Efficient Pricing in Transport

The Gap between Theory and Practice

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EJTIR, **1**, no. 1 (2001), pp. 29 - 44

Received: July 2000
Accepted: September 2000

Many transport economists agree on the need for 'efficient pricing' in transport, as this would improve allocative efficiency and raise social welfare. Although the principle of efficient pricing is gaining ground in many countries, up to now it has been applied only rarely because of strong social resistance. But how can so many people be opposed to a principle which aims to increase social welfare? In this paper, I explore the major reasons underlying this paradox and examine the validity of arguments for and against efficient pricing. It appears that most arguments against efficient pricing can be refuted easily. However, everything stands or falls on the basic assumption that efficient pricing will increase social welfare, the validity of which appears to be practically impossible to prove. The main cause of this difficulty is the lack of complete information on the welfare effects of efficient pricing.

1. Introduction

> 'Since the problems became acute with the advent of motor vehicle mobility, economists have proffered their familiar efficiency-based solutions. [..] But economists' arguments have been politically persuasive only in part. We observe congestion on roads and streets everywhere, suggesting institutional failures both to restrict the demand for and to increase the supply of road facilities' (J.M. Buchanan, in: Roth, 1996: p. xv).

For several decades, economists have pleaded for 'efficient pricing' in transport, because according to them, it will increase overall social welfare (see for instance Pigou, 1920; Marchand, 1968; Roth, 1996). Nevertheless, the principles they have developed have been put into practice by only a few governments. There are two reasons for this. One, the implementation of efficient pricing in transport has been hampered by the absence of

equipment necessary to collect charges at a reasonable cost[1]. Recent technological developments have levelled this barrier; think for instance of the sophisticated electronic road pricing system employed in Singapore. Two, governments considering the implementation of efficient pricing in transport have met strong resistance from society and politicians. Yet how can this be reconciled with the goal of efficient pricing -raising social welfare?

In this paper an attempt is made to explain the above paradox. Although some of the illustrations used in the paper refer to road transport, the focus is on motorized transport in general, including road transport, rail transport, inland navigation, deep sea shipping, and aviation. The paper is structured as follows. The economic arguments for efficient pricing in transport are described in section 2. The arguments underlying public resistance to efficient pricing are treated in section 3. The validity of these arguments is examined in section 4. Finally, a summary of the main conclusions presented in the paper is given in section 5.

2. Why efficient pricing?

> 'In the absence of pricing, public roads are available for all on a 'first-come-first-served' basis, road services being rationed only by congestion. Those whose time is least valuable stay on the roads, while those who can not afford to waste time in traffic move their work or their homes to other areas. It is difficult to think of a more wasteful criterion for the allocation of a scarce resource – road space' (Roth, 1996: p. 28).

The quote cited is not unique, for decades many economists have advocated the need for efficient pricing in transport, not only in road transport but in all transport markets[2]. This raises two questions. One, why are transport markets not efficient and how is that related to pricing? Two, how should prices be set in order to improve efficiency?

2.1 Motive: inefficient transport markets

The motive behind the plea for efficient pricing in transport is the presence of inefficiencies in transport markets; part of the resources used, such as fuel, land, infrastructure capacity, and time, could yield more welfare if put to another use. The alleged inefficiencies of transport markets are caused by the fact that these markets do not meet the Pareto conditions of productive efficiency and allocative efficiency. A market outcome is productive efficient if output is produced at the lowest attainable cost. A market outcome is allocative efficient if resources are allocated among the various goods that can be produced in such a way that it is impossible to make someone better off without making someone else worse off. An important condition for allocative efficiency is that prices must equal marginal cost for all products (Lipsey et al., 1987: p. 247-249).

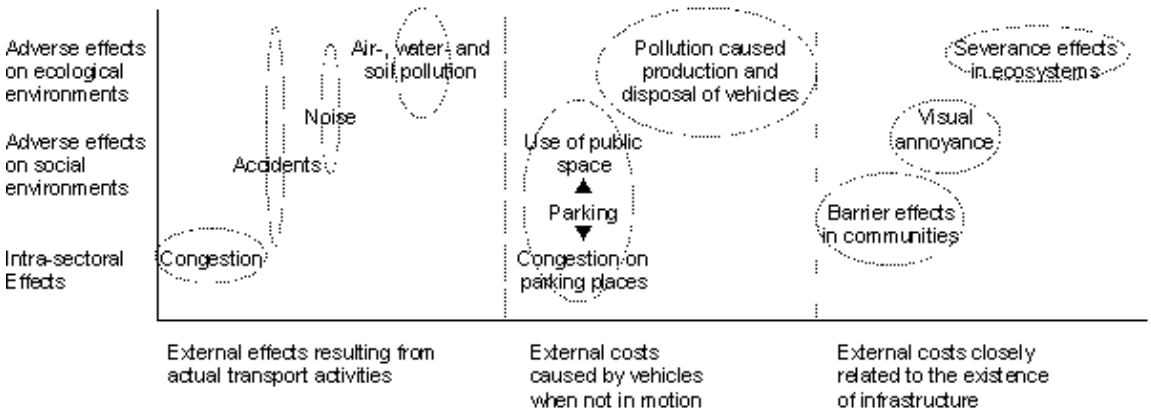
Probably few transport markets will meet the above conditions. For instance, there are several allocative inefficiencies caused by transport prices not equaling marginal costs. Most

[1] This holds for most *links* (roads, railroads, and waterways). On *nodal* infrastructures such as airports and seaports, traditionally it has been possible and even quite usual to charge users (DE WIT AND VAN GENT, 1996: P. 161).

[2] In this paper, transport markets are classified according to *modality:* road transport, railways, inland navigation, etcetera.

scientists agree that currently, traffic pays less than its marginal costs, although the gap between prices and marginal costs varies for the transport modalities and heavily depends on the way external costs are monetized (see for instance Geurs and Van Wee, 1997: p. 14). The literature on efficient pricing focuses on the latter phenomenon and recommends improving allocative efficiency of transport markets through adaptation of prices.
The major causes of the gap between current transport prices and marginal costs relate to two factors, namely the presence of externalities and non-optimal taxes. Both causes will be treated below.

Ad 1: Externalities
Externalities are effects, either good or bad, on parties not directly involved in the production or use of a good or service (Lipsey et al., 1987: p. 909). Someone producing externalities causes costs or benefits to others, but does not take them into account in the decision-making processes. As a result, his or her production or consumption may be too high or too low from the viewpoint of social welfare. A main cause of the existence of externalities is a lack of well-defined property rights, which in turn is related to prohibitive transaction costs. As a result, there is no market in which externalities can be traded. For instance, people that suffer from congestion, pollution or traffic noise, have no right to uncongested roads, clean air or silence. Even if they had, negotiating and reaching satisfactory agreements on the size of congestion costs, pollution and traffic victims would be unfeasible because of the attached costs (Jansson and Lindberg, 1997: p. 24). An alternative is to charge people, causing an externality, equal to these costs or, when the externality is positive, to give people who cause the externality a subsidy. This solution has been suggested by Pigou (Pigou, 1920).
Transport generates several negative externalities or external costs, which are depicted for road transport and road infrastructure in figure 1. The same cost typology can be observed for other transport modes such as rail transport and inland navigation. Only ‘first order external costs’ are depicted in figure 1, which are external costs that are directly caused by transport. ‘Second order costs’, such as increasing emissions per vehicle-kilometer due to congestion, are excluded. External effects are to a large extent time and place sensitive, which means that their value may vary heavily between various periods and places (Verhoef, 1996: p. 16).



Source: Verhoef, 1996: p. 15.

Figure 1. Typology of external costs of road transport

Ad 2: Non-optimal taxes
Another cause of the deviations between transport prices and marginal costs is that transport prices are affected by taxes that have no direct relation to costs of transport facilities such as infrastructure or to external costs. This is because the reason for taxes is generally to raise revenue, not to correct for externalities.

2.2 Appearances of allocative inefficiencies

Of course, inefficient prices per se do not necessarily lead to allocative inefficiency in the size and composition of transport. If demand for transport services was inelastic and substitutability between modalities extremely low, the current situation would be close to the allocative efficient situation. In practice, however, the demand for transport services and infrastructure capacity is often price elastic and in certain situations, modalities are substitutes.
Inefficient prices in transport lead to allocative inefficiency in four ways:

- inefficiency due to the malfunctioning role of prices in rationing demand
- inefficiency due to the absence of correct (dis) investment signals
- inefficiency due to the existence of excess demand
- inefficiency due to the distortion of intermodal competition

Ad 1: Malfunctioning role of prices in rationing demand
Prices play an important role in markets because they provide information for producers and consumers about scarcity, i.e., shortages or excesses in supply. If demand exceeds supply, prices will go up. In the short run, demand is then rationed, because the goods or services will be supplied to those people that have the highest willingness-to-pay, which may reflect that these people derive the highest utility from consumption. In a competitive market, production will be increased until prices equal marginal costs and demand and supply are in equilibrium. When supply exceeds demand, the opposite will happen.
In transport, prices do not reflect scarcity and have no rationing function as described above. If demand exceeds supply, demand is rationed by queuing rather than by pricing and willingness-to-pay is replaced by willingness-to-wait. Rationing by queuing is less efficient than rationing by pricing, because it implies additional costs – the cost of time spent queuing, and one could be avoided if prices were used as a rationing device (Stiglitz, 1988: p. 130). Furthermore, since part of the waiting costs is external, waiting costs that are inflicted upon others, scarce resources may be allocated non-optimally. This occurs if people with a high willingness-to-pay and who set a high value on time withdraw from consumption in favor of people with a low willingness-to-pay and who set a low value on time. This is said to happen in Dutch road transport, where hauliers leave the roads to commuters[3]. The reason is that in goods transport, the willingness-to-pay for transport is narrowly related to the value placed on time. The shorter the travel times and the more reliable the arrival times, the lower transport costs are and the higher willingness-to-pay. Congestion leads to an increase in transport costs, because travel costs increase, and reliability of arrival times decreases, which

[3] See for instance CPB, 1998 and TNO Inro, 1991; 1995.

leads to 'scheduling costs': costs that arise when goods are not delivered in time such as lost sales and lost productivity due to production delays[4].

Ad 2: Incorrect (dis) investment signals
In the absence of 'efficient prices', there are no correct signals for investment evaluations. If infrastructure could be priced like a private good, excess revenues or excess costs would provide indications of either a shortage of supply or over-capacity (Roth, 1996: p. 59). Therefore, current infrastructure capacity may be inefficient, being either too high or too low. In principle, efficient prices are believed to give more accurate signals. It should be noted that if prices are set at marginal costs, they do not reflect fixed costs; infrastructure charges will then lead to exploitation losses. Nevertheless, the proportion between revenues and costs at 'marginal prices' should give a better indication of the extent to which supply equals demand.

Ad 3: Excess demand
Excess demand appears when the number transport services consumed are higher than in the optimal situation, where prices equal marginal costs. Excess demand may provoke allocative inefficiency because too much use is made of scarce resources. A complicating issue in measuring these inefficiencies is that because transport imposes multiple costs, the inefficiencies of 'mispricing' may multiply. For instance, non-optimal parking fees affect efficiency in the market for parking and also lead to inefficient levels of congestion, pollution, and other costs (Litman, 1999: p. 2). Furthermore, excess demand can also add to the problem of non-optimal rationing (see under 1).
Excess demand may well be assumed to exist in road transport. As an example, a study conducted by the Free University of Amsterdam showed that the introduction of congestion charges on road transport in several countries has led to a reduction of road (passenger) transport (Van der Vlist et al., 1998). Assuming that prices including the congestion charge are better proximates of efficient prices than the current ones, this indicates the existence of an excess demand prior to the introduction of the charges.

Ad 4: Distortion of intermodal competition
The difference between prices and marginal costs differs for the various transport modalities, which could lead to a non-optimal use of the modalities. It is often claimed that prices in road transport are relatively too low, resulting in underconsumption of public transport, inland navigation, and rail transport (see for instance Tieleman, 1998).

2.3 Reducing inefficiency through efficient pricing

In the previous section, it was concluded that many transport markets are allocative inefficient as prices differ from marginal costs, which is notably caused by externalities. These inefficiencies may affect related markets, such as goods markets and labor markets. Many authors therefore plea for government intervention to set prices at the optimal level

[4] Note that the distinction between willingness-to-pay and willingness-to-wait is somewhat artificial. Waiting also involves costs, namely time, and therefore willingness-to-wait can be regarded as a specific form of paying, namely paying with time. However, paying with time causes additional *external time costs* to others that are not paid for.

('efficient prices'; see for instance Button and Verhoef, 1998; Jansson and Lindberg, 1997; Roth, 1996; Verhoef, 1996), but what is an optimal price level?
Three principles for efficient pricing can be distinguished in the literature, each based on a certain assumed state of the world. These principles are discussed below.

2.3.1 Pricing in a 'first-best' world

In a first-best world, actors are completely informed and strive for utility maximization, markets function optimally in the absence of possible distortions such as transaction costs, externalities, or economies of scale. The typical market structure is that of perfect competition. In a first-best world, prices equal marginal costs and a welfare optimum, 'Pareto optimality', is attained. In this situation, it is not possible to improve the welfare of one individual without worsening that of another.
Clearly, in reality, these assumptions are not valid. The consequence of one or more markets in a society not meeting the first best conditions is that the conditions in other markets are also affected and as a result, welfare maximization is not possible. This is because distortions in a particular market may affect other markets:

- the demand for substitutes and complementary goods is affected
- income effects may occur, for instance, if houses are sold at prices that exceed marginal costs, consumers are left with less to spend to other goods and services

2.3.2 Pricing in a 'second-best' world

Transport markets are characterized by many distortions, such as information failures, monopolies, and location subsidies for firms. This may cause welfare losses compared to the first-best situation. Several economists state that in these situations, prices should not be based on marginal costs, but should be set in a manner that corrects for the negative effects of market distortions, i.e., be set as second-best prices (see for instance Verhoef, 1996).
Such 'piecemeal' improvements of the affected markets are only possible under strict information demands. A government should know exactly what the impact is of the market distortion on social welfare at any given moment, and how prices should be adapted as to realize a welfare improvement. Second-best prices therefore are only possible in theory (Ng, 1979: pp. 223-224).

2.3.3 Pricing in a 'third-best' world

Finally, pricing principles have been developed that explicitly address the issue of information failures, called third-best prices. A distinction is made between situations of 'information scarcity' and 'information poverty' (Ng, 1979: pp. 233-243; Maks, 1992: pp. 5-9).
In the first situation, a government has some limited information on the impact of a market distortion on social welfare, which allows it to reduce welfare losses through price adaptations. Through trial-and-error and extensive research a government can determine the specific prices at which, in practice, a welfare improvement can be attained.
In the situation of information poverty, the regulating government has little information, and piecemeal second best improvements are useless. In order to 'do the best for the rest of the economy', a government should use first best rules in other markets. This means that prices are set at marginal costs (Ng, 1979: p. 218). If, however, third-best principles are applied to

only a few markets, and other markets remain priced suboptimally, there is no guarantee at all that the overall social welfare will be improved. The current nonoptimal prices in transport may, for instance, compensate for distortions in other markets, e.g., labor markets and real estate markets, but they may also reinforce these distortions. In the first situation, efficient prices in transport may lead to overall welfare losses, in the second situation to welfare gains.

The conclusion is that third-best prices offer, in theory, the possibility to attain a welfare improvement. The above-mentioned remarks indicate however that it is far from certain that such improvements will be attained in practice.

The three pricing principles have two disadvantages in common. One, the determination of prices is likely to be extremely costly or even impossible because of the information that has to be collected. The main cause is that price are among other things based on marginal external costs, which depend heavily on vehicle, trip and even drivers' characteristics (Verhoef, 1996: p. 16). Moreover, the valuation of external costs is sometimes controversial. What is the value of a life? What is the cost of extirpation of an animal species? Although several methods have been developed to determine such costs, scientists have not reached consensus about them (see for instance Geurs and Van Wee, 1997). Two, as marginal costs may vary heavily with time, the pricing instrument is less effective in situations where people have already made the decision to use the car, a vessel, or a train. Their options to withdraw from transport consumption or to switch to another modality are then restricted.

So, how can efficient pricing in theory improve welfare? This can be illustrated by assuming the basic representation of Pigou's economic analysis of road pricing, as for instance described by Verhoef (1996: p. 187) and Button and Verhoef (1998: p. 5). See figure 2, where the introduction of a congestion charge on a congested road based on marginal cost pricing is depicted. In the figure, demand is represented as the sum of each individual car user's marginal benefit from road use. The marginal social cost curve (MSC) exceeds the marginal private cost curve (MPC) due to congestion. The free market outcome is N^o and the welfare optimum is N*. A Pigouvian tax is charged at r*, which is equal to the marginal external costs at N*. This tax yields a social welfare gain of *X*. Without redistribution of the tax revenues N* x r*, everybody is worse off, except the infrastructure provider. Those who remain using the road incur a net welfare loss of *a,* which consists of a time gain *b* and the higher road price r*. Those who are taxed off the road incur welfare losses varying from 0, for the initial marginal user, to *a*, for the marginal 'non-user' after the tax.

These are not the only welfare effects, however. After some time, people that had withdrawn from road use prior to the congestion tax because of time losses[5] may return, which yields benefits to them. In the case of other taxes, for instance noise taxes, those benefiting are people that gain from decreased noise. Furthermore, the use of the tax revenues may yield welfare to people outside the transport system, e.g., if the revenues are used to finance schools, income transfers etcetera.

[5] See section 2.2, under Ad 1: Rationing by queuing.

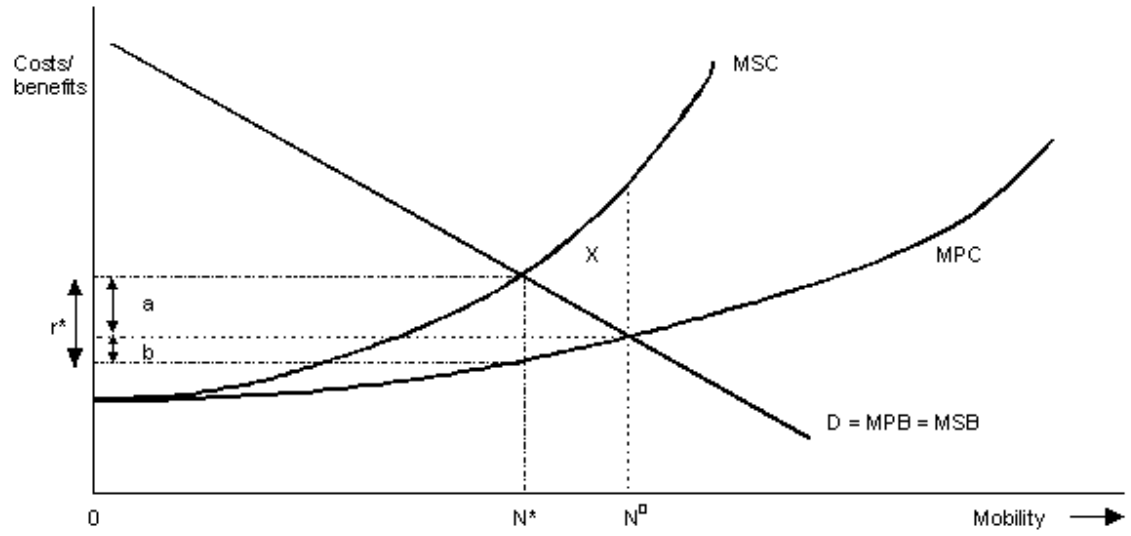


Figure 2. Effects of congestion charges in road transport

3. Why *not* efficient pricing?

> 'There have been many attempts to introduce urban road pricing around the world over the last 40 years – and most have failed. [..] In most cases extensive professional studies had demonstrated the technical feasibility and economic benefits of introducing the scheme, but the stumbling block was public and political acceptability. Too often this aspect was given inadequate attention, in the mistaken belief that a scheme which showed strong social and economic benefits would sell itself' (Jones, 1998: p. 263).

Although authors advocating efficient pricing in transport differ with respect to the way in which efficient pricing should be designed, they agree on one thing, namely that efficient pricing is desirable in order to improve welfare. Social resistance to governmental plans for efficient pricing is very strong, however. This for instance became apparent with the proposed introduction of a congestion charge in the Netherlands ('Rekeningrijden'). This seems to contradict the goal of efficient pricing: improving welfare. In the following the major arguments against efficient pricing are described and an explanation for the public resistance suggested by several economists is treated.

3.1 Arguments against efficient pricing

Governmental proposals for the application of efficient pricing in transport have focused mainly on charging road users for the (marginal) external congestion costs. As stated above, these plans have met heavy social resistance. Several studies have been conducted to explore the reasons behind this resistance (see for instance Jones, 1998). Fundamental arguments

against the concept of congestion pricing, and in my opinion, against the principle of efficient pricing in transport in general, are (Jones, 1998: pp. 265-268)[6,7]:

- traffic participants do not believe that efficient pricing will improve welfare
- traffic participants believe that they are charged for something of which they are victims rather than contributors, i.e., congestion
- congestion charges are not necessary, as problems are not bad enough. Furthermore, congestion can better be reduced by improving alternatives, such as public transport;
- congestion charges (and efficient pricing in general) will be ineffective, as transport demand is very price inelastic
- congestion charging (and efficient pricing in general) will cause severe boundary problems, such as a shift of problems to other areas
- people believe that the goal of efficient pricing is raising tax incomes for other purposes, rather than improving welfare
- efficient pricing will cause social inequity

3.2 An economic explanation for resistance to efficient pricing

Several economists believe that the redistributional effects of efficient pricing cause the social resistance to it (see for instance Verhoef, 1996; Rietveld and Verhoef, 1998; Johansson and Mattson, 1995b). Efficient pricing will cause welfare gains for some people and welfare losses for others (see figure 2). Even if efficient pricing leads to a net welfare improvement, people may be opposed to efficient pricing. This not only holds for people who are worse off, but also for people that are better of. Several explanations are offered:

- many traffic participants are badly informed about the costs and benefits of transport (Rietveld and Verhoef, 1998: p. 294). Furthermore, people are likely to be more aware of increased costs than increased benefits (Litman, 1999: p. 41). The latter effect can be enhanced when a substantial part of the benefits is intangible, e.g., a decrease of the greenhouse effect
- those incurring welfare losses may have a better political lobby, which enables them to dominate the public opinion (Verhoef, 1996: p. 169)

4. Should efficient pricing in transport be introduced, or not?

> ‘It has been a commonplace event for transportation economists to put the conventional diagram on the board, note the self-evident optimality of pricing solutions, and sit down waiting for the world to adopt this obviously correct solution. Well, we have been waiting for seventy years now [..]. Why is the world reluctant to do the obvious?’ (Lave, 1995, in: Button and Verhoef, 1998: p. 7).

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[6] In my opinion, fundamental arguments relate to the objectives, assumptions, and expected effects of efficient pricing vis-à-vis social welfare and not to the desirability of these issues from other perspectives.

[7] Early 1999, the ANWB, a Dutch interest group for motorists, employed nearly the same arguments against *Rekeningrijden*, a congestion charge to be levied during morning peak hours on the highways around the four largest cities.

Up to now, the main arguments for and against efficient pricing in transport are described, as well as an explanation of the unpopularity of efficient pricing, offered by its advocates. But what do these arguments imply for the concept of efficient pricing; should it be introduced or not? Let us assess the validity of the arguments against efficient pricing and of the economic explanation for the unpopularity of efficient pricing in order to answer this question.

4.1 Argument 1: Efficient pricing will not improve welfare

One of the arguments that relate to the core of the concept of efficient pricing is that people refuse to believe that it will result in welfare improvements. Unfortunately, this argument proves to be very hard to refute:

- in section 2.3, it appeared that if we consider our world a third-best world, it is not guaranteed that efficient pricing in one sector, transport, will lead to welfare improvements. The current prices in transport may compensate for various distortions in other, related markets, however, due to a lack of information such distortions are largely unknown
- welfare effects that traffic participants derive from use of transport systems appear to be very difficult to operationalize and measure (see for instance CPB, 1998: p. 35). Usually, values of time are used, however, to some traffic participants such as business travelers and freight carriers, (un)reliability of travel times may be more important. Very little is known about such welfare effects (CPB, 1998: p. 10). Moreover, the use of transport systems varies heavily over time, which implies that the overall welfare at moment X may differ strongly from that at moment Y
- it is uncertain whether resources, sacrificed to satisfy excess transport demand, fuel, time, infrastructure etcetera; see section 2.2, could be used more efficiently elsewhere

The conclusion is that incomplete information makes it impossible to prove whether or when efficient pricing in transport results in welfare improvements compared to the current situation. This issue, however, is barely addressed or recognized by the advocates of efficient pricing, mentioned in section 2.

4.2 Argument 2: Efficient pricing means paying for ‘exogenous’ problems

Some people find it difficult to accept that they are charged for congestion costs, because they feel they have to pay for something that they wish to avoid, and that they are victims of congestion rather than contributors to it. A congestion charge would mean that they have to pay twice: once in loss of time and once for the actual congestion charge. This reasoning is erroneous, however. Firstly, in the case of infrastructures that are used by many vehicles such as cars, trains, vessels etcetera, every additional vehicle may reduce speed and contribute to congestion. Secondly, when waiting, people do not pay for all the costs, as the costs of time losses inflicted on others are not incurred.

4.3 Argument 3: Efficient pricing is not necessary

According to some of those using transport modes, efficient pricing is too blunt an instrument to combat problems such as congestion and environmental pollution. This is a normative issue, which has nothing to do with the economic goal of efficient pricing. For instance, some people have little regard for environmental problems, they are not yet bad

enough. However, most governments do take the environment into consideration, and have internationally agreed to lower environmental pollution. Jansson and Lindberg therefore state that it is advisable to have a moral principle to back up taxes that involve taking environmental costs into account. They state that such a principle has gradually become accepted for air pollution since the Polluter Pays Principle has become well established in politics (Jansson and Lindberg, 1997: p. 24)[8].

Other people believe that if the problems mentioned above are to be reduced, it makes more sense to improve alternatives such as public transport, however, this solution is only adequate if transport alternatives are perfect substitutes – which at present public transport modes are not.

From an economic point of view, some problems such as congestion are not bad enough only if it can be proven that efficient pricing will lead to a net welfare loss. This issue was treated in section 4.1.

4.4 Argument 4: Efficient pricing will not work

Another argument against efficient pricing is that it will not work, as demand for transport will be very inelastic. Yet this argument is not valid from an economic point of view. Even with inelastic demand efficient pricing could be effective, because the effects must be a restriction of total traffic and a better distribution of traffic in time or over the network (Van der Vlist et al., 1998: p. 2). Furthermore, various studies have demonstrated that at least the demand for road transport is sensitive to changes in transport costs (see for instance Van der Vlist *et al.,* 1998 and Small and Gomez-Ibañez, 1998).

4.5 Argument 5: Efficient pricing will cause severe boundary effects

Some people fear that a congestion charge on some parts of a road network will lead to a transfer of problems to other parts of the network. Furthermore, it is felt by some that in the case of road transport, a shift of road transport from highways to secondary roads will lead to an increase in traffic accidents, causing additional costs. An economic counter-argument to the first argument is given in section 4.4 above. The second argument is more difficult to counter. Some transport economists have suggested charges, which internalize traffic accident costs (see for instance Jansson and Lindberg, 1997), however, this again touches upon a normative issue: should we allow people to harm other people's health if they pay for it? How do we value health and quality of life? And how do we place a monetary value on life?

4.6 Argument 6: Efficient pricing is an abuse of governmental powers of taxation

Fear of governmental abuse of taxation privileges centers on two issues:

1. if tax revenues from efficient pricing are used for other policy goals, e.g. schools or health, users of transport systems feel they have to pay for others' needs
2. users of transport systems fear that governments will raise taxes if more money is needed for other policy goals

[8] Jansson and Lindberg recognize that this does not yet apply to greenhouse gases.

The first argument is not valid from an economic view. Taxation is regarded as a necessity to bring transport to an efficient level. The tax revenues related to transport do not have to be used to refund drivers, improve the environment or finance infrastructure, but should be used in such a manner that they yield the highest utility. It is evident however that the use of tax revenues obtained from efficient pricing will not help to gain public support for efficient pricing[9]. The second issue is unrelated to efficient pricing and as such will not be discussed here.

4.7 Argument 7: Efficient pricing will lead to inequality

The goal of efficient pricing is to improve social welfare through the more efficient use of scarce resources in an economy, given a certain initial distribution of resources over the economy's members. In principle, economics is not concerned with 'normative' issues such as to whether it is just that efficient pricing will lead to income redistributions. In the real world however most people and governments are concerned with such issues. Many fear that efficient pricing may lead to inequity in two ways:

- it could lead to a regional differentiation of transport prices
- it is often criticized as harming poor people. An elitist transport system is said to be created that benefits the rich, who would enjoy uncongested roads, while low income motorists are forced to use inferior travel options

One can also argue that current prices are unequal:

- people pay for the choice of others to be located in distant rural areas
- people who do not use a transport system do pay for that system (Jansson and Lindberg, 1997: p. 64)
- current rationing of infrastructure by queuing or congestion may harm both rich and poor people. Those whose time has less value, i.e., retired or unemployed, may be more willing to wait than 'either the busy corporate executive or the low-paid worker holding down two jobs' (Stiglitz, 1988: p. 130)

Furthermore, there is no empirical evidence that efficient pricing will harm the poor. There is even evidence that an increase in transport costs while reducing taxes would tend to benefit low income households, who drive less than average (Geurs and Van Wee, 1997: p. 8). Finally, from an economic perspective current prices are not efficient. If certain income redistributions are undesirable, then direct subsidies to certain target groups are preferable to general subsidization.

4.8 The economic explanation for the unpopularity of efficient pricing

The explanation offered by several economists and described in section 3.2, focuses on, the perception of, redistributional effects. It is assumed that efficient pricing will yield a net welfare gain, but people will fail to see this. From the discussion presented in section 4.1 it became apparent that the assumption that efficient pricing will improve social welfare is not necessarily valid.

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[9] This is confirmed by empirical studies in which people are asked about their opinion on the introduction of taxes. For instance, in The Netherlands 83 percent of the respondents who were asked about their opinion on *Rekeningrijden* said that their opinion was dependent on how the revenues were used (Verhoef, 1996: P. 192).

5. Conclusions

For several decades, transport economists have argued that transport markets are not efficient, as part of the resources that are used for transport could yield more welfare if put to another use. The main cause of this is the malfunctioning of the price mechanism. Under the heading of efficient pricing, several principles have been developed aimed at improving efficiency and with that, raising welfare; however, social resistance to the application of these principles in practice is strong, which seems to contradict the objective, that of improving welfare.

The reasons underlying the gap between theory and practice in efficient pricing in transport were explored in this paper. One of the main conclusions to be drawn is that the welfare improvement that could in theory be realized through efficient pricing, is not guaranteed in practice. Due to a lack of information it has proved to be extremely difficult, if not impossible, to assess whether or not efficient pricing improves welfare in a particular situation. Advocates of efficient pricing in transport have largely ignored this issue and too easily assumed that efficient pricing will lead to welfare improvements. So, what should be done?

As the discussion between supporters of and opponents to efficient pricing has come at a deadlock because of uncertainty about the welfare effects of efficient pricing, it seems adequate to explore in more detail the types of welfare effects that certain groups of people derive from transport systems. Furthermore, more attention could be given to the welfare effects of distortions in transport markets for other markets, and vice versa. This would allow an assessment of the extent to which transport markets are inefficient. Subsequently, the efficiency and effectiveness of efficient pricing for improving allocative efficiency could be compared to that of alternatives, such as mortgage taxes and travel expenses arrangements, i.e., instruments that directly affect transport demand. One conclusion might even be that doing nothing is preferable from a welfare perspective.

A more critical approach from economists and policy makers towards the idea of efficient pricing would therefore seem to be appropriate. This could be operationalized as follows. One, other instruments aimed at improving efficiency of transport markets should be given more attention. Two, more pragmatically, other goals can be sought to justify the application of efficient pricing. As mentioned above, charging traffic participants for the external costs they inflict on others can be justified on the basis of the Polluter Pays Principle.

Acknowledgment

The author thanks his colleagues Koen Dittrich, Bart Kuipers, and Rolf Künneke and two anonymous reviewers for their useful comments on earlier drafts of this paper.

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