

## **Empirical Investigation on the Range Anxiety for Electric Vehicles**

by

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(joint work with Ho-Yin Mak, Marcelo Olivares, and Ying Rong)

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**(Conducted in English)**

### **Abstract:**

Electric vehicles (EVs) are an important technology for curbing the carbon footprint of road transportation. However, mass adoption of EVs has yet to happen in major auto market. Among the major shortcomings of EVs on the market is the limited range and long recharging times, creating psychological concerns to drivers, called *range anxiety*, and hence making them reluctant to adopt EVs. Therefore, measuring drivers' range anxiety is essential for informing product and policy design, and eventually for the mass adoption of EVs. In this work, using a novel data set collected from an on-demand car sharing system, we empirically identify and quantify the effect of a car's effective driving range on its attractiveness to drivers on a single-trip basis, and contrast the findings for EVs and traditional combustion engine (CE) vehicles. We conduct three complementary econometric analyses i) to identify drivers' aggregate preferences on fuel type; ii) to show that a key attribute that may account for such difference is the range; and iii) to quantify drivers' preference for longer range by evaluating the trade-off between a car's fuel level versus the cost of access. Our results show that EVs substantially decrease the demand (by 20~25%) and the fuel level has a statistically significant effect on the demand rate only for EVs. Moreover, we find that drivers renting EVs are willing to walk four to ten times as far as they would do for CEs for the same amount of additional range. We see that these are significant findings, since they reveal that range anxiety is not merely a matter of *purchase* behavior, but also one associated with day-to-day *usage*.

### **Bio:**

Sang Won Kim is an assistant professor in the Department of Decision Sciences and Managerial Economics at CUHK Business School. He is interested in applying economic analysis, in particular game theoretic analysis and empirical investigation, to address problems in operations management. He has conducted research in public procurement and mechanism design, supply chain structures, as well as sustainable operations. In recent years, he is broadening his research interests to OM-IS interface. He earned a PhD in Decision, Risk, and Operations at Columbia Business School and an MS in Financial Engineering at Columbia University.

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**All are welcome!**