A Key Model Enhancement for Personalized Marketing Introducing Purchase Timing Predictions to Hierarchical Bayes Pareto/NBD Model

1st Evşen Korkmaz
Technology & Operations Management,
Rotterdam School of Management
Erasmus University Rotterdam
The Netherlands
evsenko@gmail.com or 0000-0002-2886-0462

2nd Dennis Fok
Econometrics Department,
Erasmus School of Economics
Erasmus University Rotterdam
The Netherlands
dfok@ese.eur.nl

3rd Roelof Kuik
Technology & Operations Management,
Rotterdam School of Management
Erasmus University Rotterdam
The Netherlands
rkuik@rsm.nl

Abstract

Personalized marketing is a key business strategy that uses customer data to offer an optimized marketing experience. Leveraging the extensive customer data, businesses can identify behavioral patterns to more effectively design targeted marketing tactics. Buy-till-you-defect [BTYD] models are one of the key enablers in this endeavor as they specify customers' transaction and defection processes for businesses operating under a non-contractual setting. These models have been typically used to identify active customers in a company's customer-base as well as to predict purchase frequency and amount. Given the rise of personalized marketing, companies continuously need to improve their understanding of customers to stay ahead of competition. In this article, we enhanced BTYD models' predictive capability so that these models can jointly predict also the customer's decision of *when* to shop, together with how often to shop and how much to spend. Purchase timing predictions are managerially relevant as they enable marketing executives to choose appropriate targeting and promotion strategies to improve revenues. For two well established BTYD models, Pareto/NBD model and its Hierarchical Bayes extension, we derive closed-form expressions for future purchase timing. Next, we validate these timing predictions on real datasets. We believe extending the use of BTYD models with this additional model output will lead to higher business adoption.

Keywords—Buy–till–you–defect models, purchase timing, Bayesian estimation, customer base analysis, personalization