

My research primarily focuses on applied microeconomics, with a specific emphasis on energy economics and industrial organization. A central theme in my research is examining firms' responses to changes in their environment, including cost shifts, spatial shocks due to rivals' price changes, and alterations in policies or market structures, especially within the electricity and retail gasoline markets. This involves studying the speed and frequency of price adjustments, as well as the dynamics of price cycles and synchronization.

In my job market paper, I investigate "sticky prices" in retail gasoline market in Korea. Despite empirical evidence of price stickiness across retail sectors, economics explanations of the phenomenon are still debated in macroeconomics and industrial organization. In macroeconomics, pricing models are categorized into two types: state-dependent (SD) models, where price changes depend on changes in cost or demand, and time-dependent (TD) models, where price changes occur at regular intervals. Within industrial organization, researchers have emphasized the impact of market power on pricing, noting that prices tend to be more rigid in concentrated markets.

Using a logit model, I investigate how the probability of price changes relates to variables representing both SD and TD pricing rules. The estimation results reveal that retailers don't adhere strictly to one pricing rule but employ a mix of both SD and TD pricing rule. Furthermore, the results show that stations with more local market power tend to change their price on a weekly basis, suggesting a stronger inclination toward the TD pricing rule. These implications bridge the gap between studies in industrial organization and macroeconomics by providing evidence of the relationship between market power and costly adjustments, indicating that both are actually aligned, not conveying different narratives.

In another study, I revisit the pricing behavior of retail gasoline stations in Korea, this time with an emphasis on the speed of adjustment. Asymmetric price adjustment, commonly known as "Rocket and Feathers" refers to the phenomenon where retail product prices quickly rise in response to cost increases but fall more gradually when costs decrease. Recent studies on "Rocket and Feathers" tend to employ high-frequency data to avoid bias arising from the temporal aggregation of data.

I use an error correction model to investigate price adjustment patterns in response to cost changes and examine how estimation results differ based on data structure and sub-samples. I find that the adjustment patterns estimated from weekly data are relatively consistent across both data structures (time series vs. panel) and periods (2009-2014 vs. 2015-2019). However, results from daily data reveal varying adjustment patterns. These differences arise from model misspecification, which fails to account for a crucial feature of daily-level data: censored responses to cost changes.

Besides economic studies, I address policy questions using economic concepts. While preventive maintenance is crucial for ensuring the reliability of a power system, it is not feasible to allocate unlimited costs to achieve higher reliability. In general, the marginal rate of increase in the survival rate of the power system diminishes as maintenance expenditure rises. Therefore, balancing reliability and maintenance costs is crucial in determining the optimal preventive maintenance.

Using a Cox proportional-hazards model, this study investigates the effect of maintenance costs on the survival rate by analyzing the outage data of substation in power system in Korea. Additionally, lasso regression is used for determining the functional form describing the relationship between preventive maintenance cost and failure rates. The empirical findings confirm a diminishing marginal rate of failure as maintenance costs increase. Based on the estimated results, the optimal preventive maintenance costs

can be determined by considering the marginal benefit of maintenance cost and the avoided outage loss.

In my future research, I plan to conduct follow-up research for two previous studies related to retail gasoline market. Specifically, I have found an interesting pattern of price changes in which retailers exhibit a preference for particular days of the week for price adjustments, and this pattern changes as the market structure evolves. This evidence may provide insights into price synchronization and changes in strategic equilibrium. I intend to further investigate these findings and find their economic implications.

Additionally, I am also interested in the EV charging market. The Korean EV charging station industry is now emerging due to government efforts to promote the purchase of EV cars. There are two different types of price schedules for slow charging: one remains constant over time, while the other varies depending on the time. Most firms select the former schedule for price, but some firms opt for the time-varying price schedule. Using individual level charging data in Korea, I am planning to investigate how consumers respond to these two different pricing schedules and subsequently examine whether the latter price schedule is profit-maximizing.