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Cost-effectiveness of climate policy at the municipal level

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Nearly all Danish municipalities have formulated independent carbon budgets and climate targets to reduce local emissions. Efforts focus on energy consumption, land use, and public spending. The transportation sector represents the primary focus of carbon reduction efforts among municipalities. However, municipalities lack the authority to implement cost-effective climate policies, as a uniform carbon price, which must take place at the national or even international level. This paper discusses implications of climate targets at different political levels and evaluates the cost-effectiveness of municipal carbon reduction initiatives in two major cities by conducting cost-benefit analysis.

The municipality of Copenhagen implemented a 10 km/h speed limit reduction with the intention of reducing its carbon footprint. Assuming a 0.3 km/h reduction in travel speed for each 1 km/h reduction in speed limits and considering 782 million kilometers annually traveled on affected roads, the social cost is estimated at 441 million DKK annually. The benefits of the policy are estimated based on changes in the number of kilometers travelled due to the speed limit reduction. Meta-studies have found a price elasticity of fuel with regards to demand for transportation of 0.5. Similarly to time consumption, fuel consumption is also a component of the total marginal cost of driving. For this reason, the elasticity of time consumption with regards to demand for transportation is assumed to be 0.5, leading to decreased demand for cars and fuel, and thus reduced tax revenue. With an average speed of 33.3 km/h the speed limit reduction is expected to decrease travelled kilometers by 5% annually. The total benefits of the policy are estimated to be 33.3 million DKK per year, while the tax revenue loss is estimated at 36.1 million DKK per year. The results are obtained using official unit prices from the Danish Ministry of Transport and DTU. Our findings suggest that the benefits, such as reduced noise, pollution, accidents, road wear and CO_2-emissions are not sufficient to offset the costs associated with the policy. The local shadow price of carbon abatement is estimated at 98,000 DKK/ton, indicating that the policy is not cost-effective compared to national and

ETS carbon prices. Sensitivity analyses confirm that the main finding is robust to changes in assumptions.

A similar cost-benefit analysis of a similar initiative decided (and since substantially amended) by the municipality of Odense also shows shadow prices order of magnitudes higher than shadow prices implicit in national and EU instruments, as well as being orders of magnitudes higher than expected benefits.