Income Elasticity of Driving and Regressivity of Emission Control Taxation Policies: Evidence from Massachusetts New Car Market

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Abstract

What is the distributional impact of emission control taxation policies on new car markets? This paper examines the relative regressivity of taxes on fuel and taxes on the low fuel economy of cars, conditioning on car purchases. To estimate how tax revenues change with income, I rely on nameplate-model fixed effects indicated in a rich panel of new cars sold in Massachusetts and exploit the correlation between driving patterns and average demographic characteristics at the ZIP Code level to identify flexible substitution patterns for new car buyers. The heterogeneity allowed in my model demonstrates that the difference between the elasticities of tax revenues with respect to income across the two policies lies in the income elasticity of driving. Theory shows that if the income elasticity of driving is positive, the elasticity of fuel tax revenues with respect to household income must be greater than that of taxes on low fuel economy. Policy counterfactuals confirm the theoretical result. Although wealthier people are less likely to purchase more fuel-efficient cars when facing trade-offs between vehicle fuel efficiency and other vehicle attributes, the fact that more affluent households drive more makes fuel taxes more progressive relative to taxes on low fuel economy. Moreover, I show that the loss in total consumer surplus from applying fuel taxes is smaller than that from applying taxes on low fuel economy for achieving the same level of externality reduction because fuel taxes have heterogeneous influences on consumers in different mileage groups. Therefore, this paper provides a framework for understanding the distributional consequences of regulating the market of energy-using durable goods with various policy instruments in the presence of usage heterogeneity.

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