset by other measures. We have argued that such measures should ideally consist in the introduction of two-part pricing schemes or, failing that, in public subsidies. As a second-best policy, financial restrictions may have to be imposed on the nonscheduled road users. Provided deregulation is accompanied by any of these measures, there is no case for modifying the policy of deregulation itself. Similar
comments apply to restrictive regulation that serves to offset social dis-economies of road transport (e.g., inadequate road pricing): deregulation will have to be accompanied by measures to charge the road users for these costs, in order to prevent an inefficient diversion of traffic from rail to road upon the abolition of restrictive road regulation.

5. Whenever the restriction has exceeded the level required to compensate the specific economic burdens on the scheduled carriers and the railways, and the social diseconomies of road transport, no supplementary measures are required. The traffic which flows to the deregulated sector can only promote economic efficiency and welfare. The alleged loss of capital values that may result from the contraction of rail and scheduled road carrier operations is only an accounting loss; it has no significance for economic efficiency.

6. Item (2) justifies no compromise with the policy of deregulation, as long as we consider only the aspect of economic efficiency. Economic efficiency demands that high-cost firms, when they cannot adapt to competition, should be eliminated in favor of lower-cost competitors. To the extent that their assets are highly specific, which is unlikely in road transport, they may suffer a capital loss, but again this has no significance for economic efficiency.

7. Item (3) deals with the equity aspects. While deregulation favors previously barred outsiders and the users of road transport services, it clearly harms previously protected insiders. We have shown that total gains exceed total losses, but this does not eliminate the equity problem. Deregulation will tend to reduce previously protected carriers' incomes and destroy the value of their operating licenses, and may reduce the value of specific capital assets owned by high-cost firms. Some or all of these effects may be considered inequitable. The obvious remedy is not to renounce deregulation, but to pay the losers equitable compensation, e.g., all or part of the previous market price of the operating license. The funds might be obtained by temporarily charging a moderate entry fee to new carriers.

8. This leaves only one inherent problem of deregulation not entirely soluble through supplementary measures, item (4). All the information the public authorities can provide to existing and prospective carriers may still not compensate for their lack of experience in an unregulated road transport market. Although the Australian experience with sudden and total deregulation of interstate trucking effectively disproves the claim that complete chaos follows deregulation, it might be advisable to retain some form of control for a limited period of time. 1/ The most

1/ See Joy, "Unregulated Road Haulage: The Australian Experience." He states that "...the most important conclusion to be drawn from the Australian experience is that freedom of entry and operation need not necessarily lead to chaotic conditions in the road transport industry."
appropriate method would appear to be a firm-oriented licensing system, which serves to impose a minimum prospective rate of return on the firm, but does not inhibit entry or expansion of more efficient firms. The licenses should be as general as is practicable (no differentiation with respect to routes, types of transport, etc.), and the policy should aim at reducing the market price of the licenses to a low level and eventually to zero, preferably according to a gradual but fixed schedule of deregulation. In this manner, short-term disturbances can be avoided with a minimum of restriction during the transitional period of learning to live with unregulated competition.

9. One final comment seems in order. Any policy of deregulation will inevitably meet with resistance from vested interests, in the industry itself, in the railways, and in the administration. These interests are concentrated among a relatively small and coherent group, which can generally exert some considerably political power. The economic advantages of deregulation, on the other hand, are scattered among a large and heterogeneous group of shippers and final consumers, who often do not even realize that their interests are harmed by restrictive regulation. This inequality of political power probably largely explains the survival of depression-era legislation which has long outlived its economic function. The main political problem of deregulation will be to mobilize these scattered consumer interests and convince the voters that a more rational road transport policy will raise the common welfare, though all supposedly knowledgeable insiders—who represent vested interests—oppose such a policy. It may also be equitable and wise to pacify the opposing interests with appropriate palliatives, provided they do not compromise deregulation. We have suggested a number of such palliatives, in particular a compensation to existing carriers for the reduced value of their licenses. These general and very inadequate comments on the political aspects of deregulation will have to suffice, since the appropriate approach will depend very much on the specific circumstances in the country.
XXIII. SUGGESTIONS FOR FURTHER RESEARCH

1. This paper has raised a number of unanswered questions. The major points that require additional research would appear to be:

(1) the public service obligations to be imposed on scheduled carriers, and the size of the deficit that scheduled carriers would incur as a result;

(2) the practical possibilities of two-part pricing in transportation;

(3) the social cost of restrictive regulation and the budgetary burden of deregulation.

2. Item (1) is clearly a very important general problem, primarily concerned with the stand-by capacity scheduled carriers should be required to hold, over and above the level they can finance out of their regular revenues. Clearly, the policy problems posed by the scheduled carrier are more serious, the larger the public service capacity and the larger the associated deficit. The subject requires a theoretical analysis of the optimum level of capacity and its operational definition. It also requires extensive empirical research to evaluate the parameters of the social cost and benefit functions involved.

3. Item (2) is entirely a practical matter. It is important because restrictive regulation is justified in the road transport industry only as a second-best policy, when the scheduled road carriers and the railways cannot effectively apply two-part pricing methods. Some potentially feasible two-part pricing schemes have been suggested, but so far none seems to have been worked out in sufficient practical detail to be tested. 1/ A feasibility study would have to consider several alternatives, examine them on their theoretical and practical merits, and test them.

4. Item (3) would appear to be of fundamental importance to the policymaker. Since the social cost of present regulatory practices is a measure of the economic importance of a new approach to regulation, a study of social cost could be a powerful argument in the hands of those who wish to move away from restrictive regulation towards a more rational road transport policy. At the same time, deregulation may require public funds to compensate existing carriers for the loss of protection. Although the compensation is only a transfer payment and there are no social costs involved, the operation may cause some short-run practical and political difficulties. Consequently, the size of the compensatory payments should be evaluated and the budgetary implications of deregulation determined. In the case of licensing systems, a maximum estimate of the compensation

1/ See Chapter X, section 2-d.
to existing road carriers can readily be obtained from the market price of
operating licenses. Other budgetary effects of deregulation, such as the
reduced cost of administering the regulatory system, should also be con-
sidered.

5. To be at all useful, a study of the social cost of regulation
should be concrete and specific, i.e., it should deal with a particular
country, its specific transportation structure, and its actual regula-
tory policies. The loss of generality inherent in a case study would be
more than made up for by the immediate relevance of the results and by
the experience in operational problems that could then be applied to other
cases. The study would also have to range wide enough to examine the road
transport problem in the context not only of the transport industry but
also of the economy as a whole, because the net gains of deregulation are
scattered widely throughout the economy. So far, no serious studies of
this kind have been made. A few guesstimates have been offered, but they
are not based on serious and extensive analysis. Nor are they relevant
to developing countries, for which even such first approximations are
tirely absent. Given the lack of experience on the subject, it might
be advisable to begin with a pilot study in a small country with a rela-
tively simple transportation structure and transparent regulatory policies,
preferably strongly restrictive ones in order to clearly bring out the
effects of regulation and deregulation.
BIBLIOGRAPHY

BOOKS


ARTICLES


———. "Bracket Tariffs - The Proposed System of Rate Regulation in the European Economic Community." Transportation Journal, Fall 1967, pp. 29-34.


Taschereau, P. "Canada’s National Transportation Act and the Canadian Transport Commission." Transportation Research Forum Papers, 1968.


REPORTS

INTERNATIONAL ORGANIZATIONS


NORTH AND SOUTH AMERICA

Argentina


Canada


United States


EUROPE, ASIA, AND AFRICA


