POLICY BRIEF

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Fuel tax incidence in developing countries: the case of Costa Rica

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Although fuel taxes are a practical means of curbing vehicular air pollution, congestion, and accidents in developing countries—all of which are typically major problems—they are often opposed on distributional grounds. Few studies have investigated the empirical validity of this argument in a developing country context. This policy brief describes the results of a study based on data from a household survey and income-outcome coefficients to analyze fuel tax incidence in Costa Rica.

Over the past four decades, vehicle fleets in developing countries have grown at 6% per year, double the rate for developed countries (Dargay et al. 2007). As cars, trucks and buses have proliferated, so too have attendant negative externalities including air pollution, traffic congestion and accidents. Unfortunately, a number of factors limit policy makers' ability to curb these problems using conventional command-and-control measures such as maintenance and inspection programs, fuel economy standards, driving restrictions and technology mandates.

Key Points

- The notion that rising fuel prices unfairly burden the poor has been used to argue for reductions in fuel taxes.
- Our incidence analysis suggests that the distributional effects of a 10% fuel price hike through all types of direct and indirect spending would be modest, albeit regressive.
- In deciding whether to raise fuel taxes, policy makers in developing countries need to balance an array of distributional, political, fiscal and environmental concerns. Our analysis demonstrates that distributional concerns need not trump competing goals.

An often discussed means of sidestepping these institutional constraints is to impose a tax on vehicular fuel: higher taxes can spur cuts in driving, substitution out of fuel inefficient vehicles and, consequently, a reduction in polluting emissions, congestion, and traffic accidents (Sterner 2007; Timilsina and Dulal 2008). Notwithstanding this evidence, a common argument against raising fuel taxes is that it would be regressive—poor households would bear an unfair burden.

Studies of fuel tax incidence in industrialized countries, where vehicle ownership is widespread in all socioeconomic classes, have generated mixed results (Parry et al. 2007; Poterba 1991; Santos and Catchesides 2005; West and Williams 2004). Intuitively, one might expect fuel taxes to be less regressive in developing countries where vehicle ownership is concentrated in higher socioeconomic brackets (Sterner 2007). To our knowledge, this question has yet to be addressed in the case of Central or South America.

To help fill this gap, we use data from a 2005 household income and expenditure survey and a 2002 input-output matrix to analyze the incidence of fuel taxes in Costa Rica. The analysis involves the following steps. First, we calculate the upper and lower bounds of total monthly expenditure deciles. Second, we identify five different types of monthly fuel expenditures included in the survey data. Third, for each decile, and for each of the categories of fuel spending, we calculate the average expenditure on fuel taxes as a percentage of total expenditure

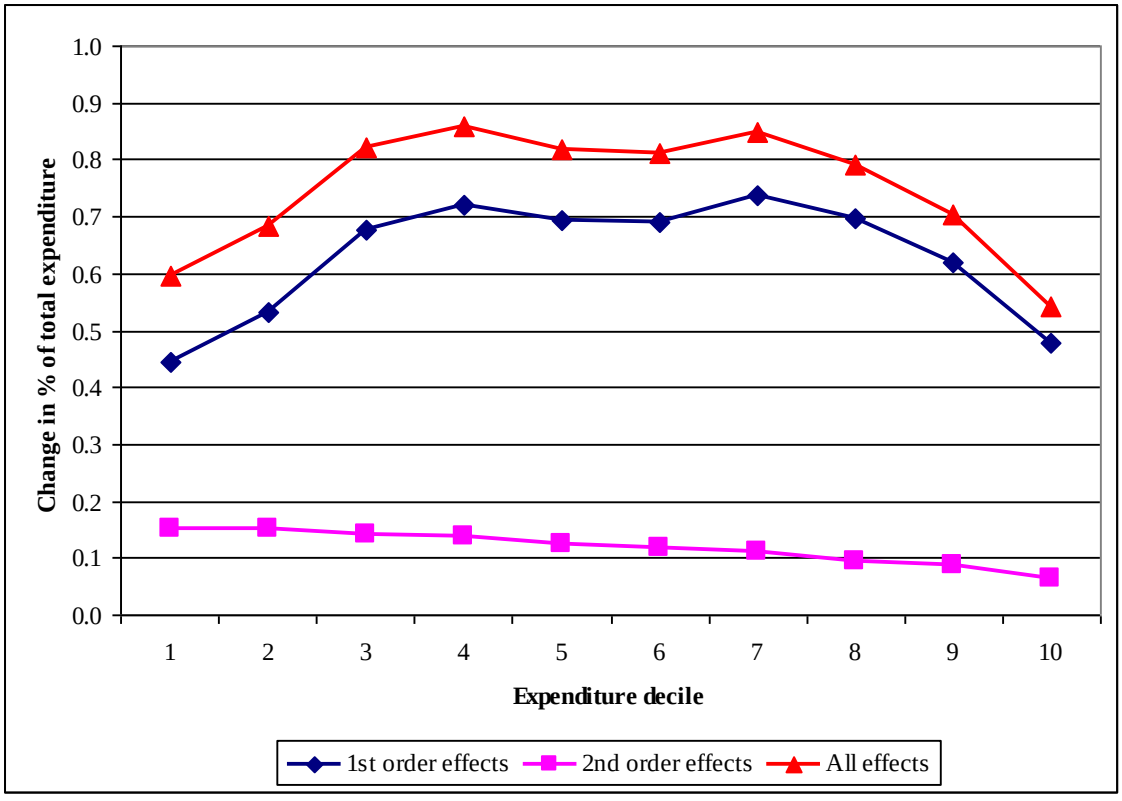
on all goods and services. Fourth, we compare these averages across deciles to determine whether the share of expenditures devoted to taxes for each category of fuel is greater among lower deciles—in which case the tax is regressive—or higher deciles—in which case it is progressive. Finally, for each category of fuel taxes, we calculate the Suits index, a widely used measure of tax incidence that is the tax analog of the Gini coefficient used to measure income inequality.

Distributional concerns need not rule out using fuel taxes to address pressing public health and safety problems

We find that the effects of a ten percent fuel price hike through direct spending on gasoline would be progressive; its effect through spending on diesel—both directly and indirectly, via bus transportation—would be regressive (mainly because poorer households rely heavily on buses), and its effect through spending on goods, other than fuel and bus transportation, would be relatively small, albeit regressive.

The graph reinforces these points, showing that first order effects (i.e., distributional effects through direct spending on gas and diesel—both directly and via bus transportation) are modest and regressive—affecting households in middle expenditure deciles the most. Second order effects (i.e., distributional effects through spending on goods other than fuel and bus transportation) are relatively smaller and slightly regressive. Finally, we find that although the overall effect of a ten percent fuel price hike through all types of direct and indirect spending would be slightly regressive, the magnitude of this combined effect would be modest. We conclude that distributional concerns need not rule out using fuel taxes to address pressing public health and safety problems, particularly if gasoline and diesel taxes can be differentiated.

Combined first and second order effects



Increase in share of total household spending on fuel due to a 10% price hike, by fuel type and decile.

Policy implications and recommendations

What are the policy implications of these results? In general, our results suggest that in Costa Rica—and possibly in similarly upper income developing countries—increases in gasoline taxes, whether imposed to help mitigate vehicle negative externalities or for other reasons, would not exacerbate income inequality since wealthier strata would bear most of the burden of the increase. However, the same is not true of increases in diesel taxes, which have the greatest effect on lower and middle income strata, mostly because they would spur increased spending on bus travel.

One possible specific policy implication is that in Costa Rica and similar countries, policy makers can avoid adverse distributional consequences of fuel tax hikes by differentiating taxes on diesel and gasoline and reserving steep increases for the latter. This reasoning has not been lost on Costa Rican policy makers. The 2001 Law of Tax Simplification and Efficiency set taxes on gasoline 70% higher than taxes on diesel.

But while differentiating tax increases by type of fuel could mitigate distributional concerns, this policy may be problematic on other grounds. First, if consumers buy far more diesel than gasoline as in Costa Rica, increasing gasoline taxes will generate less revenue than increasing diesel taxes. Second, if diesel vehicles are more plentiful than gasoline vehicles, increasing taxes on gasoline would probably do a worse job of mitigating negative vehicle externalities, particularly in light of the fact that compared to gasoline vehicles, diesel vehicles typically generate more fine particles that are particularly damaging to human health (Sterner 2003). Finally, taxing gasoline at a higher rate than diesel can create incentives for businesses and households to buy diesel vehicles. In Europe, for example, the share of such cars in the automobile fleet is growing quickly; this is strongly correlated with increases in the price of gasoline relative to diesel (Sterner 2007).

An alternative policy prescription, also supported by our findings, is to use revenue from fuel tax hikes to subsidize bus travel. In Costa Rica, and presumably countries like it, diesel taxes are regressive in large part because they raise spending on bus travel.

In the final analysis, in deciding whether to raise fuel taxes, policy makers in developing countries need to balance an array of distributional, political, fiscal and environmental goals. Our analysis demonstrates that distributional concerns need not trump competing goals.

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ABOUT THIS BRIEF

This brief is based on results from Blackman A., Osakwe R. y Alpízar F. 2009. Fuel Tax Incidence in Developing Countries: the Case of Costa Rica. RFF Working Paper 09-37. Environment for Development Center for Central America. Turrialba, CR.

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