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The Long-term and Short-term Effects of Product Competition on Supply Abundance in an E-commerce Platform

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Abstract: Previous research suggested that both demand stimulation and extrusion effects appeared at an e-commerce platform due to the intense competition for sellers. On the one hand, market competition implies more market opportunities. On the other hand, it also attracts more customers (such as through low price and promoting) and creates network effect obviously on the demand side, which stimulates more products to enter the platform. The seemingly contradictory views were rarely observed and examined from time series analysis in previous studies. In this paper, both the long-term and short-term effects of product competition on the abundance of product supply were tested by using 140,000 outbound tour packaged products from Ctrip.com. FGLS was used to test the econometric model. The result shows that product competition will have a positive stimulating effect on the abundance of product supply in a short-term time window (about one month), but then there is a mixed effect of positive stimulus and negative extrusion, and finally, the effect gradually disappears. This paper provides an important policy implication for the e-commerce platforms to improve governance of product competition and effectively manage complementors and product categories.

Keywords: e-commerce platform, network effect, product competition, supply abundance, long-term and short-term effect

1. Research Questions

E-commerce platforms play an important role in promoting economic growth with the rapid development of Internet technology. A large number of business practices show that the high transaction volume attribute to the abundance of products on e-commerce platforms [1]. The abundance of product supply (i.e., supply abundance) refers to the network scale of tradable products. Product abundance depends on the supply of complementors, and complementors also face intense competition while providing products. However, inconsistent results have been found on the effect of product competition on supply abundance on e-commerce platforms in previous research. Some studies confirmed the positive effect of product competition on supply abundance [2], while others hold the opposite view [3].

Despite these conflicting arguments about the consequences of product competition on supply abundance, there have been scant empirical studies due to the limitations of data. Our research question is as follows, ***what is the relationship between product competition and supply abundance in an e-commerce platform?***

2. Research Model and Results

The intense competition implies that the products in this market are favored by consumers, which will stimulate complementors to provide more similar products. However, complementors may adopt the competitive strategy of low-price to gain advantages, reducing their survival rate. Therefore, based on the previous studies on Porter's competition theory and competition neglect, and combined with our research questions, two hypotheses were proposed: H1: in the short term, product competition has a positive effect on supply abundance on an e-commerce platform. H2: in the long term, product competition has a negative effect on supply abundance on an e-commerce platform.

We tested hypotheses by using a half-monthly longitudinal dataset of outbound tour packaged products on Ctrip.com, the largest tourism e-commerce platform in China, from March 1, 2017 to April 1, 2018 (27 periods).

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We use this dataset to calculate variables. The product competition can be quantified by the Herfindahl-Hirschman index(HHI), and the number of tradable tourism products in the market is used to measure the supply abundance. We also include three control variables: the quality of tourism products, location of departure city and seasonality. In addition, we developed an econometric model based on descriptive statistics and correlation analysis of all variables to test hypotheses. The short-term and long-term effects of the product competition on supply abundance are captured by different period lags of the dependent variable in the econometric model. Hence, our econometric model is:

$$\ln(Abundance_{i,t+n}) = \beta_0 + \beta_1 \ln(Competition_{i,t}) + \beta_2 (lnCompetition)^2_{i,t} + \beta_3 lnQuality_{i,t} + \beta_4 City_{i,t} + \beta_5 Spri_{i,t} + \beta_6 Summ_{i,t} + \beta_7 Autu_{i,t} + v_i + \varepsilon_{i,t} \quad (n = 1,2,\dots n, \max(n) = 26)$$

FGLS is used to test the econometric model. Moreover, we verify the robustness of our results by using the ordinary least square with panel correction standard error (OLS-PCSE) to test the econometric model [4]. The empirical results show that product quality, location of departure city and seasonality all shaped the supply abundance. Our results further show that product competition has a positive stimulating effect on the supply abundance in a short-term time window (about one month). Moreover, in a long-term time window (about a month later), product competition exhibits a mixed effect of positive stimulus and negative extrusion, and finally, the effect gradually disappears. In other words, in the long term, product competition on e-commerce platforms tends to have no effect on the supply abundance, rather than a negative effect.

3. Research Contributions

The main theoretical contributions are as follows: First, we quantify network effects with supply abundance to capture the evolution of network effects. Previous literature on the quantification of network effects has typically been focused on the installed base and the performance, and less research attention has been paid to the supply abundance. However, the importance of supply abundance is confirmed. Second, the relationship between product competition and supply abundance was decomposed based on the time effect in our research, which provides a new perspective to explain the seemingly contradictory results in previous studies.

Beyond the theoretical contributions, we also see a variety of implications for platform management. First, in the early stage of the platform, it is an effective way for platform management to strengthen the positive network effect by stimulating more complementors to enter the platform. Second, when the product competition starts to have a negative effect, platform management should shift their attention from expanding the installed base to platform governance. Third, in the long term, platform management should consider establishing a platform incentive mechanism to encourage the complementors to innovate continuously.

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