The Welfare Effects of Congestion Pricing: Evidence From High-Occupancy Toll Lanes

Yooseon Hwang

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Abstract

This paper estimates the effects of highway congestion pricing on traffic, economic activity, and welfare. Using spatial panel data on real-time traffic speed and flow in California, I first provide reduced-form evidence that changes in traffic patterns are different in the short- and medium-run when non-toll lanes are converted to toll-lanes with dynamic pricing. This implies that individual responses may involve not just changing where they drive, but also where they live or work. Therefore, to estimate the full equilibrium effects, I develop a quantitative urban model with endogenous commuting costs in which residential and commercial locations, driving routes, travel times, and toll costs are simultaneously determined. Based on model estimates, I estimate both partial and general equilibrium effects of congestion pricing. In the partial equilibrium analysis that holds locations of residences and workplaces fixed, congestion pricing induces a spatial leakage of traffic externality as people divert from toll lanes to non-toll lanes, reducing annual aggregate welfare by $1.8-11.0$ million. However, in the general equilibrium analysis that allows for adjustments in residences, workplaces, and driving routes, congestion in the overall road network decreases because people re-sort to reduce commuting distances. In aggregate, when net toll revenues are redistributed, it increases annual welfare by $2.4-11.6$ million.

Keywords: congestion pricing, commuting, economic geography

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