**Carbon Tax Policy Impact on Energy Intensity in Canada**

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**Overview**

Canada ranks among the top energy consumers with energy intensity among the OECD nations, largely due to its vast geography, varied climate, and resource-intensive economy. However, while energy consumption has been increasing, the energy intensity trend has been negative. The changes in energy intensity can be attributed to factors such as structural change or improvement in efficiency caused by significant changes in policy, particularly those aimed at reducing carbon emissions. This study investigates the impact of recent federal and provincial carbon policies on energy intensity in Canada.

**Methods**

We use the Fisher Ideal Index to decompose the energy intensity changes into activity and efficiency at the national, provincial and industry levels for the period 1997-2017. We also use a panel regression method to tease out the impacts of various factors contributing to decline the total energy intensity and its elements.

**Results**

We show most of the reduction in the EI can be attributed to efficiency improvements rather than shifts in economic activities with a wide variation across provinces. The results also indicate an initial decline of EI following the carbon tax policies. Furthermore, many industries except for mining and construction, have decreased their EI, primarily driven by shifts toward less energy-intensive activities. The provincial panel regression results indicate that carbon policy has a negative impact on EI while income, capital-labor ratio and colder climate contribute to higher EI. Our regression analysis also includes energy endowment effects across provinces and industry level analysis.

**Conclusions**

In this study, we conducted a thorough analysis of the changes in energy intensity in Canada resulting from interventions in carbon policies and shifts in various socioeconomic factors spanning from 1997 to 2019. Employing the Fisher Ideal Index decomposition method, we examine how efficiency and composition factor contribute to changes in energy intensity at the national, provincial, and industry levels. The analysis reveals that, both nationally and provincially, the primary driver behind the reduction in energy intensity was improved efficiency. Furthermore, provincially, the decline in energy intensity was predominantly due to efficiency improvements, while at the industry level, shifts towards less energy-intensive activities played a significant role.

The provincial regression analysis indicates that provinces implementing carbon policies tended to have lower energy intensity, primarily due to shifts towards less energy-intensive activities. Factors such as higher average incomes, greater capital-labor ratios, and colder weather conditions are associated with higher energy intensity, while elevated energy costs and faster population growth contribute to lower energy intensity. These nuanced provincial differences underscore the complexity of energy dynamics across Canada and highlight the necessity for tailored policy approaches.

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