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Workshop on statistics on the volume of road traffic (vehicle-kilometres)

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Statistics on the volume of road traffic for Norway

Transmitted by the Institute of Transport Economics and Statistics, Norway

In Norway, three different institutions are involved in estimating the amount of traffic: Statistics Norway, Norwegian Public Roads Administration and Institute of Transport Economics. Statistics Norway carries out a survey on road goods transport, the Norwegian Public Roads Administration produces the Road Traffic Index and the Vehicle Register, and finally the Institute of Transport Economics estimates annual aggregate mileage based on these two sources as well as other relevant statistics.

Estimates are made separately for passenger transport and goods transport. Passenger transport includes buses, taxis, motorcycles, mopeds and private cars. Goods transport includes all kinds of goods vehicles, irrespective of their loading capacity. The calculations of traffic performances for private cars are mainly based on the registered number of such cars and the average annual mileage estimated for them. Finally, the estimates for all vehicles are adjusted in accordance with the results from the Road Traffic Index.

In Norway, as in most of the other European countries, the kilometre recorder of the vehicle is read at the periodic inspections. These data have not yet been used in estimating the aggregate mileage for private cars. However, it is planned that this source will be exploited in the near future.

Table 1: Domestic road traffic. Million Vehicle Kilometres. 1990-2004.

Year	Total traffic	Coaches	Taxis and car hire	Private cars	Motorcycles, mopeds	Goods traffic
1990	27,755	324	528	23,029	645	3,228
1995	29,133	332	665	23,698	644	3,795
2000	32,569	342	1,147	25,771	907	4,403
2004	35,637	353	968	28,764	1,121	4,430 [1)]

1) A survey of small goods vehicles in 2003 gave new, lower values for the aggregate mileage than earlier estimates. The figure for 2004 is therefore not directly comparable with earlier figures.

Table 1 shows domestic road traffic in Norway for the years 1990, 1995, 2000 and 2004. As can be seen, passenger cars contribute approximately 80 per cent of aggregate traffic. Therefore, it is important that the estimates of aggregate mileage for passenger cars are as reliable as possible. In this paper, Norway outlines the method of estimation currently employed for passenger cars and considers possible improvements.

Aggregate mileage for passenger cars is estimated by taking as a starting point the number of cars that are mainly used for transport of people. In addition to "pure" passenger cars, this comprises part of the stock of combined cars, vans and minibuses. Data for this is provided by the central vehicle register maintained by the Norwegian Public Roads Administration. The mean number of cars (the arithmetic mean of the number of cars at the beginning and at the end of the year) is then multiplied by an estimate of mean annual mileage of cars included in the population. The data quality of the central vehicle register is considered to be good. A substantial annual tax on vehicles registered ensures, on the one hand, that vehicles whose number plates have been removed are de-registered. On the other hand, the estimate of mean annual mileage has a larger uncertainty. The same is the case for the change in annual mileage from one year to the next.

The estimate for mean annual mileage starts with an estimated level for a base year, in this case 1998. That year a travel survey was carried out where a random sample of owners of passenger cars were asked, among other questions, how many kilometres their car had run in the previous 12 months. The owners of 7400 cars answered the question and mean annual mileage was estimated at 13,700 kilometres. The change in year i is then calculated as an index, A_i:

$$A_i = \left(\frac{\dfrac{P_i}{C_i S_i}}{\dfrac{P_{i-1}}{C_{i-1} P_{i-1}}} \right)$$

P_i is the annual sale of petrol for cars in the year i, C_i is mean petrol consumption per km for cars in the population of passenger cars and S_i is the number of vehicles running on petrol in year i.

In Norway, the number of passenger cars running on diesel has always been modest. In 1990, the share of diesel passenger cars (taxis not included) was three per cent. In recent years the share has increased, at the end of last year it was 13 per cent and is expected to increase

considerably in the coming years. When the index A_i only considers the sale of petrol and the population of petrol cars, this entails an assumption of a similar trend for annual mileage for diesel cars as for petrol cars. This may have been a reasonable assumption in 1990, but will not necessarily be reasonable in the future.

There are fairly good estimates for the total sale of car petrol annually and for the number of cars running on petrol. The critical variable is the mean consumption of petrol per car per km. During the last 25 years, the petrol consumption of passenger cars has been reduced substantially. To provide a fairly correct estimate for the aggregate population of cars, it is therefore necessary to estimate the petrol consumption for each age (cohort) separately. For each age group of cars, the mean petrol consumption has therefore been estimated. This has been done by selecting the 50 car models most commonly sold each year and multiplying the stated petrol consumption for each model by the number of cars of this kind sold. Beginning in 1998, the EU-norm for petrol consumption has been used for this calculation. For the years before 1998, the petrol consumption quoted by the importers was used.

Table 2: Mean petrol consumption for cars in the population. Litre per 100 km.

Year	Consumption Litre petrol per 100 km
1975	9.5
1980	9.2
1985	8.5
1990	8.2
1995	7.8
2000	7.8
2004	7.7

Table 2 shows mean consumption of petrol per car per 100 km for selected years from 1975 to 2004. As may be seen, mean consumption was considerably reduced up to the middle of the 1990s. Afterwards, changes in petrol consumption for the car population in Norway have been minimal.

The method employed here means that petrol consumption per km is used as a proxy variable for the distance travelled. In the main this is valid, but it entails a number of sources of error: The share of city driving and driving on a motorway may differ from the standard, the style of driving is different for different people, the petrol consumption of a car depends on the maintenance of the engine, climate and temperature affect petrol consumption (the number of cold starts), petrol consumption is likewise influenced by the extent of congestion, possible improvements of the road network, etc.

For the estimates of mean annual mileage, it is more important to obtain the best possible estimates for the annual *changes* than for the *level*. If the factors called attention to the above change systematically from one year to the next, it may lead to biased estimates. An example is the influence of the weather on petrol consumption: A long and unusually cold winter may lead to annual mileage being overestimated because petrol consumption increases compared to a normal year. In the same way, substantial improvements of the road network over a period may lead to lower petrol consumption and thereby to the opposite effect. It is assumed that factors like

style and kind of driving varies between people but to a lesser extent change over time: an individual with an aggressive style of driving will probably show a tendency to maintain this style of driving, at least in the short run.

The previous paragraphs have shown that the current use of fuel consumption as a proxy for mileage entails certain sources of error. However, the main problem with this method pertains to the future: When alternative energy sources and novel technologies are introduced in earnest in ten to twenty years, the method will simply not be adequate. Diesel cars are already a large percentage of the population of cars and above we have called attention to the sources of errors this entails. In years to come, due to increased use of alternative fuels like hydrogen, biofuels, natural gas etc., Norway will probably experience a noticeable decline in petrol consumption as in most countries. A number of different fuels for car use will accordingly make the use of fuel as proxy for driving less valid.

Norway is therefore searching for a novel and better method than the one currently being used for estimating annual mileage. By a "better method" is meant a method that produces estimates with a smaller uncertainty than the current method and at the same time that is not too demanding of resources. In this connection, it is an interesting possibility to investigate whether data from the obligatory periodic inspections of the vehicle can be used to estimate average yearly vehicle-kilometre.

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