

Three Essays on Electric Vehicle Adoption, its Effects, and Related Incentives

Abstract

This dissertation thesis explores few aspects of electric vehicle (EV) adoption; more specifically, this study focuses on the incentive policies on EV, the effects of EV adoption on energy consumption, and the factors behind the joint adoption of EV and solar Photovoltaics (PV). In the first chapter of my dissertation, I analyze the effect of state-level tax credit policy on electric vehicle sales in Maryland by focusing on a synthetic control approach using Bayesian structural time series. I found this incentive indeed increased the electric vehicle (EV) adoption, but at the same time, the State's goal of EV adoption is too high to achieve with the current incentive program. As I have observed a substantial increase in EV adoption by the State incentive program, I elaborate my analysis on my second chapter, which focuses on two different but interrelated aspects of EV adoption. First, using California's monthly county-level data for 2010 to 2019, this study reveals that EV, and their supportive infrastructures significantly increase residential and commercial electricity consumption. Second, analyzing the electricity generation information by county, this study concludes that there is a significant negative relation between EV adoption and the share of electricity from renewable sources. This study argues that unless California adopts cleaner sources of power plants, public spending on EV adoption may not result in a clean atmosphere, which was the primary concern of the EV incentive policies in the first place. That leads me to my third chapter, which explores the factors behind the joint adoption of EV and solar PV, as solar PV is an environmentally friendly energy generation option for households. I find education levels significantly influence the future decision of the joint contribution. Also, income level and household type are essential factors of adoption.