The Impact of Carbon Pricing Policies in Reducing CO_2 Emissions from Road Transportation: A Meta-Analysis of Empirical Studies

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Conclusion

- Combined policies (policy mixes) offer the most potent reduction effects, given their ability to collectively address multiple factors influencing consumer decisions.
- The relative size of the fee levied as part of the policy is positively correlated with the reduction of CO_2 emissions, regardless of type, as it leads to reduced vehicle usage (intensive margin) and changes in vehicle selection (extensive margin).
- Policies with fees priced continuously are more efficient in reducing vehicle CO_2 emissions rates than those based on emissions bands or thresholds.
- Registration and fuel taxes decrease the prevalence of high-emitting vehicles (>180 gCO_2/km). Like circulation taxes, they promote the adoption of diesel vehicles.

Introduction

- The international efforts to address climate change are falling short of the targets set by the Paris Agreement. Road transport alone accounts for approximately 11% of global CO2 emissions. Without controlling for these emissions, national 2030 climate targets will not be met.
- Theoretical constructs emphasize the environmental effectiveness and economic viability of carbon pricing as a means of reducing CO2 emissions from road transport, a notion that is supported by the scholarly community.
- However, there is limited knowledge about which types of carbon pricing policies are effective and the reasons why. The intent of this study is to identify and examine currently existing carbon pricing policies and their effects on emissions, thereby aiding policymakers in designing effective policies for the future.

Methodology

- The study performed a qualitative meta-analysis on both peer-reviewed and gray literature published between 2017 and 2023.
- Tailored search queries were applied to the Scopus, Web of Science, PAIS-Index, ABI/INFORM, and Econlit databases, which resulted in 136, 123, 69, 27, and 10 hits, respectively. This yielded a total of 365 records for screening.
- For inclusion, records had to be published between January 1, 2017, and June 1, 2023, and authored in English; however, there was no geographic limitation. Both quantitative and qualitative studies were considered, including unpublished literature.
- Out of the identified records, 351 were excluded due to duplications or irrelevant research questions, among other reasons, leaving 14 records for review. A subsequent reference search of these records led to 76 additional records, from which 4 met our selection criteria for inclusion. In total, the review comprised 18 records.

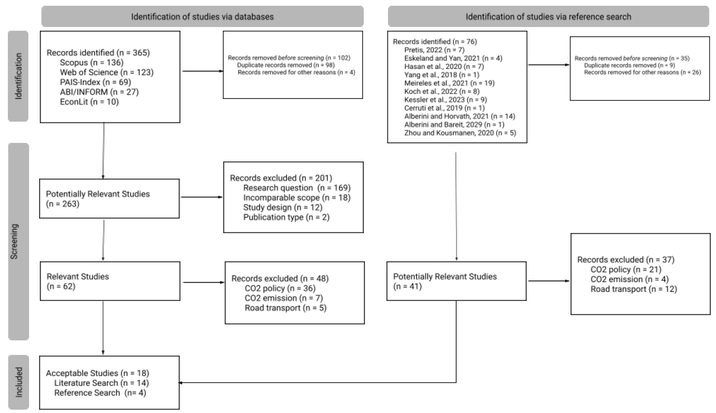

Figure 1: PRISMA flow diagram illustrating the literature selection process. The diagram distinguishes between the database and reference search, and outlines each selection step: identification, potentially relevant, relevant, and accepted.

- Each record in the review was thoroughly analyzed with a focus on the design and implementation of the policy or policies studied, their estimated effects, and any inherent limitations or shortcomings. Patterns in policy type, design, implementation, and documented effects were identified through a comparable analysis.

Results

- A total of 44 authors contributed to the literature sample, which studied policies in 46 countries, predominantly in Europe. The most frequently examined were France, Italy, and Germany in decreasing order of frequency.
- Future research should be directed towards identifying efficient policy mixes, discerning which types of policies complement each other effectively, and understanding the underlying reasons for their combined efficiency.

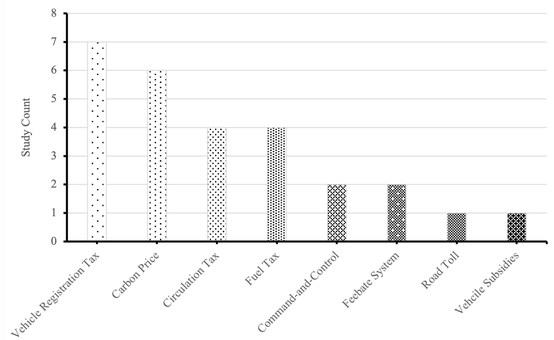

Figure 2: The figure displays the frequency with which each of the eight identified types of carbon pricing policies is analyzed in the literature of the review.

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