Estimating the impact of incidents on urban controlled-access highways: an empirical analysis

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ABSTRACT

An empirical analysis is developed that quantifies the impact of different types of traffic incidents on the speed and maximum flow averages of vehicles on a controlled-access highway. The incident types considered include damage to highway infrastructure, vehicle rollover, crashes (into stationary objects), collisions (with moving vehicles), rain, fog, vehicle breakdowns, pedestrians on roadway, etc. Using real-world data from Chile's most heavily used urban motorway/freeway, estimates of incident impacts on speed are generated using a multiple linear regression model incorporating instrumental variables to correct for endogeneity. Flow results are then generated using the fundamental traffic equation relating speed, flow and density. A ranking of the impacts on highway traffic of the different incident types based on incident frequency as well as impact size demonstrates that for the real case studied, the incidents with the greatest cumulative effect are (in order of magnitude) vehicle breakdown, collisions and rain.

KEYWORDS: traffic incidents, density, speed, maximum flow, highway capacity, accidents, vehicle breakdown, collision, rain, instrumental variables, endogeneity