

Modeling car ownership and use in a developing country context with informal public transportation

Lara Al Otary, Maya Abou-Zeid, Isam Kaysi

Department of Civil and Environmental Engineering

American University of Beirut

Car ownership and use is a main contributor to the deterioration of air quality in cities and to global warming. There is thus a pressing need to understand their determinants in this era of increasing demand for mobility. This paper studies car ownership and use decisions in a car-dominant developing country context, and quantifies the effect of public transportation availability on these decisions. A discrete–continuous modeling framework that estimates car ownership and use simultaneously is presented. People’s latent attitudes towards public transportation and the private car are also assumed to influence these decisions. The model is applied to the case of Lebanon, a developing country characterized by a high car ownership rate, a high percentage of trips made by car, and an informal public transportation system. Five policy scenarios involving potential improvements to the public transportation system, land use densification, or increase in fuel taxes were tested. The findings show that the current public transportation accessibility level has a minor impact on car ownership, but none on car usage. Only if major improvements to the public transportation services are enacted would a decrease in car ownership and usage be achieved. In such a case, model outcomes show that car ownership will be reduced in households with two cars by 5.88% and usage in general will be reduced by 15.22%. As a result, emissions and fuel consumption will be reduced by around 15%. Densification of zones outside Municipal. Beirut is also a promising strategy for reducing car usage.