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A Model of Competition between Perpetual Software and Software as a Service

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Abstract

Software as a service (SaaS) has grown to be a significant segment of many software product markets. SaaS vendors, which charge customers based on use and continuously improve the quality of their products, have put competitive pressure on traditional perpetual software vendors, which charge a licensing fee and periodically upgrade the quality of their software. We develop an analytical model to study the competitive pricing strategies of an incumbent perpetual software vendor in the presence of a SaaS competitor. We find that, depending on both the SaaS quality improvement rate and the network effect, the perpetual software vendor adopts one of three different strategies: (1) an *entry deterrence strategy*, (2) a *market segmentation strategy*, or (3) a *sequential dominance strategy*. Surprisingly, we find that vendor competition does not always result in higher consumer surplus, and it might lead to a socially inefficient outcome under certain conditions. We further show insights into how the incumbent perpetual software vendor can defend its market position by providing incremental quality improvement through patching and/or by releasing consecutive versions with major quality upgrades. Finally, we extend our model to include the vendor's quality improvement cost and users' switching cost. These additional analyses help to identify the effect of different quality and cost factors on the market competitive equilibrium.

Keywords: Software as a service (SaaS), network effects, pricing and competition, switching cost, game theory, analytical modeling