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Incorporating Subjective Constraint into Models of Demand

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Abstract

Consumers often face both monetary and non-monetary costs when purchasing goods. To individuals, non-monetary costs are often uncertain or not fully known prior to purchase. Unlike monetary costs, which are typically explicit and objective, non-monetary costs such as mental effort, time, or inconvenience are rarely stated and therefore tend to be subjectively evaluated by consumers. As a consequence, consumers' perceived costs may diverge from the costs assumed as being objective by researchers or managers, creating systematic biases in conventional demand modeling. We propose a new demand model that explicitly incorporates consumers' subjective evaluations of marginal costs through alternative-specific perception parameters. The model nests the standard monetary constraint while adding a flexible nonmonetary resource-based constraint whose perceived marginal cost can vary across individuals and alternatives. We derive the associated likelihood using Karush–Kuhn–Tucker conditions and provide a general estimation procedure suitable for both discrete and volumetric demand settings. We apply the proposed model to two empirical contexts: a discrete choice dataset on floor-cleaning services, where waiting time acts as a non-monetary cost, and three online-course datasets where homework time generates volumetric demand. Across all applications, the proposed model delivers superior in-sample fit, substantially improves out-of-sample predictions, and yields parameter estimates that differ meaningfully from those of standard models. Importantly, allowing for subjective time perception leads to different assessments of willingness-to-pay and the relative importance of non-monetary versus monetary constraints, resulting in distinct and more nuanced managerial implications.

Keywords: Consumer Constraint; Non-monetary cost, Direct utility

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