Less is More: The Case of Minimalist Luxury

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Abstract

We show theoretically that when high-quality, low-price counterfeits exist and are visibly indistinguishable from authentic products, the status-seeking wealthy may embrace a "less is more" purchasing strategy or what we refer to as the minimalist luxury strategy, to signal their status. These are the wealthy who have a high disutility of shopping for counterfeits. Specifically, in our model, only buyers know the authenticity of their own purchases. Because of this information asymmetry, these wealthy buyers may purposefully restrain from consuming luxury goods as a sacrifice of functional utility to stand out, a signaling strategy that the rest are not willing to mimic. Thus, "less" functional utility allows those status-seeking wealthy to enjoy "more" symbolic utility that the society bestows on their perceived status. This minimalist luxury strategy is in sharp contrast to Veblen's conspicuous consumption strategy, as well as to the maximalist luxury strategy proposed by Liu et al. (2022). We derive this minimalist luxury equilibrium, discuss how signaling in our context can differ from that of Veblen and Liu et al. (2022), and explore its managerial implications for the luxury goods industry.

Keywords: Luxury brands, Signaling, Conspicuous consumption, Counterfeits, Minimalism

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1 Introduction

In the "land of plenty," as America was referred to, "more is better" was the ethos of consumption culture (Emerson, 2016). The Gilded Age (1870's-1900) produced conspicuous, excessive consumption that was vividly captured by Veblen (1899) as a way to signal wealth. Today, however, that ethos is changing and consumers even in the land of plenty are embracing "less is more" across many aspects of their lives (dwelling, travel, clothing, architecture design, interior decoration, product design, branding, etc.). This new ethos impacts a number of industries, including the luxury goods industry. Many industry experts have noted a growing trend of consumers exercising "purposeful limitation" (Fagan, 2017) or "material purge" (Chayka, 2016) whereby they buy less even if they can afford more.

This phenomenon of "less is more" runs counter to Veblen's thesis about excessive consumption of luxury goods as a signal for status and raises the question of how the wealthy can stand out through consuming luxury goods. If it is true that "overt materialism is generally a less clear marker of status today" (Currid-Halkett, 2017; Currid-Halkett et al., 2019), how do the wealthy signal their status? Interestingly, some industry observers have ventured a counter-intuitive answer, suggesting that less may actually be more. As Fagan (2017) pointed out, "It is just another form of conspicuous consumption, a way of saying to the world: 'Look at me! Look at all of the things I have refused to buy, and the incredibly-expensive, sparse items I have deemed worthy instead!'" Indeed, in a recent experimental research, Bellezza et al. (2019) have confirmed that "minimalism serves as a particular form of conspicuous non-consumption that affords greater social status." Could conspicuous underconsumption become the signal for wealth in the luxury goods industry? In this paper we investigate this question theoretically and explore the managerial implications of "less is more" for the luxury goods industry in this paper.

Coinciding with the changing ethos is the changing market conditions for the luxury goods industry, especially in the West. One of the most noticeable changes in that industry is the emergence of high-quality, low-price counterfeits. These are the counterfeits that look identical to the authentic luxury goods, with even professional authenticators unable to tell them apart (Schmidleaug, 2010; Mau, 2018; Qian, 2014a). According to a survey conducted by the US Government Accountabil-

ity Office, "counterfeits and their packaging are getting so sophisticated that it's even difficult for manufacturers - much less consumers - to identify them as fake" (Unglesbee, 2018). In addition, consumers in the West are undoubtedly buying them.[1] The luxury goods industry loses tens of billions of dollars a year to counterfeits worldwide (wisermarket.com, 2021).

In the presence of high-quality, low-price counterfeits, Liu et al. (2022) point out that luxury goods as a signal for wealth à la Veblen faces some serious challenges for its validity. If counterfeit goods are identical in appearance to the authentic ones, and they are available at very low prices, more spending on more luxury goods can no longer serve as an effective signal for wealth. This is because even if a consumer has moderate wealth, she can mimic the wealthy by buying the same luxury goods that the wealthy have purchased, only replacing them with high-quality counterfeits that look the same, as only the buyers know the authenticity of their own purchases.[2] They propose that the maximalist luxury strategy can serve as a new effective signal for the wealthy when the luxury goods have a sufficiently small functional value. They define the maximalist luxury strategy as "the wealthy being motivated by the presence of counterfeits to purchase the maximum number of luxury goods available and actually purchase many more than they would in their absence" (Liu et al., 2022, p.286). They use this theory to explain why luxury goods sales in emerging markets such as China and India do not seem to have suffered from the presence of high-quality, low-price counterfeits. Could the same signaling strategy work for the marketplace in more developed economies?

In this paper, we propose that the presence of high-quality, low-price counterfeits can create the conditions for "less is more," an exact opposite phenomenon to the maximalist luxury in Liu et al. (2022). By modeling a varying degree of functional utility associated with luxury goods and the different levels of disutility consumers incur in purchasing counterfeits, we show that the restraint in consuming luxury goods on the part of some wealthy is a viable strategy to signal their type in a market where high-quality, low-price counterfeits exist. In this "minimalist luxury" equilibrium,

[1] According to the US Patent and Trademark Office, "around 80 percent of these goods are produced in China, and 60 percent to 80 percent of those products are purchased by Americans." Of course, other countries in the West are not guilt-free either. For instance, 26% of adults in France, Germany, Italy, the United Kingdom, and the United States said they had purchased counterfeit items in a 2018 survey (www.uspto.gov, 2020).

[2] Hattori and Higashida (2022) study the situation where genuine and fake goods coexist without any information asymmetry on the part of the buyers and hence there is no signaling necessary or possible in their model. Their model is more suited for a marketplace where a branded product competes with a generic product.

which we will define formally soon, some wealthy use the minimalist luxury strategy to stand out: they purchase fewer luxury goods than the total number of (authentic plus counterfeit) goods that the rest will purchase, and also fewer luxury goods than what maximizes their functional utility. This signaling strategy is in contrast to Veblen's thesis where excessive spending is the signal, and to the maximalist luxury where the wealthy signal through purchasing the maximum number of luxury goods available. In this paper, we focus on identifying the mechanism for "less is more" and derive the managerial implications of this minimalist luxury strategy for the luxury goods industry.

Our analysis provides a rational explanation for why we observe some wealthy consumers preferring fewer items, and why buying fewer items can be a credible signal of wealth as well as disdain for counterfeits. We show that the wealthy can use "less" to signal their status by sacrificing their functional utility in a way that the rest do not want to mimic, but they get "more" in return through the exclusivity of high symbolic utility associated with status advantages. In effect, they pursue the minimalist luxury strategy characterized by high symbolic utility and low functional utility, and the rest are better off pursuing the strategy of low symbolic utility and high functional utility.

Past literature on conspicuous consumption mostly builds on Veblen (1899)'s thesis that it is a form of costly wealth signaling. Bagwell and Bernheim (1996) theoretically derives the condition under which the Veblen effect can arise. A number of papers in economics, marketing, and psychology also expand the number of signals to include non-conformity (Bellezza et al., 2014), brand prominence (Han et al., 2010), product size (Dubois et al., 2012), and social capital (Berger et al., 2011). By incorporating social influence into consumption utility, Amaldoss and Jain (2005a) show that an upward-sloping demand curve can occur when both snobs and followers derive utility, albeit differently, from others who purchase the same product. Subsequently, they also extend this model to a competitive context to discuss pricing and promotion decisions (Amaldoss and Jain, 2005b). Also in the competitive context, Kuksov and Xie (2012) show that when consumers value status goods, the dynamics of pricing competition can be quite unintuitive such that for apparent substitute goods, competition can raise rather than decrease market prices. Our objective here is different. Our research extends the original Veblen effect and shows that when high-quality counterfeits exist at a low price, the minimalist consumption of luxury goods can make the wealthy stand out.

The concept of minimalist luxury is closely related to the idea of "quiet luxury" that has been

explored in the behavioral literature (Han et al., 2010; Dubois et al., 2012; Bellezza et al., 2014; Berger and Ward, 2010). The premise of quiet luxury is that the discreet signals of luxury such as smaller logo size, less striking color schemes, and subtle design can be more powerful and more telling about one's social status and social aspirations. As a result, luxury brands can charge more for "quieter" items. In our research, we go back directly to the Veblen thesis on excessive consumption and examine if minimalist consumption can also signal wealth. It can. To the extent that minimalist luxury consumption is a discreet signal, our study extends the concept of quiet luxury to include the situation where the wealthy purposefully limit their consumption of luxury goods.

Past research has studied how counterfeits impact the sales of and customer preferences for authentic brands (Qian, 2008, 2014b; Givon et al., 1995; Bai and Waldfogel, 2012; Waldfogel, 2012; Wilcox et al., 2009). We take up the issue of high-quality counterfeits and explore how their presence poses a difficulty for the wealthy to use excessive consumption as a signal for their status. In that context, we analyze theoretically the possibility of using minimalist consumption as an effective signal for wealth, which has, to our knowledge, been overlooked in the literature. Another related research is Feltovich et al. (2002), who study in a labor market context the phenomenon of countersignaling, that is, not sending a signal. Our framework differs from theirs in three distinct ways in terms of who distorts their consumption behavior to send the signal, the mechanism of signaling, and the institutional context of the luxury goods market with high-quality, low-price counterfeits.

More closely related to our research is Liu et al. (2022), which is similarly looking into the luxury goods markets plagued by the high-quality, low-price counterfeits. Our research differs from theirs in four ways. First, the minimalist luxury strategy we uncover here contrasts sharply with the maximalist luxury strategy they have developed. These two very different signaling mechanisms complement each other and they are both indispensable parts of a complete theory on luxury goods consumption as a signal in the presence of counterfeits. Second, the main focus of their research is on the luxury goods of little functional utility. In our case, we have allowed functional utility to vary, and we also incorporate the varying degrees of disutility the consumers incur in purchasing counterfeits. These modeling differences gives rise to a new signaling mechanism we uncover in this paper. Third, by generating both the maximalist and the minimalist equilibria in a single model,

we not only reconcile both minimalist and maximalist luxury phenomena, but also gain a much better understanding of and appreciation for the diverse and polarized consumer behaviors in the luxury goods markets. Fourth, our research further suggests that "less is more" signals both wealth and disdain for counterfeits and can even be a better signal for the latter than for the former.

Our main theoretical contribution is to uncover the mechanism through which minimalist luxury can be a signal of wealth, but not an exclusive one due to customer heterogeneity. While uncovering this mechanism, we also generate four managerially relevant insights. First, we show that the damage inflicted on a luxury brand by counterfeits comes not only from those who switch to counterfeits, but also from those who never purchase counterfeits. This is because some wealthy people purposefully refrain from excessive consumption as a signal for their status, which consequently reduces sales of luxury goods. Second, all consumers can benefit from the availability of high-quality, low-price counterfeits at the expense of a luxury brand unless the income gap is sufficiently large, indicating the complexity and long-term nature for a luxury brand to combat counterfeits. Third, luxury goods may no longer be the status signal exclusively for the wealthy so that a luxury brand needs to become more inclusive in its marketing. Finally, the impact of high-quality, low-price counterfeits on a luxury goods market can be quite complex, and both the maximalist and the minimalist signaling strategies can co-exist in the same market for different products, or in different markets for the same product.

In the rest of the paper, we start by developing a model in Section 2. We provide our key insights in Section 3. In Section 4, we make three extensions to our benchmark model to generate additional insights about minimalist luxury. Finally, we conclude in Section 5.

2 Model

We consider a market of luxury goods where an authentic luxury brand (A) sells a portfolio of $n \in \mathbb{R}^+ (n \geq 1)$ products and a competitive group of counterfeiters (C) peddle replicas of each

luxury product. Consumers are assumed to buy at most one unit of each of the n products.[3] [4] An authentic product and its counterfeit version have similar functions, and thus a consumer buys either, but not both of them. For instance, a Louis Vuitton handbag of a certain design and its counterfeit version are used for the same purpose of carrying personal items, so a consumer chooses between the authentic version and the counterfeit version of the product. As a result, even when consumers buy both authentic and counterfeits, they own no more than n products in total. Thus, we only need to consider up to n products and avoid an unnecessarily large solution space for simplicity.

Consumers have high or low wealth levels and hence different budgets for luxury goods purchase, denoted by B. In the benchmark model, we assume that there are two types of consumers in the market: $\theta \in \{H, L\}$. The high-budget type, or H-type, has more to spend on luxury goods than the low-budget type, or L-type, does ($B_H > B_L$). The shares of H-types and L-types in the market are denoted respectively by ρ_H and ρ_L. We normalize the total market size to 1 such that we have $\rho_H + \rho_L = 1$.

Consumer utility depends on two factors for both types of consumers, which we refer to as the functional and symbolic utility. We introduce them each in turn. The functional utility of products is obtained from each unit in use, and it depends on the number of goods in use and their respective quality. Here, we assume that authentic goods have objectively higher quality than counterfeits, or $q_A > q_C$.

Specifically, let

$$U(k_A, k_C) = \alpha(q_A k_A + q_C k_C) \tag{1}$$

indicate the total functional utility of a consumer from owning k_A authentic and k_C fake products. Here, α calibrates the marginal functional utility of a product in use.

Consumers of both types can buy from both authentic and counterfeit stores, and these two types of stores are two distinct distribution channels. As discussed in Liu et al. (2022), the cost of shopping

[3] Here n can refer to different product categories for fashion goods, which include clothing, accessories, handbags, shoes, or beauty. It can also refer to the product category handbags, which include backpacks, belt bags, bucket bags, clutches, cross-body bags, hobo bags, satchels, shoulder bags, totes, wallets and wristlets.

[4] For technical convenience, we assume that the size of product portfolio is a continuous variable instead of integers. Note that this assumption is not consequential to our qualitative results.

at those two distribution channels are different because the counterfeit stores are small in scale, fragmented in location, competitive in pricing, and more costly to access, while authentic goods are commonly sold in authorized stores (Chow, 2000; Beconcini, 2016; Department of Homeland Security, 2020). More importantly, inconvenience for consumers aside, counterfeit shoppers must incur other non-pecuniary costs due to embarrassment, the possible legal penalties and the lack of post-sale service. A large meta-analysis has shown that psychographics matters significantly in determining the attitudes, intention, and behavior towards purchasing counterfeits (Eisend et al., 2017). A more recent paper has also shown that these psychographic variables include personal embarrassment, shame (Gregory-Smith et al., 2013), a psychological burden of criminal guilt, and exposure of a social wrong (Bian et al., 2016). In this context, Yoo and Lee (2004) convincingly show that not only counterfeit buyers had lower income and lower socio-economic class, they also feel a lower psychological burden of criminal guilt. In addition, Hamelin et al. (2013) "found a significant difference between groups of income and the feeling of embarrassment; that is, higher-income respondents felt more embarrassed by the purchase of counterfeits" (see also Ang et al. (2001), Chuchinprakarn (2003), and Stöttinger and Penz (2015)).

From the differences in distribution channels and in psychographics, we can deduce three stylized facts. First, a consumer incurs more disutility shopping for counterfeit goods than for authentic ones (Stöttinger and Penz, 2015). Second, consumers differ in the disutility they incur in purchasing counterfeits, but on average, it is more costly for the H-types than for the L-types, as the H-types' embarrassment cost, for instance, is higher as mentioned previously. Of course, this can also be supported by the fact that the H-types' opportunity cost of time and their reputation cost are higher. Third, the market for counterfeits is populated by small competitive vendors, who have little pricing power. To capture the first two stylized facts, we assume that a consumer purchasing a counterfeit good will incur one of the two levels of disutility, b_η, for $\eta \in \{h, l\}$ where $0 \leq b_l < b_h$. We further assume that ω_H fraction of the H-types and ω_L fraction of the L-types have the disutility of b_h. By the second stylized fact, we should have the average disutility higher for the H-types than that for the L-types, which implies $1 \geq \omega_H > \omega_L \geq 0$. To get to our conclusions quickly, we start our analysis with $\omega_L = 0$ in the benchmark model. We will explore the case of $\omega_L > 0$ later, in Section 4.1. By the third stylized fact, we assume that the price for the counterfeit goods

(p_C) is competitively driven to a constant marginal cost, which we set to zero for simplicity in the benchmark model.[5] In this market, the luxury brand sets its own price (p_A) to maximize its profitability.

Consumers gain symbolic utility when they are recognized as an H-type, but receive a zero symbolic utility if they are recognized as an L-type. This symbolic utility is a lump-sum utility that only materializes when a consumer successfully signals her higher wealth to others. We assume that this lump-sum utility is calibrated by the wealth gap ($B_H - B_L$) in the society. This utility captures the advantage that the society bestows on someone perceived to have a high-wealth status.[6] Putting these sources of utility together, a consumer's decision is to maximize a sum of the functional and symbolic utilities from consuming luxury goods and counterfeits subject to her budget constraint as given below,

$$\max_{k_A,k_C} V(\theta,\eta,k_A,k_C|\mu) = \underbrace{U(k_A,k_C)}_{\text{Functional Utility}} + \underbrace{(B_H - B_L)\mu(\theta = H|k_A+k_C)}_{\text{Symbolic Utility}} - b_\eta k_C + X, \tag{2}$$

$$s.t. \quad p_A k_A + p_C k_C + X \leq B_\theta, \tag{3}$$

$$0 \leq k_A + k_C \leq n, \tag{4}$$

$$X \geq 0 \tag{5}$$

where X denotes the number of numeraire goods consumed. In the utility function, $\mu(\cdot) \in [0,1]$ is the probability that the consumer is perceived as the H-type by others through consuming ($k_A + k_C$) products.

It is important to note that this probability μ depends on the total number ($k_A + k_C$), instead of the individual number of authentic and counterfeit goods consumed. This is because even though the authentic goods and counterfeits are different in objective qualities, they are visibly indistinguishable to others. In other words, in this market of high-quality counterfeits, only buyers know whether they have authentic products or counterfeits and no one else does, because only buyers know where they

[5] We investigate the case of $p_C > 0$ in section 4.3.

[6] This advantage is captured vividly in the short story "The Million Pound Bank Note" by Mark Twain, which was later adapted to become a classic movie "The Million Pound Note (1954)" starring Gregory Peck. The gist of the plot is when Henry is given an uncashable million pound note, every courtesy imaginable in London is extended to this down-on-luck man. Of course, the plot would be very different if Henry holds only a hundred pound note.

have purchased their products (Mavlanova and Benbunan-Fich, 2010; Qian, 2014a; Bate et al., 2015). As shown in the literature, the knowledge of authenticity in this market depends on the reliability of the supplier (Barnett, 2005; Yu et al., 2018; Maltzahn, 2018; Kruh et al., 2017). For instance, if buyers purchase a luxury item from an authorized store, they would have a high confidence that the product they just purchased is authentic (Barnett, 2005, pg.1397). Said differently, in our model, buyers have much more information about the authenticity of a product they use than the people around them. We will explain the formation and updating of this belief function shortly. Since wealth is unobservable to others and symbolic utility is desirable, this creates the opportunity for both types to pursue symbolic utility through luxury consumption.

The timing of the game is as follows. The luxury brand chooses price p_A for all n products. Counterfeiters observe the products and prices. Then, counterfeiters provide replicas of all products. Given p_A and $p_C = 0$, consumers decide how many authentic and counterfeit items to buy among all available products, denoted by k_A and k_C respectively, with $k_A + k_C \leq n$. Finally, the public makes an inference about a consumer's type based on what the consumer uses. A consumer gains functional utility as well as symbolic utility, where the latter is based on the type they are perceived to be.

We now formally define the equilibrium concept in our model. Each consumer purchases $k_A \geq 0$ and $k_C \geq 0$ products from the authentic and counterfeit outlets, respectively, such that the total number of purchased items does not exceed n, i.e., $(k_A, k_C) \in \mathcal{L} \equiv \{k_A \in \mathbb{R}_{\geq 0}, k_C \in \mathbb{R}_{\geq 0} : k_A + k_C \leq n\}$. We focus on the pure strategy perfect Bayesian equilibrium (PBE) $(k_A^*(\theta,\eta), k_C^*(\theta,\eta)) : \{H, L\} \times \{h, l\} \mapsto \mathcal{L}$ that satisfies the following three criteria:

1. Given the public's belief μ, each consumer chooses the number of authentic and counterfeit products to maximize her utility subject to her budget constraint:

$$(k_A^*(\theta,\eta), k_C^*(\theta,\eta)) \in \arg\max_{k_A,k_C} V(\theta,\eta,k_A,k_C|\mu) \tag{6}$$

$$s.t.\ p_A k_A + X \leq B_\theta \tag{7}$$

$$k_A \geq 0, k_C \geq 0, k_A + k_C \leq n, \tag{8}$$

$$X \geq 0. \tag{9}$$

Here, the budget constraint (7) is always binding at optimum.

2. For any number of products $k \in [0, n]$ that a consumer purchases, there exists a public belief $\mu(k) : [0, n] \mapsto [0, 1]$ corresponding to the probability that a consumer who owns $k\,(= k_A + k_C)$ items in total is an H-type.

3. On every equilibrium path, beliefs are updated according to the Bayes' rule. Specifically, define $k^*(H, \eta) = k_A^*(H, \eta) + k_C^*(H, \eta)$ as the total equilibrium purchases by H-type with cost b_η and $k^*(L, \eta) = k_A^*(L, \eta) + k_C^*(L, \eta)$ as the total equilibrium purchases by L-type with cost b_η. The belief μ that is formed upon observing k items satisfies the following condition:

$$\mu\left(\theta = H | k = k^*(\theta, \eta)\right) = \frac{\mathcal{P}_H(\theta, \eta)}{\mathcal{P}_H(\theta, \eta) + \mathcal{P}_L(\theta, \eta)},$$

where

$$\mathcal{P}_H(\theta, \eta) \equiv \rho_H \omega_H \mathbf{1}\left[k^*(H, h) = k^*(\theta, \eta)\right] + \rho_H(1 - \omega_H)\,\mathbf{1}\left[k^*(H, l) = k^*(\theta, \eta)\right]$$
$$\mathcal{P}_L(\theta, \eta) \equiv \rho_L \omega_L \mathbf{1}\left[k^*(L, h) = k^*(\theta, \eta)\right] + \rho_L(1 - \omega_L)\,\mathbf{1}\left[k^*(L, l) = k^*(\theta, \eta)\right].$$

In the expressions above, $\mathbf{1}[\cdot]$ is an indicator function equal to 1 if the statement in the bracket is true and 0 otherwise. This Bayesian updating rule ensures that without any discerning information, public beliefs are based on the priors. However, public beliefs will rationally update with any new discerning information. This gives rise to the incentives for both types to distort their consumption choices in pursuit of symbolic benefits.

Finally, the profit of a luxury brand (π_A) is given by the total revenue from both the H-types and the L-types:

$$\pi_A = \sum_{\theta \in \{H, L\}} \rho_\theta \left[\omega_\theta k_A^*(\theta, h) + (1 - \omega_\theta)\, k_A^*(\theta, l)\right] p_A.$$

The Intuitive Criterion is commonly used to address the issue of multiplicity of equilibria in signaling games (Cho and Kreps, 1987). We shall do the same in the paper. For all the equilibria that survive the Intuitive Criterion, we resort to a hierarchical equilibrium selection criterion. First, for all the equilibria with the same set of prices (p_A, p_C), we select the ones based on consumer welfare by eliminating those where all consumers are strictly worse off. Second, among the remaining

equilibria, we select the equilibrium that gives the luxury brand the highest profit.

In addition, we invoke the same two tie-breaking rules in our analysis as in Liu et al. (2022). Specifically, a consumer will purchase authentic goods if she is indifferent between buying authentic and counterfeit goods. Moreover, a consumer will make a purchase only if the basket contains authentic goods when she is indifferent between buying and not buying. These two tie-breaking rules capture the consumer preference and aspiration for the authentic products.

3 Analysis

We start by exploring to what extent the H-types distort their consumption to stand out in a world where high-quality, low-price counterfeits are available, and how those distortions in turn impact the sales of the authentic brand. To do this, we establish a comparison case where counterfeits are *not* available. By comparing to this case, we shall isolate how the availability of counterfeits contribute to the consumption and price distortions in the luxury goods market.

For all the analysis we conduct hereafter, we shall maintain the following assumptions. We require $B_L > \frac{n\alpha q_A}{\rho_H}$. Here, the L-types' budget cannot be too small so that consumption distortion is not needed to separate the two types in the absence of counterfeits. In other words, we focus on the equilibrium where the luxury goods are indeed used as a signaling device.

Lemma 1. *(**Conspicuous Excessive Consumption**) When counterfeits are not available, the equilibrium is a separating equilibrium if and only if* $B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H}$ *and* $B_L > \frac{n\alpha q_A}{\rho_H}$*, where the H-types purchase more than the L-types, and they stand out through purchasing more than what maximizes their functional utility. Otherwise, the equilibrium is a pooling equilibrium, where both the H-types and L-types consume the same number of luxury goods, and they cannot be distinguished from each other. The equilibrium price of a luxury good is given by*

$$p_A^* = \begin{cases} \alpha q_A & \text{if } B_H - B_L \leq \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ or } B_L \leq \frac{n\alpha q_A}{\rho_H} \\ \frac{B_L + \varepsilon}{n} & \text{if } B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ and } B_L > \frac{n\alpha q_A}{\rho_H} \end{cases}.$$

The proof of Lemma 1 is provided in the online Appendix. It is important to note that in

the separating equilibrium of Lemma 1, the H-types engage in excessive, conspicuous consumption to signal their type as described by Veblen (1899). In the analysis that follows in Section 3, we further assume that the minimum disutility of shopping for counterfeits is not too high, i.e. $b_l < \frac{B_L}{n} - \alpha q_A + \alpha q_C$. Otherwise, the market will revert to the case in Lemma 1 as if counterfeits are absent. We are now ready to analyze our benchmark case where counterfeits are available.

Proposition 1. ***(Minimalist Luxury)*** *When counterfeits are available, the H-types with high disutility of shopping for counterfeits (b_h) buy only authentic goods and separate themselves from the rest through "minimalist luxury" strategy if and only if $\alpha q_C > b_l$, $\omega_H > \omega_1$, and $0 < B_H - B_L \leq \overline{B}$. Minimalist luxury strategy is achieved by these H-types through purchasing fewer luxury goods than what they could afford and what maximizes their functional utility. It is conspicuous as the rest purchases more goods ($k^*(H,h) < k^*(H,l) = k^*(L,l)$). Otherwise, we have a pooling equilibrium where all consumers purchase the same number of luxury goods.*

In Proposition 1, we have $k^*(H,h) = n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)$, $k^*(H,l) = k^*(L,l) = n$ in the separating equilibrium. The equilibrium price of a luxury good is given by

$$p_A^* = \begin{cases} \min\{\alpha q_A, \alpha(q_A - q_C) + b_h\} & \text{if } \alpha q_C > b_l, B_H - B_L \leq \overline{B}, \omega_H > \omega_1 \\ \alpha q_A + \min\left\{\frac{(B_H - B_L)\rho_H}{n}, b_h - \alpha q_C\right\} & \text{if } \alpha q_C > b_l, B_H - B_L \geq B_0, \omega_H > \omega(b_h, b_l) \\ \alpha q_A & \text{if } \alpha q_C \leq b_l \\ \alpha(q_A - q_C) + b_l & \text{if o/w} \end{cases}.$$

The corresponding variables for the pooling equilibrium, ω_1, and $\overline{B} > 0$, along with the proofs for this proposition and the propositions hereafter, are all given in the online Appendix.

In the separating equilibrium, the H-types with a high disutility of consuming counterfeit goods will only purchase authentic goods, and they are the ones who engage in minimalist luxury to separate from the rest. These are the status-seeking H-types. The rest, consisting of H-types with low disutility of consuming counterfeit goods and all L-types, will each buy the same number of counterfeit goods so that they are perceived as the H- and L-types with respective probabilities of $\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L}$ and $\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}$. This is a sharp contrast to the equilibrium in Lemma 1 where all

H-types engage in conspicuous and excessive consumption to stand out: they consume more than what maximizes their functional utility and more than the L-types. Rather surprisingly, when the high-quality, low-price counterfeits are present, less is actually more for the status-seeking H-types to signal their type and to stand out. Our analysis and conclusions in Proposition 1 theoretically uncover this phenomenon in the context of high-quality, low-price counterfeits. More importantly, our analysis identifies a mechanism for this phenomenon.

The status-seeking H-types stand out by pursuing minimalist luxury strategy fundamentally because they can no longer stand out by outspending the L-types, as whichever goods they can purchase the L-types can always match with counterfeits. Given that authentic and counterfeit goods cannot be distinguished by their appearance, expenditure is no longer a potent signal for the H-types, as the price of counterfeits is zero in our benchmark model.[7] However, the status-seeking H-types can stand out by sacrificing their functional utility in a way that the rest are not willing to mimic. The sacrifice these H-types make in consuming luxury goods is compensated for with symbolic utility once their wealth status is recognized.

It is important to note that in our model, "less is more" signals both wealth and shopping disutility. This can be seen through the fact that when shopping disutility *or* wealth is the same for both types of consumers, there is no "less is more" equilibrium in our model. This means that both the differences in wealth and shopping disutility are the necessary conditions for minimalist luxury to happen. More importantly, the practitioners of minimalist luxury are always the wealthy. Here, the minimalist luxury as a signal differs from conspicuous consumption à la Veblen, where wealth and consumption has a bijective relationship. The minimalist luxury is a surjective signal. Said differently, à la Veblen, overconsumption signals wealth and the wealthy always engage in overconsumption. In contrast, minimalist luxury signals wealth, but not all wealthy embrace it. Thus, the minimalist luxury as a signal is more focused and selective, and this difference is attributed to the presence of high-quality, low-price counterfeits.

The phenomenon of minimalist luxury hinges on three factors in our model. First, "less is more" happens only if the income gap $(B_H - B_L)$ exists, and it is not too large. A non-zero income difference is necessary for the separating equilibrium because the symbolic utility is bestowed on

[7] In Section 4, we extend our analysis to the case where the price of counterfeits is not zero.

the people perceived to be wealthier. In other words, the society rewards the wealthy status in our model as it is in Veblen's.[8] However, the income gap cannot be too large. Otherwise, the symbolic utility is also very large, so that even the L-types will forego some of their functional utility to pursue it so as to make the separating equilibrium impossible. When the income gap is not too large, the luxury brand's ability to create exclusivity is restored, *albeit* through minimalist luxury. This is because when the income gap is not too large, the symbolic utility is correspondingly not as attractive and the functional utility thus looms larger. For all consumers with low disutility in consuming counterfeits, they are better off taking advantage of counterfeits and maximizing their functional utility. For the H-types with high disutility in consuming counterfeits, pursuing a high functional utility is not a viable option, as they are handicapped by their high disutility to take advantage of counterfeits. Therefore, they have more incentives than the rest to pursue the symbolic utility. They can do so through sacrificing enough functional utility to make it not worthwhile for the rest to mimic for the purpose of capturing symbolic utility. Then, underconsumption becomes conspicuous as it separates the status-seeking H-types from the rest.

Second, functional utility cannot be too small for the minimalist luxury to occur, which is reflected in the condition $\alpha q_C > b_l$. This is because too small a functional utility will encourage the L-types to mimic. Indeed, as shown in Liu et al. (2022), when functional utility is sufficiently small, both H-types and L-types will have incentives to pursue symbolic utility such that maximalist luxury occurs. As we will soon make it clear in our extension, the importance of functional utility will mediate whether maximalist or minimalist luxury occurs. Finally, the utility gain from minimalist luxury has to be sufficiently large. This is reflected in the condition $\omega_H > \omega_1$. To see this, for the H-types with b_h, their utility gain from minimalist luxury when they stand out is given by $(B_H - B_L)\left(\frac{1-\rho_H}{1-\rho_H\omega_H}\right)$, which increases with ω_H.

Thus, proposition 1 advances and complements the main conclusion of maximalist luxury in Liu et al. (2022). Here, we identify the phenomenon of minimalist luxury, uncover the utility sacrifice as the mechanism of this phenomenon, and identify three key conditions that are conducive to its occurrence. It also provides new managerial perspectives on luxury goods in the age of high-quality,

[8]Conceivably, the symbolic utility can be awarded to the people with high disutility for counterfeits. If this were to happen, one can show that a separating equilibrium can exist, alongside the equilibrium of wealth signaling, where the consumers with high disutility are separated from those with low disutility.

low-price counterfeits. First, the availability of those counterfeits may not be as alarming as it may seem, judging by the Veblen thesis. Their availability does not always, as Proposition 1 has shown, destroy the viability of luxury goods as a status signal, and it simply changes whether and how the wealthy send the signal. Depending on the income gap in a market, product category, and consumer propensity to use counterfeits, maximalist luxury may not be the only way by which the wealthy can stand out and the minimalist luxury, as Proposition 1 has shown, is another alternative. Therefore, a luxury brand may want to learn about and embrace the phenomenon, rather than dismissing or discouraging it. Second, the mechanism of sacrificing functional utility to stand out, as captured in Proposition 1, provides some actionable managerial insights for a luxury brand. A brand's pricing, product, and channel decisions, insofar as they impact on the consumer preference for functionality and on their propensity to purchase authentic products, can affect how much the H-types have to sacrifice to signal. Therefore, a luxury brand needs to become mindful of the status-seeking H-types' desire to stand out through minimalist luxury and accommodate it. Finally, our analysis suggests that minimalist luxury is more likely to be a phenomenon in economies where the income gap is not too large. Empirically, this means that the Gini index in a market plays a role in predicting the incidence of the minimalist luxury phenomenon.

Comparing Proposition 1 to the results in Lemma 1, we can answer a number of other managerially important questions. First, can a luxury brand ever be better off because of counterfeits? Second, how should the brand adjust its price and expect the sales at the onset of those counterfeits? Third, do consumers actually benefit from the presence of those counterfeits? We answer these questions in the next proposition.

Proposition 2. ***(Effects of Counterfeits)*** *The emergence of high-quality, low-price counterfeits is detrimental to a luxury brand when the equilibrium of minimalist luxury occurs. Specifically, the arrival of those counterfeits reduces the brand's sales, price, and profitability in that equilibrium. Furthermore, the presence of counterfeits always makes the L-types better off, but the H-types can be worse off when the income gap between the H-types and L-types is sufficiently large.*

It perhaps comes as no surprise that the arrival of high-quality, low-price counterfeits has deleterious effects on a luxury brand. What is surprising, however, is how those effects come about. A

close look into those effects can help develop insights into how best a luxury brand could cope with counterfeits. Intuitively, the sales for the luxury brand will go down as the L-types switch from authentic to counterfeit goods. This is the obvious way in which a luxury brand loses its sales to counterfeiters. However, a new and perhaps more detrimental way is actually to lose sales amongst the status-seeking H-types. As we have shown in Proposition 1, these H-types will purchase fewer authentic goods to separate from the rest, who can avail themselves of all n counterfeits at zero price. In other words, counterfeits hurt a luxury brand *twice*: once due to the loss of sales to counterfeits, and twice when the luxury consumers refrain from excessive consumption.

It may seem quite intuitive that a luxury brand will reduce its price due to the arrival of counterfeits. However, some reflection would suggest otherwise. This is because if all except the status-seeking H-types purchase counterfeits and only the status-seeking H-types purchase authentic goods, wouldn't the luxury brand do better by raising the price, as those H-types certainly could afford them? The reason why a luxury brand cannot charge a high price in the equilibrium of minimalist luxury is in fact quite informative of the strategic role a brand's price plays in this context. In the absence of the high-quality, low-price counterfeits, a high price by the luxury brand is aligned with the H-types' incentive to engage in excessive consumption to stand out. Thus, "soaking the rich" actually helps facilitate signaling, and this is also why a high price can result in a high demand for luxury goods. In the presence of counterfeits, the H-types cannot separate from the L-types by buying more than the latter, and they can only seek to stand out by consuming less. The brand needs to charge high enough a price, on the one hand, to leave as small a surplus as possible in net functional utility to the status-seeking H-types. Doing so will also ease the pain for those H-types from reducing their consumption of luxury goods, as the net functional utility from consuming an authentic good is smaller with a higher price. On the other hand, the brand cannot charge so high a price that the net functional utility from authentic goods is negative, as is in the excessive equilibrium characterized by Lemma 1. A negative net functional utility would encourage the status-seeking H-types to not purchase anything at all while still standing out. By lowering the price, the luxury brand can keep those H-types and partially restore the law of demand. This balancing act leads to a price lower than that in the excessive equilibrium. Thus, insistence on a high price facing the arrival of counterfeits can hurt the viability of luxury goods. When the price

and sales both go down, a luxury brand will suffer from a lower profitability.

If the luxury brand is worse off in the equilibrium of minimalist luxury, and the counterfeits provide a cheap alternative, one would expect that all consumers should benefit from the presence of counterfeits. Proposition 2 suggests otherwise. In fact, all H-types are worse off when the income gap is sufficiently large. This is because a large income gap gives rise to larger symbolic utility. In turn, the large status utility will motivate the L-types to always mimic the H-types. The availability of counterfeits enables the L-types to do so, making the separation less likely to occur. As a result, the H-types suffer because they can no longer capture the maximum status utility, which is sizable for a large income gap.

In sum, the availability of high-quality, low-price counterfeits can hurt a luxury brand. This perhaps explains why luxury brands particularly loathe high-quality counterfeits. To fight such counterfeits, the luxury brand can rely on some consumer support only in the countries where the income gap is sufficiently large. If the luxury brand cannot fight counterfeits, it can still maintain its exclusivity by accommodating minimalist luxury. This means that minimalist luxury is not a fad, and may be here to stay, as the interests of all consumers and counterfeiters are aligned when the income gap is not too large.

4 Extensions

In our analysis up to this point, we have focused on minimalist luxury as a signaling device for the wealthy in the context of high-quality, low-price counterfeits. We have shown that luxury goods are still viable in helping the status-seeking wealthy to stand out and underconsumption, instead of excessive consumption, achieves the separation. The phenomenon of minimalist luxury is also compatible with an ongoing movement broadly labeled as minimalism. This movement, as we have noted in the introduction, affects a broad range of industries and involves a broad spectrum of people (Fagan, 2017). In the luxury goods industry, one might naturally question whether underconsumption is a signaling device reserved exclusively for the wealthy. If not, what motivates the non-wealthy to adopt a minimalist luxury strategy?

In our main analysis, to get to the mechanism of minimalist luxury quickly, we have also avoided

detailed modeling of shopping costs for customers when they buy authentic goods at authorized dealers versus counterfeits at small and fragmented vendors. Such details are what underlie the equilibrium of maximalist luxury in Liu et al. (2022). An interesting question to ask is whether both maximalist luxury and minimalist luxury can co-exist in the marketplace, or when one or the other would occur.

To address these questions, we introduce three extensions to our analysis in Section 3. First, we allow both types of consumers to have high or low disutility of shopping for counterfeits, resulting in four distinct types of consumers. Second, we add to our benchmark model a cost of shopping at authorized dealers, which makes our model a more general one than that in Liu et al. (2022). This addition allows us to investigate the full spectrum of phenomena arising from high-quality, low-price counterfeits in the luxury goods market. Lastly, we assume a positive price for counterfeits and examine its potential impact on the equilibrium outcomes.

4.1 Consumer Heterogeneity and Minimalist Luxury

In the previous section, we have assumed away the possibility of L-types having high disutility from shopping for counterfeits by setting ω_L to zero. We can relax this assumption by allowing $0 < \omega_L < \omega_H$. This extension effectively creates four consumer segments instead of three. With this added complexity, luxury goods as a status signal become even more complex. In the following proposition, we summarize our analysis and show that not all who pursue minimalist luxury are H-types and not all H-types want to stand out.

Proposition 3. ***($L-$type minimalist luxury)*** *There exists the equilibrium of minimalist luxury if and only if* $\alpha q_C > b_l$, $\omega_H > \omega_1 - \frac{\rho_L \omega_L}{\rho_H}$, *and* $0 < B_H - B_L < \hat{B}$. *In this equilibrium, all consumers with* b_h *will pursue minimalist luxury and stand out from the rest, i.e.* $k^*(H,h) = k^*(L,h) = n - \frac{(B_H - B_L)(f-g)}{\alpha q_C - b_l}$ *and* $k^*(H,l) = k^*(L,l) = n$.

The equilibrium price of a luxury good is given by

$$p_A^* = \begin{cases} \min\{\alpha q_A, \alpha(q_A - q_C) + b_h\} & \text{if } \alpha q_C > b_l, B_H - B_L < \hat{B} \\ \alpha q_A + \min\left\{\frac{(B_H - B_L)\rho_H}{n}, b_h - \alpha q_C\right\} & \text{if } \alpha q_C > b_l, B_H - B_L \geq \hat{B}, \omega_H > \omega_1 - \frac{\rho_L \omega_L}{\rho_H} \\ \alpha q_A & \text{if } \alpha q_C \leq b_l \\ \alpha(q_A - q_C) + b_l & \text{if o/w} \end{cases}.$$

The definitions for $\hat{B}$, f, and g are provided in the online Appendix. We derive two insights from Proposition 3. First, the phenomenon of minimalist luxury as a signaling device is robust to adding more consumer heterogeneity. In fact, the region where the equilibrium of minimalist luxury happens is larger with more consumer heterogeneity as $\hat{B} > \overline{B}$. Second, more importantly, those who practice minimalist luxury are not exclusively the H-types. This is because the L-types with b_h will also be motivated to pursue symbolic utility, mimicking the status-seeking H-types, and the existence of counterfeits makes it impossible to separate these two types through spending.

These two insights provide us with a deeper understanding of the phenomenon of minimalist luxury as a status signal in the presence of high-quality, low-price counterfeits. With the availability of counterfeits, the H-types no longer have the advantage over the L-types in consumption. Moreover, the signaling strategy of underconsumption does not leverage wealth. Instead, it requires sacrificing functional utility, from which both the H-types and L-types can feel the same pain. For that reason, some other consumer attribute needs to be leveraged for separation. The difference in disutility of shopping for counterfeits becomes that attribute. This attribute is inherently a fuzzy signal for wealth, as some H-types and L-types can share the same attribute. However, it is important to note that the difference in this attribute is only a *necessary* condition for a separating equilibrium. The fact that some H-types and L-types can stand out does not mean that they will. They want to stand out because those who stand out will enjoy an elevated probability of being perceived as the H-types than those who do not. This means that a certain composition of H-types and L-types in a market ($\frac{\rho_H \omega_H}{\rho_H \omega_H + \rho_L \omega_L} > \frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H) + \rho_L(1-\omega_L)}$) and the societal rewards for the wealthy are also necessary conditions for underconsumption to be a status signal.

Our analysis thus suggests that consumer behavior in the luxury market can be very diverse as

has been recognized (Dahlhoff and Zhang, 2020). Our insights shed more light on that diversity by showing that both H-types and L-types can signal, with the right conditions, to stand out.

4.2 A Tale of Two Equilibria

Our benchmark model closely resembles that of Liu et al. (2022) with three critical distinctions. First, functional utility is either zero or quite small in Liu et al. (2022). In our benchmark model, we model explicitly this functional utility. Second, the disutility in shopping for counterfeits is identical for all types, denoted by b in Liu et al. (2022). Here, we allow this disutility to have two levels: b_h and b_l. Third, we let the disutility of shopping for authentic goods to be zero while in Liu et al. (2022), this disutility, denoted by c, is positive. In this extension, we show that these three differences are responsible for producing the equilibrium of maximalist luxury in Liu et al. (2022) and the equilibrium of minimalist luxury in our model. We do so by producing both types of equilibria in a single model by adding a lump sum disutility, $c \geq 0$, of shopping for authentic goods.[9] This extended model will converge qualitatively to the benchmark model in Liu et al. (2022), if we set $\alpha = 0$ and $b_h = b_l = b$.[10] The results of our analysis for this extended model are summarized in the following proposition.

Proposition 4. *For $\alpha q_C > b_l$, there exists an equilibrium of minimalist luxury when $\omega_H > \omega_1$ and $c \in [0, \overline{c})$ given $0 < B_H - B_L < \overline{B}$, or when $c \in (\underline{c}, \overline{c})$ given $\overline{B} \leq B_H - B_L < \overline{\Delta B}$. For $\alpha q_C \leq b_l$, the equilibrium of maximalist luxury occurs when $c_1 < c < c_2$ and $\underline{B} \leq B_H - B_L < n(b_l - \alpha q_C)$. Otherwise, there exists a pooling equilibrium or a conspicuous excessive equilibrium as in Lemma 1.*

The thresholds $\underline{c}$, $\overline{c}$, c_1, c_2, $\underline{B}$, and $\overline{\Delta B}$ are all defined in the online Appendix. From Proposition 4, we see that both the equilibria of maximalist luxury and minimalist luxury can occur in marketplace, depending on the market conditions. However, whenever the equilibrium of maximalist luxury occurs, that of minimalist luxury does not, and vice versa. Thus Proposition 4 establishes that the impact of high-quality, low-price counterfeits can manifest itself in two extremes. Our analysis here

[9] In this extended model, we also relax our assumption made in Section 3 by allowing the minimum shopping disutility for counterfeits, b_l, to be smaller or larger than $\frac{B_L}{n} - \alpha q_A + \alpha q_C$.

[10] In the benchmark model of Liu et al. (2022), the maximal symbolic utility is capped at 1. In our new model, we make this more general to be $B_H - B_L$. This difference does not substantively affect the type of equilibria that arise.

takes one step forward in understanding the full impact of such counterfeits on the luxury goods industry enabled by a comprehensive model that allows these two extremes to occur. With this comprehensive model, we now have a deeper understanding of the determinants for each type of equilibrium, which sheds light on what consumer behavior to expect and how to manage luxury goods in different markets.

The occurrence of the maximalist luxury equilibrium hinges on three determinants: small functional utility, large income gap, and intermediate level of disutility in shopping for authentic goods. These are the determinants that are discussed in Liu et al. (2022). However, when functional utility is sufficiently large, income gap is sufficiently small, disutility of shopping for authentic goods is sufficiently small, and more H-types are predisposed only to buy authentic goods, the equilibrium of minimalist luxury prevails. This is the kind of equilibrium that Liu et al. (2022) overlook.

This extended analysis offers two practical insights about the luxury goods market when the high-quality, low-price counterfeits are present. First, signaling in the luxury goods market becomes more diverse and polarized. Both conspicuous excessive consumption based on expenditure à la Veblen, as well as maximalist and minimalist luxury that are not based on expenditure, can serve as means for the H-types, and potentially some L-types, to stand out. Second, to the extent that the market environment differs across different product categories and across different geographies, one can expect the co-existence of different signaling mechanisms in the same market for different product categories or across different markets for the same product category. In short, the luxury goods industry may need to embrace diversity in consumer signaling strategies in a market with high-quality, low-price counterfeits.

4.3 The Role of Counterfeit Price

Given that the low counterfeit price is what renders expenditure as an ineffective signal, it is interesting to investigate how this price may change the equilibrium outcome in the luxury goods market. We can do so here by introducing a non-zero price for counterfeits, $p_C > 0$. Our analysis is summarized in the following proposition.

Proposition 5. ***(The Role of Counterfeit Price)*** *For $\alpha q_C > b_l$, the minimalist luxury equilib-*

rium occurs when $0 < p_C < \overline{p_C}^{MINI}$*, and the maximalist luxury equilibrium occurs when* $\alpha q_C - b_l \leq p_C \leq \overline{p_C}^{MAX}$*, where* $\overline{p_C}^{MINI} < \alpha q_C - b_l < \overline{p_C}^{MAX}$*. When* $p_C > \overline{p_C}^{MAX}$ *and* $B_H - B_L > \frac{B_L + c - n\alpha q_A}{1-\rho_H}$*, there exists an equilibrium of conspicuous excessive consumption as in Lemma 1.*

In the online Appendix, we also show that the pooling equilibrium occurs when $\overline{p_C}^{MINI} \leq p_C < \alpha q_C - b_l$ or when $p_C > \overline{p_C}^{MAX}$ and $B_H - B_L \leq \frac{B_L + c - n\alpha q_A}{1-\rho_H}$. This proposition suggests that, as the price of counterfeits rises, the luxury goods market can change from the minimalist luxury to the maximalist luxury, ending with Veblen's conspicuous consumption. This is because a higher counterfeit price restores the mechanism of the wealthy using expenditure to stand out. To the extent that a luxury brand can influence the price for counterfeits through legal enforcement actions, Proposition 5 also suggests a rather counterintuitive insight: the luxury brand may not want to make the counterfeits go away entirely, even if it could, as its profit is the highest under the maximalist luxury equilibrium.

5 Conclusion

In the presence of high-quality, low-price counterfeits, overspending à la Veblen ceases to be an effective way for the wealthy to stand out when authentic and fake goods are hard to distinguish and high-quality counterfeits are available at a very low price. This paper addresses the most pressing questions of whether luxury goods can still be a signal for the wealthy and if they are, how they may be used as a signal.

Our answers to these two questions differ in the extreme form from those in Liu et al. (2022). Instead of pursuing the maximalist luxury, we show that an effective way for the status-seeking wealthy to signal their wealth is to purposefully refrain from luxury consumption and to stand out by sacrificing more functional benefits than what the mimickers are willing to give up. This signaling mechanism through minimalist luxury is but a special form of sacrificing functional utility to seek status recognition. Other forms of sacrifice as a status signal are also observed beyond the luxury goods industry. For instance, binding feet to 10 cm for wealthy women in the traditional Chinese society is a painful and credible way to signal that they are from a wealthy family (Turner, 1997, p.446). This is a practice that a woman from an ordinary family cannot afford to mimic because

the feet of that small size effectively prevent her from doing any manual labor. Similarly, excessive dieting to appear slender or fit is also a painful way to signal for belonging to the high class in the elite European society.

This new signaling mechanism gives us a new perspective to understand the seemingly paradoxical new reality related to consumer attitude towards consumption: "less is more" (Jeffries, 2011). Our analysis shows that this attitude may not be unique to the wealthy and a mix of both wealthy and not-so-wealthy individuals may embrace this idea. From this perspective, it becomes imperative that luxury brands heed this growing trend and develop managerial strategies to cope with it, if they are not already doing so. Our analysis has shown that the trend of minimalist luxury is not something to be alarmed about, and luxury brands can manage it if they know how.

Our analysis further shows that although the equilibria of the maximalist and the minimalist luxury do not occur under the same market conditions, they can co-exist across different product categories in the same market and across different markets for the same product category. Thus, the luxury goods industry should expect a diverse range of consumer signaling behaviors in the presence of high-quality, low-price counterfeits. These insights further suggest some managerial implications, which we have discussed in the paper.

Although minimalist luxury is exciting to uncover, and the mechanism through which it occurs is quite robust, it is important to point out that our conclusions are limited by our model's focus and simplicity. Future research can further verify that our mechanism will survive even with a distribution of prices for authentic and counterfeit goods, respectively. In addition, future research can analyze the possibility that some consumers may derive utility from keeping some products around, either as collectors or due to psychological comfort from possessions. However, we venture to suggest that collectors value for the wealthy would ease the pain of displaying fewer luxury goods, and hence may be conducive to the emergence of minimalist luxury.

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WEB APPENDIX

Proof of Lemma 1:

In the absence of counterfeits, shopping disutility is not relevant, and thus there are effectively only two types of consumers: the H-types with high wealth and the L-types with low wealth.

We derive the profit-maximizing equilibrium by comparing the luxury brand's equilibrium profits from three price ranges: (i) $p_A \leq \alpha q_A$, (ii) $\alpha q_A < p_A \leq \frac{B_L}{n}$, and (iii) $p_A > \frac{B_L}{n}$.

First, consider the price range where $p_A \leq \alpha q_A$. By assumption, we have $B_H > B_L \geq n\alpha q_A \geq np_A$. Hence, in this price range, both the H-types and the L-types can afford all available authentic goods and enjoy a positive surplus from owning the luxury goods regardless of their status benefit. On the one hand, there exists no separating equilibrium where the two types of consumers behave differently. This is because the H-types and the L-types share the same incentive constraints, and the L-types can always afford to mimic the H-types. On the other hand, there exists a pooling equilibrium where both the H-types and the L-types consume n luxury goods. There are many beliefs that are compatible with this pooling equilibrium outcome. One such belief is that $\mu(k) = \rho_H$ if $k = n$, and $\mu(k) = 0$ if $k < n$. We can show that this pooling equilibrium outcome survives the Intuitive Criterion. This is because any off-the-equilibrium-path message $k < n$ is either dominated or undominated (depending on how one modifies the off-the-equilibrium beliefs) for both types of consumers, as they both can afford and are willing to pay for the available luxury goods. In addition, at this price range, this pooling equilibrium outcome generates the highest consumer welfare than any other pooling equilibrium outcomes where consumers purchase fewer than n products. Therefore, for any $p_A \leq \alpha q_A$, the luxury brand obtains a profit of $\pi_A = n(\rho_H + \rho_L)p_A$.

Second, consider the price range where $\alpha q_A < p_A \leq \frac{B_L}{n}$. Again, there exists no separating equilibrium because the L-types can always afford to mimic the H-types. Similarly, all the pooling equilibria survive the Intuitive Criterion. Based on our hierarchical selection criteria, we choose the pooling equilibrium where no consumers purchase any goods because it generates the highest consumer welfare than any other pooling equilibrium outcomes. This is because consumers obtain identical symbolic utility across all pooling equilibria but strictly lower functional utility net of price if they purchase any luxury goods than if they do not. As a result, the luxury brand obtains zero profit at this price range ($\pi_A = 0$).

Third, we consider the price range where $p_A > \frac{B_L}{n}$. Note that the L-types cannot afford all n available luxury goods in this case. Next we show that when $(B_H - B_L)(1 - \rho_H) > \frac{B_L}{p_A}(p_A - \alpha q_A)$, there exists a separating equilibrium and it is the only equilibrium that satisfies the Intuitive Criterion. We prove this by guess-and-verify. Suppose there exists a separating equilibrium where the

H-types purchase $k_A^*(H) = \frac{B_L+\varepsilon}{p_A}$ products and the L-types do not buy any luxury goods, where $\varepsilon > 0$ is an arbitrarily small constant. Since the L-types cannot afford to mimic the H-types, their best response is to buy zero products in a separating equilibrium, given that the price of luxury goods is higher than their functional utility. Meanwhile, incentive compatibility for the H-types implies the following condition:

$$(\alpha q_A - p_A)(\frac{B_L+\varepsilon}{p_A}) + (B_H - B_L) \geq 0. \tag{A1}$$

It is straightforward to see that $(B_H - B_L)(1-\rho_H) > \frac{B_L}{p_A}(p_A - \alpha q_A)$ is a sufficient condition for (A1). Thus, the strategy profile where $k_A^*(H) = \frac{B_L+\varepsilon}{p_A}$ and $k_A^*(L) = 0$ constitutes a separating equilibrium. Also note that, for a given p_A, this is the equilibrium outcome that involves the least amount of consumption distortion, i.e., the Riley outcome. In this equilibrium, the luxury brand obtains a profit of $\pi_A = \rho_H(B_L + \varepsilon)$. Next, we show that, when $(B_H - B_L)(1-\rho_H) > \frac{B_L}{p_A}(p_A - \alpha q_A)$, this is the only equilibrium outcome that satisfies the Intuitive Criterion. We prove this in two steps.

Step 1: We prove that any separating equilibria where the H-types purchase more than $k_A^*(H) = \frac{B_L+\varepsilon}{p_A}$ fails the Intuitive Criterion.

Suppose there exists a separating equilibrium where the H-types purchase in total $\hat{k} > k_A^*(H)$ goods, and they obtain a symbolic utility of $(B_H - B_L)$ in equilibrium, whereas the L-types obtain zero symbolic utility and thus their best response is not to purchase anything, i.e., $k_A^*(L) = 0$. Given that $p_A > \frac{B_L}{n} > \alpha q_A \Longrightarrow \alpha q_A - p_A < 0$, there must exist an off-the-equilibrium-path message $k' \in [k_A^*(H), \hat{k})$ such that $k' p_A > B_L$ and

$$(\alpha q_A - p_A)k' + (B_H - B_L) > (\alpha q_A - p_A)\hat{k} + (B_H - B_L). \tag{A2}$$

The right hand side of inequality (A2) is the equilibrium payoff for the H-types and the left hand side is the maximum payoff the H-types could obtain by consuming k' products given that the public holds rational beliefs, in this case $\mu(\theta = H|k') = 1$. Meanwhile, the L-types cannot afford to buy k' authentic goods. Therefore, k' is dominated for the L-types and not for the H-types. Once we restrict the public's beliefs to $\mu(\theta = H|k') = 1$, the maximum payoff that the H-types obtain by consuming k' products is larger than their equilibrium payoff. Hence this separating equilibrium fails the Intuitive Criterion.

Step 2: we prove that any pooling equilibria where the H-types and L-types purchase equal amount of products fail the Intuitive Criterion.

Suppose there exists such a pooling equilibrium where the H-types and L-types both purchase

k^* luxury goods and obtain a symbolic utility of $\rho_H(B_H - B_L)$. By construction, k^* goods must be affordable for the L-types, that is, $p_A k^* \leq B_L$. Given that $(B_H - B_L)(1-\rho_H) > \frac{B_L}{p_A}(p_A - \alpha q_A)$, there exists an off-the-equilibrium-path message $\tilde{k} > k^*$ such that $p_A\tilde{k} > B_L$ and

$$(\alpha q_A - p_A)\tilde{k} + (B_H - B_L) > (\alpha q_A - p_A)k^* + (B_H - B_L)\rho_H \tag{A3}$$

The right hand side of inequality (A3) is the equilibrium payoff for the H-types in this pooling equilibrium and the left hand side is the maximum payoff the H-types could obtain by consuming $\tilde{k}$ products given that the public holds rational beliefs, in this case $\mu(\theta = H|\tilde{k}) = 1$. Meanwhile, the L-types cannot afford to buy $\tilde{k}$ authentic goods. Therefore, $\tilde{k}$ is dominated for the L-types and not for the H-types. Hence this pooling equilibrium fails the Intuitive Criterion.

Alternatively, when $(B_H - B_L)(1-\rho_H) \leq \frac{B_L}{p_A}(p_A - \alpha q_A)$, we cannot eliminate the pooling equilibrium outcome where all consumers purchase zero luxury goods ($k_A^*(H) = k_A^*(L) = 0$) based on the Intuitive Criterion. In addition, this pooling equilibrium generates the highest consumer welfare (for both types of consumers) than any other candidate equilibria. Hence, in that price range, our selection criteria imply that the pooling equilibrium is chosen and the luxury brand obtains zero profit ($\pi_A = 0$).

Summarizing the luxury brand's profit in the above three price ranges, we can rewrite the profit function of the luxury brand as follows:

$$\pi_A = \begin{cases} np_A & \text{if } p_A \leq \alpha q_A \\ \rho_H(B_L + \varepsilon) & \text{if } p_A > \frac{B_L}{n}, (B_H - B_L)(1-\rho_H) > \frac{B_L}{p_A}(p_A - \alpha q_A) \\ 0 & \text{if o/w} \end{cases}.$$

Note that the first domain corresponds to a pooling equilibrium and the second domain a separating equilibrium. The luxury brand's profit strictly increases in price within the first domain and it remains the same within the second. The second domain is non-empty when $B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H}$.

Lastly, among those remaining candidate equilibria, we select the one that gives the luxury brand the highest profit. Hence, the equilibrium is a separating equilibrium if and only if $B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H}$ and $\rho_H B_L > n\alpha q_A$. Otherwise, it is a pooling equilibrium where both types of consumers purchase n luxury goods.

Proof of Proposition 1:

When high-quality, low-price counterfeits are available, the public observes the size of one's total consumption but cannot distinguish a fake from a real product. There are effectively three types

of consumers: H-types with high-wealth (B_H) plus high (b_h) and low (b_l) shopping disutility and L-types with low-wealth (B_L) plus low (b_l) shopping disutility.

We derive the profit-maximizing equilibrium by comparing the luxury brand's equilibrium profits from three price ranges: (i) $p_A \leq \alpha(q_A - q_C) + b_l$, (ii) $p_A \in (\alpha(q_A - q_C) + b_l, \alpha(q_A - q_C) + b_h]$, and (iii) $p_A > \alpha(q_A - q_C) + b_h$

Case (i): $p_A \leq \alpha(q_A - q_C) + b_l$

In this case, we have $\alpha q_A - p_A \geq \alpha q_C - b_l > \alpha q_C - b_h$. In other words, all consumers strictly prefer authentic luxury goods to counterfeits. Moreover, they can afford all n authentic goods in this price range because $B_L > n\alpha(q_A - q_C) + nb_l \geq np_A$. First, we show that there do not exist any separating or partial separating equilibria. We can prove this by contradiction. Suppose that there exists an equilibrium where $k_A^*(H, \eta) \neq k_A^*(L, l)$ for some $\eta \in \{h, l\}$. Then Bayes rules imply that the public believes that a consumer is a H-type with higher probability if s/he purchases exactly $k_A^*(H, \eta)$ goods than if s/he purchases $k_A^*(L, l)$ goods. Given that at this price range, both the H-types and L-types can afford all n products, incentive compatibility for the H-types and our tie-breaking rules imply that the L-types should find it worthwhile to mimic the H-types by deviating to purchasing $k_A^*(H, \eta)$ which yields strictly higher symbolic utility. This contradicts the notion of an equilibrium. Next, note that the pooling equilibrium outcome where all consumers purchase the same number ($k_A^*(H, \eta) = k_A^*(L) = k^*$) of authentic goods survives the Intuitive Criterion. This is because any off-the-equilibrium message $k \neq k^*$ is either dominated or undominated (depending on how one modifies the off-the-equilibrium beliefs) for all types of consumers. Moreover, when the functional utility of authentic goods exceeds their price, i.e. $\alpha q_A - p_A \geq 0$, the equilibrium outcome where $k^* = n$ generates the highest consumer welfare than any other pooling equilibrium outcomes in this price range. Alternatively, when $\alpha q_A - p_A < 0$, the equilibrium outcome where $k^* = 0$ generates the highest consumer welfare. Therefore, in this price range, the luxury brand obtains a profit of π_A given by

$$\pi_A = \begin{cases} np_A & \text{if } p_A \leq \min\{\alpha q_A, \alpha(q_A - q_C) + b_l\} \\ 0 & \text{if } \alpha q_A < p_A \leq \alpha(q_A - q_C) + b_l, \alpha q_C < b_l \end{cases}.$$

Case (ii): $p_A \in (\alpha(q_A - q_C) + b_l, \alpha(q_A - q_C) + b_h]$

In this case, we have $\alpha q_C - b_l > \alpha q_A - p_A \geq \alpha q_C - b_h$. In other words, only the H-types with high shopping disutility still prefer authentic goods to counterfeits whereas the rest strictly prefer counterfeits in this price range. First, note that there does not exist a separating equilibrium where $k^*(H, \eta) > k^*(L, l)$ for some $\eta \in \{h, l\}$ either. This is because Bayes rules would imply

that a consumer is a H-type with a higher probability if s/he purchases exactly $k_A^*(H,\eta)$ goods than if s/he purchases $k_A^*(L,l)$ goods instead. Note that, to assemble the same number of goods, the L-types always incur less disutility (net of functional benefits) than the H-types in this price range. Hence incentive compatibility of the H-types should imply that the L-types would have been strictly better off by deviating to consuming exactly $k^*(H,\eta)$ counterfeit goods. This contradicts the notion of an equilibrium. Second, note that there does not exist a separating equilibrium where $k^*(H,l) \neq k^*(L,l)$ because the incentive compatibility constraints are the same for these two types of consumers. However, we can show that there exists a (partial) separating equilibrium where $k^*(H,h) < k^*(L,l) = k^*(H,l)$ only if $\alpha q_C > b_l$ and it is the only equilibrium that survives the Intuitive Criterion as long as $B_H - B_L < n\left(\alpha q_C - b_l\right)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}$. We prove this by guess-and-verify. To begin with, it is easy to see that when the shopping disutility exceeds the functional utility of counterfeits ($\alpha q_C - b_l \leq 0$), there is no such "minimalist" separating equilibrium where $k^*(H,\eta) < k^*(L,l)$. This is because the L-types would have strict incentives to mimic the H-types if buying fewer goods not only reduces shopping disutility (net of functional utility) but also signals higher status. Next, we examine the case when $\alpha q_C - b_l > 0$. Suppose there exists a separating equilibrium where the H-types with high shopping disutility purchase $k_A^*(H,h) = \tilde{k} < n$ authentic goods and no counterfeits, whereas the rest purchase $k_C^*(H,l) = k_C^*(L,l) = n$ counterfeit goods. One public belief[11] that supports this equilibrium is characterized as follows:

$$\mu(k) = \begin{cases} 1 & \text{if } k \leq \tilde{k} \\ \frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L} & o/w \end{cases} \tag{A4}$$

Under such public beliefs, consumers purchasing more luxury goods are faced with the trade-off of increasing functional utility but losing symbolic utility. For the proposed consumption quantities to support a separating equilibrium, net of price, the L-types' gain in symbolic benefits should not exceed their loss in functional utility from mimicking, whereas the (H,h)-types' loss in symbolic utility should be larger than their gain in functional utility from deviating. Formally, the IC

[11] Note that there is a wide variety of off-the-equilibrium-path beliefs that are compatible with this separating equilibrium outcome, which correspond to different equilibrium profiles. For instance, the public might believe that a consumer with any consumption strictly less than $\hat{k}$ is considered as the high-type with a probability equal to their population share ρ_H. Or formally,

$$\mu(k) = \begin{cases} \rho_H & \text{if } k < \tilde{k} \\ 1 & \text{if } k = \tilde{k} \\ \frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L} & \text{if } k > \tilde{k} \end{cases}.$$

But they all correspond to the same equilibrium outcome, and thus are observationally equivalent. Therefore, without loss of generality, we specified here one simplest off-the-equilibrium-path belief.

constraint for (H,h)-type consumers is given by

$$(\alpha q_A - p_A)\,\tilde{k} + (B_H - B_L) \geq (\alpha q_A - p_A)\,n + (B_H - B_L)\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L} \tag{A5}$$

and that for both (H,l)- and (L,l)-type consumers is given by

$$(\alpha q_C - b_l)\,\tilde{k} + (B_H - B_L) \leq (\alpha q_C - b_l)\,n + (B_H - B_L)\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L}. \tag{A6}$$

Combining (A5) and (A6), we obtain the following condition when $p_A < \alpha q_A$,

$$n - \frac{B_H - B_L}{\alpha q_A - p_A}\left(\frac{\rho_L}{\rho_H\,(1-\omega_H)+\rho_L}\right) \leq \tilde{k} \leq n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H\,(1-\omega_H)+\rho_L}\right), \tag{A7}$$

and when $p_A \geq \alpha q_A$, we obtain

$$0 \leq \tilde{k} \leq n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H\,(1-\omega_H)+\rho_L}\right). \tag{A8}$$

Note that, when $p_A \leq \alpha q_A$, $\tilde{k} = n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)$ is the maximum amount of luxury goods (i.e. minimum distortion) required for the H-types with high shopping disutility to separate from the rest. Given that we have $\alpha q_A - p_A < \alpha q_C - b_l$ in this case, it is easy to see that the solution set for $\tilde{k} > 0$ is non-empty as long as the upper bound is strictly positive, i.e. $B_H - B_L < n\,(\alpha q_C - b_l)\,\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}$. The belief specified by (A4) is thus consistent with the optimal strategies chosen by the consumers. Hence the strategy profile where $k_A^*(H,h) = n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right) < n = k_C^*(H,l) = k_C^*(L,l)$ and $k_C^*(H,h) = k_A^*(L,l) = k_A^*(H,l) = 0$ constitutes an equilibrium. Alternatively, when $p_A > \alpha q_A$, $k_A^*(H,h) = 0 < n = k_C^*(H,l) = k_C^*(L,l)$ and $k_C^*(H,h) = k_A^*(L,l) = k_A^*(H,l) = 0$ constitutes an equilibrium.

Next we show that, when it exists, this equilibrium is the only one that survives the Intuitive Criterion. We prove this in two steps.

Step 1: we prove that any other (candidate) separating equilibria where the status-seeking H-types purchase fewer than $k^*(H,h) = n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)$ luxury goods when $p_A \leq \alpha q_A$ and more than $k^*(H,h) = 0$ when $p_A > \alpha q_A$ fail the Intuitive Criterion.

First, we examine the case when $p_A \leq \alpha q_A$. Suppose there exists such a separating equilibrium where the H-types with high shopping disutility purchase in total $\hat{k} < k^*(H,h)$ goods and they obtain a symbolic utility of $(B_H - B_L)$ in equilibrium, whereas the L-types obtain a symbolic utility of $(B_H - B_L)(\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L})$ and thus their best response is to purchase n counterfeits, i.e. $k^*(L,l) = n$. Given that we have $p_A \leq \alpha q_A$ and $k_A^*(H)$ satisfies (A6), there must exist an off-the-

equilibrium-path message $k' \in (\hat{k}, k_A^*(H)]$ such that

$$(\alpha q_A - p_A)k' + (B_H - B_L) \geq (\alpha q_A - p_A)\hat{k} + (B_H - B_L) \tag{A9}$$

$$(\alpha q_C - b_l)k' + (B_H - B_L) < (\alpha q_C - b_l)n + (B_H - B_L)(\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L}) \tag{A10}$$

The right hand sides of inequality (A9) and (A10) are the equilibrium payoff for the (H,h)-type and the L-types respectively; the left hand sides are respectively the maximum payoff the (H,h)-type and the L-types could obtain by consuming k' products given that the public holds rational beliefs, in this case $\mu(\theta = H|k') = 1$. Therefore, k' is dominated for the L-types and not for the (H,h)-type. Once we restrict the public's belief to $\mu(\theta = H|k') = 1$, the maximum payoff that the (H,h)-type obtain by consuming k' products is larger than their equilibrium payoff. Hence this separating equilibrium fails the Intuitive Criterion. Next we examine the case when $p_A > \alpha q_A$. Suppose there exists a separating equilibrium where the status-seeking H-types purchase $\hat{k} > 0$ luxury goods. Note that, in this case, there must exist an off-the-equilibrium message $k' \in [0, \hat{k})$ such that both (A9) and (A10) hold. Following the same logic discussed above, any such equilibrium fail the Intuitive Criterion.

Step 2: we prove that any pooling equilibria where all consumers purchase equal amount of products fail the Intuitive Criterion.

Suppose there exists such a pooling equilibrium where all consumers purchase $\hat{k}$ luxury goods and obtain a symbolic utility of $\rho_H(B_H - B_L)$. Given that the lowest symbolic utility one could get is zero for any off-the-equilibrium signal[12], the Incentive Compatibility constraint must imply that

$$(\alpha q_C - b_l)\hat{k} + (B_H - B_L)\rho_H \geq (\alpha q_C - b_l)n + 0 \tag{A11}$$

Together with the condition that $B_H - B_L < n\,(\alpha q_C - b_l)\,\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}$, we know that $\hat{k}$ must satisfy the following condition:

$$\hat{k}\,(\alpha q_C - b_l) > (B_H - B_L)(\frac{\rho_H\,(1-\omega_H)+\rho_L}{\rho_L} - \rho_H) > (B_H - B_L)(1-\rho_H) \tag{A12}$$

Given (A12) and $\alpha q_A - p_A < \alpha q_C - b_l$, there must exist an off-the-equilibrium-path message $k' < \hat{k}$ such that

$$(\alpha q_A - p_A)k' + (B_H - B_L) > (\alpha q_A - p_A)\hat{k} + (B_H - B_L)\,\rho_H \tag{A13}$$

$$(\alpha q_C - b_l)k' + (B_H - B_L) < (\alpha q_C - b_l)\hat{k} + (B_H - B_L)\rho_H \tag{A14}$$

[12]Note that (A11) is naturally satisfied when n is an on-the-equilibrium signal, i.e. when $\hat{k} = n$.

The right hand sides of inequality (A13) and (A14) are the equilibrium payoff for the (H,h)-type and the L-types and the left hand sides are the maximum payoff the (H,h)-type and the L-types could obtain by consuming k' products given that the public holds rational beliefs, in this case $\mu(\theta = H|k') = 1$. Therefore, k' is dominated for L-types and not for the (H,h)-type. Once we restrict the public's beliefs to $\mu(\theta = H|k') = 1$, the maximum payoff that the (H,h)-type obtain by consuming k' products is larger than their equilibrium payoff. Hence this pooling equilibrium fails the Intuitive Criterion.

Alternatively, when $B_H - B_L \geq n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}$ or $\alpha q_C \leq b_l$, there exists no separating equilibria and we cannot eliminate any pooling equilibria based on the Intuitive Criterion. When $\alpha q_C \leq b_l$, we must have $\alpha q_A - p_A < \alpha q_C - b_l \leq 0$ and hence we select the pooling equilibrium where no one buys any luxury goods based on our welfare criterion. The luxury brand obtains a profit of $\pi_A = 0$. When $\alpha q_C > b_l$ and $B_H - B_L \geq n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}$, we select the pooling equilibrium where the (H,h)-types buy n authentic goods and the rest buy n counterfeits, which generates the highest consumer welfare. Therefore, for any $p_A \in (\alpha(q_A - q_C) + b_l, \alpha(q_A - q_C) + b_h]$, the luxury brand obtains a profit of $\pi_A = 0$ when $\alpha q_C \leq b_l$ and a profit of π_A given below when $\alpha q_C > b_l$.

$$\pi_A = \begin{cases} \rho_H\omega_H\left(n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)\right)p_A & \text{if } B_H - B_L < n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}, p_A \leq \alpha q_A \\ 0 & \text{if } B_H - B_L < n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}, p_A > \alpha q_A \\ \rho_H\omega_H \min\{B_H, np_A\} & \text{if } B_H - B_L \geq n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L} \end{cases}.$$

Case (iii): $p_A > \alpha(q_A - q_C) + b_h$

In this case, we have $\alpha q_C - b_l > \alpha q_C - b_h > \alpha q_A - p_A$. In other words, all consumers strictly prefer counterfeit goods to authentic goods. There is zero demand for authentic luxury goods and thus $\pi_A = 0$.

Lastly, according to our equilibrium selection criterion, we choose the equilibrium that maximizes the luxury brand's profit.

Hence the chosen equilibrium is a separating equilibrium if and only if it exists and generates higher profit than a pooling equilibrium does, which translates into the following two conditions

$$B_H - B_L < n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L} \tag{A15}$$

and

$$\rho_H\omega_H\left(n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)\right)\min\{\alpha q_A, \alpha(q_A - q_C) + b_h\} \geq n(\alpha(q_A - q_C) + b_l) \tag{A16}$$

Note that (A15) and (A16) reduce to one condition: $B_H - B_L \leq \overline{B}$, where

$$\overline{B} \equiv n\left(\alpha q_C - b_l\right)\left(\frac{\rho_H\left(1-\omega_H\right)+\rho_L}{\rho_L}\right)\left(1-\frac{1}{\rho_H\omega_H}\frac{\alpha(q_A-q_C)+b_l}{\min\left\{\alpha q_A, \alpha(q_A-q_C)+b_h\right\}}\right).$$

Given $\alpha q_C > b_l$, it is straightforward to see that when $\omega_H > \omega_1 \equiv \frac{1}{\rho_H}\left(\frac{\alpha(q_A-q_C)+b_l}{\min\{\alpha q_A, \alpha(q_A-q_C)+b_h\}}\right)$, we have $\overline{B} > 0$.

□

Proof of Proposition 2:

Let $(p_A^{\text{No Counterfeit}}, S_A^{\text{No Counterfeit}}, \pi_A^{\text{No Counterfeit}})$ and $(p_A^{\text{With Counterfeit}}, S_A^{\text{With Counterfeit}}, \pi_A^{\text{With Counterfeit}})$ denote respectively the equilibrium price, sales, and profit of the luxury brand in Lemma 1 (no counterfeits) and in Proposition 1 (with counterfeits). In the absence of counterfeits, we have

$$p_A^{\text{No Counterfeit}} = \begin{cases} \alpha q_A & \text{if } B_H - B_L \leq \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ or } \rho_H \leq \frac{n\alpha q_A}{B_L} \\ \frac{B_L+\varepsilon}{n} & \text{if } B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ and } \rho_H > \frac{n\alpha q_A}{B_L} \end{cases}$$

$$S_A^{\text{No Counterfeit}} = \begin{cases} \left(\rho_H + \rho_L\right) n & \text{if } B_H - B_L \leq \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ or } \rho_H \leq \frac{n\alpha q_A}{B_L} \\ \rho_H n & \text{if } B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ and } \rho_H > \frac{n\alpha q_A}{B_L} \end{cases}$$

$$\pi_A^{\text{No Counterfeit}} = \begin{cases} n\alpha q_A & \text{if } B_H - B_L \leq \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ or } \rho_H \leq \frac{n\alpha q_A}{B_L} \\ \rho_H\left(B_L + \varepsilon\right) & \text{if } B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ and } \rho_H > \frac{n\alpha q_A}{B_L} \end{cases};$$

In the presence of counterfeits, we need to examine the cases of $\alpha q_C > b_l$ and $\alpha q_C \leq b_l$ separately. Based on the analysis in Proposition 1, we can summarize the equilibrium as follows:

$$p_A^{\text{With Counterfeit}} = \begin{cases} \min\{\alpha q_A, \alpha\left(q_A - q_C\right) + b_h\} & \text{if } \alpha q_C > b_l, B_H - B_L < \overline{B}, \omega_H > \omega_1 \\ \alpha q_A + \min\left\{\frac{(B_H - B_L)\rho_H}{n}, b_h - \alpha q_C\right\} & \text{if } \alpha q_C > b_l, B_H - B_L \geq B_0, \omega_H > \omega(b_h, b_l) \\ \alpha q_A & \text{if } \alpha q_C \leq b_l \\ \alpha\left(q_A - q_C\right) + b_l & \text{if o/w} \end{cases}$$

where $B_0 \equiv \max\left\{n(\alpha q_C - b_l)(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}), \frac{n(\alpha(q_A-q_C)+b_l)}{\rho_H^2\omega_H} - \frac{nq_A}{\rho_H}\right\}$ and $\omega(b_h, b_l) \equiv \frac{1}{\rho_H}\left(\frac{\alpha(q_A-q_C)+b_l}{\alpha(q_A-q_C)+b_h}\right)$. Note that in the first region, we have the minimalist luxury equilibrium. In the second region, we have the pooling equilibrium where (H,h)-types purchase n authentic goods and the rest of consumers purchase n counterfeits dominates. In the third and fourth regions, we have the pooling

equilibrium where all consumers purchase n authentic goods dominates. Correspondingly, we have the sales and profit given below.

$$S_A^{\text{With Counterfeit}} = \begin{cases} \rho_H \omega_H \tilde{k} & \text{if } \alpha q_C > b_l, B_H - B_L < \overline{B} \\ \rho_H \omega_H n & \text{if } \alpha q_C > b_l, B_H - B_L \geq B_0, \omega_H > \omega(b_h, b_l) \\ n & \text{if o/w} \end{cases}$$

$$\pi_A^{\text{With Counterfeit}} = \begin{cases} \rho_H \omega_H \tilde{k} \min\{\alpha q_A, \alpha (q_A - q_C) + b_h\} & \text{if } \alpha q_C > b_l, B_H - B_L < \overline{B} \\ \rho_H \omega_H n \left(\alpha q_A + \min\left\{\frac{(B_H - B_L)\rho_H}{n}, b_h - \alpha q_C\right\}\right) & \text{if } \alpha q_C > b_l, B_H - B_L \geq B_0, \\ & \omega_H > \omega(b_h, b_l) \\ n\alpha q_A & \text{if } \alpha q_C \leq b_l \\ n(\alpha (q_A - q_C) + b_l) & \text{if o/w} \end{cases},$$

where $\tilde{k} < n$. Given that $B_L > n\alpha q_A$, it is straightforward to see that the availability of high-quality, low-price counterfeits reduces the equilibrium price, sales, and profit of the luxury brand in the first region where the minimalist luxury equilibrium occurs such that $p_A^{\text{No Counterfeit}} > p_A^{\text{With Counterfeit}}$, $S_A^{\text{No Counterfeit}} > S_A^{\text{With Counterfeit}}$, and $\pi_A^{\text{No Counterfeit}} > \pi_A^{\text{With Counterfeit}}$.

Let $V^{\text{No Counterfeit}}(H)$ and $V^{\text{No Counterfeit}}(L)$ denote respectively the equilibrium utility of H-types and L-types in the absence of counterfeits. Let $V^{\text{With Counterfeit}}(H, h)$, $V^{\text{With Counterfeit}}(H, l)$, and $V^{\text{With Counterfeit}}(L)$ denote respectively the equilibrium utility of H-types with high and low shopping disutility and that of the L-types in the presence of counterfeits. According to the analysis above, we must have

$$V^{\text{No Counterfeit}}(H) = \begin{cases} (B_H - B_L)\rho_H + B_H & \text{if } B_H - B_L \leq \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ or } \rho_H \leq \frac{n\alpha q_A}{B_L} \\ n\alpha q_A + (B_H - B_L) + B_H - B_L - \varepsilon & \text{if } B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ and } \rho_H > \frac{n\alpha q_A}{B_L} \end{cases}$$

$$V^{\text{No Counterfeit}}(L) = \begin{cases} (B_H - B_L)\rho_H + B_L & \text{if } B_H - B_L \leq \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ or } \rho_H \leq \frac{n\alpha q_A}{B_L} \\ B_L & \text{if } B_H - B_L > \frac{B_L - n\alpha q_A}{1-\rho_H} \text{ and } \rho_H > \frac{n\alpha q_A}{B_L} \end{cases}$$

and

$$V^{\text{With Counterfeit}}(H,h)$$
$$= \begin{cases} (B_H - B_L) + B_H + \max\{0, \tilde{k}(\alpha q_C - b_h)\} & \text{if } \alpha q_C > b_l, B_H - B_L < \overline{B} \\ B_H + \max\{0, (B_H - B_L)\rho_H + n(\alpha q_C - b_h)\} & \text{if } \alpha q_C > b_l, B_H - B_L \geq B_0, \omega_H > \omega(b_h, b_l) \\ (B_H - B_L)\rho_H + B_H & \text{if } \alpha q_C \leq b_l \\ (B_H - B_L)\rho_H + B_H + n(\alpha q_C - b_l) & \text{if o/w} \end{cases}$$

$$V^{\text{With Counterfeit}}(H,l)$$
$$= \begin{cases} (B_H - B_L)\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L} + B_H + n(\alpha q_C - b_l) & \text{if } \alpha q_C > b_l, B_H - B_L < \overline{B} \\ (B_H - B_L)\rho_H + B_H & \text{if } \alpha q_C \leq b_l \\ (B_H - B_L)\rho_H + B_H + n(\alpha q_C - b_l) & \text{if o/w} \end{cases}$$

$$V^{\text{With Counterfeit}}(L)$$
$$= \begin{cases} (B_H - B_L)\frac{\rho_H\omega_H}{\rho_H(1-\omega_H)+\rho_L} + B_L + n(\alpha q_C - b_l) & \text{if } \alpha q_C > b_l, B_H - B_L < \overline{B} \\ (B_H - B_L)\rho_H + B_L & \text{if } \alpha q_C \leq b_l \\ (B_H - B_L)\rho_H + B_L + n(\alpha q_C - b_l) & \text{if o/w} \end{cases}.$$

It is easy to see that $V^{\text{With Counterfeit}}(L) \geq V^{\text{No Counterfeit}}(L)$ is always true; However, with some simple algebra, we can show that $V^{\text{With Counterfeit}}(H,h) \leq V^{\text{With Counterfeit}}(H,l) < V^{\text{No Counterfeit}}(H)$ holds when we have $\alpha q_C > b_l$, $\rho_H > \frac{n\alpha q_A}{B_L}$, and the income gap is sufficiently large, i.e. $B_H - B_L > \max\left\{\overline{B}, \frac{B_L - n(\alpha(q_A - q_C) + b_l)}{1-\rho_H}\right\}$.

□

Proof of Proposition 3:

In the baseline model, we have assumed away the possibility of L-types having high disutility of shopping for counterfeits by setting ω_L to zero. In this extended model, we relax this assumption by allowing $0 < \omega_L < \omega_H$. This extension effectively creates four consumer types: H-types with high-wealth (B_H) plus high (b_h) and low (b_l) shopping disutility and L-types with low-wealth (B_L) plus high (b_h) and low (b_l) shopping disutility.

We derive the profit-maximizing equilibrium by comparing the luxury brand's equilibrium profits from three price ranges: (i) $p_A \leq \alpha(q_A - q_C) + b_l$, (ii) $p_A \in (\alpha(q_A - q_C) + b_l, \alpha(q_A - q_C) + b_h]$, and (iii) $p_A > \alpha(q_A - q_C) + b_h$.

Case (i): $p_A \leq \alpha(q_A - q_C) + b_l$

In this case, we have $\alpha q_A - p_A \geq \alpha q_C - b_l > \alpha q_C - b_h \geq 0$, which implies that all consumers strictly prefer authentic luxury goods to counterfeits. The analysis of this case is exactly the same as provided in the proof for Proposition 1. There exist only pooling equilibria and we select the one where all consumers purchase n authentic goods when $p_A \leq \alpha q_A$, and the one where consumers do not purchase luxury goods when $p_A > \alpha q_A$, based on the welfare criterion. The luxury brand obtains a profit of

$$\pi_A = \begin{cases} np_A & \text{if } p_A \leq \min\{\alpha q_A, \alpha(q_A - q_C) + b_l\} \\ 0 & \text{if } \alpha q_A < p_A \leq \alpha(q_A - q_C) + b_l, \alpha q_C < b_l \end{cases}.$$

Case (ii): $p_A \in (\alpha(q_A - q_C) + b_l, \alpha(q_A - q_C) + b_h]$

In this case, we have $\alpha q_C - b_l > \alpha q_A - p_A \geq \alpha q_C - b_h \geq 0$. In other words, only the H-types and L-types with high shopping disutility prefer authentic goods to counterfeits whereas the rest strictly prefer counterfeits at this price range. First, note that there does not exist an equilibrium where $k^*(H, \eta) \neq k^*(L, \eta)$ for some $\eta \in \{h, l\}$ because the incentive compatibility constraints are the same for consumers with the same level of shopping disutility given that both the H-types and the L-types can afford all n products. Second, note that there does not exist a (partial) separating equilibrium where $k^*(H, h) > k^*(L, l)$. We can prove this by contradiction. Suppose there exists such an equilibrium. Let f and g denote respectively the probability of being perceived as an H-type upon observing $k^*(H, h)$ and $k^*(L, l)$ items. As we have shown that $k^*(H, \eta) = k^*(L, \eta)$ must be true in any equilibria, we must have that $k^*(H, h) = k^*(L, h) > k^*(L, l) = k^*(H, l)$, the public belief that supports this equilibrium should therefore imply that $f = \frac{\rho_H \omega_H}{\rho_H \omega_H + \rho_L \omega_L}$ and $g = \frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L(1-\omega_L)}$. Note that we have $f > g$ as long as $\omega_H > \omega_L$ holds. As a result, the L-types with low shopping disutility would have been strictly better off by deviating to consuming exactly $k^*(H, h)$ counterfeit goods, contradicting the notion of an equilibrium. Third, we can show that there exists a (partial) separating equilibrium where $k^*(H, h) = k^*(L, h) < k^*(L, l) = k^*(H, l)$ only when $\alpha q_C > b_l$ and it is the only equilibrium that survives the Intuitive Criterion as long as $(B_H - B_L)(f - g) < n(\alpha q_C - b_l)$. We prove this by guess and verify. Suppose there exists such an equilibrium where $k_A^*(H, h) = k_A^*(L, h) = \tilde{k} < n = k_C^*(L, l) = k_C^*(H, l)$. One public belief that supports this equilibrium is characterized as follows:

$$\mu(k) = \begin{cases} f \equiv \frac{\rho_H \omega_H}{\rho_H \omega_H + \rho_L \omega_L} & \text{if } k \leq \tilde{k} \\ g \equiv \frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L(1-\omega_L)} & \text{if } k > \tilde{k} \end{cases} \tag{A17}$$

With such belief, consumers trade off gaining symbolic utility with losing functional utility in this price range. For the proposed consumption quantities to support a separating equilibrium, the Incentive Compatibility constraint for the (H,h) and (L,h) consumers is given by

$$(\alpha q_A - p_A)\,\tilde{k} + (B_H - B_L)f \geq (\alpha q_A - p_A)\,n + (B_H - B_L)g$$

and that for the (L,l) and (H,l) consumers is given by

$$(\alpha q_C - b_l)\,\tilde{k} + (B_H - B_L)f \leq (\alpha q_C - b_l)\,n + (B_H - B_L)g.$$

Combining the two constraints, we obtain the following condition:

$$n - \frac{(B_H - B_L)\,(f-g)}{\alpha q_A - p_A} \leq \tilde{k} \leq n - \frac{(B_H - B_L)\,(f-g)}{\alpha q_C - b_l}. \tag{A18}$$

Given that we have $\alpha q_A - p_A < \alpha q_C - b_l$ in this case, it is easy to see that the solution set for $\tilde{k} > 0$ is non-empty as long as the upper bound is strictly positive, i.e. $(B_H - B_L)(f-g) < n\,(\alpha q_C - b_l)$. Hence the strategy profile where $k_A^*(H,h) = k_A^*(L,h) = n - \frac{(B_H - B_L)(f-g)}{\alpha q_C - b_l} < n = k_C^*(L,l) = k_C^*(H,l)$ and $k_C^*(H,h) = k_C^*(L,h) = k_A^*(L,l) = k_A^*(H,l) = 0$ along with the belief given by (A17) constitutes an equilibrium. Note that this equilibrium outcome is a Riley outcome with the minimal distortion for separation. Following very similar analysis as provided in the proof for Proposition 1, we can show that (1) any other candidate separating equilibria where the H-types with high shopping disutility purchase fewer than $k^*(H,h)$ luxury goods fail the Intuitive Criterion and (2) any pooling equilibra where all consumers purchase equal amount of luxury goods fail the Intuitive Criterion. Therefore, the proposed equilibrium is the only one that survives the Intuitive Criterion when $(B_H - B_L)\,(f-g) < n(\alpha q_C - b_l)$.

Alternatively, when $(B_H - B_L)\,(f-g) \geq n(\alpha q_C - b_l)$ or $\alpha q_C \leq b_l$, there exists no separating equilibria and we cannot eliminate any pooling equilibria based on Intuitive Criterion. In those cases we select the pooling equilibrium based on our welfare criterion.

Therefore, for any $p_A \in (\alpha(q_A - q_C) + b_l, \alpha(q_A - q_C) + b_h]$, the luxury brand obtains a profit of $\pi_A = 0$ if $\alpha q_C \leq b_l$ and a profit given below if $\alpha q_C > b_l$:

$$\pi_A = \begin{cases} (\rho_H \omega_H + \rho_L \omega_L)\left(n - \frac{(B_H - B_L)(f-g)}{\alpha q_C - b_l}\right) p_A & \text{if } (B_H - B_L)\,(f-g) < n(\alpha q_C - b_l), p_A \leq \alpha q_A \\ 0 & \text{if } (B_H - B_L)\,(f-g) < n(\alpha q_C - b_l), p_A > \alpha q_A \\ (\rho_H \omega_H + \rho_L \omega_L)\min\{np_A, B_H\} & \text{if } (B_H - B_L)\,(f-g) \geq n(\alpha q_C - b_l) \end{cases}.$$

Case (iii): $p_A > \alpha(q_A - q_C) + b_h$

In this case, we have $\alpha q_C - b_l > \alpha q_C - b_h > \alpha q_A - p_A$. In other words, all consumers strictly prefer counterfeit goods to authentic goods. There is zero demand for authentic luxury goods and thus $\pi_A = 0$.

Lastly, according to our equilibrium selection criterion, we choose the equilibrium that maximizes the luxury brand's profit. Hence the selected equilibrium is a separating equilibrium if and only if it exists and generates higher profit than a pooling equilibrium does, which translates into the following two conditions:

$$(B_H - B_L)(f - g) < n(\alpha q_C - b_l) \tag{A19}$$

and

$$(\rho_H \omega_H + \rho_L \omega_L)\left(n - \frac{(B_H - B_L)(f-g)}{\alpha q_C - b_l}\right)\min\{\alpha q_A, (\alpha(q_A - q_C) + b_h)\} \geq n(\alpha(q_A - q_C) + b_l). \tag{A20}$$

Note that (A19) and (A20) reduce to one condition: $B_H - B_L \leq \hat{B}$, where

$$\hat{B} \equiv \frac{n(\alpha q_C - b_l)}{(f-g)}\left(1 - \frac{1}{\rho_H \omega_H + \rho_L \omega_L}\frac{\alpha(q_A - q_C) + b_l}{\min\{\alpha q_A, (\alpha(q_A - q_C) + b_h)\}}\right)$$

and we have $f \equiv \frac{\rho_H \omega_H}{\rho_H \omega_H + \rho_L \omega_L}$ and $g \equiv \frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H) + \rho_L(1-\omega_L)}$. It is easy to see that when $\alpha q_C > b_l$ and $\omega_H > \omega_1 - \frac{\rho_L \omega_L}{\rho_H}$, we have $\hat{B} > \overline{B} > 0$.

□

Proof of Proposition 4

By adding a lump sum disutility of shopping for authentic goods ($c \geq 0$) to incorporate the model developed by Liu et al. (2022), the consumer decision problem is now given below by

$$\max_{k_A, k_C} V(\theta, \eta, k_A, k_C|\mu) = \underbrace{\alpha(q_A k_A + q_C k_C)}_{\text{Functional Utility}} + \underbrace{(B_H - B_L)\mu(\theta = H|k_A + k_C)}_{\text{Symbolic Utility}} - b_\eta k_C - cI(k_A > 0) + X,$$

$$B_\theta \geq p_A k_A + p_C k_C + X,$$

$$0 \leq k_A + k_C \leq n,$$

$$X \geq 0.$$

Given our analysis in Proposition 1, we examine the cases of $\alpha q_C > b_l$ and $\alpha q_C \leq b_l$ separately.

Case 1: $\alpha q_C > b_l$

First, we can show by contradiction that the "maximalist luxury equilibrium" proposed by Liu et al. (2022) in which the H-types separate by purchasing more than the L-types does not exist in this case. Suppose there exists such a separating equilibrium where $k^*(H,\eta) > k^*(L,l)$ for some $\eta \in \{h,l\}$. Then Bayes rules would imply that a consumer is an H-type with a higher probability if s/he purchases exactly $k_A^*(H,\eta)$ goods than if s/he purchases $k_A^*(L,l)$ goods instead. The L-types would be strictly better off by purchasing $(k_A^*(H,\eta) - k_A^*(L,l))$ additional counterfeit goods to mimic the (H,η)-type because s/he would not only obtain higher symbolic utility but also higher functional utility (net of shopping disutility) from doing so. This contradicts the notion of an equilibrium.

Next we derive the conditions under which the "minimalist luxury equilibrium" exists and dominates. First, note that in this new set-up, the (H,h)-type consumers would prefer to shop for authentic goods only if they need to assemble more than $k_h \equiv \frac{c}{\alpha(q_A - q_C) + b_h - p_A}$ items, whereas the (H,l)- and (L,l)-types would prefer to do so only if they need to assemble more than $k_l \equiv \frac{c}{\alpha(q_A - q_C) + b_l - p_A}$ items. We have $k_h \leq k_l$ for any $c \geq 0$. In a minimalist luxury equilibrium, we must have $k_h \leq k^*(H,h) < k^*(L,l) = n < k_l$. Otherwise, the incentive compatibility constraint for the (H,h)-types would always imply a profitable deviation for the L-types (to mimic the (H,h)-types) and thus the former would not be able to separate from the latter. We can rewrite $k_h \leq n < k_l$ as $\underline{p_A} < p_A \leq \overline{p_A}$, where $\underline{p_A} \equiv \alpha(q_A - q_C) + b_l - \frac{c}{n}$ and $\overline{p_A} \equiv \alpha(q_A - q_C) + b_h - \frac{c}{n}$. Next, following the proof for Proposition 1, we compare the luxury brand's equilibrium profits from three price ranges: (i) $p_A \leq \underline{p_A}$, (ii) $p_A \in (\underline{p_A}, \overline{p_A}]$, and (iii) $p_A > \overline{p_A}$.

Case 1.1: $p_A \leq \underline{p_A}$

In this case, we have $n \geq k_l$ and $p_A < \alpha q_A$, hence all consumers can afford all authentic goods. According to the analysis above, we know that there does not exist any separating equilibrium. Hence the selected equilibrium is a pooling equilibrium where all consumers buy n authentic goods. The luxury brand obtains a profit $\pi_A = np_A$.

Case 1.2: $p_A \in (\underline{p_A}, \overline{p_A}]$

In this case, we have $k_h < n < k_l$ and thus the L-types strictly prefer to shop for counterfeits. Recall that there exists a separating equilibrium only if $k_h \leq k^*(H,h) < k^*(L,l) = n < k_l$. In that equilibrium, the (H,h)-type consumes $k^*(H,h)$ authentic goods whereas the rest consume exactly n counterfeit goods. IC constraints for the (H,h)- and L-types imply that

$$(\alpha q_A - p_A)k^*(H,h) - c + (B_H - B_L) \geq (\alpha q_A - p_A)n - c + (B_H - B_L)\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H) + \rho_L} \quad \text{(A21)}$$

and

$$(\alpha q_C - b_l)k^*(H,h) + (B_H - B_L) \leq (\alpha q_C - b_l)n + (B_H - B_L)\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H)+\rho_L} \tag{A22}$$

Combining (A21) and (A22), we obtain the following condition if $p_A \leq \alpha q_A$:

$$n - \frac{(B_H - B_L)}{\alpha q_A - p_A}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right) \leq k^*(H,h) \leq n - \frac{(B_H - B_L)}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right),$$

and if $p_A > \alpha q_A$ we have

$$0 \leq k^*(H,h) \leq n - \frac{(B_H - B_L)}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right).$$

Note that, when $p_A \leq \alpha q_A$, the solution set is non-empty if and only if the upper bound is greater than k_h, which translates into the following two conditions:

$$B_H - B_L < n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L} \tag{A23}$$

$$p_A \leq p_0 \equiv \alpha(q_A - q_C) + b_h - \frac{c}{n - \frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)} \tag{A24}$$

When $p_A > \min\{p_0, \alpha q_A\}$, the only solution is $k_A^*(H,h) = 0$ as long as (A23) is satisfied. Otherwise, when (A23) is not satisfied, the selected equilibrium is a pooling equilibrium where the $(H,h)-$ types purchase n authentic goods, and the rest purchase n counterfeit goods. As a result, the luxury brand obtains a profit of

$$\pi_A = \begin{cases} \rho_H\omega_H p_A\left(n - (\frac{B_H - B_L}{\alpha q_C - b_l})\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}\right) & \text{if } p_A \leq \min\{p_0, \alpha q_A\}, B_H - B_L < n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L} \\ 0 & \text{if } p_A > \min\{p_0, \alpha q_A\}, B_H - B_L < n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L} \\ \rho_H\omega_H \min\{np_A, B_H\} & \text{if } B_H - B_L \geq n(\alpha q_C - b_l)\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L} \end{cases}.$$

Note that the first region is non-empty only if $p_0 > \underline{p_A}$, which implies

$$c < \overline{c} \equiv n(b_h - b_l)\left[\frac{n}{\frac{B_H - B_L}{\alpha q_C - b_l}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)} - 1\right]. \tag{A25}$$

Case 1.3: $p_A > \overline{p_A}$

In this case, we have $n < k_h$, hence all consumers strictly prefer to shop for counterfeit goods. There is zero demand for authentic luxury goods and thus $\pi_A = 0$.

Lastly, according to our equilibrium selection criterion, we choose the equilibrium that maximizes the luxury brand's profit. Hence the selected equilibrium is a separating equilibrium if and only if it exists and generates higher profit than a pooling equilibrium does. The existence condition requires (A23) and (A25). The dominance condition requires the following condition:

$$\rho_H \omega_H \left[n - \frac{B_H - B_L}{\alpha q_C - b_l} \left(\frac{\rho_L}{\rho_H (1 - \omega_H) + \rho_L} \right) \right] \min \{p_0, \alpha q_A\} \geq n (\alpha (q_A - q_C) + b_l) - c. \quad \text{(A26)}$$

We can rewrite it as $c \geq \underline{c} \equiv \max\{c^1, c^2\}$, where

$$c^1 = \frac{n (\alpha (q_A - q_C) + b_l) - \rho_H \omega_H (\alpha (q_A - q_C) + b_h) \left[n - \frac{B_H - B_L}{\alpha q_C - b_l} \left(\frac{\rho_L}{\rho_H (1 - \omega_H) + \rho_L} \right) \right]}{1 - \rho_H \omega_H}$$

and

$$c^2 = n (\alpha (q_A - q_C) + b_l) - \rho_H \omega_H \alpha q_A \left[n - \frac{B_H - B_L}{\alpha q_C - b_l} \left(\frac{\rho_L}{\rho_H (1 - \omega_H) + \rho_L} \right) \right].$$

Note that when $\omega > \omega_1$ and $0 < B_H - B_L \leq \overline{B}$[13], we have $\underline{c} \leq 0$. When $B_H - B_L \geq \overline{B}$, we have $\underline{c} > 0$, and thus in order to satisfy (A25), we also need $\overline{c} > \underline{c}$. This translates into a new upper bound on $B_H - B_L$, which we denote as $\overline{\Delta B}$. Note that $(\overline{c} - \underline{c})$ is monotonically decreasing in $(B_H - B_L)$ and it is strictly positive when $B_H - B_L = 0$ or $B_H - B_L = \overline{B}$ and strictly negative when $B_H - B_L = n(\alpha q_C - b_l) \left(\frac{\rho_L}{\rho_H (1 - \omega_H) + \rho_L} \right)$. According to the intermediate value theorem, we can deduce that there exists a unique $\overline{\Delta B} \in (\max\{0, \overline{B}\}, n(\alpha q_C - b_l) \left(\frac{\rho_L}{\rho_H (1 - \omega_H) + \rho_L} \right))$ such that $\overline{c} = \underline{c}$ when $B_H - B_L = \overline{\Delta B}$.

Case 2: $\alpha q_C \leq b_l$

First, we show by contradiction that the minimalist luxury equilibrium does not exist in this case. Suppose there exists such an equilibrium where $k^*(H, \eta) < k^*(L, l)$ for some $\eta \in \{h, l\}$. Then Bayes rules imply that one would be perceived as an H-type with a higher probability if s/he purchases exactly $k^*(H, \eta)$ goods than if s/he purchases $k^*(L, l)$ goods instead. Recall that the (H, h)-type consumers would prefer to shop for authentic goods only if they need to assemble more than k_h items, whereas the (H, l)- and (L, l)-types would prefer to do so only if they need to assemble more than k_l items, where $k_l > k_h$. In this equilibrium, if $k^*(L, l) < k_l$, clearly the L-types would be better off by deviating to purchasing only $k^*(H, \eta)$ counterfeit goods because it not only reduces shopping disutility (net of functional utility) but also signals higher status. Alternatively, if $k^*(L, l) \geq k_l$, then the incentive compatibility of the (H, η)-types should imply that sacrificing the utility of $(k^*(L, l) - k^*(H, \eta))$ authentic goods is outweighed by the gain of symbolic utility,

[13] ω_1 and $\overline{B}$ are defined in the proof of Proposition 1.

suggesting again a profitable deviation for the L-types to purchase fewer authentic goods. This contradicts the notion of an equilibrium.

Next we derive the conditions under which the "maximalist luxury equilibrium" exists and dominates. Following Liu et al. (2022), we let $TC^{H,h}_{min}$, $TC^{H,l}_{min}$, and TC^{L}_{min} denote the minimal total cost of assembling $\hat{k} > 0$ luxury goods for the (H,h)-, (H,l)-, and L-types respectively. Formally, we have

$$
\begin{aligned}
TC^{H,h}_{min} &:= \min_{k_A \in (0,\hat{k}]} \left\{ b_h \hat{k}, b_h(\hat{k} - k_A) + c + p_A k_A | B_H \geq p_A k_A \right\} \\
TC^{H,l}_{min} &:= \min_{k_A \in (0,\hat{k}]} \left\{ b_l \hat{k}, b_l(\hat{k} - k_A) + c + p_A k_A | B_H \geq p_A k_A \right\} \\
TC^{L}_{min} &:= \min_{k_A \in (0,\hat{k}]} \left\{ b_l \hat{k}, b_l(\hat{k} - k_A) + c + p_A k_A | B_L \geq p_A k_A \right\}.
\end{aligned}
$$

We compare the equilibrium profits from the following five price ranges: (i) $p_A > \alpha(q_A - q_C) + b_h$, (ii) $\frac{B_H(\alpha(q_A - q_C) + b_h)}{B_H + c} < p_A \leq \alpha(q_A - q_C) + b_h$, (iii) $\frac{B_H(\alpha(q_A - q_C) + b_l)}{B_H + c} < p_A \leq \frac{B_H(\alpha(q_A - q_C) + b_h)}{B_H + c}$, (iv) $\frac{B_L(\alpha(q_A - q_C) + b_l)}{B_L + c} < p_A \leq \frac{B_H(\alpha(q_A - q_C) + b_l)}{B_H + c}$, and (v) $p_A \leq \frac{B_L(\alpha(q_A - q_C) + b_l)}{B_L + c}$.

Case 2.1 $p_A > \alpha(q_A - q_C) + b_h$

In this case, the price of authentic goods is so high that there is no consumer demand for them regardless of one's budget constraint. The luxury brand obtains zero profit.

Case 2.2 $\frac{B_H(\alpha(q_A - q_C) + b_h)}{B_H + c} < p_A \leq \alpha(q_A - q_C) + b_h$

In this case, due to budget constraint, it is the least costly for both the H-types and L-types to shop only for counterfeit goods. Based on our tie-breaking rules, consumers will choose not to buy when they are indifferent between buying counterfeits and not buying anything. Hence there does not exist any separating equilibrium and our selection criterion implies that the pooling equilibrium where consumers do not buy any luxury goods is chosen. Again, the luxury brand obtains zero profit.

Case 2.3 $\frac{B_H(\alpha(q_A - q_C) + b_l)}{B_H + c} < p_A \leq \frac{B_H(\alpha(q_A - q_C) + b_h)}{B_H + c}$

In this case, the (H,l)- and L-types prefer to shop only for counterfeits ($TC^{L}_{min} = TC^{H,l}_{min}$), whereas the (H,h)-types' optimal choice depends on the number of goods they need to assemble. There may exist a (partial) separating equilibrium where $k^*(H,h) > k^*(H,l) = k^*(L,l)$. According to the incentive compatibility of consumers, we must have

$$
\alpha q_A - TC^{H,h}_{min} + (B_H - B_L) \geq 0 + (B_H - B_L) \frac{\rho_H(1 - \omega_H)}{\rho_H(1 - \omega_H) + \rho_L} \tag{A27}
$$

$$
\alpha q_C - TC^{L}_{min} + (B_H - B_L) \leq 0 + (B_H - B_L) \frac{\rho_H(1 - \omega_H)}{\rho_H(1 - \omega_H) + \rho_L} \tag{A28}
$$

Hence such separating equilibrium exists only if the following two conditions hold:

$$(B_H - B_L)\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L} \geq \frac{c(b_l - \alpha q_C)}{\alpha(q_A - q_C) + b_l - p_A} \tag{A29}$$

$$n \geq \frac{B_H - B_L}{b_l - \alpha q_C}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right) \tag{A30}$$

We can re-write (A29) as $p_A \leq b_l + \alpha(q_A - q_C) - \frac{c(b_l-\alpha q_C)}{B_H - B_L}(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L})$. Given the lower bound on p_A in this case, the solution set is non-empty if and only if we have $c > 0$ and

$$\frac{(b_l - \alpha q_C)(B_H + c)}{b_l + \alpha(q_A - q_C)}\left(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}\right) < B_H - B_L \leq n(b_l - \alpha q_C)\left(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}\right). \tag{A31}$$

Note that (A30) ensures that the L-types and (H,l)-types prefer not to mimic the (H,h)-types and thus $k_A^*(L) = k_A^*(H,l) = k_C^*(H,l) = k_C^*(H,l) = 0$. The (H,h)-types will be able to separate from the L-types by consuming a minimum of $k^*(H,h) = \frac{B_H - B_L}{b_l - \alpha q_C}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)$ luxury goods in total. As a result, the luxury brand obtains a profit of

$$\pi_A = \rho_H \omega_H \min\left\{B_H, \frac{B_H - B_L}{b_l - \alpha q_C}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right)p_A\right\},$$

where $p_A \leq b_l + \alpha(q_A - q_C) - \frac{c(b_l-\alpha q_C)}{B_H - B_L}(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L})$.

Case 2.4 $\frac{B_L(\alpha(q_A-q_C)+b_l)}{B_L+c} < p_A \leq \frac{B_H(\alpha(q_A-q_C)+b_l)}{B_H+c}$

In this case, the L-types prefer to shop only for counterfeits, whereas both (H,h)- and (H,l)-types' optimal choice depends on the number of goods they need to assemble. There may exist a separating equilibrium where $k^*(H,h) = k^*(H,l) > k^*(L,l)$. According to the incentive compatibility of consumers, we must have

$$\alpha q_A - TC_{min}^{H,h} + (B_H - B_L) \geq 0 \cdot (B_H - B_L) \tag{A32}$$

$$\alpha q_A - TC_{min}^{H,l} + (B_H - B_L) \geq 0 \cdot (B_H - B_L) \tag{A33}$$

$$\alpha q_C - TC_{min}^{L} + (B_H - B_L) \leq 0 \cdot (B_H - B_L) \tag{A34}$$

There exists such separating equilibrium if and only if the following two conditions are satisfied:

$$(B_H - B_L)(1-0) \geq \frac{c(b_l - \alpha q_C)}{\alpha(q_A - q_C) + b_l - p_A} \tag{A35}$$

$$n \geq \frac{B_H - B_L}{b_l - \alpha q_C} \tag{A36}$$

The solution set is non-empty if and only if we have $c > 0$ and

$$\frac{(b_l - \alpha q_C)(B_L + c)}{b_l + \alpha(q_A - q_C)} \leq B_H - B_L < n(b_l - \alpha q_C). \tag{A37}$$

In this separating equilibrium, we have $k_A^*(L) = k_C^*(L) = 0$, $k_A^*(H,h) = k_A^*(H,l) = \min\{\frac{B_H}{p_A}, \frac{B_H - B_L}{b_l - \alpha q_C}\}$ and $k_C^*(H,h) = k_C^*(H,l) = \max\{0, \frac{B_H - B_L}{b_l - \alpha q_C} - \frac{B_H}{p_A}\}$. The luxury brand obtains a profit of

$$\pi_A = \rho_H \min\left\{B_H, \left(\frac{B_H - B_L}{b_l - \alpha q_C}\right) p_A\right\},$$

where $p_A \leq b_l + \alpha(q_A - q_C) - \frac{c(b_l - \alpha q_C)}{B_H - B_L}$.

Case 2.5 $p_A \leq \frac{B_L(\alpha(q_A - q_C) + b_l)}{B_L + c}$

In this case, all consumers may shop for authentic goods, depending on the number of goods they need to assemble. There may exist a separating equilibrium where $k^*(H,h) = k^*(H,l) > k^*(L,l)$ when the following conditions hold:

$$B_H - B_L > \frac{B_L}{p_A}(p_A - \alpha q_A) + c \tag{A38}$$

$$n > \frac{B_H - B_L - c - B_L}{b_l - \alpha q_C} + \frac{B_L}{p_A}\left(\frac{\alpha(q_A - q_C) + b_l}{b_l - \alpha q_C}\right) \tag{A39}$$

The solution set is non-empty iff $p_A > \frac{B_L}{n}$ and $n(b_l - \alpha q_C) > B_H - B_L > c + B_L - n\alpha q_A$. In this separating equilibrium, we have $k_A^*(L) = k_C^*(L) = 0$ and the luxury brand obtains a profit of

$$\pi_A = \rho_H \min\left\{B_H, \left(\frac{B_H - B_L - c - B_L + \varepsilon}{b_l - \alpha q_C}\right) p_A + \frac{B_L\left(\alpha\left(q_A - q_C\right) + b_l\right)}{b_l - \alpha q_C}\right\},$$

where $p_A < \frac{B_L \alpha q_A}{B_L + c - (B_H - B_L)}$ if $B_H - B_L < B_L + c$. In that case, the consumer welfare is higher in a separating equilibrium than in a pooling equilibrium where no one purchases any luxury goods only if $(B_H - B_L)(1 - \rho_H) > c + B_L - n\alpha q_A$.

Based on our hierarchical equilibrium selection criterion, we may select a pooling equilibrium where consumers purchase some authentic goods only when $p_A \leq \alpha q_A - \frac{c}{n}$ in Case 2. This is because when $p_A > \alpha q_A - \frac{c}{n}$ and $b_l \geq \alpha q_C$, the disutility of shopping for either counterfeit or authentic goods outweighs its functional utility. Hence the pooling equilibrium outcome where no one purchases any goods would yield strictly higher consumer welfare to all consumers than any other pooling equilibrium outcomes. This pooling equilibrium would only fail the Intuitive Criterion when a separating equilibrium exists at the same price and generates higher utility for the H-types. When $p_A \leq \alpha q_A - \frac{c}{n}$, all consumers can afford the authentic luxury goods, and thus we select the

pooling equilibrium where $k_A^*(H,h) = k_A^*(H,l) = k_A^*(L) = n$ and $k_C^*(H,h) = k_C^*(H,l) = k_C^*(L) = 0$. The luxury brand obtains a profit of $\pi_A = np_A \leq n\alpha q_A - c$.

Lastly, we choose the equilibrium that maximizes the luxury brand's profit across all price ranges. Hence the selected equilibrium is a separating equilibrium if and only if it exists and generates higher profit than a pooling equilibrium does. The maximum profit a pooling equilibrium can generate is given by $\pi_A^{pool} = n\alpha q_A - c$. Combining Cases 2.3-2.5, we can summarize the equilibrium profits when separating equilibrium does exist as follows

$$\pi_A^{sep} = \begin{cases} \rho_H \left(B_L + \varepsilon\right), & \text{if } \frac{B_L+c-n\alpha q_A}{1-\rho_H} < B_H - B_L < \frac{(b_l-\alpha q_C)(B_L+c)}{b_l+\alpha(q_A-q_C)} \\ \rho_H \left[\frac{(B_H-B_L)(b_l+\alpha(q_A-q_C))}{b_l-\alpha q_C} - c\right] & \text{if } \frac{(b_l-\alpha q_C)(B_L+c)}{b_l+\alpha(q_A-q_C)} \leq B_H - B_L < \frac{(b_l-\alpha q_C)(B_H+c)}{b_l+\alpha(q_A-q_C)}, c > 0 \\ \rho_H B_H & \text{if } \frac{(b_l-\alpha q_C)(B_H+c)}{b_l+\alpha(q_A-q_C)} \leq B_H - B_L < n(b_l - \alpha q_C), c > 0 \end{cases}.$$

Let $\underline{B} \equiv \frac{(b_l-\alpha q_C)(B_L+c)}{b_l+\alpha(q_A-q_C)}$. The dominance condition implies that $\pi_A^{sep} > \pi_A^{pool}$, which yields the lower bound on c, i.e. $c > c_1$, where

$$c_1 \equiv \begin{cases} n\alpha q_A - B_L\rho_H & \text{if } \frac{B_L+c-n\alpha q_A}{1-\rho_H} < B_H - B_L < \underline{B} \\ \max\left\{0, \left(\frac{1}{1-\rho_H}\right)\left(n\alpha q_A - \frac{\rho_H(B_H-B_L)(b_l+\alpha(q_A-q_C))}{b_l-\alpha q_C}\right)\right\} & \text{if } \underline{B} \leq B_H - B_L < \underline{B}\left(\frac{B_H+c}{B_L+c}\right) \\ \max\left\{0, n\alpha q_A - B_H\rho_H\right\} & \text{if } \underline{B}\left(\frac{B_H+c}{B_L+c}\right) \leq B_H - B_L < n(b_l - \alpha q_C) \end{cases}.$$

Note that the first region reverts back to the case where the conspicuous excessive equilibrium dominates as described in Lemma 1. The second and third regions are where the maximalist luxury equilibrium dominates and these regions are non-empty only when $c < c_2 \equiv n(b_l+\alpha(q_A-q_C)) - B_L$. Hence the maximalist luxury equilibrium is selected when $\underline{B} \leq B_H - B_L < n(b_l - \alpha q_C)$ and $c_1 < c < c_2$.

□

Proof of Proposition 5:

First, we show that when $0 < p_C < \alpha q_C - b_l$, the only type of separating equilibrium that exists is an equilibrium of "minimalist luxury." Next we show that when $\alpha q_C - b_l \leq p_C < \overline{p_C}$, the only separating equilibrium that exists is an equilibrium of "maximalist luxury" and we derive the expressions for $\overline{p_C}$. Finally, we show that when $p_C \geq \overline{p_C}$, both the H-types and L-types purchase authentic goods, virtually eliminating the sales of counterfeits. As a result, only the conspicuous excessive equilibrium à la Veblen may exist.

Case 1: $0 < p_C < \alpha q_C - b_l$

Following the proof of Proposition 4, it is straightforward to see that no maximalist luxury equilibrium exists in which the H-types separate by purchasing more than the L-types in this case. This is because the L-types can afford and always have strict incentives to mimic the H-types by purchasing as many counterfeits as they need to. From doing so, they not only obtain higher symbolic utility but also higher functional utility (net of shopping disutility).

Next, we compare the luxury brand's equilibrium profits from three price ranges: (i) $p_A \leq \alpha(q_A - q_C) + p_C + b_l - \frac{c}{n}$, (ii) $p_A \in (\alpha(q_A - q_C) + p_C + b_l - \frac{c}{n}, \alpha(q_A - q_C) + p_C + b_h - \frac{c}{n}]$, and (iii) $p_A > \alpha(q_A - q_C) + p_C + b_h - \frac{c}{n}$.

Case 1.1: When $p_A \leq \alpha(q_A - q_C) + p_C + b_l - \frac{c}{n}$, all consumers can afford all authentic goods. There does not exist any separating equilibrium and the selected equilibrium is a pooling equilibrium where all consumers buy n authentic goods. The luxury brand obtains a profit $\pi_A = np_A$.

Case 1.2: When $p_A \in (\alpha(q_A - q_C) + p_C + b_l - \frac{c}{n}, \alpha(q_A - q_C) + p_C + b_h - \frac{c}{n}]$, the L-types strictly prefer to shop for counterfeits. There exists a minimalist luxury equilibrium where $k^*(H,h) < k^*(L,l)$ and the (H,h)-type consumes $k^*(H,h)$ authentic goods whereas the rest consume exactly n counterfeit goods, if and only if the following IC constraints are satisfied

$$(\alpha q_A - p_A)k^*(H,h) - c + (B_H - B_L) \geq (\alpha q_A - p_A)n - c + (B_H - B_L)\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H) + \rho_L} \quad \text{(A40)}$$

and

$$(\alpha q_C - b_l - p_C)k^*(H,h) + (B_H - B_L) \leq (\alpha q_C - b_l - p_C)n + (B_H - B_L)\frac{\rho_H(1-\omega_H)}{\rho_H(1-\omega_H) + \rho_L} \quad \text{(A41)}$$

Note that, when $p_A \leq \alpha q_A$, the solution set is non-empty if and only if the upper bound is greater than $k_h \equiv \frac{c}{\alpha(q_A - q_C) + b_h - (p_A - p_C)}$, which translates into the following two conditions:

$$B_H - B_L < n\left(\alpha q_C - b_l - p_C\right)\frac{\rho_H\left(1-\omega_H\right) + \rho_L}{\rho_L} \quad \text{(A42)}$$

$$p_A \leq p_0 \equiv \alpha(q_A - q_C) + p_C + b_h - \frac{c}{n - \frac{B_H - B_L}{\alpha q_C - b_l - p_C}\left(\frac{\rho_L}{\rho_H(1-\omega_H) + \rho_L}\right)} \quad \text{(A43)}$$

When $p_A > \min\{p_0, \alpha q_A\}$, the only solution is $k_A^*(H,h) = 0$. Otherwise, the selected equilibrium is a pooling equilibrium where the $(H,h)-$ types purchase n authentic goods, and the rest purchase

n counterfeit goods. As a result, the luxury brand obtains a profit of

$$\pi_A = \begin{cases} \rho_H \omega_H p_A \left(n - (\frac{B_H - B_L}{\alpha q_C - b_l - p_C}) \frac{\rho_H (1-\omega_H) + \rho_L}{\rho_L} \right) & \text{if } p_A \leq \min\{p_0, \alpha q_A\}, B_H - B_L < B' \\ 0 & \text{if } p_A > \min\{p_0, \alpha q_A\}, B_H - B_L < B' \\ \rho_H \omega_H \min\{n p_A, B_H\} & \text{if } B_H - B_L \geq B' \end{cases},$$

where $B' \equiv n \left(\alpha q_C - b_l - p_C \right) \frac{\rho_H (1-\omega_H) + \rho_L}{\rho_L}$. Note that the first region of minimalist luxury equilibrium is non-empty only if $p_0 > \underline{p_A}$, which implies the following two conditions:

$$p_C < p_1 \equiv \alpha q_C - b_l - \frac{\rho_L \left(B_H - B_L \right)}{\rho_H \left(1 - \omega_H \right) + \rho_L} \left(\frac{c}{n^2 \left(b_h - b_l \right)} + \frac{1}{n} \right) \tag{A44}$$

$$c < \overline{c} \equiv n \left(b_h - b_l \right) \left[\frac{n}{\frac{B_H - B_L}{\alpha q_C - b_l} \left(\frac{\rho_L}{\rho_H (1-\omega_H) + \rho_L} \right)} - 1 \right]. \tag{A45}$$

Case 1.3: When $p_A > \alpha(q_A - q_C) + p_C + b_h - \frac{c}{n}$, all consumers strictly prefer to shop for counterfeit goods. There is zero demand for authentic luxury goods and thus $\pi_A = 0$.

Lastly, according to our equilibrium selection criterion, we choose the equilibrium that maximizes the luxury brand's profit. Hence the selected equilibrium is a minimalist luxury equilibrium if and only if it exists and generates higher profit than a pooling equilibrium does. The existence condition requires (A44). The dominance condition requires the following condition:

$$\rho_H \omega_H \left[n - \frac{B_H - B_L}{\alpha q_C - b_l - p_C} \left(\frac{\rho_L}{\rho_H \left(1 - \omega_H \right) + \rho_L} \right) \right] \min \left\{ p_0, \alpha q_A \right\} \geq n \left(\alpha \left(q_A - q_C \right) + b_l + p_C \right) - c. \tag{A46}$$

which can be rewritten as $p_C \leq p_2$ where

$$p_2 \equiv \frac{-c + n\alpha q_A \left(1 - \rho_H \omega_H \right) + \sqrt{\left(c + n\alpha q_A \left(1 - \rho_H \omega_H \right) \right)^2 + 4 \left(\frac{\rho_L}{\rho_H (1-\omega_H) + \rho_L} \right) n \alpha q_A \rho_H \omega_H \left(B_H - B_L \right)}}{2n}.$$

Let $\overline{p_C}^{MINI} = \min\{p_1, p_2\}$. Thus, the selected equilibrium is a minimalist luxury equilibrium when $0 < p_C \leq \overline{p_C}^{MINI}$ and it is a pooling equilibrium when $\overline{p_C}^{MINI} < p_C < \alpha q_C - b_l$.

Case 2: $p_C \geq \alpha q_C - b_l$

First, one can show that the minimalist luxury equilibrium does not exist following the proof of Proposition 5. This is because consumers obtain negative functional utility net of its price and shopping disutility from purchasing counterfeits, i.e. $\alpha q_C - p_C - b_h < \alpha q_C - p_C - b_l \leq 0$. In addition, one can show that when $p_A > \frac{B_H (\alpha (q_A - q_C) + p_C + b_h)}{B_H + c}$, there is no demand for luxury goods and the luxury brand obtains zero profit. When $p_A \in (\frac{B_H (\alpha (q_A - q_C) + p_C + b_l)}{B_H + c}, \frac{B_H (\alpha (q_A - q_C) + p_C + b_h)}{B_H + c}]$,

there exists a maximalist luxury equilibrium where $k^*(H,h) > k^*(H,l) = k^*(L,l)$ if and only if the following two conditions are satisfied:

$$(B_H - B_L)\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L} \geq \frac{c(b_l - \alpha q_C + p_C)}{b_l + \alpha(q_A - q_C) - (p_A - p_C)}, \tag{A47}$$

$$n \geq \frac{B_H - B_L}{b_l - \alpha q_C + p_C}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right). \tag{A48}$$

Given the lower bound on p_A in this case, the solution set is non-empty if and only if we have $c > 0$ and

$$\frac{(b_l + p_C - \alpha q_C)(B_H + c)}{b_l + p_C + \alpha(q_A - q_C)}\left(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}\right) < B_H - B_L \leq n(b_l - \alpha q_C + p_C)\left(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L}\right). \tag{A49}$$

In this case, only the (H,h)-type consumers buy authentic goods and we have

$$k_A^*(H,h) = \frac{(B_H - B_L)}{b_l - \alpha q_C + p_C}\left(\frac{\rho_L}{\rho_H(1-\omega_H)+\rho_L}\right).$$

Thus, the luxury brand obtains a profit of $\pi_A = \rho_H \omega_H \min\{B_H, k_A^*(H,h)p_A\}$, where $p_A \leq p_C + b_l + \alpha(q_A - q_C) - \frac{c(b_l - \alpha q_C + p_C)}{B_H - B_L}(\frac{\rho_H(1-\omega_H)+\rho_L}{\rho_L})$.

When $p_A \in (\frac{B_L(\alpha(q_A - q_C)+p_C+b_l)}{B_L+c}, \frac{B_H(\alpha(q_A-q_C)+p_C+b_l)}{B_H+c}]$, there exists a maximalist luxury equilibrium where $k^*(H,h) = k^*(H,l) > k^*(L,l)$ if and only if the following two conditions are satisfied:

$$(B_H - B_L) \geq \frac{c(b_l - \alpha q_C + p_C)}{b_l + \alpha(q_A - q_C) - (p_A - p_C)}, \tag{A50}$$

$$n \geq \frac{(B_H - B_L)}{b_l - \alpha q_C + p_C}. \tag{A51}$$

The solution set is non-empty if and only if we have $c > 0$ and

$$\frac{(b_l - \alpha q_C + p_C)(B_L + c)}{b_l + \alpha(q_A - q_C) + p_C} \leq B_H - B_L < n(b_l - \alpha q_C + p_C). \tag{A52}$$

In this case, $k_A^*(H,h) = k_A^*(H,l) = \min\{\frac{B_H}{p_A}, \frac{B_H - B_L}{b_l - \alpha q_C + p_C}\}$. Thus, the luxury brand obtains a profit of $\pi_A = \rho_H \min\{B_H, (k_A^*(H,h) + k_A^*(H,l))p_A\}$, where $p_A \leq b_l + p_C + \alpha(q_A - q_C) - \frac{c(b_l + p_C - \alpha q_C)}{B_H - B_L}$.

When $p_A \leq \frac{B_L(\alpha(q_A - q_C)+p_C+b_l)}{B_L+c}$, even the L-types may prefer to shop for authentic goods, depending on the number of goods they need to assemble. There exists a separating equilibrium

where $k^*(H,h) = k^*(H,l) > k^*(L,h) = k^*(L,l) = 0$ when the following two conditions are satisfied:

$$B_H - B_L > \frac{B_L}{p_A}(p_A - \alpha q_A) + c \tag{A53}$$

$$n > \frac{(B_H - B_L - c - B_L)(p_A - p_C) + B_L(\alpha q_A - \alpha q_C + b_l)}{\alpha q_A p_C + p_A(b_l - \alpha q_C)}; \tag{A54}$$

The solution set is non-empty iff $p_A > \frac{B_L}{n}$ and $B_H - B_L > c + B_L - n\alpha q_A$. In this case, the luxury brand obtains a profit of

$$\pi_A = \rho_H \min\left\{B_H, \left(\frac{(B_H - B_L - c - B_L)(p_A - p_C) + B_L(\alpha q_A - \alpha q_C + b_l)}{\alpha q_A p_C + p_A(b_l - \alpha q_C)}\right) p_A\right\},$$

where $p_A < \frac{B_L \alpha q_A}{B_L + c - (B_H - B_L)}$ if $B_H - B_L < B_L + c$. The equilibrium is a conspicuous excessive equilibrium à la Veblen if $B_H - B_L < B_L + c$ and it is a maximalist luxury equilibrium if $B_H - B_L \geq B_L + c$.

Lastly, we choose the equilibrium that maximizes the luxury brand's profit across all price ranges. The maximum profit a pooling equilibrium can generate is given by $\pi_A^{pool} = n\alpha q_A - c$. Hence the selected equilibrium is a separating equilibrium if and only if it exists and generates higher profit than a pooling equilibrium does. Combining the cases above, we can summarize the equilibrium profits when a separating equilibrium does exist as follows:

$$\pi_A^{sep} = \begin{cases} \rho_H(B_L + \varepsilon) & \text{if } \frac{B_L + c - n\alpha q_A}{1 - \rho_H} < B_H - B_L < \underline{B}(p_C) \\ \rho_H\left[\frac{(B_H - B_L)(b_l + p_C + \alpha(q_A - q_C))}{b_l + p_C - \alpha q_C} - c\right] & \text{if } \underline{B}(p_C) \leq B_H - B_L < \underline{B}(p_C)\left(\frac{B_H + c}{B_L + c}\right), \\ \rho_H B_H & \text{if } B_H - B_L \geq \underline{B}(p_C)\left(\frac{B_H + c}{B_L + c}\right) \end{cases} \tag{A55}$$

where we define $\underline{B}(p_C) \equiv \frac{(b_l - \alpha q_C + p_C)(B_L + c)}{b_l + p_C + \alpha(q_A - q_C)}$. The first region corresponds to the conspicuous excessive equilibrium where $B_H - B_L < \underline{B}(p_C)$. The second and third regions are where the maximalist luxury equilibrium dominates where $B_H - B_L \geq \underline{B}(p_C)$. Let $\overline{p_C}^{MAX} \equiv \frac{\alpha(q_A - q_C) + b_l - (B_L + c)(b_l - \alpha q_C)}{B_L + c - B_H - B_L}$. Thus, when $\alpha q_C - b_l \leq p_C \leq \overline{p_C}^{MAX}$ and $B_H > \frac{n\alpha q_A - c}{\rho_H}$, we select the maximalist luxury equilibrium; when $p_C > \overline{p_C}^{MAX}$ and $B_H - B_L > \frac{B_L + c - n\alpha q_A}{1 - \rho_H}$, we select the excessive conspicuous equilibrium; Otherwise, the pooling equilibrium is selected.

□