Bicycle infrastructure and traffic congestion: Evidence from DC's Capital Bikeshare

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Abstract

This study explores the impact of bicycle-sharing infrastructure on urban transportation. We estimate a causal effect of the Capital Bikeshare on traffic congestion in the metropolitan Washington, D.C., area. We exploit a unique traffic dataset that is finely defined on a spatial and temporal scale. Our approach examines within-city commuting decisions as opposed to traffic patterns on major thruways. Empirical results suggest that the availability of a bikeshare reduces traffic congestion upwards of 4% within a neighborhood. In addition, we estimate heterogeneous treatment effects using panel quantile regression. Results indicate that the congestion-reducing impact of bikeshares is concentrated in highly congested areas.

JEL Codes: L91, H40, Q53, R41, R53
Keywords: Traffic congestion, public transportation, bicycle-sharing, pollution, automobile externalities

1 Introduction

Tailpipe emissions from transportation constitute 27% of greenhouse gas emissions in the United States.[1] The effect of automobile pollution is amplified further by increases in congestion in urban areas, which exacerbate both private and public damages. Schrank et al. (2012) estimate national congestion costs arising from time loss and wasted fuel at more than $120 billion in 2011, while annual CO_2 emissions attributable strictly to congestion are 56 billion pounds. In addition, 56 billion pounds of CO_2 emissions translates to over $1 trillion in social costs.[2]

In response to these concerns, government agencies have imposed highway tolls, built high-occupancy vehicle lanes, invested in public transit infrastructure, imposed fuel economy standards, and relied on voluntary information campaigns in an effort to reduce vehicle miles traveled (VMTs), alleviate congestion, and mitigate the associated environmental damages. A new mechanism to reduce urban traffic congestion that is currently gaining traction for its purported cost-effectiveness, environmental-friendliness, and positive health impacts is the adoption of citywide bicycle-sharing systems (bikeshares). This infrastructure provides an alternative to driving for short trips and extends the existing network of public transit within a metropolitan area. Further, bicycling infrastructure augments the environmental bona fides

[1] http://www.epa.gov/climatechange/ghgemissions/sources.html.
[2] These estimates are the emissions arising solely from congested travel, as opposed to free-flowing traffic.