The Benefit of Keeping Low-Quality Products: The Perspective from a Strategic Platform

Zixian Liu(✉)

University of Warwick, University House, Coventry CV4 8UW, UK
liuzixian0113@163.com

Abstract. Digital platforms (e.g., Taobao and JD) that host third-party sellers have become the dominant economic driving force in the current e-commerce industry. However, rich evidence suggests that platforms provide many low-quality products which cause numerous consumer complaints. This paper explores a parsimonious equilibrium model that provides a potential interpretation to why keeping low-quality products might improve a strategic platform's profit, although doing so might be at the low-quality seller's costs. Managerial implications are discussed.

Keywords: digital platforms · low-quality products · competition

1 Introduction

In recent years, digital platforms as a two-sided platform, integrating resources from merchants and consumers, have expanded consumer choice, and given businesses access to a broader market. It fundamentally alters how people conduct business. Two-sided markets are characterized by platforms and two distinct groups of consumers, sometimes referred to as "buyers" and "sellers," who value each other's participation. The most prominent examples of digital platforms are eBay, Amazon, Taobao, and JD.

While digital platforms facilitate life, they also have certain drawbacks. Many platforms are selling counterfeit, fake and other low-quality products to consumers at low prices, which is a massive obstacle to the healthy development of online trading. The relevant departments are highly concerned about the platform economy's regular operation and regulation. A series of laws and regulations were introduced and implemented in 2019 to regulate the platform economy. Even though there are product quality issues on the platform, consumer buying behavior has stayed the same, and many goods are still being sold. It is evident that consumers have different consumer preferences for other quality products, and differentiation affects consumers' purchases of varying quality products and, thus, the market share of digital platforms. Governance plays little of a role, which may be attributed to the platform's wants to maximize profits. Based on the above background, this paper explores the impact of firm quality differentiation on platform profitability using the Hotelling model and finds that keeping low quality products might increase the platform's profit, although doing so might be at the costs of the low-quality sellers. Many relevant managerial implications are discussed.

M. F. b. Sedon et al. (Eds.): SSHA 2023, ASSEHR 752, pp. 239–246, 2023.
https://doi.org/10.2991/978-2-38476-062-6_30

The rest of the paper is structured as follows. In Sect. 2, I discuss the relevant literature. Section 3 introduces the basic model, and Sect. 4 conducts the main analysis. Finally, Sect. 5 concludes the paper.

2 Literature Review

The low barriers and reduced transaction costs of digital platforms have attracted an increasing number of players on both sides of the market. There are a variety of ways to compete and collaborate on digital platforms. Some companies own branded websites, while others sell their products through digital platforms. Loginova (2021)[1] studied price competition when some companies operate their own branded websites while others sell their products through digital platforms, and found that in less concentrated markets when the perceived value of a product increases relatively minor, it is more likely that the same type of companies selling at different prices. Some retailers can sell directly to consumers, and some can outsource their sales services to a platform. Mariotto and Verdier (2020)[2] develop a model to study competition between platforms and continuous monopoly sellers. They find that all sellers are more willing to join a platform if the platform does not impose a limit on the maximum price of the seller's website because they can readily pass on the cost of participation to the consumer. Because platform profits depend on the total fees paid by consumers and sellers, platforms may have the sufficient market power to impose restrictions on retailers. Gabriel et al. (2018)[3] studied the motivation for platforms to assess resale price maintenance. They find that platforms may also charge a minimum resale price to raise prices on both sides simultaneously if the competition on the platform is strong enough. There are also cases where some digital platform giants receive commission revenue from each item sold on the marketplace, and some digital platforms sell first-party products alongside third-party products. Zennyo (2022)[4] finds that when platforms manipulate search engines and recommendation systems to push consumers to their first-party products, platform appropriation behavior leads to platforms levying lower commissions from sellers, which leads to lower equilibrium prices lower, thus attracting more consumers. Ameli et al. (2020)[5] argues that the stronger the network externality, the lower the threshold at which the incumbent platform finds exclusivity profitable. The weaker the network externality, the more differentiated the two platforms are, and the more likely entry deterrence will harm consumers.

[1] Loginova, O. (2021) "Price competition online: Platforms versus branded websites," Journal of Economics & Management Strategy, 31(2), pp. 259–283.

[2] Mariotto, C. and Verdier, M. (2020) "Platform–Merchant Competition for sales services," Journal of Economics & Management Strategy, 29(4), pp. 834–853.

[3] Gabrielsen, T.S., Johansen, B.O. and Lømo, T.L. (2018) "Resale price maintenance in two-sided markets," The Journal of Industrial Economics, 66(3), pp. 570–609.

[4] Zennyo, Y. (2022) "Platform encroachment and own-content bias," The Journal of Industrial Economics, 70(3), pp. 684–710.

[5] Amelio, A., Giardino-Karlinger, L. and Valletti, T. (2020) "Exclusionary pricing in two-sided markets," International Journal of Industrial Organization, 73, p. 102592.

An essential feature of bilateral markets is that prices are best-considered externalities on both sides. Vasconcelos (2015)[6] examines the case of firms selling complementary products and argues that selling below cost to a group whose demand is more price-sensitive to increase demand on this side of the market aims to increase demand on the other side of the market. Intuitively, sacrificing profits to prevent market entry allows the incumbent in a dominant position to enjoy monopoly profits on the other side. Belleflamme and Peitz (2019a, b)[7] argue that under positive cross-group externalities, the lack of information about the prices of participants on the other side of the market by some users on one or both sides of the market make the elasticity of demand lower.

Previous literature has analyzed the price competition behavior among digital platforms, most of which use pricing as the primary means of competition. Miao (2022)[8] investigates the effect of fees paid to the platform on the pricing of ancillary goods when firms sell basic and ancillary goods through the platform. They find that lower costs for ancillary goods may increase the price of basic goods. Arnold et al. (2011)[9] analyses how asymmetric market shares affect firms' advertising and pricing decisions. They find that firms with smaller markets of loyal customers advertise more aggressively than firms with larger customer markets but are not competitive on price. Miao (2022)[10] examines the effect of fees paid to the platform on the pricing of ancillary goods when firms sell basic and ancillary goods through the platform. They found that lower costs for ancillary goods may increase the price of basic goods. Jin et al. (2015)[11] studied two-sided markets from a pricing theory perspective, and they found that consumer prices decrease with the competition. Gil and Kim (2021)[12] conducted a study on competition in the U.S. airline industry, and they found that increased competition may increase consumer surplus as non-merging incumbents improve quality and convenience while keeping prices constant.

In a two-sided market, users' utility depends not only on the number of users on the other side but also on the quality offered by the other side. According to Gil and Kim (2021)[13], companies may respond to increases in competition by either raising or lowering quality, depending on how sensitive customers are to quality in relation to costs. This is because providing quality is expensive and has an unpredictable influence

[6] Vasconcelos, H. (2015) "Is exclusionary pricing anticompetitive in two-sided markets?," International Journal of Industrial Organization, 40, pp. 1–10.

[7] Belleflamme, P. and Peitz, M. (2019) "Price disclosure by two-sided platforms," International Journal of Industrial Organization, 67, p. 102529.

[8] Miao, C.-H. (2022) "The pricing of ancillary goods when selling on a platform," International Journal of Industrial Organization, 83, p. 102847.

[9] Arnold, Michael. et al. (2011) "Asymmetric market shares, advertising and pricing: Equilibrium with an information gatekeeper," The Journal of Industrial Economics, 59(1), pp. 63–84.

[10] Miao, C.-H. (2022) "The pricing of ancillary goods when selling on a platform," International Journal of Industrial Organization, 83, p. 102847.

[11] Jin, G.Z. and Rysman, M. (2015) "Platform pricing at sports card conventions," The Journal of Industrial Economics, 63(4), pp. 704–735.

[12] Gil, R. and Kim, M. (2021) "Does competition increase quality? evidence from the US airline industry," International Journal of Industrial Organization, 77, p. 102742.

[13] Gil, R. and Kim, M. (2021) "Does competition increase quality? evidence from the US airline industry," International Journal of Industrial Organization, 77, p. 102742.

on consumer demand. Gabrielsen et al. (2022)[14] examine the incentives of national retail chains to adopt national prices in local markets of different sizes and competitive intensities. They argue that in the absence of quality competition, chains will never adopt national pricing. However, if quality competition is sufficiently intense, an equilibrium exists in which at least one chain adopts national pricing.

In many markets, sellers offer these services in a differentiated manner to distinguish themselves from their competition. Wang (2021)[15] investigates the impact of quality screening of platforms on end-user engagement. He finds that sellers with high observable quality may be willing to work with low visual quality to enjoy network effects or to avoid competing offerings. Quality screening increases the total utility consumers receive from the platform's entire seller population while helping it attract more consumers and increase its market share. However, Widmer et al. (2020)[16] argue that the impact of sellers of quality differentiated services on the efficiency of both sides of the market. He argues that an increase in quality differentiation reduces market efficiency; however, this inefficiency disappears as market size increases.

While previous literature has focused chiefly on competition between platforms or partnerships between digital platforms and suppliers and channel providers, this paper examines two firms with differentiated platform quality from the perspective of digital platforms.

3 Model Setup

Assume that there is a platform which hosts two third-party sellers, A and B, each providing one product. The products are vertically differentiated in their quality levels. Without loss of generality, suppose that seller A sells a high-quality product while seller B sells a low-quality product, i.e., $q_A > q_B > 0$. In addition, assume that sellers A and B are respectively located at 0 and 1 on a Hotelling line with a unit length. Consumers are uniformly distributed on the line and each consumer buys at most one product.

The utility that customers get from purchasing product A and B is given by

$$\begin{cases} U_A = U - xt - p_A + q_A \\ U_B = U - (1-x)t - p_B + q_B \end{cases} \tag{1}$$

where U is the constant baseline utility,[17] x is the location of the consumer, t is the travel cost, and p_A and p_B are respectively sellers A and B's price. To ensure a positive

[14] Gabrielsen, T.S., Johansen, B.O. and Straume, O.R. (2022) "National pricing with local quality competition," Journal of Economics & Management Strategy [Preprint].

[15] Wang, J. (2021) "Do birds of a feather flock together? platform's quality screening and end-users' choices theory and empirical study of online trading platforms," International Journal of Industrial Organization, 75, p. 102698.

[16] Widmer, T., Karaenke, P. and Sugumaran, V. (2020) "Two-sided service markets: Effects of quality differentiation on market efficiency," Managerial and Decision Economics, 42(3), pp. 588–604.

[17] We assume that U is large enough to ensure that the market is fully covered.

equilibrium price, we assume that the quality difference ($q_A - q_B$) is not too large, i.e., $q_A - q_B < 3t$.[18]

The platform charges a commission fee (a percentage of the listing price) from sellers. We use $\rho \in (0, 1)$ to denote the commission fee. We assume that the platform's commission fee and sellers' prices and quality levels are common knowledge to consumers, sellers A and B, and the platform.

4 Equilibrium Analysis

Solving $U_A = U_B$ for x yields the location of the marginal consumer who is different between buying from seller A and buying from seller B.

$$U - xt - p_A + q_A = U - (1 - x)t - p_B + q_B. \tag{2}$$

Equation (2) can be used to find the market share of each of the two sellers. From Eq. (2), we can obtain seller A's demand given by

$$x = \frac{1}{2} - \frac{p_A - p_B}{2t} + \frac{q_A - q_B}{2t}, \tag{3}$$

and seller B's demand

$$1 - x = \frac{1}{2} + \frac{p_A - p_B}{2t} - \frac{q_A - q_B}{2t}. \tag{4}$$

Thus, the expected profit of the two sellers is given by

$$\Pi_A = x \cdot p_A = \left(\frac{1}{2} - \frac{p_A - p_B}{2t} + \frac{q_A - q_B}{2t}\right)p_A, \tag{5}$$

$$\Pi_B = (1 - x) \cdot p_B = \left(\frac{1}{2} + \frac{p_A - p_B}{2t} - \frac{q_A - q_B}{2t}\right)p_B. \tag{6}$$

Each seller chooses a price to maximize their respective expected profit. The following proposition summarizes the results.

Proposition 1. The equilibrium prices of the two sellers are given by $p_A^* = \frac{3t + q_A - q_B}{3}$ and $p_B^* = \frac{3t - q_A + q_B}{3}$; p_A^* and p_B^* respectively increases and decreases in the quality difference $q_A - q_B$.

Proof: Solving the first order condition $\frac{\partial \Pi_A}{\partial p_A} = 0$ and $\frac{\partial \Pi_B}{\partial p_B} = 0$ yields p_A^* and p_B^*. One can easily check that they satisfy the second order condition, implying that they are local maximizers. Thus, p_A^* and p_B^* constitute the equilibrium. In addition, it is obvious that p_A^* and p_B^* respectively increases and decreases in the quality difference $q_A - q_B$.

This proposition illustrates two points. First, a higher travel cost t increases the equilibrium prices p_A^* and p_B^* because the price competition is reduced. Second, a higher quality difference ($q_A - q_B$) increases p_A^* and decreases p_B^*. This is because a larger value

[18] See the equilibrium prices in Proposition 1.

for $q_A - q_B$ strengthens the competitive advantage of seller A whereas it weakens seller B, resulting a higher p_A^* and a lower p_B^*.

Corollary 1. Sellers A and B's equilibrium profits respectively increase and decreases in $q_A - q_B$.

Proof: Plugging the equilibrium prices p_A^* and p_B^* into (3) yields $x^* = \frac{1}{2} + \frac{q_A - q_B}{6t}$. Plugging x^* into (5) and (6), one can easily verify that the equilibrium profits are given by $\Pi_A^* = \frac{(3t + q_A - q_B)^2}{18t}$ and $\Pi_B^* = \frac{(3t - q_A + q_B)^2}{18t}$. Thus, it is obvious that the statement in Corollary 1 holds.

This corollary illustrates that the quality difference $q_A - q_B$ plays the same role on sellers' profits as it does on their prices. This is because a higher quality difference increases seller A's price (see Proposition 1) and its demand (a larger x^*), implying a higher profit for seller A. The lower price and reduced demand lead to a lower profit for seller B.

Now, we explore the incentive of the platform. The platform's expected profit is given by

$$\Pi_\rho^* = \rho\left(\Pi_A^* + \Pi_B^*\right). \tag{7}$$

Thus, under the commission fee contract, the expected profit of the platform is equal to a percentage of the total profits of sellers A and B. That is, under (7), the platform has an incentive to keep sellers' competition in check. The following proposition summarizes the results.

Proposition 2. The platform's profit is given by $\Pi_\rho^* = \rho\left[t + \frac{(q_A - q_B)^2}{18t}\right]$ and increases in q_A and decreases in q_B.

Proof: Plugging them into (7) yield the platform's equilibrium profit which is given by $\Pi_\rho^* = \rho\left[t + \frac{(q_A - q_B)^2}{18t}\right]$. One can easily verify that Π_ρ^* increases in q_A and decreases in q_B.

The key message illustrated by this proposition is that the platform's optimal profit increases in sellers' quality difference $(q_A - q_B)$. Specifically, a larger quality difference strengthens seller A's the competitive advantage, letting it charge a higher price than that charged by its low-quality competitor, seller B (see Proposition 1). Thus, although seller B's profit is reduced, seller A earns a higher profit, and A's increased profit is greater than B's reduced profit, making the total profit higher. This benefits the platform through the commission fee charged from sellers A and B. Thus, a higher quality difference $(q_A - q_B)$ increases the platform's profit.

The results of this proposition shed light on quality screening of digital platforms. For example, Alibaba and JD are known as the dominating platforms in China. However, both platforms are also known to provide low quality products. Although the top managers like Jack Ma of Alibaba swears to punish sellers that provide low-quality products as police do to punish drunk driving, no concrete actions have been taken to resolve the quality issue. The results of Proposition 2 might provide a potential interpretation to why a strategic platform might not want to screen out low-quality products from its shopping environment because keeping some low-quality products might improve the platform's profits. However, doing so reduce the low-quality seller (seller B)'s profit and price (see Corollary 1).

5 Conclusion

This paper provides a parsimonious equilibrium model that attempts to explain why keeping low-quality products might benefit a strategic platform. Our results show that the platform's profit increases when the quality gap is greater. Under this situation, the high-quality seller's profit is improved whereas that of the low-quality seller is reduced. Thus, the platform has an incentive to keep low-quality product in its shopping environment to keep the quality gap sufficiently large, although doing so might reduce the low-quality seller's profit.

There are some issues remaining for interested researchers to resolve for future work. First, future study can explore how the product cost—which has been abstracted away—can affect the main results. Second, it might be interesting to explore how platforms' competition plays a role in their incentives on keeping sellers' competition in check. Third, interested researchers might want to endogenize sellers' quality competition in addition to their price competition, and examine how this might affect the main results.

Acknowledgements. I would like to thank Prof. Lin Liu for his support. He is a conscientious and enthusiastic supervisor who has provided me with continuous guidance and encouragement throughout the paper writing process.

References

Amelio, A., Giardino-Karlinger, L. and Valletti, T. (2020) "Exclusionary pricing in two-sided markets," International Journal of Industrial Organization, 73, p. 102592.

Arnold, Michael. et al. (2011) "Asymmetric market shares, advertising and pricing: Equilibrium with an information gatekeeper," The Journal of Industrial Economics, 59(1), pp. 63–84.

Belleflamme, P. and Peitz, M. (2019) "Managing competition on a two-sided platform," Journal of Economics & Management Strategy, 28(1), pp. 5–22.

Belleflamme, P. and Peitz, M. (2019) "Price disclosure by two-sided platforms," International Journal of Industrial Organization, 67, p. 102529.

Gabrielsen, T.S., Johansen, B.O. and Løvmo, T.L. (2018) "Resale price maintenance in two-sided markets," The Journal of Industrial Economics, 66(3), pp. 570–609.

Gabrielsen, T.S., Johansen, B.O. and Straume, O.R. (2022) "National pricing with local quality competition," Journal of Economics & Management Strategy [Preprint].

Gil, R. and Kim, M. (2021) "Does competition increase quality? evidence from the US airline industry," International Journal of Industrial Organization, 77, p. 102742.

Jin, G.Z. and Rysman, M. (2015) "Platform pricing at sports card conventions," The Journal of Industrial Economics, 63(4), pp. 704–735.

Loginova, O. (2021) "Price competition online: Platforms versus branded websites," Journal of Economics & Management Strategy, 31(2), pp. 259–283.

Mariotto, C. and Verdier, M. (2020) "Platform–Merchant Competition for sales services," Journal of Economics & Management Strategy, 29(4), pp. 834–853.

Miao, C.-H. (2022) "The pricing of ancillary goods when selling on a platform," International Journal of Industrial Organization, 83, p. 102847.

Vasconcelos, H. (2015) "Is exclusionary pricing anticompetitive in two-sided markets?," International Journal of Industrial Organization, 40, pp. 1–10.

Wang, J. (2021) "Do birds of a feather flock together? platform's quality screening and end-users' choices theory and empirical study of online trading platforms," International Journal of Industrial Organization, 75, p. 102698.
Widmer, T., Karaenke, P. and Sugumaran, V. (2020) "Two-sided service markets: Effects of quality differentiation on market efficiency," Managerial and Decision Economics, 42(3), pp. 588–604.
Zennyo, Y. (2022) "Platform encroachment and own-content bias," The Journal of Industrial Economics, 70(3), pp. 684–710.