

Refining the evidence: British Columbia's carbon tax and household gasoline consumption

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The impact of carbon prices on consumer behavior is a central element in current policy debates dealing with mitigation of greenhouse gas emissions. A common concern is that a price on carbon will impose significant costs on households but will not substantially reduce consumption of inelastically demanded emission-intensive goods such as vehicle and home heating fuels. We investigate the impact of the BC carbon tax on private vehicle fuel consumption using a national household-level survey documenting fuel expenditures in BC and in other Canadian provinces, both before and after the introduction of the BC carbon tax.

Prior studies based on province-level monthly vehicle fuel consumption estimate substantial short-run responses to the BC carbon tax. We build on these studies in two important ways. First, our use of household-level expenditure data allows us to account for two potential confounding factors in previous studies, including major public transit improvements in BC since 2009 and potential carbon leakage across the BC-Washington border due to an increase in cross-border trips starting in 2009. Second, we view the BC carbon tax as a unique North

American policy experiment in a province with a diverse mix of urban and rural households. The BC carbon tax was not universally popular with voters and local governments, and was particularly unpopular in rural and northern BC. Part of the resistance in rural and northern BC was due to a perceived inability to adjust gasoline consumption in response to the tax. We use our household-level data to estimate differential responses to the BC carbon tax for Vancouver, smaller BC cities, and rural and northern regions.

Our results indicate that households responded to the BC carbon tax by reducing gasoline consumption. We estimate an average medium (or intermediate)-run carbon tax semi-elasticity of approximately -0.016, which suggests that a one cent per litre increase in the gasoline tax reduced gasoline consumption by 1.6%. Our estimates of the price semi-elasticities of gasoline demand range from -0.004 in Alberta to -0.008 in Quebec. Our baseline results suggest that a 5 cent per litre carbon tax reduced gasoline consumption by 8%, on average, which is 2.9 times the response to an equivalent change in the price of gasoline. Importantly, our results are robust to adjustments accounting for potential carbon leakage and incomplete pass-through of the carbon tax to the retail price of gasoline. Our most conservative lower bound estimate indicates that the carbon tax semi-elasticity is -0.01 when accounting for cross-border shopping and incomplete pass-through. Although the literature on this topic is still in its early stages, the combined evidence to date suggests that the BC carbon tax reduced gasoline consumption and that consumers responded more to the carbon tax than to equivalent gasoline price changes.

Our investigation of heterogeneous responses to the BC carbon tax are consistent with the sources of public opposition to the carbon tax. Households in more densely populated urban

centres, including Vancouver and smaller BC cities, are more responsive to the carbon tax than households in rural and northern areas of BC, which appear to have not responded to the carbon tax. Specifically, we estimate that a 5 cent per liter carbon tax reduces gasoline consumption by 12% in Vancouver and 10% in smaller cities in BC such as Victoria, Kelowna, and Abbotsford. We find no evidence that households in rural and northern areas responded to the carbon tax. Our results therefore suggest that the BC carbon tax is an effective means of reducing gasoline consumption in more densely populated areas, but is not effective in less densely populated locations where households have fewer transportation options and are therefore more dependent on private vehicles. This result is in line with the intent of carbon taxes, which is to encourage those who can adapt at least cost to reduce their consumption.