

Implications of Missing Causal Structures in Price Elasticity Estimation*

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Abstract

Traditionally, historical observational data has been used to estimate price elasticity through classical econometric models, such as linear regression and log-log models. However, these methods consider only associations, treating historical data as patterns of observation. For many applications, merely learning from past patterns is insufficient; there is a need to develop methodologies that quantify the impact of interventions. In this study, we introduce a causal inference framework as a solution to this challenge. There is a significant gap in literature, with very few studies treating price management as intervention rather than observation. We analyze the types of interactions present in causal systems and explore their manifestations in the context of price management and placing them in context of ladder of causation and Structural Causal Models based on Directed Acyclic Graphs. Additionally, we illustrate how conflating association with intervention can adversely affect profits. We quantify how neglecting causal nature of price elasticity management can distort decision making and bias conclusions.

Keywords: causal inference, price elasticity, structural causal models