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Optimal channel strategy of luxury brands in the presence of online marketplace and copycats

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Abstract

The strategic interaction between authentic luxury brands and their copycats has evolved since the proliferation of online marketplaces. Using a game-theoretic framework, we examine how an authentic luxury brand, observing the strategic behavior of its competing copycats, should make its optimal entry decision to a *third-party* online marketplace. Our findings reveal that the authentic luxury brand does not sell on the online marketplace when either the quality or the physical resemblance of the copycat to the authentic luxury brand is high. This contributes to the related literature by offering an explanation for the increasing quality of copycats amid the e-commerce boom —improving the quality of the copycat can deter the authentic luxury brand from selling on the online marketplace. Furthermore, by comparing our equilibrium outcome with the benchmark case where the authentic luxury brand does not consider selling on the online marketplace at all, we show that the authentic luxury brand's potential entry to the online marketplace is sufficient to induce the copycat to improve its quality and lower its price, thereby improving the aggregate consumer surplus. In addition, the online marketplace can always be better off allowing the entry of the copycat if there is no external enforcement against copycats. We show that our key results are valid in various extensions and they offer multiple managerial implications.

Keywords: supply chain management, conspicuous consumption, copycats, online marketplace, channel strategy

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1 Introduction

The rapid expansion of online marketplaces in recent years has rendered it an important element in understanding the channel strategy of firms, particularly in the emerging economies. For instance, China is home to 730 million Internet users and accounts for 40% of global retail e-commerce. According to Wortzel, this is only the beginning of China's growth in the e-commerce space. [1]

Luxury brands, comprising of leather goods, jewellery and watches, are products that offer *both* a consumption value for consumers and social benefits referred to as status utility in this paper. Status utility arises from the pleasure of signaling one's wealth level through the consumption of the same luxury brands as others of similar wealth levels. As a result, luxury brands are often victims of copycats. The growth of e-commerce has brought with it an unprecedented boom in the copycats of luxury brands with an estimated 40% sales in luxury fakes taking place online (Fontana et al. 2019). Back when copycats were sold in small, obscure shops, they might be considered "too small to be a threat" in the eyes of luxury brands. The rise of e-commerce has enabled these copycats which are traditionally sold offline to piggyback on the tremendous benefit that online marketplaces offer to reach a broader range of consumers. Sidney Toledano, president and chief executive of Dior, called it "a new danger". "Before e-commerce, you had to go to a special market - somewhere in Tokyo, Paris, London, New York, before [the copycat] was in front of you," he said. "Now, it's on your screen. And sometimes, it's mixed with the real things."

While the copycats were quick to embrace online marketplaces as a preferred sales channels since their onset, the relationship between online marketplaces and luxury brands has traditionally been hostile, to say the least. In November 2015, Gucci, Yves Saint Laurent and other luxury brands sued Alibaba Group for promoting the sale of copycats on its online marketplace Taobao, one of the world's biggest online marketplace. Under pressure, Alibaba vowed to fight copycats by joining International AntiCounterfeiting Coalition (IACC) in April 2016. However, this membership decision evoked even stronger protests from some luxury brand members with Gucci and Michael Kors announcing that they will quit IACC immediately. [2] Until then, these luxury brands had never considered selling their product on Taobao. The relationship between the luxury brands and Alibaba took a surprising turn in January 2017 when the latter illustrated its determination to fight copycats by suing two merchants selling knockoffs on Taobao. By August 2017, Gucci dropped its prolonged lawsuit against Alibaba and partnered the latter in resolving the issue of online copycats as Alibaba welcomed more luxury brands to set up online stores on its marketplace. [3] In short,

1. http://fortune.com/2017/12/04/china-ecommerce-growth. Accessed April, 9, 2018. https://www.thedrum.com/news/2018/08/20/china-e-commerce-market-forecast-reach-18tn-2022. Accessed December, 7, 2018.

2. http://blogs.wsj.com/chinarealtime/2016/06/15/jack-ma-says-fakes-better-quality-and-better-price-than-the-real-names/. Accessed July 22, 2020.

3. http://www.reuters.com/article/us-kering-alibaba/kering-drops-suit-against-alibaba-to-co-operate-on-counterfeits-idUSKBN1AJ1UN . Accessed on July 10, 2022

in the early days of e-commerce, luxury brands, selling products directly to consumers in their opulent department stores, shied away from e-commerce marketplaces because of the presence of copycats. However, the tremendous success of these e-commerce marketplaces has led many luxury brands to reconsider selling on these marketplaces.[4] The above shows that copycats have been present on online marketplaces long before the luxury brands and therefore luxury brands have to take the presence of copycats into consideration when making their entry decision into these online marketplaces.

In general, should an authentic luxury brand such as Gucci and Michael Kors, best known for their stylishly luxurious shopping experience in their boutiques, adopt an online marketplace as a sales channel in addition to its direct channel? Adopting this channel has the potential to generate enormous profits for the authentic luxury brands, the scale of which cannot be ignored. Nonetheless, authentic luxury brands are also cognizant of the risk in adopting these online marketplaces as a sales channel, one of which involves the threats from online copycat sellers as seen from the lawsuits filed by luxury brands against the sale of copycats on Taobao. Much as Taobao has committed effort to fight copycats, the outcomes remain to be seen.

To add salt to the wound, the quality of copycats has been improving. In 2016, Jack Ma, then executive chairman of Alibaba Group, said, "the problem is [that] the fake products today are of better quality and better price than the real names."[5] Extant literature on copycats of luxury brands such as Gao et al. (2016) however, has found that low-quality copycats of luxury brands are more likely to successfully enter the market as they pose less threat to the authentic luxury brands, which has generally been true in the past decades. Yet, the increasing quality of copycats in the last few years, clearly contradicts this finding. Could the increasing popularity of online marketplaces play a role in contributing to this quality change, amid all the other factors such as production technology upgrading? How does the proliferation of online marketplace such as Amazon and Taobao affect the strategic interaction between a luxury brand and its copycat?

Motivated by the above considerations regarding the entry of luxury brands into the online marketplace, we examine the following research questions in this paper. Firstly, under what conditions should an authentic luxury brand adopt an online marketplace in the presence of copycats? Secondly, does a profit-driven online marketplace have incentives to deter the entry of the copycat? Thirdly, how do the quality of copycats and their physical resemblance to the luxury brand affect the channel decision of the authentic firm? Finally, what is the impact on consumer surplus as luxury brands contemplate the adoption of the online marketplace?

4. https://luxurylaunches.com/otherstuff/should-luxury-brands-embrace-amazon-to-sell-their-products.php . Accessed on July 15, 2022.

5. https://blogs.wsj.com/chinarealtime/2016/06/15/jack-ma-says-fakes-better-quality-and-better-price-than-the-real-names/. Accessed on July 22, 2020.

1.1 Overview of Results

Using a two-period game between the authentic luxury brand, the copycat seller and the online marketplace, we derive the following results.

Firstly, we show that the authentic luxury brand which has its own direct channel does *not* sell on the online marketplace if and only if the quality of the copycat or its physical resemblance to the authentic luxury brand is high. This is because a high physical resemblance or quality renders the copycat a close substitute to the authentic brand, leading to intensive pricing competition on the online marketplace. In this case, the authentic luxury brand is better off not selling on the online marketplace to preserve its profitability in its direct channel. Our finding thus offers an alternative explanation for the increasing quality of the copycats as e-commerce proliferates, i.e., a high-quality copycat, as a close substitute of the luxury brand, is more able to deter the authentic luxury brand from the online marketplace. This finding contrasts with existing literature (Gao et al. 2016) which find low-quality copycats more likely to achieve successful market entry. Specifically, Gao et al. (2016) focus on the interaction between the authentic luxury brand and copycats in the earlier days when traditional market dominates and the role of online marketplace is less prominent. Hence, the authentic luxury brand is clearly the first-mover into the market and accommodates the copycats if the latter is a poor substitute, thus the low-quality of copycats. However, the presence of the online marketplace in our model, enables the copycat to become the first-mover into the online marketplace, as seen in the early days of e-commerce. This not only opens up an additional channel for the copycat but forces the authentic luxury brand, which has been slow to embrace third-party online marketplaces, to become a second-mover in the online marketplace. In other words, the online marketplace plays an important role in modifying the interaction between the authentic luxury brands and copycats. As an early adopter selling on the online marketplace, a high-quality copycat, as a close substitute of the authentic luxury brand, serves as a natural entry deterrent and is therefore able to preserve its position as a monopoly in the online marketplace.

Secondly, the marketplace always chooses a commission fee to accommodate the entry of the copycat firm to the online marketplace in the absence of external pressure or regulatory framework. Thus, relying on self-policing by online marketplaces (such as Taobao) to deter copycats is untenable and support from regulation and law enforcement is essential to successfully deter copycats.

Thirdly, mere consideration of the online marketplace by the authentic luxury brand incentivizes the copycat to increase its quality to deter the authentic luxury brand, thereby increasing consumer surplus. Again, this complements extant literature (e.g. Gao et al. 2016) which find that consumer surplus is improved in the presence of copycats only if the quality of copycats is high. The presence of an online marketplace has turned the table for the copycat when it jumped on the bandwagon of e-commerce in its early days to seize the opportunity as an incumbent in the distinct sales

channel. By increasing its quality, the copycat firm is developing an entry deterrence strategy as the authentic luxury brand ponders selling on the online marketplace.

These findings contribute to the extant literature in several ways. Firstly, we examine how an additional channel, in the form of an online marketplace, changes the nature of strategic interaction between the authentic luxury brand and the copycat. Secondly, we offer an alternative explanation for the increasing quality of copycats and the implications for consumer surplus.

2 Literature Review

Our paper is closely related to two streams of research, namely, conspicuous consumption and copycats (or counterfeits) as well as channel strategies. Consumers of status goods signal their membership in certain social groups according to the social class of the existing users of these status goods (Muniz and O'Guinn 2001), the desirability of which, is lower if such products are purchased by more people from the undesirable social class (Escalas and Bettman 2005 and Han et al. 2010). Amaldoss and Jain (2005) examine the extent in which consumer's purchase decision of status goods depends on their sensitivity towards exclusivity as well as conformity, while Amaldoss and Jain (2015) analyze the effects of social influence and competition on the branding of conspicuous goods. Pun and DeYong (2017) investigate competition with counterfeits when customers are strategic. Deviating from these studies, our model captures the interdependence of consumer social utility between groups of consumers depending on the product characteristics (quality and physical resemblance) of their consumption choice.

Qian (2008, 2014) and Qian and Xie (2014) empirically identify the effect of counterfeits on the authentic firms in terms of the pricing strategy and impact on sales and innovation incentives. Parallel to these empirical studies, Grossman and Shapiro (1988) show that counterfeits allow consumers to unbundle the status and quality attributes of the brand-name products, and alter the competition among oligopolistic trademark owners. Qian et al. (2015) uncover the nature of product differentiation in the searchable and experiential dimensions in response to deceptive counterfeits. Sun et al. (2010) discuss how an authentic firm can make its component-based technological transfer decision as a means of deterrence strategy on potential imitators. Complementing these papers, Gao et al. (2016) find that copycats that are of a high physical resemblance but low product quality are more likely to defy the deterrence of the incumbent luxury brand, Li (2018) examine the impact of status utility on vertical extension decisions for status goods, and Sun et al. (2022) study how consumer status-seeking and strategic waiting behavior affects the competition between an authentic firm and its copycats.

Several papers investigate various anti-counterfeit approaches, such as quality improvement strategy (Zhang et al. 2012), supply chain restructuring (Zhang and Zhang 2015), use of a fighter brand (Hou et al. 2020), and implementation of an Intellectual Property agreement (Ghamat et

al. 2020). Cho et al. (2015) examine the dependence of the effectiveness of anti-counterfeiting strategies on the type of counterfeits while Sun et al. (2020) investigate an online marketplace's optimal effort level in combating counterfeits when an authentic firm always sells in the online marketplace. Yi et al. (2020) consider a supply chain where a brand owner sells through a retailer who faces competition from counterfeits. These papers have been silent in at least one of the following dimensions: consumer's status utility, the authentic luxury brands' preference for direct channels and the online marketplace. As highlighted in Chen et. al (2020), one of the interesting research questions regarding online marketplace is the threat from counterfeits.

It is worth highlighting that, in the stream of research regarding counterfeits, counterfeits are classified into two categories - "deceptive counterfeits" and "non-deceptive counterfeits." A deceptive counterfeit is one that a consumer believes to be authentic at the time of purchase (e.g., Qian et al., 2015, Cho et al., 2015, Zhang and Zhang, 2015, Sun et al., 2020, etc.). For a non-deceptive counterfeit, a consumer is aware that the product is not authentic at the time of purchase and can distinguish it from the authentic product primarily via the product information provided (e.g., Zhang et al. 2012, Gao et al., 2016, Hou et al., 2020, Yi et al. 2020, etc.). It is synonymous with the term "copycat". In our paper, we study non-deceptive counterfeits and use the term copycat throughout.

Our paper is also related to the literature on dual-channel supply chains (Balasubramanian 1998, Bernstein et al. 2008, Kumar and Ruan 2006, Chen et al. 2008, Huang and Swaminathan 2009, Hsiao and Chen 2013, Gao and Su 2017). Cattani et al (2006) show that a manufacturer can benefit from a direct channel under some conditions. Ha et al. (2016) explore the impact of manufacturer encroachment on quality when the upstream manufacturer enters the downstream market and directly competes with its downstream retailer. Hu et al. (2013), however, examine an authorized versus an unauthorized channel in a grey market and find that it can be optimum for the supplier to induce gray market diversion through an all-unit discount. Our study adds to the extant literature by integrating existing studies on status goods and copycats with the literature on dual channel. Specifically, the presence of many stylish boutiques suggests that the luxury brand always adopts the direct channel while the online marketplace is a strategic channel decision for the authentic luxury brand. Furthermore, the online marketplace differs from a retailer in the traditional channel literature as the marketplace does not determine the product price but earns a commission from successful sales. To our best knowledge, this is the first study that incorporates a direct channel for the authentic luxury brand, endogenizes the decisions of an online marketplace, embeds the characteristics of status goods and their copycats, and explores the impact of copycat product characteristics on the optimal channel strategy of the luxury brand. Our paper not only reflects the recent trend of e-commerce in luxury products and its impact on the channel strategy

of luxury brands, it also offers an explanation for the recent change in the quality of copycats.

The rest of the paper is organized as follows. In §3, we describe the framework followed by the analysis before we present the findings in §4. After detailing five extensions in §5, we discuss and conclude in §6. All the proofs are in the E-Companion.

3 Base Model

We examine a two-period game with observed actions between an authentic luxury brand seller A which sells a *newly launched* authentic product, a copycat seller C and an online platform M with N (normalized to 1) infinitesimal consumers. Although we consider one copycat seller, our findings can be generalized to multiple symmetric copycat sellers. Unlike a typical product, luxury brands exhibit distinctive characteristics which we describe below.

Price Trends and Brand Equity. Generally, luxury brands do not want to be associated with discounts. Although many brands do have outlet stores, the top brands such as Louis Vuitton, Hermès – the ultimate status symbol and Tiffany & Co., never offer any sale.[6] In fact, luxury brands have gone to great lengths to preserve their elite status, including so far as burning excess inventory rather than sully the brand's reputation by posting a sale price.[7] To provide further empirical support for the price trends of luxury brands, we tracked the prices of 30 newly launched products of luxury brands (Gucci, Louis Vuitton, Hermès, Cartier, and Bulgari) over a period of three months on their official websites (direct channel). We observe that the prices of 28 products remain the same while the prices of two Gucci leather bags increased by about 3% (Table 1). More importantly, the prices of the products on the direct official channel do not change even if some brands sell their products in the online marketplaces subsequently. The detailed data is provided in the E-Companion.

Observation 1. (Price Trends of Authentic Luxury Brands.) *Over a period of more than 90 days, the prices of the authentic brands in their direct channel remain the same regardless of whether these brands subsequently sell on third-party online marketplaces or not.*

New Products	Gucci		Louis Vuitton		Hermès		Cartier		Bulgari	
	# of Products	Average % Price Change	# of Products	Average % Price Change	# of Products	Average % Price Change	# of Products	Average % Price Change	# of Products	Average % Price Change
Bags	4	+3%	4	0	3	0	-	-	1	0
Jewelry	2	0	2	0	2	0	1	0	4	0
Accessories	3	0	3	0	-	-	-	-	1	0

Table 1 – Average Percentage Price Change Over 90 Days

Direct versus Indirect Channel. In reality, luxury brands boast of extravagant direct channels.[8]

6. https://www.businessinsider.com/stores-nothing-ever-on-sale-2019-5. Accessed April 19, 2021.

7. https://www.forbes.com/sites/gregpetro/2020/05/21/will-the-coronavirus-finally-force-luxury-brands-to-discount/?sh=5874ab0f148d. Accessed April 19. 2021.

8. For example, the largest Louis Vuitton boutique in the world is housed in a Crystal Pavilion floating on the Marina Bay in Singapore.

These direct channels are predominantly brick-and-mortar stores. A recent survey also find 63% of Generation Z respondents prefer physical shopping channels to online marketplaces as they offer more personal customer service and a better shopping experience.

To capture this, we model A as having *two* sales channels, namely, a direct channel (either brick-and-mortar or online) and an indirect channel via the online marketplace M (such as Amazon.com, eBay, Taobao.com, JD.com). Copycats, on the other hand, have seen an increasingly larger proportion of its sales via online marketplaces owing to the potential reach, relatively lower cost, and lower risk of being caught (and fined) compared to operating a physical store.[9] Thus, in our model, C either sells on M or not at all. When a firm sells on M, it pays a commission that is determined by M. Although an online marketplace offers convenience to the consumers, the direct channel offers a stylishly luxurious shopping experience in their boutiques. Both the direct and indirect channels offer positive experiences in their respective ways. As these experiences are not substitutable, a consumer's channel preference is not prominent in our setting. Following Ha et al. (2016), Guan et al. (2020) and Esenduran et al. (2020), we abstract away from the consumer channel-specific preference in the base model. In Extension 2, we follow Balasubramanian (1998) and Chen et al. (2008) to incorporate consumer channel preference to show that our results remain robust.

Product Characteristics and Marginal Cost of Production. The quality of the authentic luxury brand, A, denoted by q_A, is normalized to 1. We use c_A to denote the marginal cost of production for A. Following Gao et al. (2016), we characterize the copycat, C, along two dimensions, namely, quality, q (< 1) and physical resemblance to the authentic product, α ($\in [0, 1]$). The quality relates to the product functionality, while the level of physical resemblance refers to the probability that C is mistaken to be authentic by a casual observer in the community. In our framework, we assume that q and α are independent and exogenously given although the key findings can be generalised when q is correlated to α. Furthermore, C is a close substitute of A if either q or α is close to 1. Following the copycat literature (e.g. Gao et al. (2016)) which assumes that it is less costly to achieve high physical resemblance than quality as the latter involves craftsmanship, materials etc. that are costly, we also assume that the cost associated with α is negligible. Therefore, the marginal production cost of C mainly captures the cost related to quality, and we model it as a quadratic function of quality q, denoted as $cq^2/2$ ($c > 0$), which is a common functional form adopted in the supply chain literature (e.g., Shi et al. 2013).

M's Pricing Strategy. In line with reality and extant literature on marketplaces (Mantin et al. 2014 and Zhang et al. 2019), M sets a per-unit commission fee f_i (≥ 0) for each unit of product sold by i ($i = A, C$). As our focus is on copycats (i.e., *non-deceptive* counterfeits), the prices of A

9. https://jingdaily.com/from-handbags-to-wine-chinas-luxury-counterfeiters-flee-to-wechat/. Accessed om July 24, 2021.

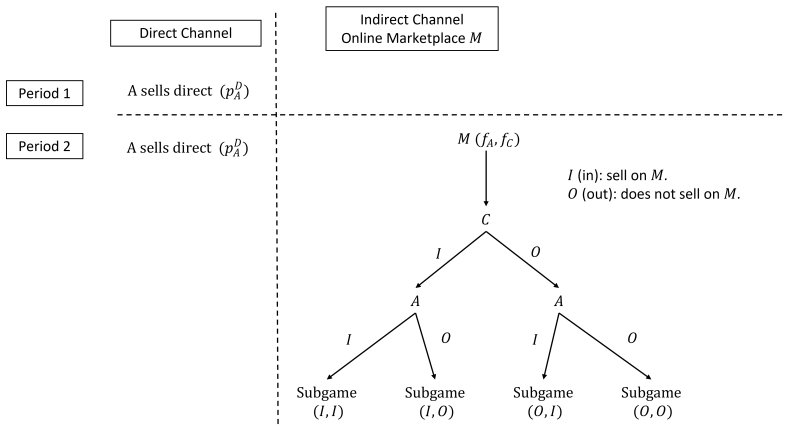

Figure 1 – Sequence of the Game

and C are potentially different. Since commission rates in online marketplaces are generally tiered according to the price of the products, it is possible that f_A is different from f_C. Furthermore, commissions are publicly available, so they are observable by both A and C before they decide whether to sell on M. [10]

3.1 Sequence of the Game

To derive the optimal channel strategy of A in the presence of M and C, we examine an entry-deterrence game that reflects the idiosyncratic features in the luxury goods market as described earlier. To capture the time lag between the exclusive launch of the authentic luxury brand in its direct channel and the sale of potentially A and C on M, we consider a 2-period model (Figure 1).

In reality, authentic luxury brands launch new products in their direct channels while copycats sell their wares online shortly *after* (Gao et al. 2016). This implies that luxury brands depend predominantly on their direct channels to sell their new products. Furthermore, as discussed earlier, the authentic firms are known to be less spontaneous than the copycats in adopting the online marketplace as a sales channel. [11] Our model captures the occurrence of events described in the introduction by having the authentic firm launch its product first on its direct channel, following which, the copycat firm determines its entry on the online marketplace before the authentic firm does. In the following, we describe the sequence of events formally.

In Period 1, A launches a new product on its direct channel at price p_A^D, which is available throughout the two periods at the same price. This assumption aligns with the observation that

10. The tier-based commissions (charged based on the price of the item) by the online marketplaces are publicly available. For Taobao, please access: https://www.taodianjia.com/article/17872.html. For Amazon, the details are also accessible with no restrictions, please see: https://services.amazon.com/selling/pricing.html. Both accessed on November 15, 2020.

11. https://luxe.digital/business/digital-luxury-reports/online-luxury-retail-transformation/. Accessed on November 20, 2020.

price adjustments for luxury brands in their direct channel are extremely rare (Observation 1). This assumption is also commonly adopted in related literature (Gao et al. 2016). For analytical tractability, we assume in the base model that p_A^D is exogenous. In Extension 5, we endogenize p_A^D and show that the key results are preserved.

In Period 2, M first announces the commission fees, f_i for i ($i = A, C$). Then, C observes f_i and decides whether to sell on M. If C sells on M, it sets price p_C. Otherwise, there is no copycat in the market. After A observes C's decision on M, A decides whether to sell on M and if so, the price p_A^M. We model A as a second-mover in the adoption of M to reflect the spontaneity of C on M relative to A as observed in reality. In Extension 1, we consider the case where A is as spontaneous as, or more spontaneous than C about selling on M and show that our results are robust. As most copycats are sold very shortly after the launch of the authentic brands (Gao et al. 2016), the authentic luxury brand makes its channel decision within the time window in which its direct channel price remains the same. However, p_A^M can potentially be different from the direct channel price, p_A^D.

In our framework, the consumers are strategic and forward-looking, i.e., they compare their respective surplus between purchasing A at price p_A^D in Period 1 and waiting until the next period to purchase C at price p_C (on M, if available) or A (either at price p_A^D in the direct channel or on M at price p_A^M, if available). Following Rao and Schaefer (2013), we use δ ($\in [0, 1]$) to denote the discount rate between two periods, which captures the degree of patience in the consumers' inter-temporal purchasing decision. When δ is close to zero (one), it implies that consumers perceive the duration between two periods to be long (short) so the utility in the current period outweighs (is less than) the utility in the future periods. The notations are summarized in Table 2.

3.2 Consumption Utility and Status Utility for Consumers

For ease of exposition, we refer to a consumer who purchases a product as a buyer. To avoid confusion, a buyer is also specifically referred to as a buyer of A or a buyer of C. A consumer who does not purchase any product is referred to as a non-buyer. Note that whether a consumer is a buyer of A, a buyer of C, or a non-buyer is the consumer's endogenized decision by weighing the utility of each purchase option and optimally choosing the one that maximizes the utility, which we detail below. Following Rao and Schaefer (2013) and Gao et al. (2016), consumers derive two types of utility, namely, consumption utility that is related to product quality, and status utility that is dependent on the wealth level of the consumers with similar purchase decisions.

Consumption Utility for Buyers and Non-buyers. In the operations management and marketing literature, the vertical differentiation model has been widely adopted to capture the quality difference between authentic brands and their copycats in the consumer's consumption utility (e.g.,

Parameters	
$\alpha \in (0,1)$	Level of physical resemblance of C to A
q (<1)	Quality of C
c_A (≥ 0)	Unit marginal production cost of A
$cq^2/2$ (≥ 0)	Unit marginal production cost of C
λ $(\in (0,1])$	Consumer's sensitivity to status utility
δ $(\in [0,1])$	Discount rate of consumer's utility
ϕ_1	$\equiv \lambda(\alpha - q)/2$
p_A^D	Unit price of A in direct channel
Decision Variables	
f_A (f_C)	Unit commission fee charged by M to i, $i = A, C$
p_A^M	Unit price of A in channel M
p_C	Unit price of C
Parameters in Extensions	
β	Additional (dis-)utility specific to channel M
ϵ	Embarrassment cost to buyers of C
κ	Fixed per-unit operational cost of A in direct channel

Table 2 – Summary of Notations

Zhang et al. 2012, Zhang 2016, Zhang and Zhang, 2015, Li et al. 2016, Pun and DeYong, 2017, Hou et al 2020, Ghamat et al., 2020, Li et al., 2021, Pun et al, 2021, Sun et al, 2022). Following this stream of literature, we model a consumer's willingness to pay (WTP) for a product as directly proportional to the quality of the product *and* her wealth level v_i ($v_i \sim U[0,1]$). Specifically, for buyers of A (with quality 1), the *lifetime* utility from consumption is $v_i \cdot 1 - p_A^D$ (or $v_i \cdot 1 - p_A^M$ if the product is purchased from M). For buyers of C, it is $v_i \cdot q - p_C$. For non-buyers, the consumption utility is 0.

Status Utility for Buyers. The consumption of conspicuous luxury brands is often associated with the signaling of wealth and social status, more so to a casual observer than to one's family and friends, who have an objective assessment of one's wealth and status. We use the expected wealth of the buyers that a casual observer identifies as making the same purchasing decision to be a proxy for the status utility. Similarly, the consumption of a copycat also accrues status utility for the consumer, and depends on the wealth level of others who are identified, by a casual observer, to make the same purchasing decision. It is worth highlighting that a casual observer may not accurately identify the authenticity of the product purchased. For example, a buyer of C may be mistakenly identified as a buyer of the authentic product by a casual observer and thus, accrues the same status utility as a buyer of A. The probability of being mistakenly identified naturally depends on how similar the copycat is to the authentic product, i.e., the resemblance level α.

For ease of exposition, we first present the status utility *given the (accurately) identified group* by putting aside the effect of resemblance level α, and defer our discussion on how the resemblance level and thus inaccurate identification of the group affects the status utility to Section 3.4 where

we present the explicit expression of the status utility of each group under different subgames.

Ignoring inter-temporal consideration for the moment, when consumers with wealth levels in the interval $[\underline{v}, \overline{v}]$ are *identified as purchasing* the same product, each buyer in this group accrues the same *lifetime* status utility, which is proportional to the expected wealth level of this group and can be written as $\lambda \frac{\int_{\underline{v}}^{\overline{v}} v_i dv_i}{\int_{\underline{v}}^{\overline{v}} dv_i} = \lambda \frac{\overline{v}+\underline{v}}{2}$, where λ ($\in (0,1)$) denotes the consumer's sensitivity towards status utility (Rao and Schaefer 2013, Gao et al. 2016, Li 2018, Hou et al 2020 and Sun et al. 2022). With the consideration of inter-temporal effect, for a product sold over two periods, the status utility for a Period-2 buyer is potentially different from that of a Period-1 buyer, as the expected wealth of the identified owners of the product may be different across the two periods. More specifically, suppose a consumer is identified to be in a group that consists of those with wealth levels in the interval $[\underline{v}_t, \overline{v}_t]$ in Period t ($t = 1, 2$). For the status utility in Period 1, instead of being the *lifetime* value, $\lambda \frac{\overline{v}_1+\underline{v}_1}{2}$, this buyer only accrues one-period status utility for Period 1, i.e., $(1-\delta)\lambda \frac{\overline{v}_1+\underline{v}_1}{2}$. The status utility from Period 2 is then given by $\delta\lambda \frac{\overline{v}_2+\underline{v}_2}{2}$, where δ takes into account the intertemporal preference of the consumer. [12]

Status Utility (U_s) for Non-Buyers. In a similar way, suppose a consumer is identified to be in a non-buyer group with his wealth level within the interval $[\underline{v}, \overline{v}]$. We will later show in Proposition 1 that the optimal $\underline{v}$ is 0 for non-buyers. The status utility is $\lambda \frac{\int_{\underline{v}=0}^{\overline{v}} v_i dv_i}{\int_{\underline{v}=0}^{\overline{v}} dv_i} = \lambda \frac{\overline{v}}{2}$. The non-buyer group also derives different status utilities in Periods 1 and 2 as some consumers who do not buy any product in Period 1 may buy a product in Period 2, thereby changing the composition of non-buyer group across the two periods. As before, the lifetime status utility for a non-buyer can be written as $(1-\delta)\lambda \frac{\overline{v}_1}{2} + \delta\lambda \frac{\overline{v}_2}{2}$, which is the sum of the one-period status utility for Period 1 and the status utility from Period 2 onward. Note that by incorporating status utility even for non-buyers rather than assuming it to be zero, we can model the difference that consumption of the luxury good makes to the non-buyers vis-á-vis the buyers. For example, the status utility of non-buyers is higher when there are very few buyers but many non-buyers than when there are many buyers but few non-buyers.

Total Consumer Utility. Taking into account *both* consumption utility and status utility (as in Rao and Schaefer (2013)), a consumer acquires the total lifetime utility that is the sum of the lifetime consumption utility and lifetime status utility. The explicit expressions of the total utility for each group under different subgames are given in Section 3.4.

12. Let x_t denote the per-period status utility in Period t. Then, $x_t(1+\delta+\delta^2+...) = \lambda \frac{\overline{v}_t+\underline{v}_t}{2}$, $t = 1, 2$. Thus, the status utility accrued in Period 1 is $x_1 = (1-\delta)\lambda \frac{\overline{v}_1+\underline{v}_1}{2}$. Furthermore, the status utility accrued from Period 2 onward is $x_2(\delta+\delta^2+...) = \delta\lambda \frac{\overline{v}_2+\underline{v}_2}{2}$.

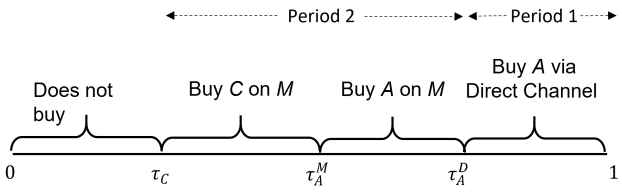

Figure 2 – Consumer Threshold Purchasing Policy (Subgame (I, I))

3.3 Consumer's Threshold Purchasing Policy

We first define a threshold purchasing policy for the forward-looking consumers when both A and C sell on M. Specifically, let τ_A^D denote the consumer who is indifferent between buying A via the direct channel in Period 1 and buying A on M in Period 2 and τ_A^M denote the consumer who is indifferent between buying A on M and buying C (on M) in Period 2. Let τ_C denote the consumer who is indifferent between buying C and not buying any product at all. Note that this definition is without loss of generality and can incorporate the cases where only A or C sells on M, or no firm sells on M. For example, when $\tau_A^M = \tau_A^D$, no consumer buys A on M. Similarly, when $\tau_A^D = \tau_C$, no one buys C on M. We will show later in Proposition 1 that such a threshold policy is optimum.

Definition 1. Consumer's Threshold Purchasing Policy. *There exist thresholds τ_A^D, τ_A^M, τ_C $(0 \le \tau_C \le \tau_A^M \le \tau_A^D \le 1)$ such that Consumer v_i $(\in [\tau_A^D, 1])$ buys A via the direct channel in Period 1; Consumer v_i $(\in [\tau_A^M, \tau_A^D])$ buys A on M; Consumer v_i $(\in [\tau_C, \tau_A^M])$ buys C on M and the rest of the consumers with v_i $(\in [0, \tau_C])$ do not buy any product (Figure 2).*

The intuition behind this purchasing policy is as follows. First, as p_A^D remains the same over the two periods, consumers who buy A direct always buy in Period 1 since they can enjoy both the consumption and status utility immediately. Second, given that a consumer with a higher wealth level values quality more, whenever Consumer v_i finds it optimum to buy A in Period 1, so would Consumer v_j $(v_j > v_i)$. Third, as the quality of A is higher than that of C and consumers with higher wealth levels value quality more, consumers with higher wealth buy A while those of lower wealth buy C or nothing. We prove the optimality of the threshold purchasing policy using the observation that the consumer's total utility is a convex piecewise linear function of the consumer's wealth level v_i. More details of the proof of Proposition 1 are summarized in the E-Companion.

Proposition 1. *Consumers optimally adopt a threshold purchasing policy (as in Definition 1) in equilibrium. Furthermore, consumers who buy A direct always buy it in Period 1 rather than delay until Period 2.*

3.4 Consumer Utility Using Threshold Purchasing and Firms' Profit

There are four subgames, namely, (I,I) (I,O), (O,I) and (O,O), where I denotes entry to sell on M and O denotes otherwise (Figure 1). Subgame (O,O) where both A and C do not sell on M never constitutes an equilibrium as it is weakly dominated by Subgame (I,O) where C sells on M while A does not since C always obtains a non-negative profit here. In the following, we present the total consumer utility and demands for A and C by taking into explicit consideration, resemblance level, α, for the three subgames, and the corresponding optimization problems for the firms.

3.4.1 Subgame (I,I)

There are four groups of consumers in this subgame as defined by the thresholds, $\tau_C, \tau_A^M, \tau_A^D$ (Figure 2), which depend on the equilibrium pricing strategies of M, A and C, the copycat attributes, α, q, consumer characteristic parameters, λ, δ and the firms' costs c_A, c.

Following Proposititon 1, consumers with wealth level v_i $(\in [\tau_A^D, 1])$ purchase A via the direct channel in the first period and receive status utility $\lambda\frac{1+\tau_A^D}{2}$. All the others are non-buyers in Period 1 who accrue the same status utility $\lambda\frac{\tau_A^D}{2}$.

From Period 2 onward, the presence of C implies that the status utility of the consumers depends on the extent in which A and C are accurately identified. Recall that α is the extent in which C physically resembles A. A high (low) α implies a high (low) level of physical resemblance between A and C so that a casual observer in the social community has a high (low) chance of *mistakenly* identifying C as A. As the probability of accurate identification of the authenticity of the products is negatively correlated to the level of physical resemblance, C is mistaken as A with probability α but accurately identified as C with probability $(1-\alpha)$. In the first case when C is mistaken to be A (with probability α), consumers with wealth levels between τ_C and 1 who have purchased either A or C would be perceived to have bought A and share the same status utility of $\lambda\frac{1+\tau_C}{2}$, and consumers with wealth levels between 0 and τ_C who have purchased neither of the products would earn the status utility of $\lambda\frac{\tau_C}{2}$. In the second case when C is accurately identified as a copycat of A, which occurs with probability $(1-\alpha)$, buyers of A with wealth levels between τ_A^M and 1 (buy A either in Periods 1 or 2) share the same status utility given by $\lambda\frac{1+\tau_A^M}{2}$. In the base model, we assume that the buyers of C when accurately identified (with probability $(1-\alpha)$), would be seen in the same light as non-buyers and accrue the same status utility as non-buyers, given by $\lambda\frac{\tau_A^M}{2}$. We consider two alternative models in Extensions 3 and 4 where buyers of C suffer embarrassment when identified as buyers of C and when buyers of C accrue a higher status utility than non-buyers.

By considering the consumption and status utility of these four groups of consumers along with the probabilities associated with the accurate identification of A and C or otherwise, the expected

utility $U^{I,I}(v_i)$ of consumer v_i in Subgame (I,I) can be written as:

$$U^{I,I}(v_i|p_A^D,p_A^M,p_C)=\begin{cases}(v_i-p_A^D)+(1-\delta)\lambda\frac{1+\tau_A^D}{2}+\delta(\lambda(\alpha\frac{1+\tau_C}{2}+(1-\alpha)\frac{1+\tau_A^M}{2})) & \text{if } v_i\in[\tau_A^D,1],\\ (1-\delta)\lambda\frac{\tau_A^D}{2}+\delta(v_i-p_A^M+\lambda(\alpha\frac{1+\tau_C}{2}+(1-\alpha)\frac{1+\tau_A^M}{2})) & \text{if } v_i\in[\tau_A^M,\tau_A^D],\\ (1-\delta)\lambda\frac{\tau_A^D}{2}+\delta(v_iq-p_C+\lambda(\alpha\frac{1+\tau_C}{2}+(1-\alpha)\frac{\tau_A^M}{2})) & \text{if } v_i\in[\tau_C,\tau_A^M],\\ (1-\delta)\lambda\frac{\tau_A^D}{2}+\delta\lambda(\alpha\frac{\tau_C}{2}+(1-\alpha)\frac{\tau_A^M}{2}) & \text{if } v_i\in[0,\tau_C].\end{cases} \quad (1)$$

Given p_A^D, p_A^M, p_C, the thresholds τ_A^D, τ_A^M, τ_C are the respective wealth levels of consumers who are indifferent between buying A direct (in Period 1) and on M (in Period 2), indifferent between buying A on M and buying C, and indifferent between buying C and not buying any product at all. Thus, $\tau_A^D=\frac{p_A^D-\delta p_A^M-(1-\delta)\frac{\lambda}{2}}{1-\delta}$, $\tau_A^M=\frac{p_A^M-p_C-(1-\alpha)\frac{\lambda}{2}}{1-q}$ and $\tau_C=\frac{p_C-\frac{\alpha\lambda}{2}}{q}$. Writing $\phi_1\equiv\frac{\lambda(\alpha-q)}{2}$, the demand of A on the direct channel (d_A^D) and the demands of A and C on M (d_A^M, d_C) are:

$$\begin{aligned}d_A^D &= \max\{0,1-\tau_A^D\}=\max\left\{0,\frac{-p_A^D+\delta p_A^M+(1-\delta)(\frac{\lambda}{2}+1)}{1-\delta}\right\},\\ d_A^M &= \max\{0,\tau_A^D-\tau_A^M\}=\max\left\{0,\frac{(1-q)p_A^D-(1-\delta q)p_A^M+(1-\delta)p_C-(1-\delta)\phi_1}{(1-q)(1-\delta)}\right\}, \quad (2)\\ d_C &= \max\{0,\tau_A^M-\tau_C\}=\max\left\{0,\frac{qp_A^M-p_C+\phi_1}{q(1-q)}\right\}.\end{aligned}$$

Using the principle of backward induction, M solves $\max_{f_A,f_C}(d_A^M f_A+d_C f_C)$ after C and A solve $\max_{p_C} d_C(p_C-c\frac{q^2}{2}-f_C)$ and $\max_{p_A^M} d_A^M(p_A^M-c_A-f_A)$ respectively, where d_A^M, d_C are given in (2).

3.4.2 Subgame (I,O)

In Subgame (I,O), only C sells on M so there are only three groups of consumers: those who buy A direct in Period 1, those who buy C from M in Period 2 and the non-buyers (Figure 3). Using the same argument as before, we can derive the total utility of the consumers as:

$$U^{I,O}(v_i|p_A^D,p_C)=\begin{cases}(v_i-p_A^D)+(1-\delta)\lambda\frac{1+\tau_A^D}{2}+\delta\lambda(\alpha\frac{1+\tau_C}{2}+(1-\alpha)\frac{1+\tau_A^D}{2}) & \text{if } v_i\in[\tau_A^D,1],\\ (1-\delta)\lambda\frac{\tau_A^D}{2}+\delta(v_iq-p_C+\lambda(\alpha\frac{1+\tau_C}{2}+(1-\alpha)\frac{\tau_A^D}{2})) & \text{if } v_i\in[\tau_C,\tau_A^D],\\ (1-\delta)\lambda\frac{\tau_A^D}{2}+\delta\lambda(\alpha\frac{\tau_C}{2}+(1-\alpha)\frac{\tau_A^D}{2}) & \text{if } v_i\in[0,\tau_C].\end{cases} \quad (3)$$

We can similarly derive $\tau_A^D=\frac{p_A^D-\delta p_C-(1-\alpha\delta)\frac{\lambda}{2}}{1-\delta q}$, $\tau_C=\frac{p_C-\frac{\alpha\lambda}{2}}{q}$,

$$\begin{aligned}d_A^D &= \max\{0,1-\tau_A^D\}=\max\left\{0,\frac{-p_A^D+\delta p_C+(1-\delta q)+(1-\alpha\delta)\frac{\lambda}{2}}{1-\delta q}\right\},\\ d_C &= \max\{0,\tau_A^D-\tau_C\}=\max\left\{0,\frac{qp_A^D-p_C+\phi_1}{q(1-\delta q)}\right\}. \quad (4)\end{aligned}$$

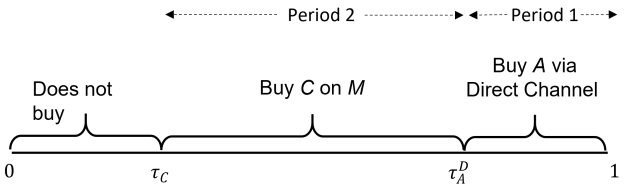

Figure 3 – Consumer Threshold Purchasing Policy (Subgame (I, O))

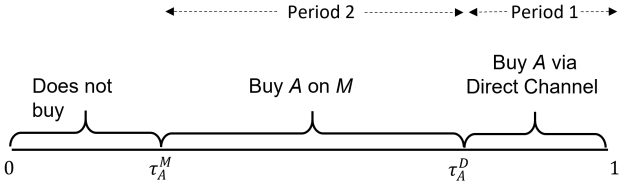

Figure 4 – Consumer Threshold Purchasing Policy (Subgame (O, I))

Again, backward induction implies that M solves $\max_{f_A, f_C} d_C f_C$ after C solves $\max_{p_C} d_C(p_C - c\frac{q^2}{2} - f_C)$, where d_C is given in (4).

3.4.3 Subgame (O,I)

In Subgame (O,I), C does not sell on M at all. Thus, consumers either buy A direct in Period 1 or buy A on M or buy nothing (Figure 4). Similarly, we derive the total consumer utility as:

$$U^{O,I}(v_i|p_A^D, p_A^M) = \begin{cases} (v_i - p_A^D) + (1-\delta)\lambda\frac{1+\tau_A^D}{2} + \delta\lambda\frac{1+\tau_A^M}{2} & \text{if } v_i \in [\tau_A^D, 1], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta(v_i - p_A^M + \lambda\frac{1+\tau_A^M}{2}) & \text{if } v_i \in [\tau_A^M, \tau_A^D], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta\lambda\frac{\tau_A^M}{2} & \text{if } v_i \in [0, \tau_A^M]. \end{cases} \tag{5}$$

Hence, $\tau_A^D = \frac{p_A^D - \delta p_A^M - (1-\delta)\frac{\lambda}{2}}{1-\delta}$, $\tau_A^M = p_A^M - \frac{\lambda}{2}$,

$$\begin{aligned} d_A^D &= \max\{0, 1 - \tau_A^D\} = \max\left\{0, \frac{-p_A^D + \delta p_A^M + (1-\delta)(1+\frac{\lambda}{2})}{1-\delta}\right\}, \\ d_A^M &= \max\{0, \tau_A^D - \tau_A^M\} = \max\left\{0, \frac{p_A^D - p_A^M}{1-\delta}\right\}. \end{aligned} \tag{6}$$

As before, M solves $\max_{f_A, f_C} d_A^M f_A$ after A solves $\max_{p_A^M} d_A^M(p_A^M - c_A - f_A)$, where d_A^M is given in (6).

By considering the various boundary conditions, we further adopt backward induction to solve each subgame to determine the equilibrium strategies of A, C and M. Given that the focus of our paper is to examine the three research questions stated earlier, we omit the detailed expressions of f_A, f_C, p_C, p_A^M for the subgames in the main text. The detailed expressions are embedded in the proof in the E-Companion.

4 Main Results

In this section, we present the equilibrium channel strategies for A and C before we discuss the comparative statics of the equilibrium channel strategies. Then, we examine the effect of A's consideration of M as a potential channel on consumer surplus.

4.1 Equilibrium Channel Strategies

Theorem 1 states the equilibrium outcomes, where the characteristics of C (given by q, α) and cost parameters (given by c_A, c) play an important role in the equilibrium channel strategy of A.

Theorem 1. (Equilibrium Channel Strategies.)
(i) C always sells on M. (ii) A sells on M as an indirect channel if and only if $c_A \leq \bar{c}_A(\alpha, q, c)$, where $\bar{c}_A(\alpha, q, c) \equiv \frac{(4-q-3\delta q)(1-q)p_A^D-(2-q-\delta q)(1-\delta)(\phi_1-c\frac{q^2}{2})}{(4-3q-\delta q)(1-\delta q)}$ and $\phi_1 \equiv \frac{\lambda(\alpha-q)}{2}$. Furthermore, $c_A \leq \bar{c}_A(\alpha, q, c)$ is more likely to hold if q or α or c_A is low, or c is high.

To understand Theorem 1, we first discuss the entry strategies of C and A on M.

Entry of C on M. We observe from Theorem 1(i) that M never deters C from the online marketplace. As M determines the commission fees on its marketplace, M can strategically deter C from M if M sets a sufficiently high commission fee for C, which renders its entry unprofitable. The absence of competition from C may provide A with more incentives to adopt M as an indirect channel, which may in turn favor the overall profitability of M. Therefore, whether the sales of C on M result in a higher total profit for M remains ambiguous. However, as seen from Theorem 1(i), M always sets a commission fee such that C sells on the marketplace. That copycats are rampant in online marketplaces bears testimony to our finding here.

In our model, we do not include any penalty for M or C when C is sold on M as the essence of our key results remain in the presence of penalty if the penalty is not too large. In reality, whether there is any penalty for selling copycats depends not only on the regulatory framework but also the law enforcement of specific regions. For example, China only passes the first law against fake goods sold online very recently, which holds online marketplaces accountable if products sold on the marketplaces are found to have violated intellectual property rights when previously only merchants caught selling knock-offs could be held responsible. [13]

Entry of A on M. We observe from Theorem 1(ii) that when the marginal production cost of A (c_A) is low, A adopts the online marketplace as an indirect channel and sells on M. This is consistent with our observation that entry-level luxury brands such as Coach and Kate Spade are early adopters of the online marketplace while top luxury brands such as Prada and Tiffany are not. When the marginal production cost of A is high ($c_A > \bar{c}_A$), A does not compete head-on with

13. www.chinadaily.com.cn/a/201808/02/WS5b629d32a3100d951b8c83a3.html. Accessed on September 1, 2019.

C on M but optimally sells direct only. Furthermore, we can verify that the threshold, $\bar{c}_A(\alpha, q, c)$, is increasing in c. This suggests that when the cost of the copycat is low, A is also less likely to sell on M as C is relatively more competitive.

Note that $\bar{c}_A(\alpha, q, c)$ is decreasing in α and when q is sufficiently close to 1, c_A is always greater than $\bar{c}_A(\alpha, q, c)$. Thus, when q or α is close to 1, it is more likely that $c_A > \bar{c}_A(\alpha, q, c)$ so A does not sell on M at equilibrium. Following these observations, we discuss the implication of α and q on the equilibrium.

Level of Physical Resemblance (α). Theorem 1(ii) suggests that A does not sell on M when the level of physical resemblance, α, is high. Note that A faces two trade-offs when deciding on its channel choice. Firstly, the presence of A on M offers an opportunity for consumers who did not buy in Period 1 to consider A again, possibly at a different price p_A^M, i.e., some consumers with wealth levels between τ_A^M and τ_A^D who would, otherwise, likely buy C when A does not adopt the indirect online channel offered by M, contribute to the *market expansion effect* where a high demand arises from participation in an additional channel. However, this effect is reduced when C is a close substitute (α high). In fact, we can show that the demand of A on M, (given by $(\tau_A^D - \tau_A^M)$) is decreasing in α, which implies that a higher resemblance level leads to a lower *market expansion effect*. Secondly, the presence of C in the second period poses a risk to buyers of A as the copycat product may be mistakenly identified as authentic by casual observers, thereby reducing the status utility of buyers of A. Again, this negative effect on buyers of A is more pronounced when α is high. As a result, any increase in status utility that is derived owing to switching from buying C to A is further reduced due to the *brand contamination effect*.

In summary, A faces two effects - a higher resemblance level increases the brand contamination effect (when C is mistaken as A) and reduces the market expansion effect, resulting in A being less likely to adopt the online marketplace as an indirect channel. As most copycats are of high physical resemblance, Theorem 1 implies that for the authentic firm to sell on M, it is vital that the online marketplace adopts a proactive approach towards regulating the physical resemblance of the copycats selling on it so that the authentic firm can benefit from selling on M.

Quality of Copycat (q). When q is sufficiently close to 1, Theorem 1(ii) shows that A never sells on M. The intuition is that a high quality copycat product allows less room for A to vertically differentiate itself from C (on M), thus leading to intense pricing competition on M. This limits A's profit margin on the direct channel too. As a result, A is less likely to sell on M.

Combining the above analysis, we deduce that as long as C is a close substitute of A, either in terms of a high quality or a high level of physical resemblance to A, A does not sell on M. Thus, C has incentives to position itself to be high in quality or high in physical resemblance, although the latter is a foregone conclusion owing to its nature as a copycat of a luxury brand. Much as the

increasing quality of copycats lately can be attributed to the upgrading of production technology among others, our finding offers an alternative explanation that singles out the distinct role that the online marketplace plays in the increasing quality of copycats, as highlighted by Jack Ma. [14]

Our paper contributes to the existing literature by uncovering the online marketplace as an important underlying mechanism driving the increasing quality of the copycats. Gao et al. (2016) develop a model where authentic brand and copycat compete in the brick-and-mortar market, i.e., the online marketplace does not exist as an additional channel for the authentic brand. In their setting, the copycat is only able to enter the market following the authentic brand (otherwise, there is no product to copy). Hence, as the second-mover in the game, the copycat has to differentiate its product substantially from the authentic product to successfully enter the market so that the authentic brand would accommodate its entry. Hence, Gao et al. (2016) find that copycats of low quality are more likely to enjoy a successful market entry as they pose a very low threat. Their finding offers an explanation for the low quality of copycats in the era *before* the success of the online marketplaces. Motivated by the proliferation of e-commerce in recent years, our paper introduces an online marketplace that serves as an alternative channel for firms to reach consumers. This changes the strategic interaction between the authentic luxury brand and the copycat. Specifically, after the authentic firm launches its products in the direct channel, the copycat has a chance to sell its products through the online marketplace before the authentic luxury brand does so, as the copycats can immediately observe and rapidly imitate the authentic products (in the direct channel) and quickly leverage the online marketplace to reach consumers. Meanwhile, as discussed in the introduction, authentic luxury brands have always been conservative about selling their products in the online marketplace. With the strategic interaction modified by the presence of the online marketplace, the copycat deters the authentic luxury brand from the online marketplace by positioning its products to be a close substitute of the authentic brand (high quality or physical resemblance). Therefore, the presence of the third-party online marketplaces has altered the landscape of traditional markets and copycats have capitalized on this alternative channel by adopting it more spontaneously than the authentic brands. Furthermore, copycats with increasing quality can better ensure their continued success in the online marketplace, as they are more likely to deter authentic brands away from this attractive channel.

Note that M can strategically set the commission rate f_A to influence the channel strategy of A. In particular, if f_A is sufficiently low, A can be incentivized to sell on M. The fact that when α or q is high, A does not sell on M suggests that when C is a close substitute of A (either in terms of quality or physical resemblance), M strategically deters A from M. To understand this, we observe that when C is a close substitute of A and when both sell on M in Period 2, intense pricing

14. http://money.cnn.com/2016/06/14/technology/alibaba-jack-ma-fake-goods/index.html . Accessed on July 25, 2022.

competition between the firms must necessarily lead to lower prices, p_A^M, p_C. That M does not embrace this possibility shows that the decrease in prices (and therefore the commissions earned by M) does not compensate for any increase in overall demand. The same argument does not apply to C in a similar way because C does not have a direct channel and thus would be willing to accept any commission rate f_C that offers it a positive profit. In contrast, A does have its direct channel as a primary channel.

In summary, Theorem 1 offers some intuition for the conditions under which A does not sell on M in equilibrium, despite the success of these marketplaces in reaching consumers. These findings further provide an alternative explanation for the increasing quality of copycats in recent years.

4.2 Consumer Surplus in the Presence of Online Marketplace

Extant literature on copycats has focused on how the entry of copycats affects the pricing strategy of the authentic luxury firm and thus consumer surplus (e.g. Gao et al., 2016). Here, we examine how the presence of an online marketplace and the authentic luxury brand's consideration of the online marketplace as a potential sales channel changes the strategic interaction between the authentic luxury brand and its copycat and, therefore, the implications on consumer surplus. As revealed by the anecdotal evidence in the introduction, luxury brands had never considered the possibility of selling on the copycat-prevalent online marketplace in the early days of e-commerce. To reflect this situation in the early e-commerce days, we define a benchmark case (B) where A does not consider selling on M at all while C sells on M. By comparing our equilibrium case against this benchmark, we can accentuate the effect of the recent change in authentic firm's attitude toward the online marketplace on consumer surplus.

Using superscript 'B' to denote the benchmark case, the sequence of events, therefore, involves A selling direct at price $p_A^D (= p_A^B)$ in Periods 1 and 2, and C setting p_C^B in Period 2 after observing M setting f_C^B. Using backward induction and applying the consumer's threshold purchasing policy, we deduce that

$$\tau_A^B = \frac{p_A^B - \delta p_C^B - (1-\alpha\delta)\frac{\lambda}{2}}{1-\delta q}, \tau_C^B = \frac{p_C^B - \frac{\alpha\lambda}{2}}{q}, f_C^B = \frac{q p_A^B + \phi_1 - c\frac{q^2}{2}}{2}, p_C^B = \frac{3(q p_A^B + \phi_1) + c\frac{q^2}{2}}{4}. \quad (7)$$

In addition, as alluded to in the introduction, the quality of copycats has been increasing in tandem with the e-commerce boom in the past decade. Much as A has shown increasing interest in selling on M (and may have considered the possibility strategically), A has thus far not shared the same marketplace as C, as generally seen in reality. This observation is also substantiated by Theorem 1, that A does not sell on M when the quality of C is high. We shall refer to this case as the equilibrium case (E).

The objective in this section is to compute the difference in consumer surplus in Cases B and E, i.e., $(CS^E - CS^B)$. In both cases, A does not sell on M although A does contemplate the possibility strategically in Case E but decides against it in equilibrium when C is a close substitute of A either in terms of high quality or a high level of physical resemblance (Theorem 1). In both cases, there are three groups of consumers: those who buy A direct (in Period 1), those who buy C on M and the non-buyers. We refer to these consumers as Groups A, C and N respectively.

For Group A in Case k ($k = B, E$) (i.e., $v_i \in (\tau_A^k, 1]$), the consumer surplus, CS_A^k, comprises of the consumption utility, $(v_i - p_A^D)$, and the status utility over two periods. The status utility in Period 1 is $(1-\delta)\lambda\frac{1+\tau_A^k}{2}$ while the status utility from Period 2 onward depends on whether buyers of C are also mistakenly identified as buyers of A. If they are, the status utility from Period 2 is $\delta\lambda\frac{\tau_C^k+1}{2}$, which occurs with probability α. Otherwise, the related status utility is $\delta\lambda\frac{\tau_A^k+1}{2}$, which occurs with probability $(1-\alpha)$. Combining, we obtain CS_A^k in (8). Similarly, we can deduce the consumer surplus of consumers in Group j in Case k, CS_j^k ($k = B, E$, $j = A, C, N$) as:

$$\begin{aligned} CS_A^k &= \textstyle\int_{\tau_A^k}^{1}[v_i - p_A^D + (1-\delta)\lambda\frac{1+\tau_A^k}{2} + \delta\lambda(\alpha\frac{1+\tau_C^k}{2} + (1-\alpha)\frac{1+\tau_A^k}{2})]dv_i, \\ CS_C^k &= \textstyle\int_{\tau_C^k}^{\tau_A^k}[(1-\delta)\lambda\frac{\tau_A^k}{2} + \delta(v_i q - p_C^k + \lambda(\alpha\frac{1+\tau_C^k}{2} + (1-\alpha)\frac{\tau_A^k}{2}))]dv_i, \\ CS_N^k &= \textstyle\int_{0}^{\tau_C^k}[(1-\delta)\lambda\frac{\tau_A^k}{2} + \delta\lambda(\alpha\frac{\tau_C^k}{2} + (1-\alpha)\frac{\tau_A^k}{2})]dv_i, \\ CS^k &= CS_A^k + CS_C^k + CS_N^k, \end{aligned} \tag{8}$$

where $\tau_A^B, \tau_C^B, p_A^B, p_C^B$ are given in (7), $\tau_A^E = \frac{p_A^D - \delta p_C^E - (1-\alpha\delta)\frac{\lambda}{2}}{1-\delta q}$, $\tau_C^E = \frac{p_C^E - \frac{\alpha\lambda}{2}}{q}$, $p_A^E = p_A^D$, $p_C^E = p_C$ where p_C is given in Table 1 in the E-Companion. Before we state the consumer surplus implications, we first compare the pricing strategies and demands of the firms between Cases B and E in Lemma 1.

Lemma 1 (Impact on Prices and Thresholds)**.** *(i)* $f_C^E = f_C^B$*, (ii)* $p_C^E \le p_C^B$*, (iii)* $\tau_A^E \ge \tau_A^B$*,* $\tau_C^E \le \tau_C^B$*, (iv)* $d_A^E \le d_A^B$*,* $d_C^E \ge d_C^B$ *and* $d_A^E + d_C^E \ge d_A^B + d_C^B$*.*

When A contemplates but does not sell on M in equilibrium, the price of C is lower than when A does not consider M at all (Lemma 1(ii)). In the latter case, there is no *potential* competition from A in the same channel M but in Case E, C needs to adjust its price, p_C^E, to deter A from M. The fact that A may consider an alternative sales channel per se decreases the price charged by C and therefore drives some consumers to switch from buying A via its direct channel to buying C on M ($\tau_A^E \ge \tau_A^B$), resulting in a lower demand for A in equilibrium than that in the benchmark (Lemma 1(iv)). In addition, the demand of C is further bolstered by its lower price and consumers who would otherwise buy nothing now buy C in Case E ((Lemma 1(iii), (iv))) and the total market demand increases. Therefore, the possible adoption of M by A increases the total number of buyers as a result of a strategic decrease in the price of C. Next, we present the results on

consumer surplus and discuss the implication on consumer surplus in Proposition 2 based on the findings in Lemma 1.

Proposition 2 (Effect on Consumer Surplus)**.** *(i)* $CS_C^E \geq CS_C^B$, $CS_N^E \leq CS_N^B$, *and* $CS_A^E \geq CS_A^B$ *if and only if* $c \geq \frac{2[(3\delta-4\delta\lambda-4\lambda)p_A^D-2(1-\delta)\lambda^2]}{\delta}$, *(ii)* $CS^E \geq CS^B$.

As alluded to in Lemma 1, A's mere consideration of M as an additional sales channel induces C to decrease its price on M to deter A from actually selling on M. Thus, the demand of C increases compared to the base model. A higher-quality copycat product or one that physically resembles A more, at a lower price induces more consumers who would otherwise be non-buyers (than in Case B), to buy C as the consumption and status utility are now higher for buyers of C. This leads to an increase in the consumer surplus of buyers of C, i.e., $CS_C^E \geq CS_C^B$. Furthermore, as the group of non-buyers shrinks and more consumers buy a product (A or C), the status utility of non-buyers decreases, resulting in a corresponding decrease in the consumer surplus of non-buyers.

With a lower price p_C, fewer consumers buy A from its direct channel. Thus, buyers of A accrue a higher status utility in Period 1 since the expected wealth of this group increases. However, more buyers of C in Period 2 means that their status utility from Period 2 decreases, the extent of which depends on the increase in the demand of C and the likelihood that C is mistaken as A (given by α). As seen in Proposition 2, when the cost of C is sufficiently high, the decrease in p_C is less so that the increase in demand of C is not too large. In this case, the gain in the status utility of consumers of A in Period 1 outweighs the loss in Period 2, leading to an overall increase in the consumer surplus of buyers of A.

In general, the shift in the attitudes of A towards online marketplaces makes an impact on the dynamics between A and C and therefore changes the competitive outcomes such that aggregate consumer surplus increases even when A does not eventually sell on M (Proposition 2(ii)). And the increase in consumer surplus is *not* solely a direct consequence of more consumers having access to the products. Rather A's consideration of M induces C to reduce its price and a copycat with a high quality or physical resemblance is better positioned to preserve its monopoly on the marketplace, which increases consumer surplus as a result.

5 Extensions

In this section, we examine five extensions to validate the robustness of our findings.

Extension 1: A and C Decide Simultaneously in Period 2. We consider an alternative scenario where A and C make their entry decision on M simultaneously. Note that the main difference is in Subgame (I, I) where both A and C are present on M. When A and C make their decisions on selling on M simultaneously, Theorem 2 shows that the key results are similar to that in Theorem 1. When A does not sell on M, the best response for C is to sell on M since C can

always earn a positive profit. When A sells on M, C is more likely to be profitable on M if C is sufficiently competitive, both in terms of the product offering (α, q) and the cost c (relative to c_A). Likewise, given that C sells on M, the same conditions imply that the best response of A is not to sell on M. Thus, the essence of Theorem 1 is preserved as shown in Theorem 2.

Theorem 2. (Equilibrium Channel Strategies with Simultaneous Moves.) *(i) C always sells on M. (ii) A adopts M if and only if $c_A \leq \bar{c}_A^{SM}(\alpha, q, c)$, where $\bar{c}_A^{SM}(\alpha, q, c) \equiv \frac{2(1-q)p_A^D - (1-\delta)(\phi_1 - c\frac{q^2}{2})}{2-q-\delta q}$. Furthermore, $c_A \leq \bar{c}_A^{SM}(\alpha, q, c)$ is more likely to hold if q or α or c_A is low, or c is high.*

Technically, it is also possible for A to make its entry decision on M *before* C does although it does not reflect reality in the early days of e-commerce where C can be found on M way before any authentic luxury brand sells on M. Nonetheless, when A instead of C is the first-mover to sell on M, A does not enjoy the same advantage as C when the latter moves first because the price of A on M has a direct impact on not only the relative attractiveness of C but also the sales and profit of A in its direct channel. Thus, A cannot substantially decrease its price on M to deter C's entry. Together with the argument that A is less competitive if C poses itself as a close substitute of A, we deduce that C always sells on M regardless of the entry decision of A. As a result, A is more likely to stay out of M under similar conditions in Theorem 1. Therefore, our main results hold regardless of the sequence of moves between A and C regarding their entry into the online marketplace, M. Rather, the presence of M constitutes the underlying driver for why our results differ from Gao et al. (2016).

Extension 2: Consumer Channel-Specific Preference. Here, we extend our base model to incorporate the consumer's channel-specific preference. Following Balasubramanian (1998) and Chen et al. (2008), we use β to denote the additional utility (or disutility if β is less than zero) that consumers receive over a long horizon from buying products through the indirect channel offered by M. If β is modeled as a one-time utility, we can write the total expected utility $U^{I,I}(v_i)$ for Consumer v_i in Subgame (I,I) as:

$$U^{I,I}(v_i|p_A^D, p_A^M, p_C) = \begin{cases} (v_i - p_A^D) + (1-\delta)\lambda\frac{1+\tau_A^D}{2} + \delta(\lambda(\alpha\frac{1+\tau_C}{2} + (1-\alpha)\frac{1+\tau_A^M}{2}) & \text{if } v_i \in [\tau_A^D, 1], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta(v_i - p_A^M + \lambda(\alpha\frac{1+\tau_C}{2} + (1-\alpha)\frac{1+\tau_A^M}{2}) + \beta) & \text{if } v_i \in [\tau_A^M, \tau_A^D], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta(v_i q - p_C + \lambda(\alpha\frac{1+\tau_C}{2} + (1-\alpha)\frac{\tau_A^M}{2}) + \beta) & \text{if } v_i \in [\tau_C, \tau_A^M], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta\lambda(\alpha\frac{\tau_C}{2} + (1-\alpha)\frac{\tau_A^M}{2}) & \text{if } v_i \in [0, \tau_C]. \end{cases} \quad (9)$$

The consumer utility functions in Subgames (I,O), (O, I) can be similarly revised to incorporate β. By analyzing these three subgames, we summarize the results in Theorem 3 below.

Theorem 3. (Equilibrium Channel Strategies with Consumer Channel Preference.)

(i) C always sells on M. (ii) A adopts M if and only if $c_A \leq \bar{c}_A^{CP}(\alpha, q, c, \beta)$, where $\bar{c}_A^{CP}(\alpha, q, c, \beta) \equiv \frac{(4-q-3\delta q)(1-q)p_A^D-(2-q-\delta q)(1-\delta)(\phi_1-c\frac{q^2}{2})+(1-q)(2+2\delta-3\delta q-\delta^2 q)\beta}{(4-3q-\delta q)(1-\delta q)}$. Furthermore, $c_A \leq \bar{c}_A^{CP}(\alpha, q, c, \beta)$ is more likely to hold if q or α or c_A is low, or c or β is high.

Theorem 3 shows that the key results in the base model remain robust. Furthermore, a high channel-specific preference for M (high β) can induce A to sell on M despite competition from C. From A's perspective, it can invest in its direct channel to improve visitors' channel-specific preference towards its direct channel (in order to reduce β) such that A does not sell on the M in equilibrium.

Extension 3: Embarrassment From Copycat Purchase. In §3, we have formulated the status utility for different groups of consumers as the expected wealth of the consumers in each group following a threshold purchasing policy. With reference to Subgame (I,I), when C is mistaken as A (which occurs with probability α), buyers of C accrue the same status utility as buyers of A given by $\lambda\frac{1+\tau_C}{2}$ in (1). However, when C is accurately identified as a copycat of A (which occurs with probability $(1-\alpha)$), the status utility of buyers of C is modeled to be the same as non-buyers, which is equal to $\lambda\frac{\tau_A^M}{2}$.

Yet, one may argue that when the market identifies C as a copycat, buyers of C may be embarrassed. Let ϵ (≥ 0) denote the embarrassment cost to these buyers. Then, when buyers of C are identified as buyers of copycat, the status utility is $\lambda(\frac{\tau_A^M+\tau_C}{2}-\epsilon)$, where the first term is the expected wealth of this group of consumers who buy C. Non-buyers, on the other hand, do not suffer any embarrassment, so their status utility is simply their expected wealth, given by $\lambda\frac{\tau_C}{2}$. As an illustration, the utility function of the different groups of consumers in Subgame (I, I) can now be written as:

$$U^{I,I}(v_i|p_A^D, p_A^M, p_C) = \begin{cases} (v_i - p_A^D) + (1-\delta)\lambda\frac{1+\tau_A^D}{2} + \delta(\lambda(\alpha\frac{1+\tau_C}{2} + (1-\alpha)\frac{1+\tau_A^M}{2})) & v_i \in [\tau_A^D, 1], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta(v_i - p_A^M + \lambda(\alpha\frac{1+\tau_C}{2} + (1-\alpha)\frac{1+\tau_A^M}{2})) & v_i \in [\tau_A^M, \tau_A^D], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta(v_i q - p_C + \lambda(\alpha\frac{1+\tau_C}{2} + (1-\alpha)(\frac{\tau_A^M+\tau_C}{2}-\epsilon))) & v_i \in [\tau_C, \tau_A^M], \\ (1-\delta)\lambda\frac{\tau_A^D}{2} + \delta\lambda\frac{\tau_C}{2} & v_i \in [0, \tau_C]. \end{cases} \quad (10)$$

Using the same approach, we can derive the utility function of the consumers in the other subgames. Similar analysis as in the base model yields the following result, which is qualitatively similar to Theorem 1.

Theorem 4. (Equilibrium Channel Strategies with Consumer Embarrassment.) *(i) C always sells on M. (ii) A adopts M if and only if $c_A \leq \bar{c}_A^{CE}(\alpha, q, c, \epsilon)$, where $\bar{c}_A^{CE}(\alpha, q, c, \epsilon)$ is given in the E-Companion. Furthermore, $c_A \leq \bar{c}_A^{CE}(\alpha, q, c, \epsilon)$ is more likely to hold if q or α or c_A is low, or c or ϵ is high.*

When consumers suffer a higher level of embarrassment, A is more likely to adopt M ceteris paribus. This is because the higher embarrassment cost attached to copycats gives A more competitive advantage relative to C on M as copycats are now less appealing. Thus, only when C has a high quality or a high level of physical resemblance can C compensate consumers for this loss, via *both* a high consumption utility and a reduction in the likelihood of embarrassment. Overall, the findings in this extension are qualitatively the same as those in the base model. Note further that when the embarrassment cost ϵ is high, consumers avoid buying C, rendering the entry of A on M profitable.

Extension 4: Buyers of C Receive Different Status Utility from Non-Buyers. Another possibility is that buyers of C accrue a different status utility from the non-buyers; that is, buyers of C are different from non-buyers based on the perspective of the casual market observers. To address this, we define the status utility of copycat buyers simply as the expected wealth of this group of buyers (when they are accurately identified) while the status utility of non-buyers remains as the expected wealth of the non-buyers. This is essentially a special case of Extension 3 where ϵ is equal to zero. Therefore, following Theorem 4, we note that even when there is no embarrassment cost here, it remains true that a copycat that is high in both quality and physical resemblance does deter A from M in equilibrium.

Extension 5: Endogenous Price of A in the Direct Channel (p_A^D). In this extension, we endogenize p_A^D in Period 1. More specifically, A determines p_A^D in Period 1 and the sequence of the game from Period 2 remains the same as that in the base model.

Let κ denote the fixed per-unit operational cost of A in the direct channel. κ reflects the resources needed to ensure a unique luxurious shopping experience for the consumers of A in the direct channel. As we do not make a distinction between a direct online channel and a direct offline channel, the magnitude of κ can also be interpreted as the extent in which the luxury brands operate direct online stores. In this case, κ is lower when there are more direct online stores. Using the principle of backward induction, we can incorporate our analysis from each of the subgame in the base model into the maximization problem of A:

$$\max_{p_A^D} \quad \left(d_A^D(p_A^D - c_A - \kappa) + d_A^M(p_A^M - c_A - f_A)\right), \tag{11}$$

where $d_A^D = \max\{0, 1-\tau_A^D\}$, $d_A^M = \max\{0, \tau_A^D - \tau_A^M\}$ are functions of $f_C, f_A, p_A^D, p_A^M, p_C$ obtained in each subgame. Once we substitute the equilibrium prices f_A, f_C, p_C, p_A^M into the profit function of A in Period 1, the expression becomes extremely tedious. Thus, we rely on numerical computations to develop our insights (see Section G in the E-Companion for the detailed analysis), which we state as Observation 2. The equilibrium strategies remain qualitatively similar to that in Theorem 1.

Observation 2. (Equilibrium Channel Strategies with Endogenous p_A^D.)
(i) C always sells on the online marketplace. (ii) A adopts M if and only if $\kappa \geq \bar{\kappa}(\alpha, q, c, c_A)$, where $\bar{\kappa}(\alpha, q, c, c_A)$ is subsumed in the E-Companion. Furthermore, $\kappa \geq \bar{\kappa}(\alpha, q, c, c_A)$ is more likely to hold if q or α or c_A is low, or c or κ is high.

As in the base model, we further develop insights on the impact of A's consideration to sell on M on consumer surplus by comparing the benchmark case where A does not consider the possibility of selling on M (Case B) and the equilibrium case (Case E) where A is strategically deterred by C to sell on M. Note that in both cases, A only sells via its direct channel. When A does not sell on M in equilibrium, C must be a close substitute of A whether in quality, physical resemblance or both, leading to lower prices of A, C and higher total demand. Thus, the overall consumer surplus is higher than in the benchmark case as long as c_A is relatively higher than c, as stated in Proposition 3. As c_A is generally higher than c, Proposition 3 replicates the essence of Proposition 2 in the base model.

Proposition 3. (Effect on Consumer Surplus.) *$CS^E \geq CS^B$ if and only if $c_A + \kappa \geq F(\delta, c)$, where $F(\delta, c)$ (given in the E-Companion) is increasing in c.*

6 Discussion and Conclusion

In this paper, we examine the optimal channel strategy of the authentic luxury brand in the midst of the rapid expansion of e-commerce that has fueled the proliferation of copycats of luxury brands. Unlike extant literature on copycats of luxury brands (e.g. Gao et al., 2016), we incorporate the presence of a third-party online marketplace that reflects reality in examining the strategic interaction between the firms in this e-commerce era. Using a dynamic game-theoretic framework and exploring five extensions, we derive several managerial implications.

First, we show that an online marketplace serving as an indirect online channel always sets its commission fee such that the copycat adopts the channel. This implies that the online marketplace is unlikely to regulate the copycats of luxury brands if left alone. Thus, external pressure from the luxury brands and a proper law enforcement framework are necessary to curb the proliferation of copycats in e-commerce, in the absence of which, any claim to control the sales of copycats online is not credible. Similarly, the luxury brands have to adopt a more pro-active approach to rein in copycats. Anti-counterfeiting measures that make use of technologies can be potentially effective in combating copycats (Pun et al., 2019, Pun and Swaminathan 2021, Li et al. 2021 and Shen et al. 2021), and the effectiveness of these measures are potential directions for future research.

Second, our findings shed light on the increasing quality of copycats in recent years by showing that a high-quality copycat is more likely to deter the authentic firm from adopting the online marketplace as an indirect online channel, allowing the copycat to maintain a monopoly on the

indirect online channel. This finding contrasts with the extant literature (e.g. Gao et al. 2016) which finds that only low-quality copycats will be tolerated by the authentic luxury brand. The presence of the online marketplace, absent before e-commerce, serves as an alternative indirect channel whereby the copycat can retain its monopoly by offering itself as a close substitute to the authentic product. Thus, our finding underpins the important role of online marketplaces in the increasing quality of copycats of luxury brands.

Third, contrary to conventional wisdom, our analysis suggests that consumer surplus is higher in the presence of copycats, especially when the copycat is a close substitute of its authentic counterpart. Even without the authentic firm's actual presence on the online marketplace, its *potential* adoption is sufficient to generate positive welfare to the consumers as a whole. In this case, a high-quality copycat presents itself as a credible competitor against the authentic firm, thereby improving consumer surplus. The change in the attitude of authentic luxury brands, from absolute resistance to possible consideration toward the online marketplace has the direct effect of increasing access of products to consumers. It also extends an indirect effect that leads to an increase in the quality and a lower price of copycats, and thus aggregate consumer surplus.

Lastly, we generalize our base model using five extensions to capture simultaneous moves for the authentic luxury brand and copycat, consumer channel-specific preference, different status utility models and endogenous direct channel pricing decision. These extensions not only validate the robustness of the main results in the base model but also provide additional strategic insights. In particular, when the copycat is a close substitute to the authentic product, our findings further advocate that the authentic firm seeks to improve its direct-channel experiences for its direct-channel visitors (Extension 2) and reduce its cost of direct selling (Extension 5) so that it does not adopt the same indirect online channel as the copycats. Such strategies could be to establish larger offline stores in key cities that provide an entire portfolio of products to improve consumer shopping experience and to develop its own direct online channel so that the cost of direct sales is lower than when it only has a brick-and-mortar channel.

Our findings offer several managerial implications. It is indisputable from observations in reality that the quality of copycats is now almost on par with that of the authentic luxury brands. [15] As our results show, copycats of this nature deter the authentic luxury brands from the third-party online marketplace. How can the authentic luxury brands participate and benefit from the e-commerce boom? Our results suggest that the authentic luxury brands develop their own online direct channels that serves not only as a showcase of products but also as a transaction platform, which is increasingly common among brands such as Louis Vuitton, Gucci and Michael Kors.

Secondly, from the perspective of the online marketplace, it does miss out if it cannot bring the

15. https://blogs.wsj.com/chinarealtime/2016/06/15/jack-ma-says-fakes-better-quality-and-better-price-than-the-real-names/. Accessed on July 22, 2020.

authentic luxury brands on board. One possibility is to create an alternative online marketplace that is "by-invitation" only for the authentic luxury brands to ensure the overall authenticity of the portfolio of the products in the online marketplace, thereby creating a win-win-win situation for the marketplace, authentic luxury brands and non-deceptive copycats. In reality, Alibaba has since launched its luxury-exclusive platform, Luxury Pavilion, an invitation-only marketplace which has already attracted the presence of more than 150 luxury and designer brands.[16] In July 2019, Michael Kors, Prada and Miu Miu consecutively announced the opening of their digital flagship stores on the Luxury Pavilion, suggesting that the authentic luxury brands are exploring an alternative way to participate in online marketplaces.[17]

Finally, there are some limitations in our study. First, the consumption utility of the authentic luxury product may also depend on whether the consumer will purchase another new product from the same brand. To examine this calls for a dynamic model that captures the launch of multiple products, which is a worthwhile direction for future research.[18] Second, our model captures the strategic interaction between an authentic luxury brand and its copycat. It may be worthwhile in future studies to examine if the dynamics remain when the luxury brand faces competition from another luxury brand (and its copycat counterpart).

References

Amaldoss, W., S. Jain (2005). Conspicuous consumption and strategic thinking. *Management Science*, 51(10), 1449-1466.

Amaldoss, W., S. Jain (2015). Branding conspicuous goods: An analysis of the effects of social influence and competition. *Management Science*. 61(9), 2064-2079.

Balasubramanian, S. (1998). Mail versus mall: A strategic analysis of competition between direct marketers and conventional retailers. *Marketing Science*, 17(3), 181-195.

Bernstein, F., J. Song, X. Zheng (2008). "Bricks-and-mortar" vs."clicks-and-mortar": An equilibrium analysis. *European Journal of Operational Research*, 187(3), 671-690.

Besanko D. and Winston W. L. (1990). Optimal price skimming by a monopolist facing rational consumers. *Management Science*, 36(5), 555-567

Cattani K., W. Gilland, H. S. Heese, J. Swaminathan (2006). Boiling frogs: pricing strategies for a manufacturer adding a direct channel that competes with the traditional channel. *Production and Operations Management*, 15(1), 40-56.

Chen, K., M. Kaya, O. Ozer (2008). Dual sales channel management with service competition. *Manufacturing & Service Operations Management*, 10(4), 654-675.

Chen, Y., T. Dai, C. G. Korpeoglu, E.Körpeoğlu, O. Sahin, C. S. Tang, S. Xiao (2020). OM Forum

16. https://www.alizila.com/tmall-luxury-pavilion-marks-3-years/. Accessed November 11, 2020

17. https://www.businesswire.com/news/home/20190718005447/en/Michael-Kors-Announces-Launch-Digital-Flagship-Alibaba. https://www.pradagroup.com/en/news-media/news-section/prada-group-announces-prada-miu-miu-tmall-flagship-store.html. Accessed July 22, 2020.

18. We thank an anonymous reviewer for highlighting this.

- Innovative online platforms: Research opportunities.*Manufacturing & Service Operations Management*, 22(3), 430-445.

Cho S., X. Fang, S. Tayur (2015). Combating strategic counterfeiters in licit and illicit supply chains. *Manufacturing & Service Operations Management*, 17(3), 273-289.

Escalas, J., J., Bettman (2005). Self-construal, Reference groups and brand meaning. *Journal of Consumer Research*, 32(December), 378-389.

Esenduran, G., L. Lu, J.M. Swaminathan (2020). Buyback pricing of durable goods in dual distribution channels. *Manufacturing & Service Operations Management* 22(2), 412-428.

Fontana, R., S. Girod, M. Kralik (2019). How Luxury Brands Can Beat Counterfeiters, *Harvard Business Review*. Accessed on July 16, 2019 from https://hbr.org/2019/05/how-luxury-brands-can-beat-counterfeiters.

Gao, F., X. Su (2017). Omnichannel retail operations with buy-online-and-pick-up-in-store. *Management Science*, 63(8), 2478-2492.

Gao, S. Y., W.S. Lim, C.S. Tang (2016). Entry of copycats of luxury brands. *Marketing Science*, 36(2), 272-289.

Ghamat, S., H. Pun, G. Critchley, P. Hou (2021) Using Intellectual Property Agreements in the Presence of Supplier and Third-party Copycatting. *European Journal of Operational Research*, 291(2), 680-692.

Grossman, G., C. Shapiro (1988). Foreign counterfeiting of status goods. *Quarterly Journal of Economics*, 103(1), 79-100.

Guan, X., B. Liu, Y. Chen, H. Wang (2020). Inducing supply chain transparency through supplier encroachment. *Production and Operations Management* 29(3), 725-749.

Ha, A., X. Long, J. Nasiry (2016) .Quality in supply chain encroachment. *Manufacturing & Service Operations Management* 18(2), 280-298.

Han, Y., J.C. Nunes, X. Drèze (2010). Signaling status with luxury goods: the role of brand prominence. *Journal of Marketing*, 74(July), 15-30.

Hou, P., Z. Zhen, H. Pun (2020) Combating copycattings in the luxury market with fighter brands. *Transportation Research Part E: Logistics and Transportation Review*, 140, 102009.

Hsiao, L., Y. Chen (2013). The perils of selling online: Manufacturer competition, channel conflict, and consumer preferences. *Marketing Letters*, 24(3), 277-292.

Hu, M., J. M. Pavlin, M. Shi (2013). When gray markets have silver linings: all-unit discounts, gray markets, and channel management. *Manufacturing & Service Operations Management*, 15(22), 250-262.

Huang, W., J.M. Swaminathan (2009). Introduction of a second channel: Implications for pricing and profits, *European Journal of Operational Research*, 194, 258-279.

Kumar, N., R., Ruan (2006). On manufacturers complementing the traditional retail channel with a direct online channel. *Quantitative Marketing and Economics*, 4(3), 289-323.

Li, K.J. (2018). Status goods and vertical line extensions. *Production and Operations Management*, 28(1), 103-120.

Li, M., S. P. Sethi, J. Zhang (2016). Competing with bandit supply chains. *Annals of Operations Research*, 240, 617-641.

Li, Z., X. Xu, Q. Bai, X. Guan, K. Zeng (2021). The interplay between blockchain adoption and channel selection in combating counterfeits. *Transportation Research Part E: Logistics and Transportation Review*,

155, 102451.

Mantin, B., H. Krishnan, T. Dhar (2014). The strategic role of third-party marketplaces in retailing. *Production and Operations Management*, 23(11), 1937-1949.

Muniz, A. M., T. C., O'Guinn (2001). Brand community. *Journal of Consumer Research*, 27(4), 421-432.

Pun, H., G.D. DeYong (2017). Competing with copycats when customers are strategic, *Manufacturing & Service Operations Management*, 19(3), 403-418.

Pun, H., J. M. Swaminathan (2021). Blockchain adoption for combating deceptive counterfeits. *Production and Operations Management*, 30(4), 864-882.

Pun, H., Swaminathan, M. J. and Huo, P (2019) An Investigation on the Impact of Counterfeiting and Traceability in the Secondary Market. *Working Paper*.

Qian, Y. (2008). Impacts of entry by counterfeiters. *Quarterly Journal of Economics*, 123(4), 1577-1609.

Qian, Y. (2014). Counterfeiter: foes or friends? how counterfeits affect sales by product quality tier. *Management Science*, 60(10), 2381-2400.

Qian, Y., Hui, X. (2014). Which brand purchasers are lost to counterfeiters? An application of new data fusion approaches. *Marketing Science*, 33(3), 437-448.

Qian, Y., Q. Gong, Y. Chen (2015). Untangling searchable and experiential quality responses to counterfeits. *Marketing Science*, 34(4), 522-538.

Rao, R.S., R. Schaefer (2013). Conspicuous consumption and dynamic pricing. *Marketing Science*, 35(5), 786-804.

Shi, H., Y. Liu, N.C. Petruzzi (2013). Consumer heterogeneity, production quality, and distribution channels. *Management Science* 59(5), 1162-1176.

Shen, B., C. Dong, S. Minner (2021). Combating copycats in the supply chain with permissioned blockchain technology. *Production and Operations Management*, 31(1), 138-154.

Sun, Y., R. Chen, T. Archibald, S. Yan (2022). Competition between incumbents and copycats under conspicuous consumption when consumers are strategic. *Journal of the Operational Research Society*, 73(5), 1033-1052.

Sun, J. , L. Debo, S. Kekre, J. Xie (2010) Component-Based Technology Transfer in the Presence of Potential Imitators. *Management Science* 56(3), 536-552.

Sun, J., X. Zhang, Q. Zhu (2020) Counterfeiters in online marketplaces: stealing your sales or sharing your costs. *Journal of Retailing* 96(2), 189-202.

Yi, Z., M. Yu, K. L. Cheung (2020) Impacts of counterfeiting on a global supply chain. *Manufacturing & Service Operations Management* 24(1): 159-178

Zhang, J., Q. Cao, X. He (2019). Contract and product quality in platform selling. *European Journal of Operational Research*. 272(3), 928-944.

Zhang, J., L. J. Hong, R. Q. Zhang (2012). Fighting strategies in a market with counterfeits. *Annals of Operations Research*, 192(1), 49-66.

Zhang, J., R. Q. Zhang (2015). Supply chain structure in a market with deceptive counterfeits. *European Journal of Operational Research*, 240(1), 84-97.

Zhang, J. (2016). The benefits of consumer rebates: a strategy for gray market deterrence. *European Journal of Operational Research*, 251(2), 509-521.