Product Warranty Length and Secondary Market Strategies

Recent studies have shown how critical after-sales services are to a manufacturing firm’s competitive resilience and profitability (Guajardo et al. 2016). An important component of such after-sales services is product warranty offerings. In particular, many durable goods manufacturing firms’ after-sales service programs include warranty programs with different product warranty offerings. For example, in the US automotive market, Kia offers 5/60,000 (year/mileage) coverage in basic warranties and 10/100,000 in powertrain warranties; Lexus offers 4/50,000 and 6/70,000 in its basic and powertrain warranties, while Honda and Toyota both offer 3/36,000 and 5/60,000 for the same.

Recent estimates regarding the automotive market suggest that the value-added from an additional year of warranty is about 3.1% of the median vehicle price. Furthermore, warranty length increase is known to compensate for quality issues particularly in the automotive market (Guajardo et al. 2016).

While the impact of a number of factors including product quality information (Spence 1977, Lutz 1989, Kirmani and Rao 2000), risk preference heterogeneity between manufacturing firms and customers (Heal 1977) and among customers (Kubo 1986, Chu and Chintagunta 2011) on warranty offering decisions have been studied in detail in the literature (see Emons 1989 for a review), the impact of a particular characteristic that is key to the notion of a durable good market, the presence of consumer-to-consumer trading—i.e., secondary markets—remains yet unexplored in this context. That is, a longer product warranty can help increase customers’ valuation of a product and imply higher profit potential while it may also amplify the volume of trade in secondary markets, thereby causing higher cannibalization for the new product. The tension between the two effects can be partially addressed by a manufacturing firm’s secondary market intervention through a variety of mechanisms (Hendel and Lizzeri 1999, Waldman 2004) including trade-ins, or buyback programs. However, to what extent the mechanics of trade-in/buyback programs and warranty offerings interact
is unknown to the literature, to the best of our knowledge. This paper takes a step in answering this question. That is, we first formulate an analytical model to analyze the role of product warranty offerings and secondary market interference, and their interaction on the profitability of manufacturing firms. We then build on this analysis to formulate a number of hypotheses and empirically test these hypotheses using field data from the U.S. automobile industry.

Our analytical model follows traditional models in the durable goods and recent operations management literature (Hendel and Lizzeri 1997, Huang et al. 2001, Agrawal et al. 2016). We consider a stylized model in an infinite horizon setting that focuses on a single product with finite durability that depreciates with use and is sold to a market of heterogeneous customers. Following the approach in Hendel and Lizzeri (1997), we focus on a stationary (Markov perfect) equilibrium, which allows us to tractably explore the interaction between the increased product value from a longer warranty offering, the cannibalization it induces, and the impact of the manufacturing firm’s secondary market interference. We then characterize conditions as to whether and when longer product warranty offerings are profitable, and explore the joint economic and environmental impact of product warranty extensions and secondary market interference.

This analysis suggests that the value of a longer warranty offering is non-monotonic in product failure rate and that secondary market interference can significantly influence when a manufacturing firm will benefit from longer warranty offerings. Essentially, longer warranty offerings can benefit two types of manufacturing firms. First, as common wisdom may suggest, a manufacturing firm observing low reliability in its products can leverage longer warranty offerings to increase profits. More surprisingly, a manufacturing firm with more reliable products may also benefit from longer warranty offerings when exercising secondary market interference. In other words, a firm that manufacturers more reliable products may want to extend warranty length and remove some of the used products from the secondary market when the product failure rate is sufficiently low.
We then empirically test these theoretically predicted relationships between product reliability, and manufacturing firms’ warranty offerings and secondary market interference (specifically measured by trade-in/buyback activities) in the U.S. automobile industry. We link the brand-level reliability data published by J.D. Power with used car transaction data from the U.S. Consumer Expenditure Survey and manufacturing warranty offering data collected by J&L Warranty. In line with our theoretical findings, we find that automobile manufacturing firms provide longer warranties when the perceived reliability of their used cars is near either extreme, i.e., either low or high.

References


