

UC Berkeley
IURD Working Paper Series

Title

AN EXERCISE IN DUTCH GOVERNMENT DECISION MAKING

Permalink

<https://escholarship.org/uc/item/50v8d248>

Journal

Institute of Urban and Regional Development

Author

Fitch, Lyle C.

Publication Date

1985-08-01

**AN EXERCISE IN
DUTCH GOVERNMENT DECISION MAKING**

Lyle C. Fitch

Working Paper No. 443

August 1985

Institute of Urban and Regional Development
University of California, Berkeley

Table of Contents

Preface	1
Background	3
Urban Holland	3
Government Structure	4
Urban Mass Transit	4
The Public Policy Problem	6
Public Policy Analysis.....	8
Administrative Arrangements for Conducting the Study.....	9
Defining Levels of Service	9
Structural Approach	10
Method of Comparative Indicators	11
Benefit/Cost Approaches	12
Measuring costs	12
Quantifying benefits	12
Utilization approach.....	12
Moving Toward an Appropriate Level of Service.....	13
Consumer Surplus Approach to Benefit Evaluation	14
Direct Benefits	14
Implementing a Consumer Surplus Approach.....	16
Utilization Approach to Benefit Evaluation	17
Positive Externalities	17
Implementing a Utilization-Based Allocation System.....	19
Efficiency Advantages of a Utilization-Based System.....	20
Administrative Feasibility	21
Intercity cost differentials	21
Special weight for peakhour trips	21
Allowing for new services with delayed potential.....	22
Budgeting for a Utilization System.....	22
Measuring travel volume	23
How It All Came Out	23

Appendix I.	
Note on Elements of the Level of Service.....	24
Appendix II-1.	
Generalized Subsidy Formulas	25
Appendix II-2.	
Cases 3-4.....	26
Appendix III.	
Figures 1-8 -- Diagrammatic Representation of Consumer Surplus Concept	27

An Exercise in Dutch Government Decision Making

Lyle C. Fitch

PREFACE

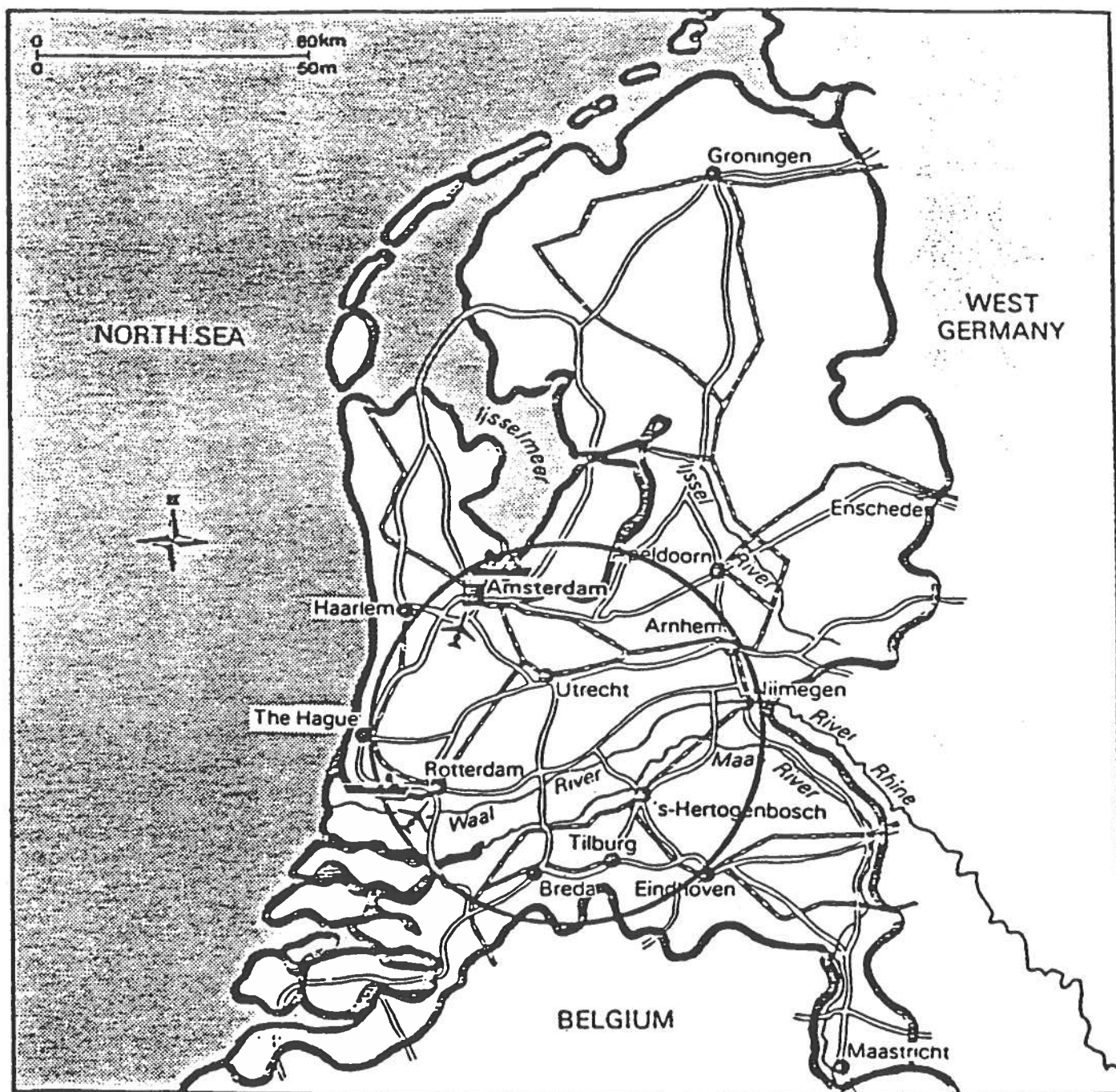
This is a report on a project by the Netherlands Ministry of Transport and Public Works on how to distribute mass transit subsidies of more than 1 billion guilders (then about \$500 million) so as to produce maximum benefit for the fifty cities involved. The author directed an Institute of Public Administration team that had been engaged as consultants to work in collaboration with the Netherlands Economic Institute. It was a particularly interesting assignment,¹ not only because of the intrinsic challenge of the project, but also because the Dutch are so different from the Americans in their attitude toward government, their system of government and intergovernmental relations, and their way of approaching policy problems.

To an outsider, the Dutch exhibit the qualities popularly attributed to them--very neat and friendly; very stubborn about many things, a quality that comes out often in debates and conferences; a high sense of public responsibility and order. There is great respect for government and education.

Their national ethos conspicuously stresses fairness, and in many respects is more egalitarian than the American. For instance, one of their proudest claims is that they have eliminated poverty.

1. Work on the project was done over a 2 1/2 year period beginning in early 1979, but the usefulness of the project as a case study is little affected by the time lapse; most of the underlying conditions still remain, though economic decline has drastically shifted priorities.

THE NETHERLANDS



BACKGROUND

Urban Holland

Holland, with a population of about 14.5 million and an area of about 15.8 million square miles, is approximately twice the size and population of New Jersey, the most urbanized U.S. state. Its urban population, like that of New Jersey, is highly concentrated; notably in the famous *Randstad* urban area, including Amsterdam, Haarlem, The Hague and Rotterdam; these and most of the other large cities are located on or near the perimeter of the circle superimposed on the map of Holland shown on the following page. Like other European countries and the U.S., Holland is increasingly suburbanized; all the large cities are losing population.

Most of the suburban housing development is multiple dwelling, in clusters which can be served economically by transit. Dutch transit policy seeks to serve new communities, as by initiating service when residents begin moving into new housing centers. Such policies, and the expansion of transit service generally have done little to check auto use, however; the greater diversion has come from the once ubiquitous bicycles.

Rotterdam, where the Board of Aldermen is solidly Labor Party, has a policy of encouraging industry to move out in order to provide more space for housing. If successful, the policy would enable more efficient use of transit equipment during work hours. The city government has also acted to discourage auto use by reducing available road and street space and parking space. But such moves have been hotly opposed by business executives who tend to prefer auto to transit travel, and argue that auto restrictions will drive corporate headquarters not only out of the City but out of the entire region.

Government Structure

Besides the national government, there are 11 provinces and some 950 municipalities. The national government and the municipalities are the most important units--the provinces have had a relatively minor role.²

The national government is a parliamentary system, of course, with at least a dozen political parties ranging across the political spectrum.

The chief governing power in the municipalities is the Board of Aldermen, presided over by the Burgomaster, who is appointed by the Crown. Aldermanic Commissions formulate policy and supervise administration of each of the major functional agencies, notably including local mass transit.

Municipalities are financed almost entirely by National Government grants--both block and program (including education and mass transit) grants. Nonetheless, the cities assert a sturdy independence that stems from a long foreign occupation, beginning in the 15th century and lasting until the Spanish, after a long struggle, were finally driven out in the middle of the 17th century. The National Ministeries handle the cities gingerly. The Hague, after all, is less than an hour away from most Dutch cities, and it is easy to make municipal displeasure felt in the Center.

Urban Mass Transit

The following discussion is devoted entirely to the urban transit systems of the 50 odd cities whose transit is subsidized by the National Government, as opposed to the National intercity rail system and the rural bus services operated by the provincial governments.

2. I understand that in the early 1980s, there were moves to expand both the number and the functions of the provinces, but that thus far few lasting changes have been effected.

Dutch cities of course make much greater use of transit than do American cities. In Amsterdam, the average number of rides per capita in 1980 was over 300 per year; by contrast, in San Francisco, of comparable size, the figure is less than 70 per year. But the number of rides falls off rapidly, the smaller the city. Rotterdam reported 270 or so, and The Hague, about 250, whereas in the smaller cities the figure goes to less than 100; in some cases less than 20. Transit use, therefore, is heavily concentrated in the largest cities.

The predominant transit mode is diesel buses though Amsterdam and Rotterdam, the two largest cities, have subways, and these two and The Hague have tram systems. Nine of the largest cities own and operate their own transit systems; all the others contract for intraurban service. Most contract with regional government bus systems; a few smaller municipalities contract with private firms.

The three largest cities accounted for 73+ percent of all transit use, but only about one-eighth of the total population. The six other cities that own their own systems accounted for about 15 percent; eight other cities with populations exceeding 100,000 accounted for 6+ percent, and other subsidized municipalities (about 33), less than 6 percent. Nevertheless, the Ministry was searching for a subsidy formula that could somehow be applied to cities of all sizes and extent of transit usage.

There are the usual problems with temporal and spatial inefficiency. ("Temporal inefficiency" refers to the tendency of transit use to be concentrated in peak hours; "spatial inefficiency" refers to the distribution of origins and destinations that concentrates traffic flow in one direction in one peak period and the opposite direction in another peak period.) Both inefficiencies characterize the typical work trip rush in American and other countries, with travelers going from homes to workplaces in the morning, and from workplaces to homes in the evening.

The largest Dutch cities exhibit somewhat the same tendencies, with rush-hour peaks being dominated by the journey-to-work. But in many of the smaller cities,

transit is used much more for shopping and school trips than in the U.S. and such trips may be more important than work trips. This was the case in Breda, the first Dutch city in which we observed transit patterns. The explanation given was that family autos tend to be monopolized by males for their journeys to work (the percentage of women in the labor force is much smaller than in the U.S.), and since there are few multicar families, wives and children resort to transit or bicycles.

The installation of a uniform ticketing system was being completed in 1981, and is now in operation throughout the country. Fares are based to some extent on trip distance, but there is no distinction between peak and nonpeak travel. (A uniform distinction would be difficult because of the difficult peaking patterns in different cities.)

Transit wages on urban and regional systems are uniform throughout Holland. Productivity was low even by U.S. standards, despite the Dutch reputation for industriousness--one indicator was the rate of absenteeism, which ran from 25 to 30 percent, whereas in the U.S., 10 percent is considered high. One hears, however, that the Dutch rate has fallen substantially since the onset of economic decline in the 1980s.

The Public Policy Problem

Under the subsidy system, which had grown up in the 1970s, each city's allocation was fixed at the amount of its operating deficit as of the year when it came into the system. (Capital allocations, which go mainly for rail system extensions, are financed entirely by the Central Government, and were not a part of the project terms of reference.) In addition the Government added 2 percent per year to the annual appropriation, to be distributed by negotiations between the Ministry and the cities that had applied for supplements. Overall, the subsidy paid 70-75 percent of intraurban operating costs in the subsidized cities.³

3. Through the 1970s the Government subsidy was in effect the difference between a city's operating costs

The subsidy issue was a hot potato because there was great discontent with the existing allocation system on the part of both the municipalities and the Government. The municipalities complained that there were large disparities in the amounts received, whether disparities were measured by vehicle kilometers, place kilometers, passengers carried, or whatever. Since part of the operating subsidy was allocated by the Directorate of Transport (in the Ministry of Transport and Public Works) to cities judged to be most in need, as demonstrated by arguments made to the Directorate by the various cities, the Directorate, in the process of making decisions, felt impelled to look into the operations of the city systems and make suggestions for savings before approving supplementary grants. Such interference was resented by the cities, the more so because the amount of city subsidies could not legally be supplemented by other funds, whatever the source.

The problem had been worked over by a Task Force organized by the Directorate, with inputs from the Directorate Research Division and from the Netherlands Economic Institute (NEI). The Task Force proposals, however, did not go down well with the cities, which was why the Ministry decided to engage a foreign consultant, The Institute of Public Administration (IPA), to help them think through the problem, working in conjunction with the NEI.

The study had an announced purpose and a not too well hidden agenda. The announced purpose was to develop a method for determining an *appropriate level of service for each municipality*. The hidden agenda was to develop a formula that would automatically allocate funds to cities, thus relieving the Ministry of the necessity of making painful decisions yearly.

In reality, of course, a decision respecting the appropriate level of service for any city is also a decision respecting the amount of transit support to be given that city.

and its operating revenues from fares. After the introduction of uniform tickets that can be purchased anywhere, it became impossible to attribute ticket revenues to individual cities, hence the government subvention in effect covers all transit operating costs.

But no matter how the consultants squirmed, reference was always to the *appropriate level of service*, not to the allocation of funds. And we came to understand why. The reason was that politicians and officials feel the need for an "objective" means of determining how much and what quality of transit service a city *should* have. Aldermen wanted a set of guidelines that would enable them to tell their constituents how good their service is, relative to (1) a *defined national standard*, and (2) *service levels in other cities*.⁴ During the entire study, this question was raised more frequently than any other, and the clients were disappointed by the consultants' inability to produce definite answers.

Public Policy Analysis

Analytic approaches appeared somewhat inverted to the pragmatic Americans. Having defined a problem, the Dutch like to theorize about it, explore the theoretical angles, devise theoretical solutions. Only later would they begin testing theory with reference to data and parameters, administrative feasibility, and the like. The more typical American approach to policy problems, by contrast, is to look at the general situation, examine the general institutional matrix and its parameters, and then begin to look for applicable theories. Whether the Dutch inclination, in addressing policy problems, to first dig deep into theory will survive drastic limitations of funds for research remains to be seen.

4. The project terms of reference specifically omitted any study of transit fare levels or the proportion of transit expenses that should be met by fares. But the terms of reference did mention a number of other tasks, most having to do with other aspects of the quality of local transportation, such as evaluation of the highway and street network serving each city. There were also a number of guidelines, the most important calling for specific attention to *social benefits and costs*.

Administrative Arrangements for Conducting the Study

The study was conducted by the Ministry of Transport and Public Works. There was a Steering Committee, composed of the most knowledgeable research people from the transit systems of three largest cities, representatives of the provincial governments, a representative of the Dutch League of Municipalities and several functionaries--about eight in all. The general supervisor, and chairman of the Steering Committee, was the Research Director of the Directorate of Transport in the Ministry.

The Committee kept close touch with the research, convening a two-day meeting every month or so to discuss progress, general policy questions, and other relevant matters. Every six months or so there would be a general meeting of the transit managers and/or concerned aldermen of the 50 cities. During the first year of the study, I made ten trips to Holland.

The clients wanted examination of all approaches and suggestions; it was a period when the Ministry still felt sufficiently affluent to pay for a thorough, even overly thorough, job.

Defining Levels of Service

One result of the emphasis on service levels, rather than the allocation of subsidy funds, was that the initial phase of the study concentrated on carefully defining the components of the level of service and devising various indexes that might be used to measure service levels. We then confronted the problem of defining "appropriate levels of service" for each city. Three possible approaches were explored:

1. A "structural" approach, based on the physical, social, demographic and economic characteristics of each city.
2. Equating various indicators of service levels for different cities.

3. Approaches based on benefit/cost analysis.

Structural Approach

The rationale of the approach is that demographic, economic and physical characteristics of individual cities are the basic determinants of transit needs. The method involved relating structural parameters--such as population size, age distribution, income, car ownership, employment characteristics, land-use density, etc.--to actual service in the corresponding cities through a regression formula of the form

$$LOS = f(X_1, X_2, X_3, \dots X_n),$$

where the X's are the independent variables--the structural parameters, and LOS, the dependent variable, is the level of service, however defined. Alternatively, the dependent variable might be a measure of actual transit usage--expressed in number of travel units. The result sought is an estimating equation that, using the relevant parameters for each city, will give a computed level of service, or of transit usage, that represents a national norm that can be compared with the actual level of service, or of transit usage for that particular city.

The approach, alas, has both theoretical and practical difficulties. A major theoretical difficulty is that the left-hand term is derived from historical levels of service or of usage in the various cities, with no direct relation to economic efficiency as indicated by benefit/cost data. The practical difficulty is that preliminary tests of the relation between city structural parameters (such as those mentioned above) and levels of transit service or usage in cities produced disgustingly low regression coefficients, no matter how we manipulated the data. So we scratched the structural approach.

Method of Comparative Indicators

The rationale of this approach is that transit service standards--a term connoting the quality and quantity of service--should be approximately equal for various cities. Thus if the level of service of City A exceeds that of City B, the government subsidy should be increased for B, relative to A, until their respective service levels are equal. Various indicators, and combinations of indicators, were analyzed.

Most attention was given to *supply-related, or service level, indicators*. We divided the elements into two groups, the first relating to accessibility and speed of service, and the second relating to comfort and safety (see Appendix II). Service-related indicators are the easiest to compute; one of the simpler ones, for instance is the amount of service provided, as measured by vehicle kilometers, or better, seat kilometers, in revenue service. But they have several defects, the most serious being that they tell us nothing about the demand for or benefits derived from the service provided. Operators can accumulate kilometers in service by simply running vehicles back and forth, regardless of whether they attract traffic.

Other service level indexes were devised to include measures of demand and/or benefits, but these ran into difficulties. For example, there was some support in the Steering Committee for a demand-related index that would be the ratio of actual to potential demand. We had some difficulty convincing proponents that in our assigned frame of reference, demand was simply a function of the level of service and that actual and potential demand were simply different points on the same demand curve; so that potential demand depended on how much of an improvement in the level of service you had in mind. Moreover, not even the clever econometricians could devise a general demand curve for particular cities, and certainly not for all cities.

Such was the attachment to indexes of service levels, however, that at the insistence of the Steering Committee we spent considerable time working up 14 different indexes, and an elaborate system of rating them. This was the basis of our

first interim report, which was solemnly discussed at a meeting of representatives of the 50 cities. But when we reached the stage of devising formulas that might accomplish the purpose of the Ministry, the notion of trying to determine the appropriate level of service for cities by equating level-of-service indexes was quietly dropped. The consultants agreed to zero in on benefit/cost approaches to defining appropriate levels and the Steering Committee acquiesced, albeit reluctantly.

Benefit/Cost Approaches

Measuring costs

Total money costs of providing transit service can be determined, given adequate accounting records. Social costs are more difficult, but once a transit system is in place, social costs are likely to be relatively small (though admittedly there are some, such as air pollution and congestion) and we decided to ignore them.

Quantifying benefits was the main swamp through which we had to wade. Consideration of transit service benefits begins by distinguishing between direct benefits to riders, and benefits that accrue to the population as a whole or important subgroups, because of the existence of transit service or improvements thereof. For shorthand, call these *nonrider benefits*. Nonrider benefits to any person or group result from the fact that someone else is using the transit system. (Any person or group, of course, may receive both rider and nonrider benefits, but here we want to distinguish between the two.)

The distinction is important because it underlies the two main approaches that emerged from the project. One, favored by the NEI team, was based primarily on direct benefits to riders, and is here referred to as the *consumer surplus approach*. The other, which was based on nonrider benefits, was developed by IPA, which termed it the *utilization approach*.

Although the two consultants chose to emphasize different concepts of benefits, they did agree on several basic points:

1. In principle, the total value of total benefits produced by subsidies should equal or exceed the amount of the subsidies. In practice, it is not feasible, for both technical and theoretical reasons, to evaluate total benefits, for all cities or even one city. But it is possible to estimate, at least within broad limits, the benefits, as well as costs, of a *change in the level of service*; hence analysis should concentrate on the effects of marginal changes, rather than overall service levels.

2. A subsidy increase is justified if the value of estimated benefits to nonriders exceeds the increased subsidy cost. Conversely, a decrease in subsidies is justified if the amount of the decrease exceeds the loss of benefits to nonriders. The optimal point, which can be defined as the much sought after *appropriate level of service*, is where any increase in subsidies would result in a smaller increase in benefits, and any decrease in subsidies would result in a larger decrease of benefits.

3. Therefore, the policy objective is to achieve a Pareto suboptimum, i.e., a state in which no further changes in service levels (and, therefore, in the distribution of the aggregate operating transit subsidy among cities) will increase the aggregate welfare of the population. The objective of subsidy policy would be to move over time to equalize marginal benefit/cost ratios for all cities.

Moving toward an Appropriate Level of Service

The above analysis implies that the "appropriate level" should be regarded as a goal to be approached over time by successive adjustments in the service levels of municipal transit systems, not something to be determined in one fell swoop. This conclusion was a disappointment to our clients, who had been hoping for a fell swoop.

Moving toward the "appropriate" service levels requires following two rules:

First, any additional funds for improvement of transit service should be allocated to the cities that can make the most effective use of funds, as measured by the additional value of benefits generated by each additional guilder of subsidy. Correlatively, reductions of service should be made where they will least affect benefit values. This is usually on the least patronized routes.

Second, funds for transit service should be reallocated among cities whenever the total value of benefits can be increased by the reallocation. For example, if shifting 1000 guilders of subsidy funds from Amsterdam to Rotterdam will make it possible, by decreasing the level of service in Amsterdam and increasing it in Rotterdam, to increase total ridership by, say, 500 passenger kilometers, the shift should be made.

Consumer Surplus Approach to Benefit Evaluation

Direct benefits

Economic analysis starts with the marginal rider--one who would not ride if the fare were any higher (given the existing level of service). The value of a trip to the marginal rider is measured by the fare he pays. A rider who would pay higher fares rather than not ride gets a benefit that is the difference between the actual fare and what he would pay if had to. The difference is the rider's *consumer surplus*. The surpluses accruing to individual riders can in principle be aggregated to produce a total consumer surplus. Lower fares made possible by transit subsidies increase the consumer surplus of existing riders, and so do service improvements financed by subsidy increases. A subsidy or subsidy increase may benefit riders through one or both of two actions: (1) fare reductions and (2) improved service. Either action increases consumer surplus of existing riders and tends to attract additional riders, some of whom also may receive a consumer surplus by virtue of the fact that they would pay a bit more for the service if they had to.

The analysis is depicted by the diagrams in Appendix 3. But while the diagrams demonstrate the theoretical validity of the consumer surplus concept and how consumer surplus can be measured conceptually, it can be quantified in actual practice for policy purposes only roughly and with respect to relatively small increases or decreases in subsidies.

The central issue here is whether subsidies are justified on the grounds that they benefit riders who would ride in any case, since they represent a transfer of funds from taxpayers to riders. But why should taxpayers subsidize transit riders? Two main justifications are advanced.

The first justification has to do with the welfare economics proposition that if the value of a benefit resulting from a deliberate policy change exceeds its cost to the economy at large, the change should be made, even if those who do not benefit (but pay all or part of the cost) are not compensated by those who do benefit. By this reasoning, a change whereby a very rich person gets a benefit worth \$1 million to him, which costs 900 other people \$1,000 apiece, should be made because it increases the aggregate income of the economy. But this reasoning, in the opinion of many economists, has several flaws, including the assumption that the marginal utility of an extra dollar is as great to a rich as to a poor person.

The second justification is that transit subsidies are justified because transit riders as a class have lower incomes than taxpayers who pay the subsidies, so that subsidies will promote greater equality of income distribution. But the data, by and large, do not support the premise--they show rather that transit subsidies are likely to be a highly erratic form of income redistribution. For example, Professor Melvin Webber long ago pointed out that with the BART (San Francisco Bay Area Transit) financing system, the rich ride and the poor pay.⁵ In a word, there are more efficient

5. Melvin Webber, *BART's Outcomes: an Early Appraisal*, Monograph No. 26, Institutes of Urban and Regional Development and Transportation Studies, University of California, Berkeley, October, 1976.

ways of financing transit service to low-income people than by subsidizing everybody, poor *and* rich.⁶

Implementing a Consumer Surplus Approach

The proponents of this approach, in considering implementation, concentrated on increases (decreases) in benefits resulting from service improvements (disimprovements). Because of data limitations, the only measurable benefit that could be identified was the value of time saved from a service improvement. The saving might result from one or a combination of three factors: increased frequency of service, increased average vehicle speed, or increased route density. Since the bulk of such increases would accrue to existing (rather than new) riders, increases in the amount of travel units, the main objective of the utilization approach, would be incidental. The technique has the effect of transferring real income from taxpayers to transit riders who would continue using transit if there were not improvement. Such transfers, it has been argued above, do not necessarily increase social welfare.

It was next decided that the most feasible measure, in view of data limitations, would be waiting time saved at transit stops as a result of increases in service frequency--the greater the frequency, the less total waiting time.⁷ The time saved would be valued at a figure derived from the median household incomes in the respective municipalities.

When tested against recent service improvements in several cities, however, the time-savings approach encountered further difficulties. The cost of the improvements in nearly all cases was found to be considerably greater than the value of time saved

6. In my own case, as a senior citizen I can ride on BART from Berkeley to downtown San Francisco and back for 26 cents. I don't know the cost to the taxpayers of such a round trip but would venture that it is somewhere between \$5 and \$10, perhaps more. I enjoy the privilege but am not prepared to argue that I am entitled to it at someone else's expense.

7. The time savings estimates were in real time,. The more elaborate, if less practicable, concept of "generalized time", which weights ways of spending travel time--such as walking to stations, waiting in stations, riding in vehicles, etc.--according to their disutility to the traveler, was not relevant to the simple measure of time savings actually employed for this project.

thereby. On the face of things, the existing level of service would be justified only if waiting time were valued at a figure greatly in excess of median family income. Under the circumstances, the improvements could be justified only by adding a generous allowance for nonrider benefits, which of course are the rationale of the utilization approach.

Utilization Approach to Benefit Evaluation

Positive Externalities

What sorts of nonrider benefits--positive externalities--might justify subsidies to reduce fares or improve service? The principal categories, which tend to be concentrated in the vicinity of transit stations, are the following:

1. *Economic advantages to business firms*, including employers who gain access to broader labor markets, merchants who can attract customers from larger areas, and owners and developers of land made more accessible by transit improvements.⁸
2. *Diverting traffic from autos*, which may generate two kinds of benefits. The first is reduction of air and noise pollution, the amount of space required for vehicle movement and storage, and the amount of energy required for carrying passengers. (But it should be noted that transit improvements that divert some travelers from autos may divert others from bicycles, a less desirable effect.)
3. *Promoting efficient patterns of urban development*. One important technique for assisting planned urban development is to initiate transit service to new activity centers--including housing developments, industrial parks, and whole new towns--in advance of need, though this may mean tolerating high operating deficits and

8. Because landlords and developers gain by charging higher rents to tenants, it is important not to count the same benefit twice (i.e., the benefit to the renter that enables him to pay a higher rent should not be added to the benefit to the landlord of the higher rent he can charge).

low patronage while demand is being built up.

4. *Possibly slowing down the decline of decline-prone urban areas.*

All these benefits are difficult to quantify and measure. Many skeptics question whether all or even most of them actually come about in most cases. But if the argument is valid that direct benefits, for reasons stated in the preceding section, do not in themselves justify subsidies, nonrider benefits are the only good reasons for subsidizing transit. It follows that *when the Government votes subsidies for transit, it is implicitly saying that the value of the indirect benefits equals or exceeds the cost of the subsidy.*

Two main points should be kept in mind:

First, nonrider benefits are a direct function of transit utilization, or ridership.

This means that unless the reduction of fares or improvement of services made possible by a subsidy increase promotes more ridership than would have been obtained without the subsidy, then the subsidy has produced no benefit to the general public and is not justified.

Second, the valuation of transit benefits is usually a political decision, not a decision that can be based on hard-nosed economic analysis. Economic analysis and quantitative studies can inform such decisions, and can point out considerations to be taken into account, but there is no way of pricing nonrider benefits "scientifically". In this respect, transit is like education, police protection, health service, and so on, which might be paid for by charges but which are paid partly or wholly by taxes because of their presumed benefits to the general public. Many urban publics, particularly in Europe, hold such a view of transit, which is why governments take over the valuation of transit benefits instead of leaving the matter to the market and the decisions of individual consumer-riders.

Implementing a Utilization-Based Allocation System

To implement a utilization-based system, the Government should first decide how much the social benefits of increased transit ridership are worth, and how much the social losses of decreased ridership would be, per travel unit. Then the decision would be implemented by the following steps:

1. The Government knows, or should know, the cost of existing service, in guilders per travel unit. If it decides to increase ridership, it will offer a subsidy increase of, say, two guilders per travel unit, for all travel increases over base year levels. Call this amount the *passmark*. The "basic" passmark can be defined as the average cost per travel unit in the base year. In principle, the amounts of the passmarks should be the same for all cities, but in practice, it may be desirable to make modifications to take care of unavoidable differences of costs among cities. This point is discussed in a later section.

2. Transit providers will then evaluate various alternative service improvements, and project the travel units that will be gained and costs that will be incurred thereby.

3. Providers will institute improvements where the passmark multiplied by the projected travel increase at least covers the projected cost of the improvement. (Since basic responsibility for transit planning and operation is left with the local authorities, the transit support formula is based on overall operations, rather than particular lines of services.) As long as costs are constant, simply offering the "basic" passmark may be sufficient to stimulate operators to attract additional patronage, since they will be fully compensated for the costs of carrying additional passengers. But if the marginal costs of attracting additional passengers is higher than the average cost,⁹ then the Government would have to raise the passmark allowed for additional travel units.

⁹. Here we must be careful to distinguish between the marginal cost per service unit (e.g., seat kilometers) and the marginal cost per travel unit of attracting additional patronage.

4. Even with higher passmarks, some systems will be unable to raise service levels to generate new ridership. And cities where ridership is declining will have their subsidies reduced proportionately. This will force them to reduce service on their least productive routes. The losers, of course will bleat loudly. If the volume of the bleats becomes politically unbearable, there are always ways of tempering the wind to the shorn lambs. For instance, the drop in their subsidies can be fixed at a figure less than proportionate to their loss of ridership.

If the Government, for reasons of budget stringency, decides to reduce total transit subsidies, it will announce that the "basic" passmark will be reduced from existing levels. Providers will be obliged to reduce services on routes where the cost is higher than the reduced passmark. (Of course, as an alternative, the Government can raise fares, which may have a smaller impact on ridership than decreases in the level of service.)

In summary, annual subsidy changes are based on year-to-year changes in ridership. For any given budget year, the subsidies and service levels of the preceding year are adjusted up or down, depending on the direction of ridership changes. Basically, the amount of the change for a given system is the passmark multiplied by the ridership increase or decrease reported by the particular system.

Efficiency Advantages of a Utilization-Based System

First, the approach requires a specific consideration of the value of transit travel to the public at large. Government decision-makers have to put a value on increasing or decreasing travel units in making decisions respecting increasing or decreasing subsidies.

Second, the system provides operators with incentives to improve their operations to attract ridership. Even if they experience greater ridership than was projected, they will still get the subsidy for the entire increase. This will provide funds

to maintain the level of service, which otherwise would deteriorate because of the increased ridership.

ADMINISTRATIVE FEASIBILITY

We next considered the administrative feasibility of the *utilization system* and the problems that would have to be resolved in applying it. The most important are the following (most of them apply as well to the *consumer surplus approach*).

1. *Intercity cost differentials*. What to do about differences in the costs of providing service, which may vary substantially among cities for several reasons:

- a. Differences among modes--metro, tram, bus.
- b. Differences in operating conditions. For instance, costs tend to be higher in more congested cities; Amsterdam's numerous canals create routing problems which, along with congestion, slow down service and raise operating costs.
- c. Differences in temporal and spatial efficiency of cities; in particular, the higher the concentration in peak hours, the greater the unit costs of operating transit will be.
- d. Differences in management efficiency and labor productivity.

Differences in service unit costs can be offset by the use of cost factors to adjust for *unavoidable* intercity cost differences, such as those listed in items a, b, and c, above. Such adjustments by definition should apply to conditions beyond the control of management; taxpayers at large should not have to pay for differences among cities which are attributable to inefficient or wasteful practices. The two categories of differences require careful analysis, for they are difficult to sort out.

2. *Special weight for peakhour trips*. Should special weight be given to peak hour trips, that cost more, or to offpeak trips, that cost less? If subsidies per travel

unit are uniform, providers may have an incentive to improve offpeak service, since offpeak demand tends to be more elastic (responsive to improvements) than peak demand. On the other hand, in the large cities, where work trips dominate both transit and auto travel, the social benefits from diverting travel from autos to transit in peak hours are greater than for offpeak hours--this argues that unit subsidies ordinarily should be higher for peak than for offpeak travel.

3. *Allowing for new services with delayed potential.* It may be well to begin service to a new housing project, for example, as soon as the first units begin to be occupied. The solution is simple--in the developing years allow the provider to include, in a special schedule, the projected number of travel units necessary to justify an adequate service, rather than the travel units actually realized. Adjustments can be made for the difference between projected and actual travel when the project is fully occupied.

Budgeting for a Utilization System

IPA proposed a procedure whereby the subsidy for any budget year would include financing for projected travel increases or decreases. (Projections would be made in the first instance by the individual cities and reviewed by the Transport Directorate's budget staff.) The amount of the subsidy increase (decrease) relative to the current year is the projected increase (decrease) in the number of travel units multiplied by the passmark. If the actual travel volume for a city exceeds the projected figure, the subsidy for the budget year will be raised accordingly. If it falls short of the projected figure, the subsidy will be cut back, or the deficiency may be subtracted from the following year's subsidy.

Of course there is always the chance that a municipal system will be caught short through overly optimistic projections of travel during the budget year. The logic of the proposed system requires that the municipality itself should make up such deficiencies out of general funds. At the time of our study, such diversions were not

allowed by the National Government. But if a limited diversion from general funds was permitted for the purpose of making up for overestimated travel projections, the transit provider and the aldermanic committee for transit could be held responsible by the municipality, with no need for interference by the National Government.

Measuring travel volume. The greatest administrative difficulty with the utilization approach is the requirement that passenger kilometers be counted with sufficient accuracy for the data to be used for purposes of subsidy allocation among cities. While data have been compiled in the past, most data are rough estimates. Nowhere is there any equivalent of the neat BART fare collection system, which identifies the origin and destination of each passenger, computes the distance he travels, and aggregates the totals for all passengers. And of course nothing comparable has yet been devised for trams and buses. But there are ways of estimating travel volume and even passenger kilometers with sufficient accuracy for subsidy allocations. Moreover, reasonably accurate estimates of passenger volumes for various routes and services are information that every transit management should have in order to do an effective management job.

How It All Came Out

There was considerable support for the utilization approach in the Ministry and the Steering Committee. But soon after we submitted our final report in 1981, the Dutch Government was forced to take into account the growing fiscal crisis and raise transit fares while cutting back on transit subsidies. In the ensuing turmoil, the decision respecting new subsidy formulas was postponed.

As all planners and budget experts know, introducing new concepts is something like the sport of oak tree racing. For those who are unfamiliar with the sport, the contestants are each provided with an acorn. They form a starting line, the starting gun goes off and they run and plant their acorns. And the race is on.

APPENDIX I

NOTE ON ELEMENTS OF THE LEVEL OF SERVICE

The study identified five elements relating to accessibility and four elements relating to comfort and safety. The elements can be combined in various ways to form indicators of the level of service.

Accessibility elements

1. Physical accessibility (distance of transit stops from origins and destinations)
2. Service frequency
3. Reliability of service
4. Vehicle speed
5. Minimal transfer requirements

Comfort and safety elements

6. Seating and lack of crowding
7. Amenities of vehicles and transit stops
8. Smoothness of ride
9. Physical safety

APPENDIX II-1

Generalized Subsidy Formulas

The following notation is employed:

L	denotes	level of service
T	"	number of travel units
F	"	average fare (assumed to equal marginal fare) per travel unit
P	"	passmark
S	"	aggregate subsidy
R	"	aggregate operating revenue
c	"	operating cost per service unit
C	"	aggregate operating cost
$\underline{M}$	"	operating surplus
M	"	operating deficit

Subscripts: a denotes actual current year magnitudes
b " projected magnitudes

Assumptions respecting actual and projected magnitudes

Case 1. Projected magnitudes equal actual magnitudes

$$S_a = S_b = PT_a$$

$$R_a = (F+P)T_a = C_a$$

Case 2. Actual ridership exceeds projected ridership

$$S_a = PT_a$$

$$R_a = (F+P)T_a$$

$$R_a > C_a$$

$$R_a - C_a = S_b - S_a = P(T_a - T_b) = M$$

A surplus from increased ridership may appropriately be used to expand service, which may further increase ridership and subsidies. Or, all or part of surplus may be distributed in ways calculated to enhance incentives for productivity (e.g., to shareholders of a private operator firm, or to management and other employees of a public enterprise).

APPENDIX II-2

Case 3. Actual ridership is less than projected ridership

$$S_a = PT_a$$

$$R_a < C_a$$

$$S_a - S_b = P(T_a - T_b) = C_a - R_a = \bar{M}$$

An appropriate response to a deficit is to reduce service on lines where load factors are lowest (and operating costs per travel unit are correspondingly highest).

Case 4. The Government decides to attempt to raise ridership by increasing passmarks. The increased subsidy may be used (1) to raise service levels or (2) reduce fares, depending on which alternative is deemed most effective in attracting ridership. The passmark increase (ΔP) may apply to (a) all T or (b) any increase in T over T_o (T_o being the projection with no service or fare change).

4.1 Subsidy increase is used to improve service.

4.11 Subsidy increase applies to all ridership

$$S_a = (P + \Delta P)(T_o + \Delta T); \quad \Delta T = f(\Delta L)$$

$$R_a = (P + \Delta P + F)T_a$$

$$M \text{ or } \bar{M} = R_a - (C_b + \Delta C), \text{ where } \Delta C = f(\Delta L), \text{ i.e., } \Delta C \text{ is the cost of the service improvement.}$$

4.12 Subsidy increase applies only to increased ridership.

$$S_a = PT_a + \Delta P \Delta T$$

$$R_a = (P + F)T_a + \Delta P \Delta T$$

$$M \text{ or } \bar{M} = R_a - (C_b - \Delta C)$$

4.2 Subsidy increase is used to reduce fares to all riders

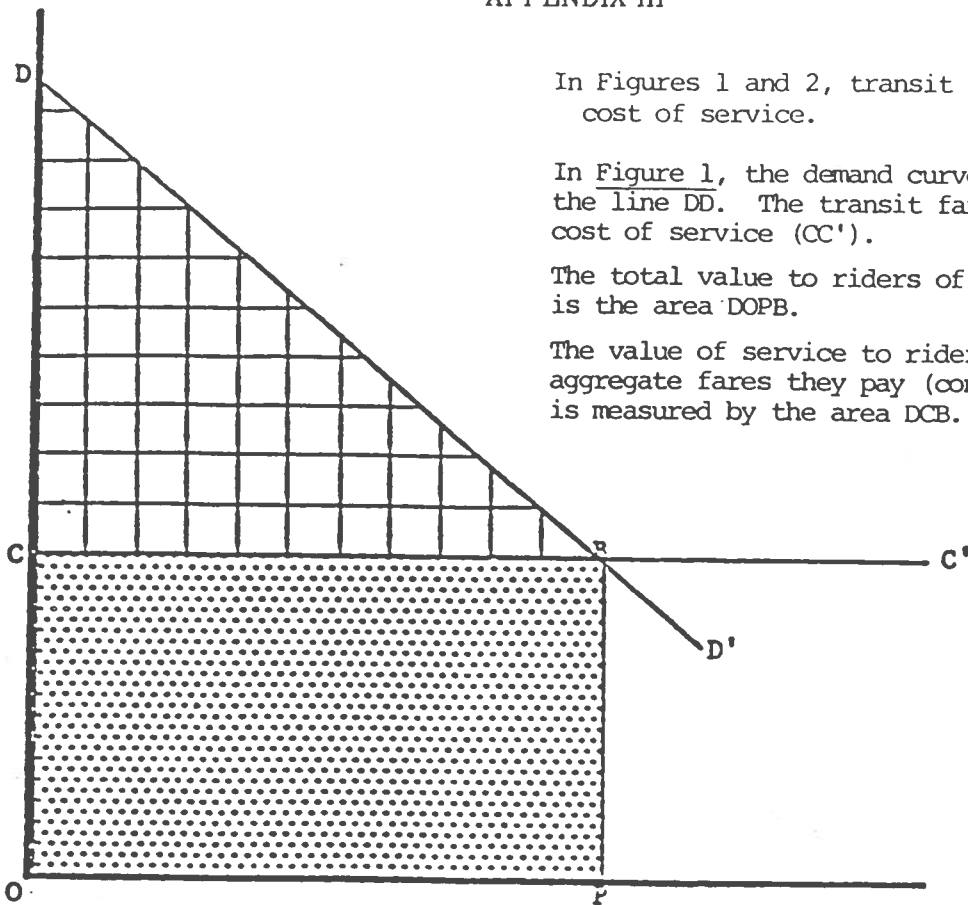
$$S_a = (P + \Delta P)(T_o + \Delta T); \quad \Delta T = f(-\Delta F)$$

$$R_a = (P + \Delta P + F - \Delta F)(T_o + \Delta T)$$

$$M \text{ or } \bar{M} = R_a - (C_b + \Delta C)$$

Figure 1

APPENDIX III



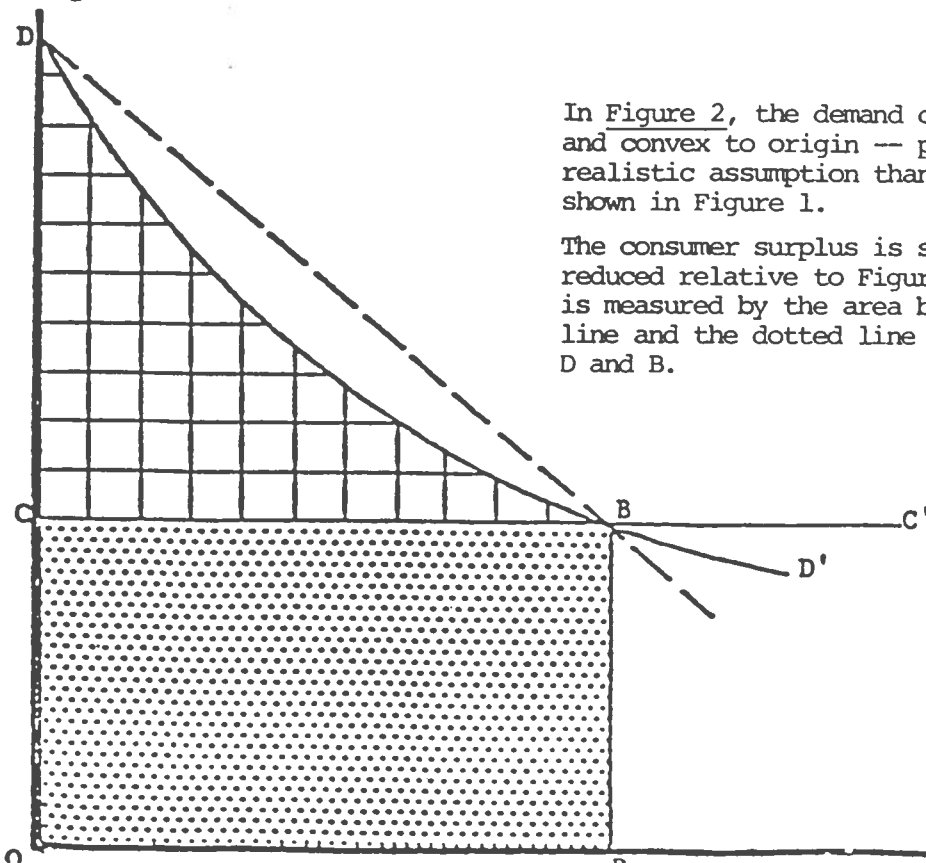
In Figures 1 and 2, transit fare = marginal cost of service.

In Figure 1, the demand curve is linear -- the line DD . The transit fare equals marginal cost of service (CC').

The total value to riders of transit service is the area $DOPB$.

The value of service to riders over the aggregate fares they pay (consumer surplus) is measured by the area DCB .

Figure 2



In Figure 2, the demand curve is curvilinear and convex to origin -- probably a more realistic assumption than the straight line shown in Figure 1.

The consumer surplus is substantially reduced relative to Figure 1; the reduction is measured by the area between the solid line and the dotted line connecting points D and B .

Figure 3

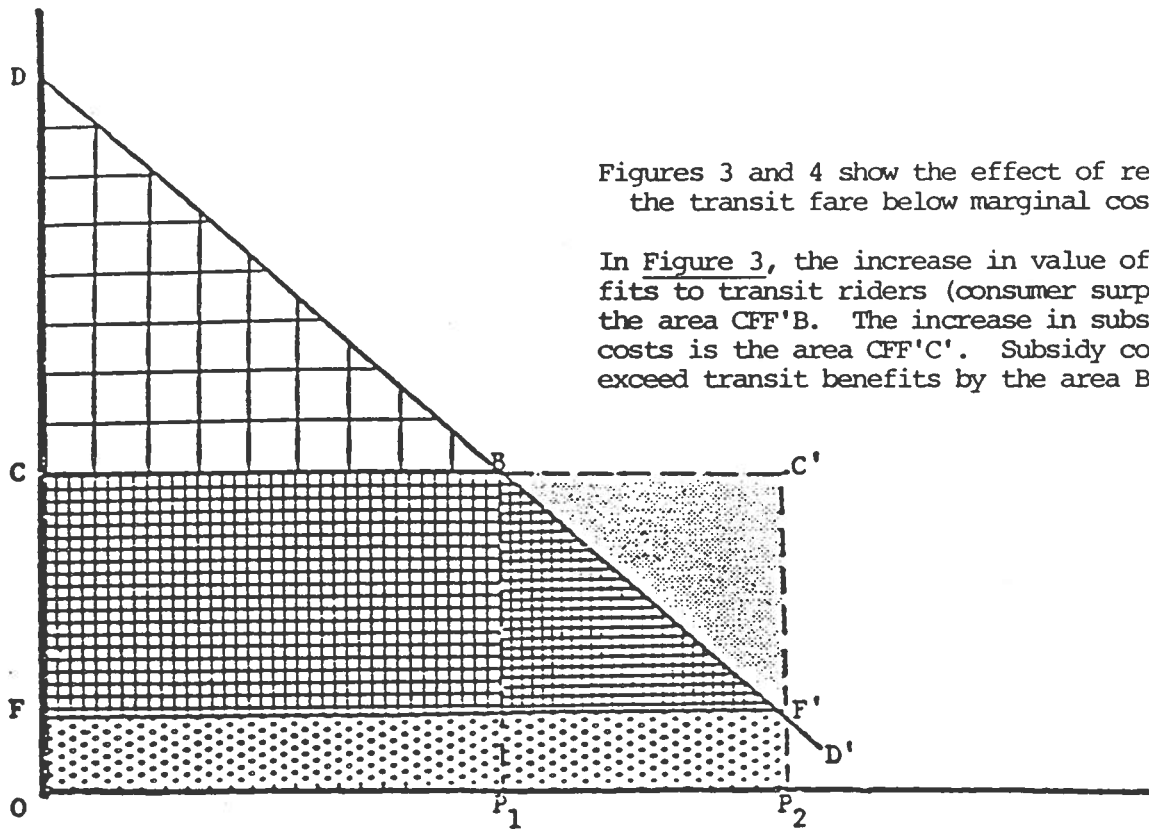


Figure 4

