

Ex ante economic assessment of various road pricing schemes

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Management summary

Introduction

The Ministry of Transport, Public Works and Water Management has asked CPB (Netherlands Bureau for Economic Policy Analysis) to produce an economic analysis of ten different road pricing schemes. The analysis is intended to assist deliberations within the National Platform on 'A Different Way of Paying for Road Use' (hereinafter: the 'National Platform') and to prepare for Part III of the Mobility Policy Document.

The road pricing schemes were put forward by the National Platform.¹ For the purpose of the economic analysis, CPB used the traffic effects calculated by the AVV (Transport Research Centre) and the environmental effects calculated by the Netherlands Environmental Assessment Agency (NMP). For some parts, CPB was able to make use of partial studies carried out by the bureaus CE and ECORYS. One working group estimated the implementation costs.²

The forms of pricing policy that were studied can be divided into two broad groups:

1. specific charges that apply at a limited number of locations and times
2. fixed charges for every kilometre driven.

These charges were examined based on their merits as regulatory instruments (traffic flow, the environment) and as financing instruments. Attention also focussed on the income effects for groups of families and businesses.

The study shows that combating congestion would benefit most from a combination of constructing extra road capacity in places where it is not too expensive to do so and specific charges at busy locations where road construction would be very expensive. Construction is expensive in places where natural barriers have to be overcome and in urban areas where there is a shortage of space and where the costs of good air quality are high. Specific charges, levied on no more than 5% of all kilometres driven, could produce results in such cases, but would need to be designed carefully. In contrast, fixed charges for every kilometre driven in the Netherlands would appear to be less efficient.

Specific charges: congestion charges

The analyses show that *specific charges* can make a big contribution to reducing congestion provided that they are designed properly (see table 1, first two columns). The congestion

¹ Ultimately the National Platform chose not to opt for one particular variant.

² See www.andersbetalenvoormobiliteit.nl.

charges that were studied – a rate of about 10 cents per kilometre, levied only at very busy times and locations – would reduce congestion in the Netherlands by 35% to 55% compared with the reference scenario. These charges would not so much reduce traffic as displace it to less busy times and locations. They also ‘select’ the traffic: traffic that has little difficulty in diverting will in fact divert, and traffic that has little difficulty in paying the charge will benefit from the space that becomes available.

Specific charges are extremely valuable in locations where it would be very expensive to expand road capacity, such as in urban areas or at natural barriers. In locations where expanding road capacity is not as expensive, road construction can be the preferred option. The social return in locations like this would appear to average 10% or more.

Given that the specific charges relate to a small portion of the number of kilometres driven in the Netherlands (no more than 5% should be contemplated), the implementation costs would be low in many cases and the differences in income effects between groups of families and businesses in the year of introduction would be relatively small. Differences would arise within groups of families and businesses. For individual families, it may entail charges of a few hundred euros per year; these are also the families who will benefit the most from improved traffic flows.

The net benefits from a well designed congestion charge could rise to more than 1.5 billion euro per year. Capitalised, that is a sum of more than 20 billion euro.

Specific charges: tolls

There are also other forms of specific charges, such as *tolls*. But the toll variants that were studied (not included in the table) proved not to be very efficient as regulatory instruments: they would barely contribute to improving the handling of traffic. Furthermore, as financing instruments, their score is not markedly better than, for instance, the motor vehicle tax (MRB).

Some of the locations that could be considered for the levying of tolls would not actually be suitable for the construction of new roads. In some places, the extra costs to alleviate the pressure on the environment would be so high that road construction would not show positive net benefits. A better option would be a carefully designed congestion charge.

Table 1 Net benefits to society of two specific charges and two flat kilometre charges (in 2020)^a

Variant	Congestion charges		Flat kilometre charges	
	8a1	8b1	1a	1b
Coverage of the charge (% of kilometres driven)	3.0	4.0	100.0	100.0
Level of the charge (eurocent/kilometre)	11.0	5.5 – 22.0	3.4	5.7
	in %			
Effect on amount of traffic in the whole year	– 1.0	– 0.4	– 13.1	– 18.3
Effect on average speed in the whole year	1.7	3.2	2.1	3.0
Effect on congestion on workdays	– 35.0	– 55.0	– 30.0	– 40.0
	bln euro			
Direct effects on families	0.1	0.4	0.5	0.5
Income effect	– 0.2	– 0.3	0.3	0.5
Travelling timesaving benefits	0.3	0.7	0.5	0.7
Reduced road use	0.0	0.0	– 0.3	– 0.7
Direct effects on businesses	0.9	1.1	0.0	– 0.2
Financial effect	– 0.3	– 0.4	– 1.0	– 1.5
Travelling timesaving benefits	1.3	1.6	1.0	1.3
Reduced road use	0.0	– 0.1	0.0	0.0
Direct effects on government budget	0.0	– 0.1	0.0	0.2
Revenue from charge	0.5	0.7	4.7	7.4
Reduction of MRB/BPM ^b	0.0	0.0	– 4.2	– 6.6
Collection costs for government ^c	0.0	0.0	– 0.5	– 0.5
Annual investments in infrastructure	– 0.5	– 0.7	0.0	0.0
Indirect effects on government budget	0.0	0.1	– 0.6	– 0.9
External effects on environment/safety/noise	0.1	0.0	1.0	1.4
Net benefits for all Dutch citizens	1.0	1.6	1.0	1.2
Idem, net present value ^d	14.7	22.7	14.1	17.0

^a Differences from the value in the reference scenario in the year 2020.

^b Motor vehicle tax/motor vehicle purchase tax

^c Under variants 8a1 and 8b1, these annual costs are less than EUR 50 million.

^d Calculated using a discount rate of 7%.

Specific charges in and around the four large cities

Charges *in and around the four large cities* would also be another form of specific charge. Two variants were studied: an entry charge and an area-wide charge. The entry charge would apply to all traffic passing the ring-road around the city, including the traffic on those ring-roads. The area-wide charge would apply to every motorist who makes use of the roads and streets within the ring-road around the city. The latter variant would therefore be very similar to the London Congestion Charge.

According to the study, an entry charge would have a positive net benefit, but an area-wide charge would not. The entry charge would have a positive effect because it would also be applicable to the ring-roads where additional travelling time can be saved, while the

implementation costs could be very low. The main conclusion that can be drawn from these fairly general calculations is that any charges in and around the large cities would require supplementary analyses, in which the local circumstances and the implementation costs would require close examination.

Fixed charges: replacing the annual motor vehicle tax and the motor vehicle purchase tax

Fixed charges for every kilometre driven in the Netherlands would have a positive net benefit, compared to a situation in which no pricing is applied (see table 1, final two columns). The net benefits could be up to 1.2 billion euro per year. Capitalised, that is a sum of 17 billion euro. As a regulatory instrument such charges could reduce congestion and environmental damage, and as a financing instrument they could be a large source of income for the government. But fixed charges are inefficient instruments for achieving those objectives, and there are better alternatives.

For instance, a fixed kilometre charge would reduce congestion by 30% to 40%. But a greater effect could be realised through a combination of expanding road capacity in locations where it would not be too expensive to do so and a congestion charge at times and locations that remain very busy.

A fixed kilometre charge would reduce national emissions of harmful substances, reduce noise nuisance and improve traffic safety, and the positive prosperity effect has been calculated to be 1.0 to 1.6 billion euro per year. The question arises whether other, more direct measures could be taken in order to achieve the same goal. Take for instance specific environmental measures related to fuel duties and the requirements set of vehicles. New proposals were recently put forward to limit noise nuisance, amongst other things by using extra baffle boards and applying double-layered porous asphalt in urban areas. There are also many profitable traffic-safety measures available. And specific charges, particularly charges in and around the large cities, could make a contribution to reducing noise nuisance, as well as local environmental damage such as that caused by fine particles.

Fixed charges would also be relatively inefficient as a financing instrument. The collection costs are relatively high, at almost 0.25 billion euro per year for motorists and 0.5 billion euro per year for the government. Putting downwards pressure on the amount of traffic would also give rise to a shortfall in revenue. For instance, in variant 1b, the amount of traffic would fall by 18%; that would mean that the new charge and the existing duties would together raise approximately 2.5 billion euro less than was initially calculated. Together with the collection costs, this would mean that 30% to 40% of the initial charge revenues would be lost. Motor vehicle tax (MRB) and motor vehicle purchase tax (BPM) are more efficient financing instruments because they do not, or scarcely, give rise to the two aforementioned 'revenue loss' effects.

The charge for every kilometre driven would result in some groups of people limiting their car use. As was stated above, that would be 18% under variant 1b. This limitation of road use would be a loss to those involved. These prosperity losses would also make fixed charges less efficient.

Finally, the introduction of a fixed kilometre charge, for instance to replace motor vehicle tax (MRB), would give rise to income effects. The differences that would arise between groups of families and between groups of businesses would not necessarily be very large, but within those groups of families and businesses there could be differences amounting to a few hundred euros. Additional tax measures could be applied if there was a desire to limit these effects, but those measures would generally result in a partial undoing of the effects on traffic. The net benefits, in the form of reduced congestion costs and reduced damage to the environment, would then be partially lost.