An Impact Assessment of the Motorcycle Electronification Policy in Taiwan: From the Economy-Energy-Environment (3E) Perspective

Topic: Special Session: IO Analyses for Electrified Vehicles
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(1) the research question: As the problem of global warming becomes increasingly serious, countries regard electric vehicles as a key measure to reduce carbon emissions. Asia countries are highly dependent on motorcycles, with Taiwan ranking at the top in terms of motorcycle density (followed by Vietnam, India, Malaysia and Thailand). As of October 2023, there are 620 motorcycles per thousand people, and the number continues to increase. Taiwan government plans to completely ban the sale of fuel-powered motorcycles by 2040 and achieve a 100% market share of electric motorcycles. It places special emphasis on the localization of the supply chain and fosters the local electric motorcycle industry through subsidies, research and development, etc.

(2) the method used: This paper applies the dynamic computable general equilibrium model (CGE) and the newly released 2021 Taiwan Input-Output Table.

(3) the data used (if any): Due to the data restriction on an aggregated motorcycle sector, the related industry classification in Taiwan consists of motorcycles, electric vehicles, etc. However, in order to explore the development of Taiwan's electric motorcycle industry, the cost structure and distribution flow of electric motorcycles in the original motorcycle sector must be identified and calibrated. It will be separated into another independent sector to facilitate the subsequent appropriate assessment of its impact on industrial development, energy use, environment, etc.

(4) the novelty of the research: This paper analyzes the impacts of Taiwan's motorcycle electronification policy from three perspectives: economy, energy, and environment. We also designed several policy scenarios, such as using subsidy incentives to increase electric motorcycle sales and banning the sale of fuel motorcycles, to explore the impact of different scenarios on the electric motorcycle industry chain. However, these policies will also bring structural shocks to the traditional fuel-powered vehicle market. Therefore, we explore the impact of electric vehicle development policies on the overall economy, industrial development, and changes in employment demand from an economic perspective. In addition, the promotion of electric motorcycles will significantly reduce dependence on petroleum gasoline, help Taiwan's energy structure adjustment, and promote the transition to green energy.
As the proportion of renewable energy increases, Taiwan's electricity carbon emission coefficient will be significantly reduced, further reducing carbon emissions over the entire life cycle of electric motorcycles and laying the foundation for achieving the net zero emissions target by 2050. This process will not only have a positive impact on the environment, but will also promote the joint development of the economy and energy, and promote Taiwan's steady progress in the global green transformation path. Therefore, motorcycle electronification policy is not only an effective means to address climate change, but also a key strategy to achieve sustainable economic growth in Taiwan.