PRICING AND REGULATORY ISSUES IN URBAN TRANSPORT

Alvaro Pachon and Frida Johansen

December 1989

Discussion Paper

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This report was prepared by Alvaro Pachon (consultant) and Frida Johansen (principal
economist) in the Transport Division of the Policy, Planning and Research Staff.
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Pricing and Regulatory Issues in Urban Transport

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Abstract

The paper first categorizes public policy interventions to improve traffic in cities, through quantity and price management focussed on public and private transport. It notes that availability of both information and skills in planning staff can bias the policy choice. Thereafter the paper focuses on price management of public transport. Public transport pricing has two basic elements: the pricing of inputs (such as road space) and the pricing of output (fares). Road space should ideally be priced at its marginal cost, or as a second best solution where otherwise public subsidies would be required to cover capital costs, via price discrimination, for instance with two-part pricing for fares, to increase revenues. An important point is recalled, that traffic management can be an alternative to pricing and achieve the same results. Fare regulation, on the other hand, introduces a variety of distortions, as does the regulation of provision of services. The cost of distortions can be measured in various ways. One way is through supply and demand functions for public and private transport; the example of the high cost of distortions in London is given. Other ways are through measuring gains of traffic management systems and of deregulation processes. In addition to distorting resource allocation, fare regulation has an impact on income distribution. Fare regulation normally involves subsidies to improve mobility of the poor; however, the objectives are seldom met and the costs are high. Better alternatives to granting subsidies are to improve public transport efficiency and, thereby, to reduce the cost of service; to adopt unregulated fare policies; and to improve the system of route allocation to improve service.
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Introduction: Taxonomy of Policy Interventions

1. Public policy interventions to improve traffic in cities contain traffic (quantity) and cost (price) management activities and are oriented to both private and public modes. For some purposes it is useful to think in terms of a two dimensional matrix containing four cells, four "pure" interventions (Figure 1 below). Traffic management that affects mainly private modes, such as defining the optimal timing of traffic signals, can be placed in quadrant II. Defining transit fares, a pure price management strategy that affects mainly public modes, can be placed in quadrant III. Policy interventions in practice have components falling in any of the quadrants, although given some basic economic forces discussed below, there is a tendency for a bias towards some of the quadrants.

![Figure 1](image)

2. High income people and high income countries tend to favor traffic management solutions, with sophisticated components oriented to cars. In less developed countries, the urban transport problem is frequently addressed with price management oriented towards public transport, including imaginative public transport systems with an ample variety of low-cost options. This reflects the simple fact that consumers and producers economize in the use of the dearest good:

(a) Cars and other private vehicles tend to be relatively inexpensive consumer durables, almost a necessity, in rich countries. They are a luxury in developing countries, where the incentive to economize in the use of vehicles is notorious. A compact car that can be purchased for US$8,000 in the US represents six months of average GNP per capita. The same car costs more in an LDC, sometimes twice as much,
and can correspond to more than 12 years of average GNP per capita.1/

(b) Time is valued more by highly productive people. Traffic management systems are geared to minimize unnecessary delays and to increase travel speed.

3. Availability of information and techniques influences the type of policy intervention. Scarcity of information can increase the perceived risk of a project and bias the decision towards a low-cost solution. Risks can also be underestimated and lead to a high-cost solution such as metros. The relevancy of the models used also has effects on the kind of policy chosen. Traffic management techniques from developed countries can be easily adapted to less developed countries because of the existence of generally accepted analytical techniques. Pricing management interventions in public transportation are usually based on inferences or generalizations of case studies. State-of-the-art economic models for North American cities are often not suitable for use in less developed countries where the numbers of routes, of modes and of other variables are well beyond the maximum number normally applied in the models. In the US, models handle mostly buses (1 type) and cars. In developing countries, there are 3 to 4 types of buses, rickshaws, motorcycles, pedestrians, 2 to 3 types of taxis and private cars.

4. Skills of the planning staff can also bias the type of policy intervention. Both traffic engineers and economists examine options for obtaining optimal solutions to the transport problem of a given city. Engineers think more in terms of maximizing flows or quantities while economists tend to think more in terms of costs and prices. Policy interventions can then be geared to traffic management or to price management depending on the problem to be solved or the predominant skills (engineering or economics) in the agency developing the policy.

5. This report focuses on public transport and on management by pricing or regulations with economic repercussions. It is however well known that the process of optimization subject to a budget constraint can be approached either from the quantity side or from the price side. Optimization provides the same answer in terms of quantities and their corresponding shadow prices or in terms of prices and their corresponding optimal quantities.

Pricing

6. One of the most important functions of the price system is to provide adequate signals to consumers and producers to guide their decisions, both their short-run decisions and their investment decisions.

7. Consumers choose between goods and also different qualities of a given good. Transport is a derived demand, sought for other

1/ Based on the price of a Renault 9 in Colombia and the U.S.
purposes. People travel to the work place in order to be with fellow workers for carrying out some work. People are willing to spend time and resources in commuting in order to live at their preferred housing location. Demand for a given mode is associated with the use of consumers' time and money. Variety in the dimensions of price and time provides consumers with choices that serve different consumers better. Transit fare levels and travel times affect the quantity of bus services demanded. Availability of private cars also has an important effect on the demand for transit. For some cities of developing countries a simple model that postulates that the head of car-owning households travels by car and the other members of the household travel by transit, provides an accurate prediction of actual modal choice. Transit level of service also affects car-ownership decisions; good transit service reduces ownership of cars.

8. Producers choose to invest in a sector if an adequate return can be made at given prices for the good or service. Short term decisions are also guided by the price system. A firm will produce an additional unit if the additional cost of that unit (the marginal cost) is less than the additional revenue that the firm can get. The additional revenue is equal to the selling price of the last unit net of any effect caused by the reduction (if any) of the price of the units sold previously. If a firm has two different lines of products then it will tend to expand the most profitable line and contract the other until both product lines have the same profit rate.

Pricing Road Space

Optimal Pricing

9. The optimal allocation of resources in urban transport, likewise, requires adequate pricing policies.2/ The general principle of pricing for attaining an efficient allocation is that prices reflect the marginal cost of using the resources required to provide urban transport services. Marginal costs of urban transport vary by time of day and by location as demand for transport services varies. Demand for transport early in the morning before 6 a.m. is insignificant; rush-hour is a time of intensive use of transport. The reason for different peak and off-peak cost is that capacity of public facilities, needed for transport, is limited. Operator costs depend not only on the operator's decision but also on the decisions of other operators and of car owners. Operating costs depend on the number of vehicles present on the street. The private cost of a vehicle could be different from the cost to society because of the congestion caused by the vehicle on all others sharing the same facility. Congestion costs vary by time of the day and by location; they tend to be concentrated in the central business district (CBD) and at rush hour.

2/ For a clear textbook presentation of marginal social cost in transportation see Chapter 5 of Glaister (1981).
10. Nevertheless, public facilities usually are perceived to be "free of charge" by the users and are financed by indirect taxes (vehicle licenses, sales taxes of vehicles, fuel taxes, general sale taxes, betterment levies, property taxes, etc.). Direct charge for road space has been implemented in Singapore and experimentally in Hong Kong, and with tolls. The difficulty of measuring and applying a location and time specific charge for the use of road space has been the major cause of the failure to implement direct charges for the use of road space. Parking charges can be developed in such a way that they charge indirectly for the use of road space.

11. Parking charges can be varied with location and time of day and consequently be in line with congestion externalities. Furthermore, parking charges affect car use decisions. Well designed parking charges could lead to considerable improvement in the use of road space in many cities of the developing world as it is likely that the existing parking policies are in great part responsible for the problems observed. Parking charges tend to be low for peak users and high for off-peak users, unless varied by time of day. Parking charges sometimes are controlled, inhibiting an adequate supply of off-street parking and making street parking more attractive. Land use regulations often restrict the number of parking spaces that can be constructed in the CBD as a means of restricting car trips. This often leads to a move by firms to other parts of the city where there are no such restrictions. Parking charges could be adjusted to compensate for unnecessarily low user charges on private transport, eliminating some of the criticism for inequitable treatment of public transport vis-a-vis private transport. However, parking charges are not applicable to public transport vehicles.

12. Charging buses for the use of road space in the CBD (the hub of the bus network) promotes a more efficient route structure and corrects some of the distortions of the hub and spoke system seen in most of the cities of the developing world. Charges could change by time and by location without creating major administrative problems. Since bus routes are known and the time a bus passes through any point on the route can be estimated with reasonable precision, it is relatively easy to charge the bus companies for the use of road space. It should be noted that the transaction costs arguments given for not using road charges to charge for the use of road space do not apply to buses, since they operate over a fixed route and with reasonably fixed schedules. However, where buses are a public enterprise and especially where it is believed they have to provide subsidized services and the enterprise is run with losses, such pricing may be difficult to apply effectively.

13. Since the scarcest resource in the CBD is curb space needed for boarding and alighting, charging for curb space may, most of the time, displace route buses to nearby streets and allow cars to use some of the lanes that are being used inefficiently by buses for alighting and boarding passengers. It could also mean making these lanes available for express services that do not require curb space.

14. Efficient pricing of road space, nevertheless, may not be enough to solve congestion problems. Congestion in urban settings is
generally localized at the intersection level. The use of roads can be rationed at intersections by means of sophisticated traffic signals with timing that depends both on the characteristics of the location and on the time of the day. Optimal traffic light timing is a way of giving a signal to the driver of the costs that he is causing others. Traffic signals are then complementing the price signals observed by motorists permitting a better allocation of resources; waiting at lights is a sort of congestion charge. Allocation of resources is done generally more efficiently by means of traffic signals optimally defined than by pricing systems that are difficult to implement.

**Pricing Above Marginal Cost**

15. Marginal cost pricing may also be insufficient to cover all costs. In the presence of congestion, pricing at marginal cost for peak hour traffic should cover capacity costs. Capacity should be adjusted to peak hour traffic; price signals should discourage use of equipment and facilities during the peak and encourage use during off-peak hours, to reduce the need for investments. Furthermore, high marginal congestion costs (which should be captured in the charge) indicate potential high benefits from improvements. However, in the presence of underutilized capacity as, for instance, of rail systems, for which fixed costs are considerable, a subsidy may be needed to cover capital costs.

16. The need for public subsidies under marginal cost pricing can be reduced or avoided if it is possible to charge different prices to different customers, and consequently to require some contributions from passengers in order to pay for amortization and interest, with two-part pricing. Fare cards provide an example of two-part tariffs. Under these arrangements consumers pay a fixed amount for the privilege of using the system and an additional charge, sometimes zero, for each additional trip. This is similar to practices in the private sector: taxis usually charge a fixed sum for boarding and a marginal price for distance or waiting time. This two-part tariff for taxis services produces an optimal allocation of resources. Beesley and Glaister have shown that the fare should cover the cost of supplying the time the trip takes (vacant time is covered by the fixed charge).3/ Rental cars usually also apply some fixed charge and a charge for additional mileage. Utilities also charge a fixed or connection charge and a smaller charge for each additional unit consumed.

17. Second best pricing sets charges according to the users' net willingness to pay, subject to the supplier's net revenue constraint.4/ The level of service that can be approximated by the total number of vehicle-miles produced in the city affects the marginal cost of producing passenger miles. Multimode transit companies should know the interaction between the demand for rail and bus services and require a pricing

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4/ For an analysis of this problem see Section 5.3 in Glaister (1980), which is based on Baumol and Bradford (1970).
decision for both modes; given the difference in peak and off-peak costs, the company needs to find prices for both modes at both times. Solutions to problems also depend on the mix of private and public modes. Some of the transport pricing policies will affect wages and labor opportunities and will also affect housing supply and demand.5/

Traffic Management Alternative to Pricing

18. An important fact of the theory of optimization and second best decisions is that when the quantity of a given good is optimally selected then the marginal conditions for the other goods hold. In urban transport settings it will mean that if the optimal amount of private car use has been attained by means of an optimized traffic management system, then pricing for bus services that follow the rules of price equal to marginal costs will be optimal. Or, one can conclude that if the objective function used for solving the optimal assignment of traffic lights is correct then the difficulty of charging for the use of road space has been overcome.

19. Quantitative solutions for the optimization problem in a three mode (private cars, rail and buses), two period (peak, off-peak) model have been derived for the case of London Transport.6/ An interesting conclusion of the London modelling exercise was that the optimal private vehicle flow was very similar to the one observed under non-optimal pricing. The tendency of optimal car flows to be very close to observed car flows has also been obtained in a similar exercise for Bogota. Experience in the US and other developed countries with the concept of free transit shows a very small response of car users to transit price changes.

Fare Regulation

20. Fare regulation in general causes distortions in the allocation of resources. It affects both investment and operating decisions of producers; it tends to give operators the wrong signal. Artificially low fares constrain the purchase of new buses and drive capital out of the transit sector. Operators of old buses experience a capital loss on the value of their vehicles. When fares are fixed below their efficiency value, capital is underpaid. Control of fares may act as a form of expropriation without compensation. In the short run buses will continue to operate as long as fare revenue covers variable costs. Given the existence of a stock of vehicles the effect of pricing on investment tends to be delayed, but owners lose incentives to economize on the use of vehicles and tend to avoid making major repairs and overhauls; quality of service declines. In the end, the public sector may have to take charge of operating the bus company. Fares above efficient values have the opposite effect; they grant capital gains to owners of buses and attract more resources to the transit sector.


6/ Glaister and Lewis (1978) and Glaister (1981) Section 8.3.
Flat fare systems are widely adopted because they are implemented with minimal transaction costs, usually do not require a conductor and provide a sense of fairness. Flat fare systems implicitly tax short distance trips and subsidize long distance trips. A uniform flat fare system tends to subsidize costly routes and to tax routes with low operating costs. Flat fare systems of unsubsidized private operators subsidize journeys during the peak and tax travel during the off-peak period. But uniform fares independent of distance provide an incentive for shortening of routes; fares below the operating costs of a given route provide incentives for not servicing that route. Transit pricing solutions are hindered by the prevalence of uniform flat fare systems that do not distinguish between different times of service and locations.7/

Fare policies tend to have unintended effects in the supply of a particular mode when they provide unequal returns. Given the scarcity of information available to the regulatory agency for setting fares, it is usually almost impossible to allow the same rate of return to all modes and it is frequently observed that one transit mode is favored over others. Consequently it is also usually common to observe a concentration of investments in one of the modes. Sometimes vehicles that once were called microbuses and that went out of business because of a low fare, turn out as colectivos and become profitable because of a favorable fare for colectivos. Also as a consequence, vehicles of only one type tend to operate during off-peak hours. The bias in favor of a mode is likely to become more important when only that mode is subsidized. In this case breakeven load factors for the subsidized vehicle tend to be low compared to the unsubsidized modes making it more attractive to operate the subsidized mode at off-peak hours. Indeed, the subsidized mode may be the only one that can afford to operate at off-peak hours.

Supply Regulation and Effect on Pricing

Regulation tends to favor incumbents over potential entrants to the market, and tends to favor carriers and their labor force over users. Additionally to these distributive effects, regulation tends to have deleterious effects on society at large because of distortions in the use of resources. Entry restriction tends to increase the cost of providing transport services. Exit restriction also tends to increase the cost by maintaining inefficient operators. In some cases buses are not allowed to leave the service, on the argument that this would be contrary to the public interest. This restriction leads to the use of buses beyond their economic life. Quantitative restrictions such as entry and exit limitations lead to higher costs and higher fares. Users have to pay higher prices and established operators earn more in markets with entry restrictions. Scarcity rents are earned sometimes by both the owners of the route and the owners of the vehicles. Above normal earnings

7/ Flat fare systems by making the marginal cost of travelling equal to zero make it more attractive to live farther from the work place. This fact is independent of the level of subsidy since the marginal cost is always equal to zero.
are frequently reflected in higher prices of vehicles. License plates of buses and taxis become valuable and a market may develop for them. Allocation of license plates by bidding could generate resources for the government that in most cases accrue to those fortunate to have the license.

24. Route allocation has been contemplated as a means to improve the operation of public transportation. Attempts have not been entirely successful for both technical and political reasons. From the technical point of view, the information and the analytical techniques for solving the problem have not been available. Origin and destination information is difficult to get. The influence of travel time, frequency of service and waiting time on demand has not been determined in most cities. In the cases in which a route allocation/restructuring exercise has been carried out with simulation models of the public transport network the solutions have been found wanting in several respects. The solutions tend to favor the use of the more efficient buses while the public tends to favor the use of more than one type of vehicle. Any major restructuring of routes is usually seen as a zero-sum game and consequently is opposed by the potential losers. Since regulation tends to favor incumbents through very elaborate procedures for assigning routes it is very likely that any major effort to change the route structure of a city will require important changes in regulation which will be bitterly fought in the political arena.

25. The experience of airline deregulation provides an important lesson for route restructuring. One of the consequences of deregulation of airlines in the US, has been the development of a network of routes in the shape of hub and spokes (Figure 2). The hub and spoke network of an airline is similar to those observed in the public transport sector of most cities in developing countries. The similarity indicates that changes in bus route structures imply welfare gains to users similar to the welfare benefits estimated in the US for the deregulation of the airlines. Three reasons favoring the development of hub and spoke systems are: (i) economies of scale in operating the trunk part of a route; (ii) consumer preference for more frequent services; and (iii) consumer preference for travelling with the same carrier. According to Alfred Kahn, deregulation set off an explosion of competition, a flood of entry by new firms and market interpenetrations by incumbents. In some cases the intensified competition resulted in substantial price reductions in real terms, the effects on the structure of rates being more dramatic than on their average levels. Competition also resulted in an increased variety of price/quality options and greatly improved the efficiency of operations; it exerted powerful downward pressure on inflated wages, painful for the workers affected but healthy for the economy at large. Bearing in mind that society's choices are between imperfect systems, even imperfect competition is preferable to regulation.8/

8/ Alfred Kahn (1988).
Figure 2

Western Airlines Route Structure Before and After Deregulation

After Consolidation

Prior to Consolidation
26. Benefits obtained from aviation deregulation have been less than the potential benefits because of failure to charge efficiently for the use of the hub. Optimal peak pricing of landing spots in some airports has been suggested as the way to eliminate distortions in the hub and spoke system.

27. The evidence available shows that route associations (owner-operators working together on one route), tend to be efficient and viable units. The case of Buenos Aires has been frequently mentioned as one in which route associations fulfill an important role. There are several advantages in a system of route associations, each allowed to operate over only one route. First, fares can be different for different routes and can be related to travel distance. There need not be cross subsidies between routes and between short and long distance passengers. Second, a route association can provide some services such as market research, lobbying, etc., through a system of limited revenue sharing and, given the small number of members, is able to control the payment for these services. Third, a route association can allocate buses to different times of day, rotate the scheduled departure time trying to allocate fairly any particularly favorable time of departure, and through sharing of revenues induce a behavior that is optimal to the association. They could eliminate the so called "penny wars" seen in some cities where operators are fighting for customers without any consideration for traffic regulations. In this case, route associations with some kind of revenue sharing are in effect solving the externalities caused by one man operations, aptly called ownership externalities since these can be internalized by means of common ownership of the resources. Route associations should be allowed to have different types of vehicles, to preserve flexibility in the allocation of equipment for varying time periods and to serve different segments of a market.

28. The ultimate restriction, public rather than private bus service provision, tends to be a poor choice. Public bus companies tend to be larger and less efficient than private companies. The main reasons for this inefficiency are: (i) the difficulty of providing adequate incentives; (ii) the diseconomies of information and control; and (iii) the lack of autonomy by management and multiplicity of objectives imposed on management. But public transport services provided by the public sector can be improved. Recent Bank work has suggested developing contract plans between the government and the bus company where the obligations of both the government and the company are well-defined, but such plans may remain indicative. Work done in London Transport has shown the convenience of decentralizing decisions. A clear objective of maximizing passenger-miles could be given to lower management; theoretical work has shown that decentralization and use of shadow pricing can be applied to other objectives such as maximization of the sum of consumer and producer surplus more in line with welfare economics. The use of both contract plans and decentralized decision procedures could help to make public bus companies more efficient and fares, lower.
Measuring the Cost of Distortions

29. Taxes and subsidies normally cause distortions in the allocation of resources, i.e., government intervention usually has spill-over effects. For example, sales taxes on new vehicles not only increase the selling prices of new vehicles but also increase prices of old vehicles. Taxes on vehicles make capital more expensive and make it more attractive to economize on the use vehicles, both new and old. As a consequence, economic lives of vehicles tend to be longer where they are heavily taxed. Increases in economic life are accompanied by lower depreciation rates. Costs reflecting both the opportunity cost of capital and the depreciation rate tend to be high where vehicles are heavily taxed and where real interest rates are high. This can be observed in developing countries, where costs tend to be higher than the corresponding costs in developed countries.

30. Producers are affected by government intervention. Their return on investments is affected by government pricing policies. A real subsidy increases the operator's return up to or even above what can be earned in other activities using the resources at his disposal. Producers have to pay some taxes and may get some subsidies. They may act as collectors of taxes and as dispensers of subsidies; when an operator gets a subsidy, he many times is paid for services rendered to consumers; the final beneficiaries of the subsidy are the consumers that are able to ride buses at lower fares, but they are not the full beneficiaries where there is monopoly, as with e.g., route associations.

31. The cost of distortions caused by taxes, subsidies and non-marginal pricing decisions can be estimated given supply and demand functions for public and private transport. The empirical evaluation of welfare losses is often subject to criticism because of the model or the mathematical procedures used. Aggregation over commodities tends to produce lower welfare loss estimates. Obviously, the results depend on the accuracy of the parameters used; most of them are at most educated "guesses" without a solid econometric base. However, it is important to note that most results depend heavily on one parameter only.

32. Sensitivity analysis can clarify how the value of the welfare loss due to inefficient pricing varies with respect to a critical parameter. Glaister estimated the welfare loss for the case of London Transport and found that it depends mainly on the price elasticity of off-peak rail; the effects of the other parameters are relatively negligible. Figure 3 shows the variation of the welfare loss due to inefficient pricing of London Transport services. For the best estimate available of the price elasticity of rail off-peak demand (-.75), the welfare loss is estimated as three percent of total household expenditures. The relative magnitude of welfare losses can be seen in a better perspective when they are compared with expenditures on transit and not with total


10/ The figure is derived from data in Glaister (1979).
Expenditures. Expenditures for bus services in greater London are 1.12 percent of household expenditures while expenditures on rail services are 1.11 percent. Thus, the best estimate of welfare losses due to inefficient price of London Transport Services is 134 percent of total expenditures in public transport. As can be seen in the figure, welfare losses are above transport expenditure whenever the absolute value of the elasticity of off-peak rail travel is above 0.58. It is possible to conclude that welfare losses created by inefficient pricing are very important and should be taken into account when developing transport policy. Only in the case of an inelastic off-peak rail travel demand function (elasticity equal to zero) is the welfare loss negligible.

The analysis of the incidence of subsidies requires an estimate of the situation without the intervention and compared to the actual situation. The price difference between the two provides an estimate of the effect of intervention. In the case of a flat fare under perfect competition, it is possible to assume that the "optimal" solution is to charge variable marginal cost during the off-peak period and to charge long-run (variable and marginal capital costs) during the peak period. Data for London Transport show the implicit tax on off-peak users as 100 percent of short-run marginal cost and the implicit subsidy for peak users as 16 percent of long run marginal costs. Off-peak fares should be 43 percent of peak fares. In the case of Madras, as presented in the Urban
Transport Data Book and assuming that peak traffic in passenger miles is 2.5 times the flow in the off-peak period, the implicit tax on off-peak users can be estimated as 50 percent of the efficient peak pricing. Peak users are receiving a subsidy approximately equal to 17 percent of the long run marginal cost of producing bus services. Off-peak fares should be 55 percent of peak fares.

Potential benefits of more flexible prices of public transportation can also be inferred from the large gains of traffic management systems. Flat uniform fares can be associated with the idea of traffic signals operating under fixed cycles across the city. Flexible fares varying with distance, time of day can be associated with a coordinated system of traffic signals that minimizes some social cost function. The recommendation of an economist for flexible pricing is entirely similar to the recommendation for a modern traffic control system.

The process of deregulation has also provided quantitative information for estimating the cost of regulation. A large part of the benefits arises because of the freedom of the deregulated industries to fix prices in line with costs. With easy entry into markets, operators become aware that their markets are "contestable" and that if they don't keep costs and prices down, other operators will enter the industry charging lower prices. Deregulation has introduced incentives for operators to reduce costs and optimize their operations.

The literature provides different ways of estimating the cost of regulation. The estimation of welfare losses is sensitive to the disaggregation used in the analysis and the methods of estimation. For reliable estimates one needs to know the complete set of own and cross-price elasticities of demand and supply.

Even if the consumer benefits from deregulation, there are costs to operators and to labor. The deregulation of trucking in the U.S. has been accompanied by a considerable increase in the number of firms going bankrupt and in a considerable decrease in the wages of drivers. Airline deregulation showed a similar pattern; the losers are the weak companies and labor. The winners are the innovative companies and the users.

Deregulation experiences in developing countries have not been analyzed in detail. It has been argued that given the difficulties of enforcing regulation in most of the countries, there is a de facto non-regulation and consequently there will not be major improvements in welfare for any deregulation. Besides the fact that many countries do indeed enforce regulation in urban transport, the conventional wisdom ignores two important points. First, that resources are being used in the regulatory process both at the government and the operator levels. The cost to society is not the salary of the government employees but the opportunity cost of not devoting these efforts to productive endeavors needed for transport planning and traffic system management. In some countries the only people with some transport training are working for the government in the regulatory agency or working for the transport lobby and the operators trying to get some of the rents caused by the regulations.
Second, unenforceable regulations lead to corruption; pirate operators (those not licensed by the government) are continually under pressure by the police and their only recourse is to bribe public officials and police officers. Enforcement, however, is important under deregulation. As in developed countries, deregulation should be accompanied by antitrust enforcement and by adequate pricing of public modes and facilities; even informal bus operator cartels can frustrate the potential benefits of deregulation as happened in Santiago.

**Subsidies and Income Distribution**

39. The granting of subsidies is geared to improving the mobility of low income people by making transit trips more affordable. Special pricing for students or the elderly are usually based on some notion of helping disadvantaged groups of the population. With flat fares no one is deprived of access to the transit system because of his decision to live in a particular neighborhood. Flat fares are similar to flat mail rates. In most countries it costs the same to send a letter to any destination no matter how isolated are both origins and destinations and no matter the day it is sent, but quality of service makes up for this to an extent.

40. When transit is widely available and several levels of service are provided it is possible to design transit subsidies oriented to the poor. The existence of a supply segment specialized in serving the poor makes it possible to reach a target population with a minimum of leakages to other groups with higher incomes.

41. However, the objectives are not always met. For instance, the lowest 20 percent of Bogota households received a subsidy of less than .2 percent of their income.11/ (After more than sixteen years, the subsidy was found by the Supreme Court to be unconstitutional and was suspended.) In the very poor countries poor people usually cannot afford public transportation and consequently, they walk to their jobs or live in tenements centrally located in order to save on transport costs. Under regulated fares some of the poor neighborhoods are only served by the so-called "pirate" operators whose fares are often above the regulated fares.

42. Two aspects of any government intervention are usually studied: the welfare or efficiency costs, discussed above, and the impact on income distribution. Both implicit and explicit taxes cause inefficient use of consumers' resources. When the price is unnecessarily high because of a tax, the consumer demands less of a resource whose cost to society is below its price. If there is an implicit tax on off-peak travel, there will be less than the optimal amount of travel. Some consumers forego the possibility of travelling during off-peak hours. When consumers are subsidized implicitly or explicitly, they tend to use more of the good and pay less than the cost to society. The impact on

income distribution is measured by the difference in consumer expenditures with and without intervention.

43. The redistributional benefits of a well designed transit subsidy should be balanced with the costs induced by it. Subsidies distort producers' and consumers' decisions, sometimes lead to increased unit costs and require the use of scarce public funds. Cost-benefit analysis can be carried out to illustrate efficiency/income distribution trade-offs of a transit subsidy. Careful quantitative estimation of the impact of a subsidy program is required to establish the incidence of government intervention on the distribution of income. A well designed subsidy could have a positive impact on the poor.

44. Don H. Pickrell of the Kennedy School of Government has completed a study on transit subsidies in the United States during the period 1970-82. In his analysis transit deficit increases are allocated among five different possible sources: (i) a rapid increase in operating expense per vehicle mile was responsible for more than 60 percent of the increase in subsidy payments; (ii) increased total vehicle miles of service, 9 percent; (iii) interactions of rising expenses and service, 8 percent; (iv) underwriting fare reductions, 14 percent; and (v) declining demand for transit service, 7.5 percent.

45. Pickrell's analysis provides interesting results that should be taken into account in the design of better subsidy schemes. According to him, the most surprising finding was that the continuing decline in demand, the main source of the US transit industry's historical contraction and financial deterioration, was not the main cause of the rapid escalation in government subsidies for transit. Government subsidy programs can become substantially more effective if transit operators can gain some control over operating costs, adapt their service offerings to changing patterns of demand for urban travel, and restructure fares to recognize variation in the costs of providing different services. A revision of the mechanisms for funding and distributing subsidies could contribute to achieving these results, since growth in the availability of operating assistance may itself be a cause of the escalation in costs and deficits. The earmarking of tax sources for automatic distribution as transit subsidies often permanently exempts these from the fiscal scrutiny normally applied to periodic budget appropriations. Similarly, grants are often distributed according to formulas that fail to take into account the financial or operating performance of their recipients; these need to be revised to reestablish incentives for transit operators to control operating costs and tailor their services to changing patterns of demand for travel.13/

12/ An integrated analysis for the UK can be found in Dogson and Tophan (1987). They found that subsidizing transit through an increase in property tax will lead to an improvement in welfare.

46. A recent analysis of urban transport subsidies in Western Europe and North America provides interesting results that could be used in the analysis of subsidy reform in developing countries. According to Pucher the main differences between United States and Western Europe are due to (i) variation in philosophy of subsidy; (ii) variation in administration and organization; and (iii) variation in levels of subsidy.14/

47. Subsidies permit lower fares and better level of service but can be responsible for at least some portion of the observed changes in productivity and costs of public transport. Pucher, using vehicle kilometers per full-time employee equivalent as an index of productivity, found the lowest values of this index in Belgium, Italy, and the Netherlands, the three countries where central government finances the largest shares of total subsidy. The highest values of the productivity index were found in Great Britain, Sweden, Switzerland, and West Germany where transit financing is primarily a local responsibility. Higher costs were also observed where central governments finance transit. The rate of increase in per-unit costs has also tended to be higher in countries where central governments are responsible for the financing of transit. Earmarking of taxes to subsidize transit services could in principle lead to inefficiencies and result in high and increasing levels of subsidies. In the US, the effect of earmarking of taxes has been an increase in costs, while in France the earmarking of taxes has produced an important effect on service expansion.

48. Fares and subsidies are usually determined at national levels and implemented at city levels, but in various countries urban transport has become a local responsibility as a consequence of the process of decentralization. The transition has sometimes led to difficulties, mostly due to lack of qualified personnel at the local level able to manage the process of setting indicative fares and regulating urban transport.

Conclusion: Do Not Depart from Competition

49. The paper has illustrated the complexity of the issues relating to pricing and regulatory policy in urban transport. While it is difficult to prescribe a single set of conclusions since each case must be analyzed within its own social and political as well as economic context, it is clear that excessive and ill-designed government intervention through pricing and regulatory policies have significantly negative consequences. There is really little justification for departing from competition and optimal pricing in public transport. The underlying principle is to help make the market mechanism and the pressures of competition work to better allocate resources, raise production efficiency, promote innovation, lower costs and increase urban transport options in terms of price and service quality.
