Driving Policy

Weiwei Liu says that for higher gasoline taxes to be an effective method of curbing climate change, they need to be customized by region and even individual.

By Caroline Collier | Graphic by Mike DeWachio

Getting a handle on a warming planet will require a group effort, said Weiwei Liu, assistant professor of economics at TCU. Automobile use, in particular, must be reimagined because it plays a key role in driving up global temperatures. The transportation sector accounts for about 29 percent of the world’s carbon emissions, and personal vehicles are responsible for more than half of those emissions.

To encourage more sustainable transportation habits, economists recommend higher gasoline taxes, which in theory should reduce fuel consumption, and higher fuel-efficiency requirements for new cars. In 2019, federal gasoline tax in the United States averaged about 50 cents per gallon. The Environmental Protection Agency and National Highway Traffic Safety Administration have mandated new cars deliver 55 miles-per-gallon efficiency by 2025 (though the Trump administration is attempting to cut the requirements to 37 miles per gallon).

But the well-considered policy measures have not delivered the expected reduction in domestic gasoline consumption. The reasons are twofold. For one, “When something becomes really cheap, we tend to abuse it,” Liu said. “If your car is really efficient, you drive more, and you go on more trips.” For two, different people also have different options in responding to tax-enhanced gasoline prices.

In the past, economists have estimated population-wide reactions to gasoline tax changes, but Liu said the one-size-fits-all approach is not realistic. She used what’s called a semiparametric model, a complex economic equation that accounts for individual differences. To crunch the more personal numbers, Liu used the Consumer Expenditure Survey published by the federal Bureau of Labor Statistics. It reports income along with a range of demographic information.

Her findings might improve estimates of how fuel-efficiency regulations and hikes in gas tax affect consumption and thus the climate. In addition, Liu said her model might incentivize people to hang up the noble, but only if taxes can be variable based on region, income and family size, for starters. “If our goal is in the long run to reduce gas consumption and to reduce carbon emissions, then customizing the tax rate might work in the future.”

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Liu’s economic model explains how people respond to a 10-cent increase in gasoline taxes:

STATES WHERE DRIVERS WILL RESPOND THE MOST:
- Utah
- Iowa
- Delaware
- Maine
- North Dakota

STATES WHERE GAS CONSUMPTION WON’T CHANGE MUCH AT ALL:
- New Jersey (least responsive)
- Massachusetts
- Arkansas
- South Dakota
- Alabama

OTHER FACTORS INFLUENCING HOW PEOPLE RESPOND TO CHANGES IN GASOLINE PRICE:
- Income: Higher-income households care less about price increases. The households in the bottom 25 percent of income reduced gas consumption the most after price changes.
- Family size: The bigger the family, the less responsive the drivers are to price changes.
- Proximity to cities: Rural households are less likely to change driving patterns when the price increases.

Source for above: Weiwei Liu

AVERAGE GASOLINE TAXES IN OTHER PARTS OF THE WORLD (PER GALLON):
- Netherlands ........... $3.36
- Israel .................... $3.17
- Japan .................. $1.91
- Chile ................... $1.89
- Australia ............... $1.17
- United States ........... $0.56
- Mexico ................. $0.00

Source for above: Organisation for Economic Co-operation and Development