

Changing Market Structure and Evolving Ways to Compete: Evidence from Retail Gasoline

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Firms constantly innovate, and innovations force changes in the competitive landscape. Firm innovations have been remarkable, particularly in the retail sector, and the introduction of automation is one example of firm innovations, altering the optimal allocation of resources of buyers and sellers. In this paper, I use a case-study approach to examine the competitive effects of an innovation in a retail-gasoline market and jointly investigate how an innovation changes ways firms compete on price: the introduction of self-service technology in retail gasoline in Korea.

My setting is unique in that I have high-frequency, station-level data starting in 2010, when self-service sellers were very rare, and continuing through 2015, when they accounted for a quarter of the market. I study sellers' pricing by service level, and find that gas stations that continue to offer full-service differentiated themselves by offering bundled products and services and raised their prices during this period.

I first perform a test of whether the monopolistic competition theory – greater competition lowers price – explains the increasing the full-service premium. If the gasoline market is segmented by service level, then the increase in the full-service premium could be explained by the falling number of full-service stations and the increased number of self-service stations. However, in a difference-in-difference specification, the changes in the service composition of gas stations barely explain the increasing full-service premium in this market. The trend of full-service premium is very robust to measures of the competitive environment.

In the meantime, I find that self-service stations offer competitive prices and drive down prices of nearby competitors. Self-service stations charged 5% less per gallon on average, and price elasticity of competition is much higher in absolute value when competitors are self-service than when they are full-service. This finding confirms that self-service stations compete for price-sensitive customers who may prefer only a low-priced gasoline component to a bundle of gasoline and service.

I further show descriptive evidence that full-service stations differentiate on one or more non-price dimensions. Product differentiation is generally implemented by full-service stations whose gasoline prices are significantly higher than the average price for full-service. As the market is transformed from full-service to self-service, more full-service stations are increasingly differentiated to charge a high premium for their full-service gasoline. The price gap between full-service and self-service increases over time as a result. I claim that such product repositioning is the new strategic choice of high-cost marginal sellers in response to the emergence of low-price competitors, and document that the strategic choices of stations evolve in different ways when the market is undergoing a significant restructuring; thus, each type of station is using its unique position to its advantage.

This study has important implications. First, the strategic choices for incumbents vary by firm characteristics. Neither exiting market nor adopting new technology, sellers can differentiate their product on some other dimensions to avoid price competition. Seller characteristics that sometimes are unobservable to the econometrician are important to understanding price competition among differentiated sellers in real-world markets. Second, the advent of innovation like digital

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transformation breaks boundaries among traditional industries, and firms attempt to create a synergy effect by merging various industries. Amazon Go is a good example of combining automation with traditional convenience stores. Quantifying the across-industries effects of the new competitive landscape created by innovation is an attractive and emerging field for research.