

REFORMING TRANSPORT PRICING: AN ECONOMIC PERSPECTIVE ON EQUITY, EFFICIENCY AND ACCEPTABILITY

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ABSTRACT

This paper applies the traditional definition of equity and efficiency in economics to transport pricing. It is shown how this framework can also be used to define acceptability. The problems and potential of this approach are illustrated by examining the effects for Belgium of replacing current transport pricing by marginal social cost pricing. The welfare effects on different income groups of this pricing reform are shown using a computable general equilibrium model. We demonstrate how the efficiency, equity and acceptability of the reform depend not only on the change in transport prices but also on the way the extra tax revenues are used. We compare the effects of the use of net tax revenues for higher social transfers and for lower labour taxes.

1. INTRODUCTION

Any major pricing or taxation reform will be accepted only if it shows a welfare gain or no welfare loss for a sufficiently large majority of the voters. This is the essence of the economic approach to acceptability. A necessary condition for an individual voter to accept the reform is that his utility is not reduced. For some types of reform, the utility impacts on voters will be unequally distributed which makes the reform more difficult to accept. This is a well-known problem in the reform of industrial and trade policy.

In this paper we focus on transport pricing reforms. We deal with reforms that bring us from the present pricing policies – that are not very well focussed – to marginal social cost pricing which increases economic efficiency by addressing the different sources of external costs more directly. This is a policy priority for the European Commission.

In the next section we cast the transport pricing reform in the traditional equity-efficiency trade-off framework. The basis of this framework is to measure individual welfare by a utility function that encompasses all relevant characteristics of the individual and his economic environment. If one assumes furthermore the social comparability of individual utility levels,

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one can use the traditional Pareto-frontier concept to define the equity-efficiency trade-off in transport pricing. Efficiency corresponds with the maximisation of the sum of individual utilities. Equity issues are introduced by considering a weighted sum of utilities where the individuals with lower incomes receive a higher weight. The utility levels are also used to define acceptability. We qualify a transport reform as economically acceptable when it is welfare increasing or welfare neutral for a sufficiently large number of people.

In the third section we illustrate the concepts by comparing two policy reforms. Both reforms implement marginal social cost pricing for transport. Marginal social cost pricing means that current charges and taxes are changed so that each transport user is confronted with his marginal social costs. Infrastructure is kept fixed. For our case study (Belgium), the implementation of marginal social cost pricing generates a surplus of tax revenues that will be used in two different ways. The first scenario uses the net tax revenues to decrease labour taxes, while the second scenario recycles the extra revenue through higher social security transfers. Both transport reforms imply an increase in economic efficiency but differ in their equity impact and therefore in their acceptability. For each of the two scenarios we show the change in pricing per mode, in transport volumes and in individual utilities, as well as the impact on efficiency, equity and acceptability.

The last section discusses a number of caveats and concludes. The caveats concern the measurement and comparability of individual utilities and the aggregate level of the illustration. The main conclusion of the paper is that equity and acceptability cannot be discussed at the level of the transport markets: a more global analysis is required that includes the use of the transport tax revenue and its effects.

2. THE ECONOMIC FRAMEWORK TO STUDY EQUITY – EFFICIENCY AND ACCEPTABILITY TRADE-OFFS

The trade-off between efficiency and equity is illustrated best by means of a graphical analysis. To keep things simple we restrict ourselves to an economy with two groups of identical individuals: poor and rich individuals. First, we briefly discuss the use of individual utility functions and their comparability across individuals. Next, we define the concepts of the utility possibility set, the Pareto frontier and economic efficiency. In a third step we define equity and acceptability.

2.1. Individual Utility and Comparability Across Individuals

A utility function defines the total benefit an individual can get from his consumption bundle, his leisure and his labour effort. The consumption bundle comprises not only his market transactions but also quality aspects of his consumption. These include, amongst other things, travel and living conditions (pollution, noise etc.). Whenever the individual prefers a combination of consumption goods, travel and living conditions, this combination will have a higher utility level. So a utility function² is extremely useful to discuss the trade-off between consumption possibilities and non-market elements of individual well-being, such as quality of transport and environmental quality.

Absolute utility levels are not necessary to express individual choices: any increasing monotonic transformation of the utility function will lead to the same individual choices. Absolute utility levels are also not necessary to discuss economic efficiency. We will however need to introduce utility functions for which we define absolute levels in order to introduce equity aspects easily³: for equity one needs to compare how well off one individual is versus another, which requires to compare absolute levels of utility.

From now on we assume we can measure the welfare level of an individual by using his utility function. The utility levels of the two types of individuals that are of interest to us is denoted by U_{poor} and U_{rich} . These utility levels measure the net benefit of all market and non-market goods (environment, time, etc.) in which the individual is interested.

2.2. The Utility Possibility set, Efficiency and Equity

Our simplified economy has given resources: a time endowment and some capital (human, physical) inherited from the past. When we combine these resources in a production process and distribute the labour effort and production over the different individuals we can achieve a given utility combination (U_{poor}, U_{rich}), as represented in Figure 1. For given institutions and policy instruments one can define a utility possibility set. This is a set of utility pairs (U_{poor}, U_{rich}) that can be achieved with the given resources, institutions and policy instruments.

It is useful to neglect at first all market imperfections (externalities, imperfect information, etc.) and to assume moreover that the transport sector can be organised like any other production

² The utility approach is standard in mainstream economics. However, there are problems with its application in certain contexts, such as the perception of large and small accident risks. These and other aspects are studied by Kahneman and Tversky (2000).

³ This is a technical question on which one can consult Mas-Colell et al. (1995), Chapter 22. In fact we use more assumptions than necessary in order to simplify the exposition.

sector. This provides us with a benchmark. Some of these assumptions will be relaxed later on. In this framework a perfectly competitive economy will always lead to a point on the line most outbound on Figure 1. This line is called the First Best Frontier. Each point on this frontier is Pareto efficient: it is impossible to increase the utility level of one individual without decreasing the utility level of another. Without policy intervention the market outcome will correspond to a point on this First Best Frontier. Suppose it leads to point d where the rich are much better off than the poor because they own more resources or because they are more productive per hour of labour. If the policy maker can use individualised lump-sum taxes and transfers, he can achieve all points on this frontier. This is the so-called second theorem of Welfare Economics. By individualised lump-sum taxes and transfers one understands taxes that cannot be altered by the behaviour of individuals. An example is a tax on innate intelligence or physical force: the policy maker knows the potential productivity of the individual and forces him to pay a tax whatever the number of hours of work he decides to work.

This is a useful but purely theoretical construct. In reality perfect individualised lump-sum taxes do not exist, mainly because the planner has insufficient information about the innate capabilities of individuals so he cannot force the rich to pay a high, individualised tax. The planner is therefore confined to using income tax schemes and other taxes on transactions that distort prices and cause efficiency losses. In Figure 1 this means that only allocations on the Second Best Frontier are feasible. The Second Best Frontier can be interpreted as the efficiency-equity trade-off curve: it is only possible to increase the utility of the poor by using high labour taxes that discourage labour supply and create high welfare losses. It is important to note that we are already in a second best world even before we have introduced market imperfections. There is one exception: the First Best and Second Best Frontier will meet each other in only one point: when the income distribution of the perfect competition equilibrium is optimal. However, this is unlikely since the policy maker is in general concerned with equity. In general he prefers a more equal allocation, such as e (on the Second Best Frontier) to allocation d . The policy maker wants to sacrifice some efficiency in order to obtain more equity. This is the basic rationale for the use of distortionary labour and income taxes which are used to finance the production of public goods and to redistribute income from the rich to the poor. High labour taxes are probably the major source of inefficiencies in our market economies and they find their justification in equity concerns.

A convenient way of defining equity formally is to use weighted sums of utility functions where the weights are inversely proportional to the level of income or utility. When one is not concerned by equity at all (“not inequality averse”), one unit of income for a poor individual counts as much as one unit of income for a rich person. When we refer to efficient solutions in the rest of the paper, we refer to solutions that maximise this unweighted sum of individual utilities. The other extreme is that only the utility of the poorest individual matters, which corresponds with a so-called Rawlsian or maximin social welfare function.

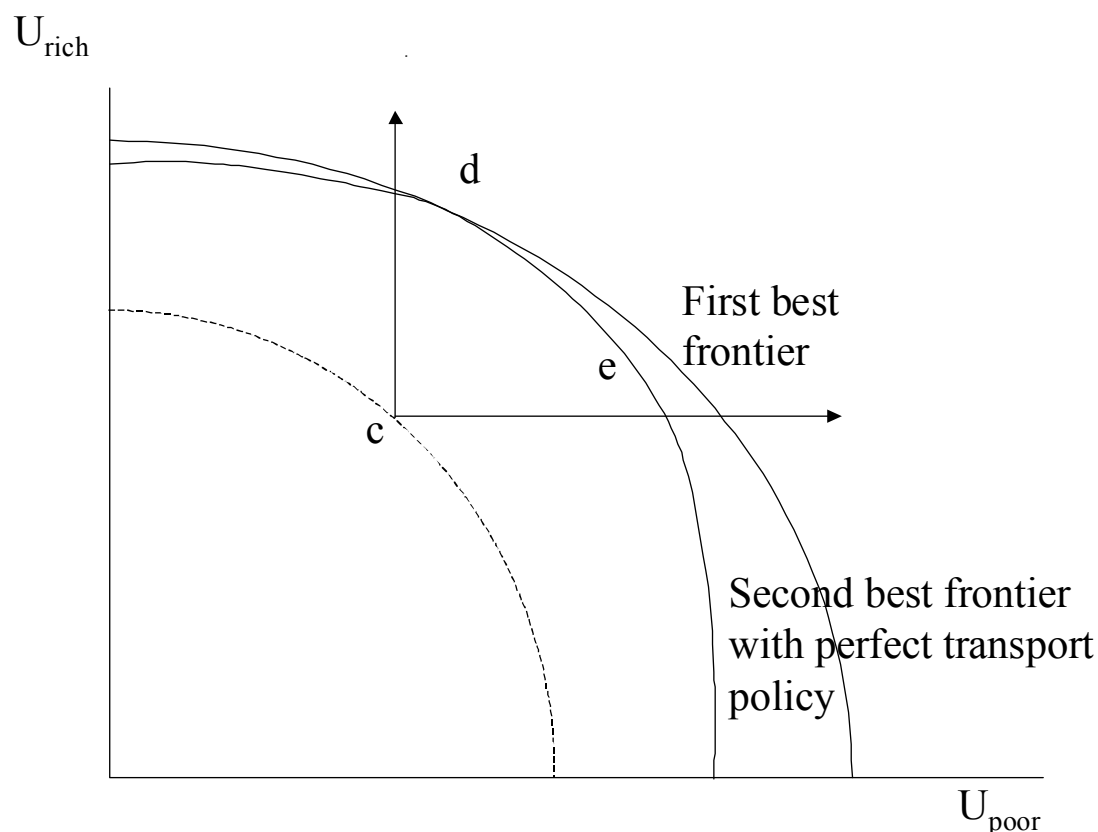


Figure 1: Equity-efficiency trade-off in economics

2.3. Introducing Transport Market Imperfections

We can now introduce different market imperfections and concentrate on transport pricing problems. We start from point *c* in Figure 1. This point is way below the First and Second Best Frontiers. The reason is that with market imperfections one cannot reach these two frontiers: there is a pure loss of utility possibilities that is due to institutional (and technological) barriers to good transport pricing. Sticking to the present imperfect pricing could limit the economy to the region inside the dotted curve. All one could achieve by distributive policies (labour taxes etc.) are points on the dotted curve. It is only when barriers to transport pricing reform are removed that one could achieve the more efficient points *e* and *d*.

It is important to see that by removing transport pricing barriers one can only achieve points on the Second Best Frontier because the removal of these barriers does not bring us the individualised lump-sum taxes necessary to reach the outbound First Best Frontier. Where will we end up on the Second Best Frontier? We may want to end up in point *e* rather than *d*. Point *e* still has high labour taxes but generates a more equal distribution of utilities than point *d*.

What does moving from *c* to *e* imply in terms of policy reform? This may require that not all revenues are used to reduce labour taxes (one may favour some more transfers targeted to the

poor). Moreover, this may require departures from marginal social cost pricing in the transport sector. Whenever one is faced with distortions on the labour market, these departures may entail taxing certain transport goods less heavily because they are used predominantly by the poor and taxing commuting transport less than leisure related transport because this alleviates distortions on the labour market.

2.4. Acceptability

The acceptability of a policy reform has to do with the change in utility between point c and points d or e . Starting from initial point c , we define a reform from c to e as acceptable for individual i iff:

$$U_i(e) \geq U_i(c)$$

From the viewpoint of society a reform will be acceptable if this condition holds for a sufficiently large number of voters. An extreme case is when at least one individual gains and no one loses, which economists call a Pareto improvement. Such a reform is acceptable for all.

The definition of acceptability we use here has a few caveats. First, it assumes that everyone correctly perceives the effect of the reform on his utility level. If people only perceive the tax increases and not that this allows other taxes to be decreased, a reform will never be acceptable. Perception is therefore a key element. Second, it does not take into account loss aversion. Third, it assumes the absence of envy phenomena. Envy exists and if it is taken into account into the utility function, some population groups may oppose reforms in which they gain much less than other groups. In addition, valuing outcomes may be context specific. People compare themselves with relevant others, above all when they are uncertain. Finally, it assumes that every individual is only interested in ranking policy reforms and that this is not part of a social choice mechanism. In a social choice context, individuals may be interested in strategic behaviour and qualify an option as not preferred (or not acceptable) if they know that this helps to select a third option that they prefer even more. The social decision mechanisms are obviously much more complex than a simple comparison of utility levels. The political economy literature (see Persson and Tabellini, 2000) studies in much more detail the influence of the political institutions and the role of lobby groups and administrations in making a proposal go through or not.

3. NUMERICAL ILLUSTRATION OF THE EFFICIENCY, EQUITY AND ACCEPTABILITY OF MARGINAL SOCIAL COST PRICING

3.1. The Policy Reform

We compute the welfare effects of introducing marginal social cost pricing for the road, rail and other public transport in Belgium. With marginal social cost pricing the current charges and taxes are changed so that each transport user faces his marginal social costs. These equal the sum of marginal resource costs and marginal external costs. The marginal external costs include marginal external congestion, accident, pollution and wear and tear costs. Infrastructure is kept fixed. For our case study (Belgium), the introduction of marginal social cost pricing leads to extra tax revenues that will be used in two different ways. In the first scenario the extra tax revenues are used to reduce labour taxes. In the second scenario they are recycled through higher social security transfers⁴. Both scenarios lead to more economic efficiency, but differ in their equity impact and therefore in their acceptability.

There are two qualifications for our choice of scenarios. First, marginal social cost pricing is only optimal in a first best world. Given that we are in an economy in which the government is confined to using distortionary taxes, this means that the scenarios we test are not necessarily optimal⁵. Second, the implementation of marginal social cost pricing may require important implementation costs or may not yet be fully feasible. Marginal social cost pricing is however an interesting benchmark scenario, which is the reason why it has been chosen here.

3.2. The Model Used to Evaluate the Utility Effects of the Reform

The welfare effects of the policy reforms are evaluated by means of the Computable General Equilibrium (CGE) model for Belgium⁶. It is a static model for a small open economy, with a medium term time horizon. Four types of economic agents are considered: five consumer groups, fourteen main production sectors, the government and the foreign sector. Two individuals belonging to different consumer groups are assumed to differ in terms of their productivity, their tastes and their share in the total endowment of capital goods and the government transfers. Individuals belonging to the same consumer group are however identical in terms of their needs.

⁴ Various alternatives, such as infrastructure investment, a change in the supply or quality of public transport, etc., could be considered. The efficiency and equity effects will in general depend on the instrument that is chosen.

⁵ For the optimal tax and investment rules in a second-best economy in the presence of externalities, see Mayeres and Proost (1997).

⁶ For a detailed discussion of the CGE model the reader is referred to Mayeres (1999, 2000).

The CGE model includes several transport commodities, summarized in Table 1. A distinction is made between passenger and freight transport, between various transport modes, between vehicle types and for some transport modes between peak and off-peak transport.

Table 1: Transport in the CGE model for Belgium

| Passenger transport ^a | | | Freight transport ^b | | |
|----------------------------------|---------|----------|--------------------------------|----------|-----------------------------------|
| | Private | Business | | Domestic | Export or import related, transit |
| Car | | | Road | | |
| Gasoline | X | X | Gasoline van | X | |
| Diesel | X | X | Diesel van | X | |
| LPG | X | X | Truck | X | X |
| Bus, tram, metro | X | | Rail | X | X |
| Rail | X | X | Inland navigation | X | X |
| Non-motorized | X | | | | |

^a For all passenger transport modes a distinction is made between peak and off-peak transport

^b The split between peak and off-peak transport is made only for road transport

Four types of externalities are taken into account: congestion, air pollution (including global warming), accidents and road damage externalities. Air pollution and accidents are assumed to have an impact on the consumers' welfare, but not on the behavior of the economic agents⁷. This assumption is relaxed for congestion⁸, which does not only affect the consumers' welfare negatively, but also influences their transport choices. Moreover, the modeling approach implies that the value of a marginal time saving is determined endogenously in the model. Congestion also reduces the productivity of transport inputs in the production sectors.

The starting point of the exercises is the situation in Belgium in 1990, which represents the benchmark equilibrium. There are two exceptions however. First, we made use of the expenditure survey by income class of 1995. Second, we introduced cars and trucks with the emission characteristics of the year 2000. In 1990 most cars were much more polluting and this would lead to very high air pollution costs.

⁷ In reality air pollution and accident risks also affect the consumption and production choices. Such feedback effects are not yet included in the model.

⁸ The modelling of the impact of congestion is based on DeSerpa (1971) and Bruzelius (1979). The utility function is defined over commodities and the time allocated to various transport commodities and leisure. This implies that time allocated to transport and leisure generates (dis)utility and that the marginal value of time depends on the activity for which it is used. The utility function is then maximised subject to a budget constraint and time allocation constraints. The latter state that total time allocated to each transport commodity should be as least as large as the minimum time requirement, which depends on the level of congestion.

3.3. The Pricing Reform and Its Transport Effects

Table 2 gives an idea of the price reform that is necessary to implement marginal social cost pricing. One sees that strong price increases are needed for almost all transport modes, including public transport. The most pressing inefficiencies in present pricing are found in the peak period for diesel cars and trucks and for public transport. In Belgium diesel cars still have a more favourable tax treatment than gasoline cars despite their higher environmental damage (Mayeres and Proost, 2001). Public transport on the other hand is very strongly subsidised with cost recovery rates of 25% or even less. This means that prices are below marginal social costs in most cases and that marginal social pricing implies large price changes.

Table 2 The effect of the policy reforms on transport prices

| Belgium – 1990 | Benchmark | Scenario 1 | Scenario 2 |
|---------------------------------------|------------|------------------------------------|---------------------------------------|
| | | MSC + lower labour income tax | MSC + higher social security transfer |
| Price passenger transport | (EURO/pkm) | percentage change w.r.t. benchmark | |
| Peak | | | |
| Gasoline car – committed ^a | 0.29 | 21% | 20% |
| Gasoline car – suppl. ^a | 0.13 | 84% | 82% |
| Diesel car – committed | 0.19 | 69% | 67% |
| Diesel car – suppl. | 0.08 | 209% | 204% |
| Bus, tram, metro | 0.06 | 89% | 91% |
| Rail | 0.06 | 73% | 75% |
| Off-peak | | | |
| Gasoline car – committed | 0.29 | -8% | -9% |
| Gasoline car – suppl. | 0.13 | 16% | 15% |
| Diesel car – committed | 0.19 | 23% | 23% |
| Diesel car – suppl. | 0.08 | 98% | 96% |
| Bus, tram, metro | 0.06 | 146% | 149% |
| Rail | 0.06 | 72% | 75% |
| Price freight transport | (EURO/tkm) | percentage change w.r.t. benchmark | |
| Truck | | | |
| Peak – committed | 0.17 | 40% | 40% |
| Peak – supplementary. | 0.17 | 111% | 110% |
| Off-peak – committed | 0.16 | 27% | 27% |
| Off-peak – supplementary. | 0.16 | 89% | 88% |
| Rail | 0.05 | 7% | 9% |

^a The distinction between committed and supplementary mileage allows us to model the link between car ownership and car use. The CGE model assumes that owning a car implies a certain minimum mileage. This is reflected in the committed mileage, which is proportional to the vehicle stock. The costs of committed mileage include the ownership and running costs per km. The consumers can choose to drive more than the minimum mileage per car. This is captured in the supplementary mileage, whose cost includes only running costs.

The price changes are very similar in the two scenarios. This means that in this case the use of the revenues does not strongly influence the volumes of transport and the marginal external costs. The change in the labour income tax and the social security transfers mainly affects the externalities via a change in the activity level of the economic agents, and not via a change in the composition of the economic activity. The lower labour income tax raises real generalised income for the richer quintiles, and the opposite is true for the higher transfer. However, the difference in consumption patterns between the quintiles is not large enough to lead to very different impacts on the externalities

Implementing marginal social cost pricing means higher transport prices and therefore lower overall use of passenger and freight transport. According to Table 3 the strongest decrease can be found for peak car transport and for bus use in the off peak. Public transport benefits from substitution effects and this explains the net increase of volume of rail freight.

Inspecting Tables 2 and 3 it is clear that implementing marginal social cost pricing means a net loss of consumer surplus for almost all transport users. If one limits the assessment to the effect on individuals as transport users, there is no chance of ever having such a reform accepted. We have to take into account the benefits in terms of reduced externalities and revenues to make the reform interesting.

Table 3 The effect of the policy reforms on transport demand

| 1.1.1.1 Belgium – 1990 | Benchmark | Scenario 1 | Scenario 2 |
|----------------------------|--------------|------------------------------------|---------------------------------------|
| | | MSC + lower labour income tax | MSC + higher social security transfer |
| Passenger transport | mio pkm/year | percentage change w.r.t. benchmark | |
| Peak | 36532 | -12.89% | -12.76% |
| car | 29308 | -14.28% | -14.14% |
| bus, tram, metro | 4239 | -3.98% | -3.64% |
| rail | 2985 | -11.93% | -12.21% |
| Off-peak | 59684 | -5.42% | -5.37% |
| car | 51813 | -3.36% | -3.27% |
| bus, tram, metro | 4317 | -20.38% | -20.41% |
| rail | 3554 | -17.30% | -17.69% |
| Freight transport | mio tkm/year | percentage change w.r.t. benchmark | |
| Road – peak | 7485 | -15.04% | -15.12% |
| Road – off-peak | 32715 | -11.12% | -11.30% |
| Rail | 8354 | 6.51% | 4.05% |

In order to understand the welfare effects of the reform by income class we need more information on the characteristics of these income classes. In Table 4, first row we see the share of every household income quintile in total expenditures. This shows clearly that the

poorest quintile has an average spending level that is less than one third the level of the highest income quintile. The richest quintiles have a disproportionate share in labour income as they have the highest salaries. The poorest quintile has a relatively larger share in government transfers.

The share in public transport is less unequal over population groups. The higher income groups more intensively consume private car transport. The highest income group consumes in fact more private and more public transport.

Table 4: The share of the household income quintiles in total household expenditures and income

| | Quintile | | | | |
|---|----------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 |
| Total gross expenditures (incl. saving) | 9.7% | 14.6% | 18.5% | 23.7% | 33.4% |
| of which | | | | | |
| Private car transport | 7.1% | 14.8% | 19.2% | 24.9% | 34.2% |
| Public transport | 15.6% | 15.4% | 17.9% | 21.0% | 30.1% |
| Income | | | | | |
| Net labour income | 2.4% | 7.2% | 17.6% | 27.7% | 45.1% |
| Net capital income | 9.2% | 15.0% | 17.9% | 23.8% | 34.1% |
| Government transfers | 19.5% | 23.3% | 20.7% | 18.6% | 17.9% |

Source: Belgium, Ministerie van Economische Zaken (1997)

The first part of Table 5 gives the net welfare effect of the two reforms. It is useful to concentrate first on the pure efficiency point of view. This means that we have no aversion to inequality and that we are only interested in the sum of utility gains. In this case the introduction of social marginal cost pricing comes down to a social equivalent gain⁹ of 149 to 160 EURO/individual/year. The gain is maximal when the revenues are used to reduce labour taxes. When the tax revenues are used to increase social transfers, there is some loss in efficiency (149 instead of 160) but this can be the preferred approach when equity is also considered. This is exactly what we observe when there is inequality aversion. Here we consider the case of moderate inequality aversion, for which an income gain of 1 EURO to the lowest income class is considered equivalent to 1.4 EURO given to the highest income class. When this system of weights is used, the recycling of tax revenues via social transfers is preferred to the reduction in the labour income tax.

The magnitude of the welfare gains associated to the pricing reform appears to be rather large compared to the expenditure levels in the transport sector. The explanation lies in the gains in

time and in the reduction of other externalities that are non-market goods but that are valued by the individuals.

Table 5: The welfare effects of the policy reforms

| Belgium – 1990 | Benchmark | Scenario 1 | Scenario 2 |
|--|-----------|---|--|
| | | MSC + lower labour income tax | MSC + higher social security transfers |
| Social equivalent gain (EURO/person/year) | | | |
| No inequality aversion | | 160.66 | 148.89 |
| Moderate inequality aversion ^a | | 142.50 | 179.17 |
| Equivalent income (EURO/person/year) | | Percentage change w.r.t. benchmark | |
| Quintile 1 | 18586 | 0.47% | 3.88% |
| Quintile 2 | 22260 | 0.03% | 2.21% |
| Quintile 3 | 25027 | -0.16% | 0.75% |
| Quintile 4 | 28330 | 0.22% | 0.00% |
| Quintile 5 | 35579 | 1.45% | -0.51% |

^a The marginal social welfare weight of people belonging to the richest quintile is assumed to be approximately 70% of the weight for those belonging to the poorest quintile.

From the value of the social equivalent gain we can conclude that the policy reforms are welfare improving for society as a whole. But are they acceptable? To discuss acceptability we need to analyse the welfare effects by income groups. The second part of Table 5 gives the effect on welfare of the quintiles, measured by the change in equivalent income with respect to the benchmark equilibrium. Not all quintiles are affected equally by the policy reforms. Within each scenario the differential impact on the quintiles can be explained, inter alia, by their share in the consumption of the transport goods, their share in the total social security transfers or labour income, the initial tax levels and the quintiles' valuation of the reduction in the externalities. In Scenario 1 all quintiles gain, except quintile 3. This quintile consumes a lot of transport and does not benefit as much as the higher quintiles from the reduction in the labour income tax. The benefits for the other quintiles are spread unevenly. The highest welfare gain is observed for quintile 5. While consuming relatively a lot of transport, this quintile benefits most from the lower labour income tax and from the reduction in the externalities. Scenario 2 generates a more uneven distribution of welfare gains, specifically directed to the lowest income groups. Here the highest income group experiences a net loss. This quintile benefits the least from the higher social security transfers.

While the welfare impacts are not distributed evenly across the quintiles, it is clear that the majority of people gains from the tax reforms which is a positive result as regards the acceptability of the reforms.

⁹ The social equivalent gain is defined as the change in each person's original equivalent income that would produce a level of social welfare equal to that obtained in the post-reform equilibrium.

Our findings show that the equity impacts and the acceptability of marginal social cost pricing cannot be assessed completely unless one takes into account the way in which the extra revenue is used. A careful design of the revenue recycling policies can significantly enhance the political acceptability of transport pricing reforms.

4. CONCLUSIONS AND CAVEATS

In this paper we have applied the traditional definition of equity and efficiency in economics to transport pricing. We have shown how this framework can also be used to define acceptability. The problems and potential of this approach are illustrated by examining the effects for Belgium of replacing current transport pricing by marginal social cost pricing. The welfare effects on different income groups of this pricing reform are calculated for different income groups using a computable general equilibrium model. We demonstrate how the efficiency, equity and acceptability of the reform depend not only on the change in transport prices but also on the way the extra tax revenues are used. This is in line with findings of previous studies such as Small (1983, 1992) and Mayeres (2001). In addition, Mayeres (2001) compares three transport instruments (peak road pricing, fuel tax, subsidies to public transport). She finds that the degree of inequality aversion does not have a large impact on the ranking between the three transport measures and mainly affects the choice of the revenue recycling instruments.

Our analysis is subject to a number of caveats. First, the methodology is based on the standard economic paradigm that needs measurability and comparability of utility functions to measure equity concerns. The main limitation of the numerical exercise is the high level of aggregation. A more detailed analysis of the equity impacts requires a further disaggregation of consumers and consumer goods. Consumers should be disaggregated more according to income, household characteristics and spatial dimension (place of residence and work). Moreover, the CGE model does not model the location decisions of households and firms and therefore cannot capture the equity effects of location changes.

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