Explaining the Recent Shift in Travel Behavior and Vehicle Miles Traveled: A Vector Error Correction Approach

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Abstract

Given the recent economic downturn and increase in energy costs, forecasting travel behavior (and vehicle miles traveled [VMT]) has increased in complexity over time. In this paper, we estimate the long-run elasticities of VMT. We advance the analytical framework typically used to model elasticities (ARIMA and ARMA) with a vector error correction (VEC) regression model, which is based on system-based co-integration techniques. A benefit of co-integration analysis is that the dynamic co-movement among variables and the adjustment process toward long-term equilibrium can be studied. Applying the VEC model, we find that long-run gasoline price elasticity to VMT ranges from -0.31 to -0.88, and income elasticity ranges from 0.18 to 0.49 for the period 2000–2008. Comparing these results to previous studies, they show consumers have become more sensitive to gas price from earlier decades.

The recent changes in elasticities can be attributed to price spikes, but we posit that economic uncertainty has also played a significant role in altering people’s travel behavior. Therefore, we expanded the analysis by including the Consumer Sentiment Index (CSI) and disposable income. Results show that the CSI is a significant confounding variable that should not be excluded when explaining the cyclical shifts in travel behavior.

Key words: co-integration—elasticities—vector error correction—vehicle miles traveled