

Effectiveness of Gasoline Taxes in Europe

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Overview

The Roadmap of the European Commission for moving to a low carbon economy in 2050 (EC 2011) stipulates an overall CO₂ emission reduction about 60% compared to the level of 1990. Since road transportation is a major source of CO₂ emissions, in all European countries excise taxes on gasoline and diesel have been implemented as one measure towards attaining the desired greenhouse gas emission reduction. However, one may ask whether these taxes are actually effective in reducing the demand for fossil fuels? Thus far, studies of this kind have only been done for the United States, and they have found that a gasoline tax increase of 10 cent reduce the carbon emissions from vehicles by about 1.5% (see, for example, Davis and Kilian, 2011). However, to give an answer to this question also for the case of Europe – and to compare the results of these two regions – we first construct a new database, which contains detailed gasoline and diesel tax data for 20 European countries. Having these data, we then assess the effectiveness of gasoline and diesel taxes in Europe by estimating the tax elasticities of demand. We find similar elasticities as have previously been estimated for the United States, but we can also identify fairly strong differences within Europe. In addition, we provide an overview of the gasoline retail price schemes in the different European countries.

Methodology

The empirical methods we employ are based on the work of Davis and Kilian (2011), who compare different econometric models and eventually argue in favor of an instrumental variable approach for estimating the effect of a gasoline tax on carbon emissions in the United States. To assess differences between the countries we conduct single equation estimations with time-fixed effects to control for seasonal effects. Moreover, to make sure that no factors, which affect the fossil fuel demand, have been omitted we use a panel approach with country- and time-fixed effects. In addition we employ an instrumental variables approach to disentangle the two effects on the demand for gasoline and diesel – the effect stemming from a price change and the one from a change in the excise taxes.

Results

We find evidence for the pigouvian effect of gasoline and diesel taxes although the effect is rather small. Furthermore we find statistically significant differences between countries which can be partly explained by the levels of the retail prices, but also by differences in the overall institutional frameworks.

Conclusions

In the short run (1 year) gasoline and diesel taxes are rather ineffective in reducing carbon emissions in the road transport sector, because of the limited substitution possibilities over this short period of time. We therefore conclude that these taxes can only serve as a long term instrument, and by inducing other adjustment in the road transportation sector. The pure demand reduction from gasoline and diesel taxes may not prove sufficient for Europe to reach its climate goals for transport in 2050.

References

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