**Estimating the Spatial Effects of CO2 Emission Control Policy in**

**the Transportation Sector among U.S. States**

**Abstract:**

According to the U.S. Energy Information Administration (EIA), U.S. carbon dioxide emissions from energy sources hit their 25-year low at 5,134 million metric tons in 2017. However, for the first time, the total metric tonnage of CO2 emission from transportation exceeded that from electric power. Each state in the U.S. has a different set of policies to meet the tailpipe emission standards. In 2004, CARB (California Air Resources Board) approved the nation’s first GHG (Greenhouse Gas) emission standards specifically for cars. There are 13 other “CARB states” that follow California’s more restrictive standards with the aim to control CO2 emission specifically from vehicles. The purpose of this paper is to examine the impact of CARB’s tailpipe emission standard policy that is controversial and creates the conflicts between Trump administration’s EPA and CARB states. Using a panel dataset for 49 U.S. states over the 29-year study period (1987-2015), we estimate a Spatially Lagged Model of X (SLX) and a Spatial Durbin Error Model (SDEM). The SDEM captures the effect of omitted variables from SLX. The estimation results of SDEM indicate the expected effects of all three policy-related variables. CARB’s stricter standards have the largest effects among the alternative policy approaches tested in this study. Local spatial effect of CARB’s standards show the presence of spatial effects among neighboring states. All three policy approaches (CARB’s emission standard, gasoline price policy, and fuel efficiency) in this study should be packaged together to reach the CO2 emission reduction goal among the states in the U.S. It is highly recommended to promote collaborative efforts among neighboring states in collaboratively with EPA, NHTSA, and California in order to achieve the ambitious but still feasible CO2 reduction goal set by CARB and adopted by EPA in 2012.

**Keywords:** Tailpipe Emission Standard, Policy Effect, CO2 emission reduction, STIRPAT Model, Spatially Lagged Model of X (SLX), Spatial Durbin Error Model (SDEM)