The Joint Diffusion of a Digital Platform and its Complementary Goods:

The Effects of Product Ratings and Observational Learning

Meisam Hejazi Nia

Norris I. Bruce

Meisam Hejazi Nia is a PhD student (mxh109420@utdallas.edu), and Norris I. Bruce is an Associate Professor of Marketing, University of Texas at Dallas, P.O. Box 830688, Richardson, TX 75083 (972).883.6293 (norris.bruce@utdallas.edu).

Abstract

In many industries such as mobile applications and video games, platform owners (PO) open platforms to third party developers, who in turn create complementary products (CP) that spur adoption of platforms. Conversely, a large installed base of platform users can attract third-party developers, leading to further creation and adoption of complementary items. Thus, we extend the Bass Diffusion Model (BDM) to study the joint or interdependent diffusion of a digital platform and its complementary products. Given the experience attributes embedded in digital goods, we investigate the effects of quality signals such the distribution of product ratings, observational learning, usage levels, and referrals on their adoption. We apply the resulting model to a unique data set of daily downloads over 5 years for the Firefox browser (platform) and 52 of its add-ons (complements). For estimation, we re-cast the resulting 53 BDM differential equations into non-linear, discrete-time, state space forms; and then estimate them using an MCMC approach to the Extended Kalman Filter. Unlike continuous-time filters the procedure used here avoids numerical integration at every time period, and so is more computational efficient, given our lengthy time- series. Results show that variance of product ratings reduces and observational learning increases the demand for add-ons. We find, too, an interesting asymmetry: that a platform's new generation positively impacts the diffusion of add-ons, but an add-ons' new version does not affect the diffusion of the platform. These and others findings have implications for PO's governance of the PO-CP network.

Keywords: diffusion of digital goods; platform; complementary products; observational learning; experience goods; product generations; churn; platform competition; Extended Kalman filter; Markov Chain Monte Carlo