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Workshop 1B (room 2208) – Households' energy demand

Title

Rebound effect for car transportation in Switzerland & welfare analysis

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Abstract

Rebound effect is the difference between expected energy savings – thanks to an efficiency improvement – and realized energy savings. Realized energy savings are typically smaller than expected, because individuals adapt their behavior after the efficiency improvement. For instance, in the mobility sector, individuals purchasing a more fuel-efficient vehicle may drive more, because using their car is now cheaper. Such adaptation leads to a gap between expected and realized energy savings, known as the rebound effect.

Using the Swiss Household Energy Demand Survey (SHEDS), a panel dataset of Swiss households, we estimate the rebound effect for private mobility in Switzerland. We estimate an average rebound effect of 30 to 40%. In other words, 30 to 40% of the expected energy savings are lost due to behavioral adaptations, which partly explains why the CO

climate policies should embed behavioral adjustments of people.

A natural question arises after the rebound estimation: Should the rebound be mitigated? Because it slows down the energy transition, policy makers are in favor of a rebound mitigation. Yet, individuals' private benefits of driving need to be accounted for. To provide an overall welfare estimation of the rebound, we calculate the consumers' surplus of additional driving, and compare it to the external costs of additional driving (pollution, accident, noise, congestion, etc.). We show that the external costs of driving more are higher on average than the benefits: about 13 cents per km for the costs, and 6 cents per km for the benefits. Because the costs are higher than the benefits, rebound mitigation is legitimate and could be achieved through an increase of the fuel-tax, or a tax on the number of km driven, as it already exists for trucks in Switzerland. However, such taxes are politically difficult to implement, especially because they hit the lower- and middle-class harder.

We indeed study who benefits the most - in terms of surplus - from the additional driving, and thus who in turn would lose the most if the rebound was mitigated through higher taxes. We find that the middle-class benefits the most from the rebound, then the low-income class. The high-income class gains the least surplus. Hence, policy makers should implement compensation schemes for these two classes in case the rebound is mitigated.