

The Impact of Congestion Pricing Policies on Fuel Consumption, CO2 Emissions and Urban Sprawl

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ABSTRACT

The impacts of anti-congestion policy on urban sprawl, fuel consumption and CO2 emission are analyzed using RELU-TRAN2, a computational general equilibrium (CGE) model calibrated to the Chicago MSA circa 2000. In the model, consumers choose their residential-workplace locations and the fuel economy of their cars, their housing space, labor supply and their consumption of goods and services which entail shopping trips. Consumers also choose their mode and route for each work and non-work trip. The congestion is determined endogenously. Producers, developers and landlords are the other economic agents in the model. We model quasi-Pigouvian tolling of traffic congestion on all roads or only on major roads, versus (in each case) a revenue-neutral fuel tax per gallon of gasoline which increases the monetary cost of travel by 73% on average. The fuel tax reduces gasoline and CO2 by 18%, VMT by 15%, travel time by 11% and improves MPG by 3.3%. We also model a cordon toll for trips entering or crossing the CBD versus a CBD parking tax for trips terminating in the CBD. Under the quasi-Pigouvian toll on all roads or the equivalent fuel tax, residential and job locations become more centralized in the CBD and the City of Chicago, but when only major roads are tolled there is a tendency for job and residence locations (and the implied commutes) to become more localized in the same zone. We find that when the cordon toll is low, jobs leave the CBD and relocate near suburban residences but some jobs move into the CBD under a revenue-equivalent tax on CBD parking. Under low levels of the fuel tax, residential and jobs locations are centralized in the CBD and the City of Chicago, but when the fuel tax becomes higher jobs and residences become more suburbanized.