Institute of Transport Economics
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Summary:

Car scrappage premium – a GHG abatement measure?

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A temporay car scrappage premium as implemented in 2015 will hardly affect the life-cycle climate footprint of the Norwegian passenger car fleet. In fact, the impact is more likely than not to go in an unfavorable direction.

The possible impact of a temporary car scrappage premium is studied by means of a dynamic spreadsheet model, called BIG, for the Norwegian passenger car fleet. In the model, each year's 'population' of cars is calculated from that of the preceding year, as modified by new car sales, second hand import, scrapping, and deregistration.

The car fleet is divided into 22 segments and 31 age intervals. There are nine segments for petrol driven cars and nine for diesel driven, each fuel class being subdivided into weight classes. In addition, there is one segment for hybrid vehicles, one for battery electric vehicles, one for hydrogen fuel cell vehicles, and one for vehicles using other energy carriers (gas, ethanol, etc).

To each cell in the 22 x 31 matrix of the car fleet, various attributes are assigned, such as mean certified per km fuel consumption, mean annual distance driven, annual rate of scrapping, and an annual rate of second hand import. There is also a residual outflow of vehicles defined, with its own annual rate, covering second hand export and net temporary or permanent deregistration.

Using this framework, we simulate two pairs of development, each consisting of a reference path and a car scrappage premium path. The 'status quo' reference path ('Alternative 0') projects the 2013 new car sales, as described by the total number of new vehicles as well as by its division into fuel and weight segments, identically into the future. The 'trend' path ('Alternative 1') projects current trends in terms of growing market shares for hybrid and electric cars on to the 2030 horizon.

The hypothetical introduction of a sizeable, temporary car scrappage premium throughout 2015 is modelled through variants '0b' and '1b' of the respective two reference paths. In the car scrappage variants, scrapping rates are assumed to triple during 2015, while differential new car acquisitions during 2015-2021 are assumed to equal 70 per cent of a normal car passenger cohort, providing 'replacement' vehicles corresponding to about 35 per cent of the additional cars scrapped.

In Figure S.1, certain key results are exhibited. The car scrappage premium does result in a reduced average emission rate, but only temporarily. During 2015-2025, the mean emission rate is up to 4 grams lower per kilometer than it would have been without the enhanced renewal spurred by the scrappage premium. Put otherwise, the

same improvement is obtained up to one year earlier that it would otherwise have been.

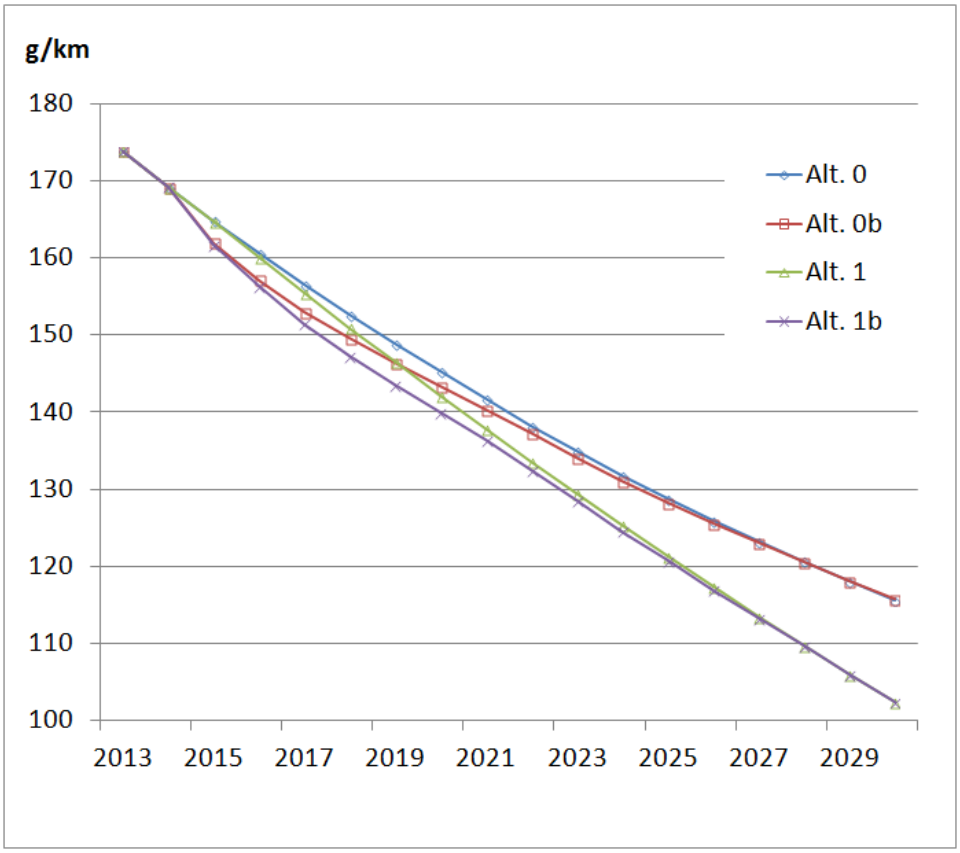

Figure S.1. The car fleet's mean CO_2 emission rate as defined in EU type approval test (NEDC). Two reference paths (0 and 1), with corresponding scrappage premium paths (0b and 1b).

The corresponding aggregate emission volumes are depicted in Figure S.2. Unlike the previous diagram, here we count real-world emissions rather than theoretical ones based on the type approval test. The gap between these two measurements has widened considerably since 2001, and since 2007 as fast as by 3 percentage points per year.

One notes that from 2020 onwards, the emission volume is higher in the scrappage premium scenarios than in the corresponding reference paths. This is so because the mean annual distance driven per car is projected to increase under the fleet renewal scenarios. Newer cars are nicer and represent a more competitive travel mode. Also, the car scrappage premium tends to affect low value cars more than the more expensive ones, leading to a disproportionately large outflow of smaller, petrol driven cars. These cars are not the worst culprits in terms of fuel consumption and CO_2 emission. To the extent that they are replaced by newer, but larger cars, the gain in terms of carbon footprint is limited.

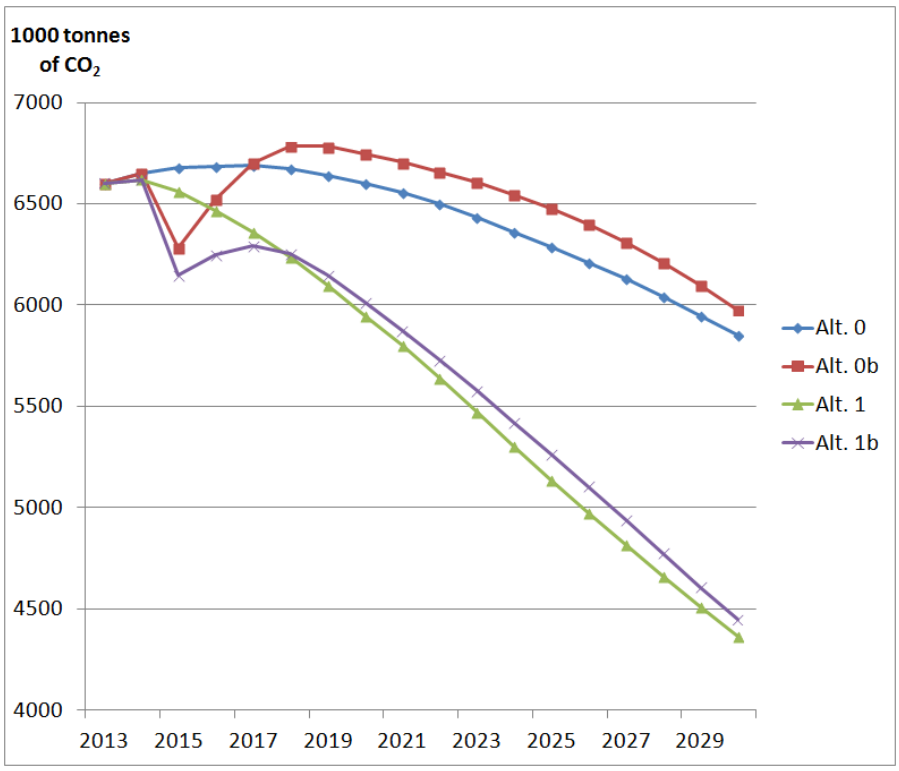

Figure S.2. Estimated aggregate real-world CO_2 emissions from Norwegian passenger cars, in four scenarios.

When account is taken also of the increased emission due to additional car manufacturing, the balance comes out rather unequivocally in disfavour of the car scrappage premium instrument. It will not help reduce greenhouse gas emissions from private cars.