The Market for Electric Vehicles: Indirect Network Effects and Policy Design

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Abstract: The market for plug-in electric vehicles (EVs) exhibits indirect network effects due to the interdependence between EV adoption and charging station investment. Through a stylized model, we demonstrate that indirect network effects on both sides of the market lead to feedback loops that could alter the diffusion process of the new technology. Based on quarterly EV sales and charging station deployment in 353 metro areas from 2011 to 2013, our empirical analysis finds indirect network effects on both sides of the market, with those on the EV demand side being stronger. The federal income tax credit of up to $7,500 for EV buyers contributed to about 40% of EV sales during 2011–13, with feedback loops explaining 40% of that increase. A policy of equal-sized spending but subsidizing charging station deployment could have been more than twice as effective in promoting EV adoption.

JEL Codes: L62, Q48, Q58

Keywords: Electric vehicles, Indirect network effects, Policy design

THE ELECTRIFICATION of the transportation sector through the diffusion of plug-in electric vehicles (EVs), coupled with cleaner electricity generation, is considered a promising pathway to reduce air pollution from on-road vehicles and to strengthen

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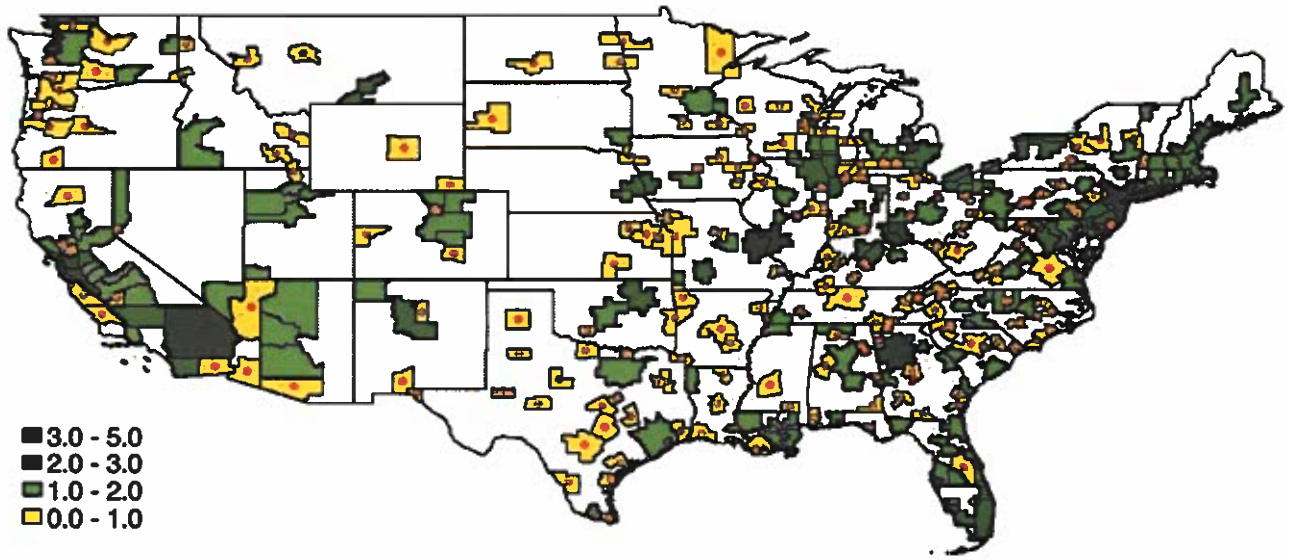

Figure 7. Heterogeneous policy effectiveness (policy2/policy1). Policy 1 gives new EV buyers a tax credit of $2,500–$7,500 based on different models as the current income tax credit policy for EVs. Policy 2 builds charging stations in all MSAs with the same budgetary cost as policy 1, assuming the investment cost per station being $27,000. The figure plots the ratio of the EV increases due to the two subsidy policies. The policy effectiveness of policy 2 varies across locations due to the heterogeneous impacts of public charging stations on the EV demand. The regions with the dots are locations where policy 1 is more effective.