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

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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 long-run when non-toll lanes are converted to toll-lanes with dynamic pricing. Hence, they suggest that individual responses may involve not just changing where they drive, but also where they live or work. Therefore, I estimate 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 the partial and general equilibrium effects of congestion pricing. In a 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 aggregate welfare by $3-$10 million. However, in a general equilibrium analysis that allows for adjustments in residences, workplaces, and driving routes, congestion in the overall road network decreases due to a decrease in commuting distance as people sort. As a result, when net toll revenues are redistributed, it increases aggregate welfare by $4-$11 million.

Keywords: congestion pricing, commuting, economic geography
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