

Online Appendices for “Consumer Preference Information Sharing of Online Platforms with Competing Suppliers and Customization”

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Appendix A: Notations

Table A1 lists the thresholds throughout the paper.

Table A1. Threshold values

Thresholds	Meanings
$\hat{q}_1^M$	The lowest q that the platform chooses strategy O under the marketplace model; $\hat{q}_1^M = \min \left\{ \frac{(2+\beta(1-2\beta))+\sqrt{(1-\beta)(7-\beta(12-\beta(13-6\beta)))}}{6-4\beta}, \frac{2\beta+\sqrt{2(5-3(2-\beta)\beta)}}{4}, \frac{2(1+\beta)+\sqrt{2(5-3\beta(2+\beta))}}{4} \right\} t$.
$\hat{q}_2^M$	The lowest q that the platform chooses strategy N under the marketplace model; $\hat{q}_2^M = \frac{(2(1-\beta)+\sqrt{2(1+\beta)(3-\beta)})t}{4}$.
$\hat{q}_1^R$	The lowest q that the platform chooses strategy B under the reselling model; $\hat{q}_1^R = \frac{(1+\beta)t-t\sqrt{(1-\beta)(1-3\beta)}}{4}$.
$\hat{q}_2^R$	The highest q that the platform chooses strategy B under the reselling model; $\hat{q}_2^R = \frac{(1+\beta)t+t\sqrt{(1-\beta)(1-3\beta)}}{4}$.
q_1^F	The highest q that the platform chooses the marketplace model for any $\phi \in (0,1)$; $q_1^F = \frac{t(8-(7-\beta)\beta)+2(1-\beta)t\sqrt{2-\beta^2}}{2(7-5\beta)}$.
q_2^F	The lowest q that the platform chooses the reselling model for any $\phi \in (0,1)$; $q_2^F = \frac{(9-8\beta)t}{4}$ if $0 < \beta \leq \frac{1}{2}$; $q_2^F = \frac{(7-4\beta)t}{4}$ if $\frac{1}{2} < \beta \leq \frac{3}{4}$ and $q_2^F = \frac{t+2t\sqrt{1-\beta}}{2}$ if $\frac{3}{4} < \beta < 1$.
q_o^M	The highest q that the informed supplier offers customization in strategy O under the marketplace model; $q_o^M = \frac{(3-\beta)t}{2} - \frac{t\sqrt{1+2\beta-\beta^2}}{2\sqrt{2}}$.
q_o^R	The highest q that the informed supplier offers customization in strategy O under the reselling model; $q_o^R = \frac{5(20-\beta(16-5\beta))t}{72}$.
q_B^R	The highest q that one supplier offers customization in strategy B under the reselling model; $q_B^R = \frac{(25-\beta(8-\beta))t}{18}$.
ϕ_N^M	The lowest ϕ that the platform chooses strategy N under the marketplace model; $\phi_N^M = \frac{8qt(2-\beta)-8q^2-(5-\beta)(1-\beta)t^2}{2t(4q-t(3-\beta^2))}$ if $q \leq \frac{(3-2\beta)t}{2}$, $\phi_N^M = \frac{8qt(3-\beta)-8q^2-t^2(17-14\beta+\beta^2)}{2t^2(1-\beta)(3-\beta)}$ if $\frac{(3-2\beta)t}{2} < q \leq \frac{(3-\beta)t}{2}$, $\phi_N^M = \frac{(1+\beta)^2}{2(1-\beta)(3-\beta)}$ if $q > \frac{(3-\beta)t}{2}$.

ϕ_O^M	The largest ϕ that the platform chooses strategy O under the marketplace model; $\phi_O^M = 1 - \frac{(1-\beta)(8qt(1+\beta)+t^2(3\beta^2-6\beta-1)-8q^2)}{4q^2-4qt\beta-t^2(2-(2-\beta)\beta(1+2\beta))}$ if $q < \frac{(2-\beta)t}{2}$ and $\phi_O^M = \frac{t^2(5-\beta)(1-\beta)+8qt\beta-8q^2}{2t(4q-t(3-\beta^2))}$ if $q > \frac{(2-\beta)t}{2}$.
ϕ_B^M	The lowest ϕ that the platform chooses strategy B under the marketplace model; $\phi_B^M = \frac{8qt(3-\beta)-8q^2-t^2(9+2\beta+\beta^2)}{2t^2(1-\beta)(3-\beta)}$ if $q < \frac{(3-\beta)t}{2}$ and $\phi_B^M = \frac{9-14\beta+\beta^2}{2(1-\beta)(3-\beta)}$ if $q > \frac{(3-\beta)t}{2}$.
ϕ^F	The lowest ϕ that the platform chooses the marketplace model when $q_1^F < q \leq q_1^F$; ϕ^F is the solution of $\pi_O^{RN**} = \max\{\pi_O^{MN**}, \pi_O^{MO**}, \pi_O^{MB**}\}$.
ϕ_{o1}^M	The lowest ϕ that customization option shifts the platform's strategy O to N under the marketplace model when $q(\beta, q, c) \in \mathcal{R}_{o1}^M$; $\phi_{o1}^M = \frac{4(2c^2-2q^2-4ct+2qt+t^2)}{4c^2-4ct(4-\beta)+t(8q+t(-4+\beta^2))}$.
ϕ_{o2}^M	The lowest ϕ that customization option shifts the platform's strategy O to N under the marketplace model when $q(\beta, q, c) \in \mathcal{R}_{o2}^M$; $\phi_{o2}^M = \frac{12c^2-4ct(8-\beta)-t(16q-t(24-\beta^2))}{8c^2-8ct(4-\beta)+2t(8q-t(4-\beta^2))}$.
ϕ_{H1}^M	The highest ϕ that customization option shifts the platform's strategy B to O or N under the marketplace model; $\phi_{H1}^M = \frac{2c^2-2ct-t^2+2t^2\beta}{2c^2-2ct}$.
ϕ_{H2}^M	The highest ϕ that customization option shifts the platform's strategy B to O or N under the marketplace model; $\phi_{H2}^M = \frac{16c^2+8q^2-16ct-8qt(3-\beta)+t^2(9+\beta(2+\beta))}{2(8c^2-8ct-t^2(3-\beta)(1-\beta))}$ if $q \leq \frac{(3-\beta)t}{2}$ and $\phi_{H2}^M = \frac{16c^2-16ct-t^2(9-(14-\beta)\beta)}{2(8c^2-8ct-t^2(3-\beta)(1-\beta))}$ if $q > \frac{(3-\beta)t}{2}$.
ϕ_{H3}^M	The highest ϕ that customization option shifts the platform's strategy B to O under the marketplace model; $\phi_{H3}^M = \frac{8qt(3-\beta)-8q^2-t^2(17-14\beta+\beta^2)}{2t^2(3-4\beta+\beta^2)}$ if $q < \frac{(3-\beta)t}{2}$ and $\phi_{H3}^M = \frac{(1+\beta)^2}{2(1-\beta)(3-\beta)}$ if $q > \frac{(3-\beta)t}{2}$.
c_{o1}^M	The highest c that the informed supplier offers customization in strategy O under the marketplace model when $(\beta, q, c) \in \mathcal{R}_{o1}^M$; $c_{o1}^M = \frac{(1-\phi)(2\sqrt{2}t-\sqrt{t(8q(1-\beta)+t(6-\beta)\beta-t)})}{2\sqrt{2}}$.
c_{o2}^M	The highest c that the informed supplier offers customization in strategy O under the marketplace model when $(\beta, q, c) \in \mathcal{R}_{o2}^M$; $c_{o2}^M = \frac{(1-\phi)((8-\beta)t-\sqrt{48qt(3-\beta)-2t^2(19-(10-\beta)\beta)-48q^2})}{6}$.
c_B^M	The highest c that one supplier offers customization in strategy B under the marketplace model; $c_B^M = \frac{(2-\sqrt{2})t(1-\phi)}{2}$.
c_o^R	The highest c that the informed supplier offers customization in strategy O under the reselling model; $c_o^R = \frac{(8-3\beta)t-6\sqrt{(2q-t)t}}{4}$.
c_B^R	The highest c that one supplier offers customization in strategy B under the reselling model; $c_B^R = \frac{4t-3\sqrt{(2q-t)t}}{2}$.
$\hat{c}_O^R$	The highest c that customization option shifts the platform's strategy N to O under the reselling model; $\hat{c}_O^R = \frac{3(4-\beta)t-2\sqrt{40t^2-12qt-18t^2\beta}}{4}$.
$\hat{c}_B^R$	The highest c that customization option shifts the platform's strategy N to B under the reselling model; $\hat{c}_B^R = \frac{(14-3\sqrt{14})t}{10}$.

Table A2. Regions

Regions	Meanings and Expressions
$\mathcal{R}_O^M$	The region that the informed supplier offers customization in strategy O under the marketplace model; $\mathcal{R}_O^M = \{(\beta, q, c) 0 < \beta < \frac{3-\sqrt{6}}{3}, q < q_o^M, c < \max\{c_{o1}^M, c_{o2}^M\}\}$.
$\mathcal{R}_B^M$	The region that one supplier offers customization in strategy B under the marketplace model;

	$\mathcal{R}_B^M = \{(\beta, q, c) 0 < \beta < 2 - \sqrt{2}, c < c_B^M\}.$
$\mathcal{R}_{BO}^M$	The region that customization option shifts the platform's strategy B to O under the marketplace model; $\mathcal{R}_{BO}^M = \{(\beta, q, c) \frac{1}{2} < \beta < 2 - \sqrt{2}, q < \frac{(3-\beta)t}{2}, c < c_B^M\}.$
$\mathcal{R}_O^R$	The region that the informed supplier offers customization in strategy O under the reselling model; $\mathcal{R}_O^R = \{(\beta, q, c) 0 < \beta < \frac{2}{5}, q < q_O^R, c < c_O^R\}.$
$\mathcal{R}_B^R$	The region that one supplier offers customization in strategy B under the reselling model; $\mathcal{R}_B^R = \{(\beta, q, c) 0 < \beta < 1, q < q_B^R, c < c_B^R\}.$

Appendix B: Technical Analysis and Results

B1. Proof of Conditional Expectation of Misfit

Before we discuss the equilibrium solutions, we first give the derivation of conditional expectation of misfit. The suppliers' prior belief about consumers' misfit degree is from the public information such as online review and blogs. For ease of derivation, we denote the public signal as b . Then, the suppliers have a prior belief that $\Pr(b = y|x = y) = 1 - \beta$ and $\Pr(b \neq y|x = y) = \beta$ for any consumer located at $y \in [0, 1]$. Following Kwark et al. (2014) and Li et al. (2018), the cumulative density function of b , conditional on the consumer's true degree of misfit x being z , can be formulated as $\Pr(b \leq y|x = z) = \beta y + (1 - \beta)H(y - z)$, where $H(\cdot)$ is the Heaviside step function that evaluates to zero if the argument is negative, and to one otherwise. The corresponding probability density function is $\Pr(b = y|x = z) = \beta + (1 - \beta)\delta(y - z)$, where $\delta(\lambda)$ is the Dirac delta distribution that satisfies $\int_{-\infty}^{\infty} \delta(\lambda)d\lambda = 1$ and $\delta(\lambda) = \begin{cases} 0 & \text{for } \lambda \neq 0 \\ \infty & \text{for } \lambda = 0 \end{cases}$. Using the Bayes' Law, $\Pr(x = z|b = y) = \frac{\Pr(b = y|x = z)\Pr(x=z)}{\Pr(b=y)} = \beta + (1 - \beta)\delta(y - z)$. Given the public signal $b = y$, the conditional expectation is

$$\begin{aligned} \mathbf{E}(x|b = y) &= \int_0^1 x[\beta + (1 - \beta)\delta(y - x)]dx \\ &= \int_0^1 \beta x dx + (1 - \beta)y = \frac{\beta}{2} + (1 - \beta)y \end{aligned} \quad (\text{B1})$$

Because the platform's private signal s is more accurate than the public signal b , we assume the noisy intensity of private signal s is $\gamma \in [0, \beta]$. Then, given the private signal $s = y$, the conditional expectation is $\mathbf{E}(x|s = y) = \int_0^1 x[\gamma + (1 - \gamma)\delta(y - x)]dx = \int_0^1 \gamma x dx + (1 - \gamma)y = \frac{\gamma}{2} + (1 - \gamma)y$. When $\gamma = 0$, the platform's private signal s can perfectly reveal consumer's true degree of misfit, that is, $\Pr(x = y|s = y) = 1$ and $\mathbf{E}(x|s = y) = y$. Since x and y are independently and identically distributed, for ease of analysis, we will not distinguish between x and y in the following discussion.

Following Kwark et al. (2014), we consider how suppliers utilize public information to forms prior beliefs. Given the platform's private signal s , informed suppliers can perfectly eliminate their preference uncertainty. Next, we will derive the equilibrium solutions under different information strategies (N, O, and B).

B2. Marketplace Model

Case O

We now analyze scenario O when the platform shares preference information with one supplier only. In scenario O, given the symmetrical nature of two suppliers, without loss of generality, we assume that supplier 1 is informed and can charge a personalized price $p_1(x)$ for each consumer. In contrast, supplier 2 is uninformed and sets a uniform price p_2 for all consumers.

The optimal price p_2 is derived by following supplier 2's prior belief. In the absence of competition, supplier 1's personalized price is $\tilde{p}_{l1} = q - t\mathbf{E}(x|b = y)$, where the tide " $\sim$ " stands for conjecture of supplier 2 (see Figure B1(a)). They can capture their loyalists satisfying $\tilde{p}_{l1} \geq 0$ and $\mathbf{E}(U_i|b = y) \geq 0$ (Since x and y follow the same distribution, for simplicity of analysis, we do not distinguish between x and y in the subsequent discussion). Specifically, consumers with type $x < \tilde{x}_1^O = (2q - \beta t)/(2(1 - \beta)t)$ (resp. $x > \tilde{x}_2^O = ((2 - \beta)t - 2q + 2p_2)/(2(1 - \beta)t)$) are willing to purchase only from supplier 1 (resp. supplier 2).

Note that, an overlap exists in the market if $\tilde{x}_1^O > \tilde{x}_2^O$. In the segmented market with $x \in [\tilde{x}_2^O, \tilde{x}_1^O]$, supplier 1 will compete with supplier 2 until its price is driven down to zero. Then, the indifference point of purchasing from suppliers 1 and 2 is $\tilde{x}_0^O = 1/2 + p_2/(2(1-\beta)t)$. In the segmented market with $x \in [\tilde{x}_2^O, \tilde{x}_0^O]$, supplier 1 will charge a non-negative price $\tilde{p}_{s1}$ to attract the switchers, where $\tilde{p}_{s1}$ is solved by $\mathbf{E}(U_1 - U_2|b = y) = 0$. In the segmented market with $x \in [\tilde{x}_0^O, \tilde{x}_1^O]$, supplier 1 cannot attract any switcher even if it sets a zero price. These consumers will purchase from supplier 2.

Based on the analysis, the optimal personalized price (from the supplier 2's perspective) is $\mathbf{E}(p_1(x)|b = y) = \max\{0, \min\{\tilde{p}_{l1}, \tilde{p}_{s1}\}\}$. Supplier 2 can only capture the consumers that supplier 1 cannot reach with a personalized price, and realizes the conjectured demand $\tilde{D}_2 = \max\{0, 1 - \max\{\tilde{x}_0^O, \tilde{x}_2^O\}\}$. The uninformed supplier 2's problem is:

$$\max_{p_2} \pi_2^O = (1 - \phi)p_2\tilde{D}_2. \quad (\text{B2})$$

From the first-order condition (FOC), supplier 2's optimal price is $p_2^{O*} = \min\{(1-\beta)t/2, \max\{(2q - t\beta)/4, 2q - t\}\}$. Because supplier 1 has private signal s , it can perfectly infer supplier 2's optimal price in equilibrium, and sets its own price based on p_2^{O*} and signal s . From supplier 1's perspective, if there is no competition with supplier 2, supplier 1's personalized price is p_{l1} , which is solved by $\mathbf{E}(U_1|s = y) = 0$. The loyalists satisfying $x < x_1^O = q/t$ are willing to purchase from supplier 1 and those satisfying $x > x_2^O = 1 - (q - p_2^{O*})/t$ are willing to purchase from supplier 2.

Competition between the two suppliers arises if and only if $x_1^O > x_0^O > x_2^O$, where $x_0^O = 1/2 + p_2^{O*}/2t$. In the switching market with $x \in [x_2^O, x_0^O]$, supplier 1 can set a non-negative price p_{s1} to attract the switchers, where p_{s1} is solved by $\mathbf{E}(U_1 - U_2|s = y) = 0$ (see Figure B1(b)). Then, supplier 1's optimal personalized price is $p_1^O(x) = \max\{0, \min\{p_{l1}, p_{s1}\}\}$, where $p_{l1} = q - tx$ and $p_{s1} = t(1 - 2x) + p_2^{O*}$. The optimal profits of supplier 1 and the platform are $\pi_1^O = (1 - \phi) \int_0^{\min\{x_1^O, x_0^O\}} p_1^O(x) dx$ and $\pi_0^O = \phi \left(\int_0^{\min\{x_1^O, x_0^O\}} p_1^O(x) dx + p_2^O D_2^O \right)$, respectively.

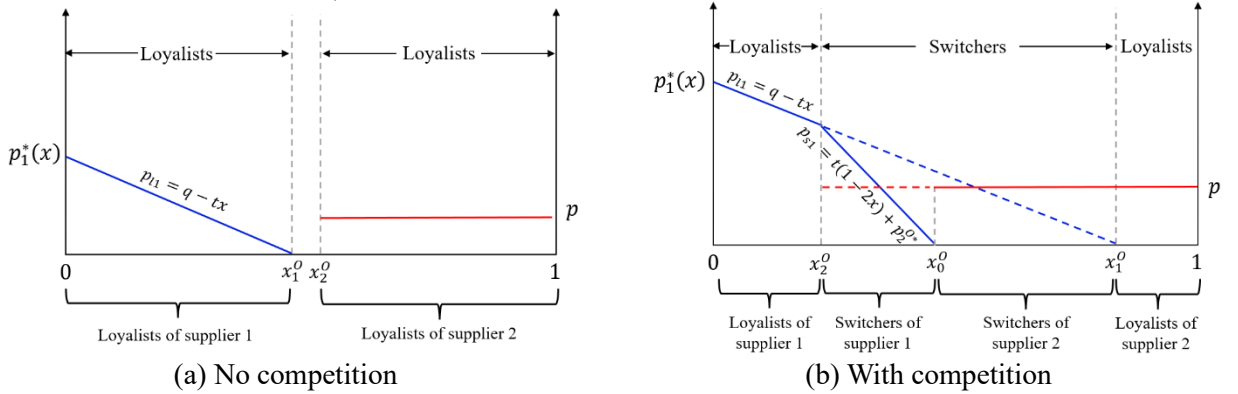


Figure B1. The market segments of two suppliers in strategy O

Using the same approach as case O, we can derive the optimal profits of involved parties in cases N and B under the marketplace model, as summarized in Table B1:

Table B1. Optimal solutions under the marketplace model in different cases

Case N				
	$q \leq \frac{(2-\beta)t}{2}$	$\frac{(2-\beta)t}{2} < q \leq \frac{(3-2\beta)t}{2}$	$q > \frac{(3-2\beta)t}{2}$	
$\mathbf{E}(\pi_i^N)$	$\frac{(2q-\beta t)^2(1-\phi)}{16t(1-\beta)}$	$\frac{(2q-t)(1-\phi)}{4}$	$\frac{(1-\beta)t(1-\phi)}{2}$	
π_i^{N*}	$\frac{(4q^2-\beta^2 t^2)(1-\phi)}{16t}$	$\frac{(2q-t)(1-\phi)}{4}$	$\frac{(1-\beta)t(1-\phi)}{2}$	
π_0^{N*}	$\frac{\phi(4q^2-\beta^2 t^2)}{8t}$	$\frac{\phi(2q-t)}{2}$	$\phi(1-\beta)t$	
Case O				
	$q \leq \frac{(4-\beta)t}{6}$	$\frac{(4-\beta)t}{6} < q \leq \frac{(3-\beta)t}{4}$	$\frac{(3-\beta)t}{4} < q \leq \frac{(3-\beta)t}{2}$	$q > \frac{(3-\beta)t}{2}$
π_1^{O*}	$\frac{q^2(1-\phi)}{2t}$	$\frac{q^2(1-\phi)}{2t}$	$\frac{(8qt(3-\beta)-8q^2-t^2(3-\beta)^2)(1-\phi)}{16t}$	$\frac{(3-\beta)^2 t(1-\phi)}{16}$

π_2^{O*}	$\frac{(4q^2 - \beta^2 t^2)(1-\phi)}{16t}$	$\frac{(t-q)(2q-t)(1-\phi)}{t}$	$\frac{(1-\beta^2)t(1-\phi)}{8}$	$\frac{(1-\beta^2)t(1-\phi)}{8}$
π_o^{O*}	$\frac{(12q^2 - \beta^2 t^2)\phi}{16t}$	$\frac{(6qt - 3q^2 - 2t^2)\phi}{2t}$	$\frac{(8qt(3-\beta) - 8q^2 - t^2(7-3(2-\beta)\beta))\phi}{16t}$	$\frac{(11-\beta(6+\beta))t\phi}{16}$
Case B				
	$q \leq \frac{t}{2}$	$\frac{t}{2} < q \leq t$	$q > t$	
π_i^{B*}	$\frac{q^2(1-\phi)}{2t}$	$\frac{(4qt - 2q^2 - t^2)(1-\phi)}{4t}$	$\frac{t(1-\phi)}{4}$	
π_o^{B*}	$\frac{q^2\phi}{t}$	$\frac{(4qt - 2q^2 - t^2)\phi}{2t}$	$\frac{t\phi}{2}$	

Lemma B1 (Suppliers' Optimal Pricing Strategy): *In the marketplace model,*

- (i) *when the platform does not share information with any supplier, the optimal retail price of supplier i is $p_i^{N*} = \min\{(1-\beta)t, \max\{(2q-t\beta)/4, q-t/2\}\}$;*
- (ii) *when the platform shares information with supplier 1 only, the suppliers' optimal retail prices are $p_1^{O*} = \max\{0, \min\{q-tx, t(1-2x) + (1-\beta)t/2\}\}$ and $p_2^{O*} = \min\{(1-\beta)t/2, \max\{(2q-t\beta)/4, 2q-t\}\}$;*
- (iii) *when the platform shares information with both suppliers, the suppliers' optimal retail prices are $p_1^{B*} = \max\{0, \min\{q-tx, t(1-2x)\}\}$ and $p_2^{B*} = \max\{0, \min\{q-t(1-x), t(2x-1)\}\}$.*

B3. Reselling Model

Case O

In scenario O, we first solve the wholesale price w_2 from the uninformed supplier 2's perspective. Because the uninformed supplier 2 cannot observe the true location of consumers, it forms a prior belief that the highest personalized prices the platform can charge for the suppliers' products are $\tilde{p}_1(x) = q - t\mathbf{E}(x|b=y)$ and $\tilde{p}_2(x) = q - t(1 - \mathbf{E}(x|b=y))$, respectively. For consumers located at $0 \leq x \leq \min\{\tilde{x}_1^O, \tilde{x}_0^O\}$, the platform's marginal profit satisfies $\tilde{p}_1(x) - w_1 > \max\{0, \tilde{p}_2(x) - w_2\}$, where $\tilde{x}_1^O = (2q - \beta t - 2w_1)/(2(1-\beta)t)$ and $\tilde{x}_0^O = (w_2 - w_1 + (1-\beta)t)/(2(1-\beta)t)$. Then the platform will sell supplier 1's product at a personalized price of $\tilde{p}_1(x)$ to these consumers. For consumers located at $\max\{\tilde{x}_0^O, \tilde{x}_2^O\} \leq x \leq 1$, the platform's marginal profit satisfies $\tilde{p}_2(x) - w_2 > \max\{0, \tilde{p}_1(x) - w_1\}$, where $\tilde{x}_2^O = 1 - (2q - \beta t - 2w_2)/(2(1-\beta)t)$. Then the platform will sell supplier 2's product at a personalized price of $\tilde{p}_2(x)$ to these consumers. For consumers located at $x \in [\tilde{x}_1^O, \tilde{x}_2^O]$, selling products brings a negative benefit for the platform when the products have no competition, that is, $\max\{\tilde{p}_1(x) - w_1, \tilde{p}_2(x) - w_2\} < 0$, which induces it not to sell products to these consumers by setting the personalized prices of the two products at w_1 and w_2 , respectively.

From the uninformed supplier 2's perspective, suppliers 1 and 2's conjectured demands are $\tilde{D}_1 = \max\{0, \min\{\tilde{x}_1^O, \tilde{x}_0^O\}\}$ and $\tilde{D}_2 = \max\{0, 1 - \max\{\tilde{x}_0^O, \tilde{x}_2^O\}\}$, respectively. Supplier i maximizes its profit by simultaneously choosing optimal wholesale price for the product, that is,

$$\max_{w_i} \pi_i^O = w_i \tilde{D}_i, \quad i = \{1, 2\}. \quad (4)$$

However, supplier 1 has private signal s and can perfectly infer supplier 2's equilibrium wholesale price, w_2^{O*} . If and only if $q - tx - w_1 > \max\{0, q - t(1-x) - w_2^{O*}\}$, will the platform sell supplier 1's product to consumers located at $0 \leq x \leq \min\{x_1^O, x_0^O\}$, where $x_1^O = (q - w_1)/t$ and $x_0^O = (w_2^{O*} - w_1 + t)/2t$. The true demands of suppliers 1 and 2 are $D_1 = \max\{0, \min\{x_1^O, x_0^O\}\}$ and $D_2 = \max\{0, 1 - \max\{x_2^O, x_0^O\}\}$, respectively. Then, given private signal s , the problem of the informed supplier 1 is to maximize the profit:

$$\max_{w_1} \pi_1^O = w_1 D_1. \quad (5)$$

Using Bayesian rule, we derive the supplier's optimal wholesale price and platform's personalized prices under different information sharing strategies. Similar to case O, we can derive the optimal profits of involved parties in cases N and B under the reselling model, as summarized in Table B2.

Table B2. Optimal solutions under the reselling model in different cases

Case N

	$q \leq \frac{(2-\beta)t}{2}$	$\frac{(2-\beta)t}{2} < q \leq \frac{(3-2\beta)t}{2}$	$q > \frac{(3-2\beta)t}{2}$		
$E(\pi_i^N)$	$\frac{(2q-\beta t)^2}{16(1-\beta)t}$	$\frac{(2q-t)}{4}$	$\frac{(1-\beta)t}{2}$		
π_i^{N*}	$\frac{(4q^2-\beta^2 t^2)}{16t}$	$\frac{(2q-t)}{4}$	$\frac{(1-\beta)t}{2}$		
π_o^{N*}	$\frac{(2q+\beta t)^2}{16t}$	$\frac{t}{4}$	$q - \frac{(5-4\beta)t}{4}$		
Case O					
	$q \leq \frac{(2-\beta)t}{2}$	$\frac{(2-\beta)t}{2} < q \leq \frac{(3-2\beta)t}{2}$	$\beta > \frac{1}{2}, \frac{(3-2\beta)t}{2} < q \leq \frac{(4-2\beta)t}{3}$	$\max\left\{\frac{(3-2\beta)t}{2}, \frac{(4-2\beta)t}{3}\right\} < q \leq \frac{(6-3\beta)t}{4}$	$q > \frac{(6-3\beta)t}{4}$
π_1^{O*}	$\frac{q^2}{4t}$	$\frac{2q-t}{4}$	$\frac{q^2}{4t}$	$\frac{(2q-(2-\beta)t)((2-\beta)t-q)}{t}$	$\frac{(2-\beta)^2 t}{8}$
π_2^{O*}	$\frac{(4q^2-\beta^2 t^2)}{16t}$	$\frac{2q-t}{4}$	$(1-\beta)(q-(1-\beta))$	$(1-\beta)(q-(1-\beta))$	$\frac{(1-\beta)(2+\beta)t}{4}$
π_o^{O*}	$\frac{8q^2+4q\beta t+\beta^2 t^2}{32t}$	$\frac{t}{4}$	$\frac{5q^2}{8t} + \frac{(1-\beta)^2 t-2(1-\beta)q}{2}$	$\frac{q^2-qt(3-2\beta)}{t} + \frac{(5-2(3-\beta)\beta)t}{2}$	$\frac{q-(20-\beta(12+\beta))t}{16}$
Case B					
	$q \leq \frac{(2-\beta)t}{2}$	$\frac{(2-\beta)t}{2} < q \leq \frac{(3-2\beta)t}{2}$	$q > \frac{(3-2\beta)t}{2}$		
$E(\pi_i^N)$	$\frac{(2q-\beta t)^2}{16(1-\beta)t}$	$\frac{(2q-t)}{4}$	$\frac{(1-\beta)t}{2}$		
π_i^{N*}	$\frac{(4q^2-\beta^2 t^2)}{16t}$	$\frac{(2q-t)}{4}$	$\frac{(1-\beta)t}{2}$		
π_o^{N*}	$\frac{(2q+\beta t)^2}{16t}$	$\frac{t}{4}$	$q - \frac{(5-4\beta)t}{4}$		

Lemma B2 (Optimal Pricing Strategy): *In the reselling model,*

- (i) *when the platform does not share information with the supplier, the suppliers' optimal wholesale prices and platform's retail prices are $w_i^{N*} = \min\{(1-\beta)t, \max\{(2q-t\beta)/4, q-t/2\}\}$, $p_1^{N*} = \max\{q-tx, w_1^{N*}\}$ and $p_2^{N*} = \max\{q-t(1-x), w_2^{N*}\}$, respectively;*
- (ii) *when the platform shares information with supplier 1 only, the suppliers' optimal wholesale prices and platform's optimal retail prices $w_1^{O*} = \min\{(2-\beta)t/2, \max\{\frac{q}{2}, q-t/2, 2q-(2-\beta)t\}\}$, $w_2^{O*} = \min\{(1-\beta)t, \max\{(2q-t\beta)/4, q-t/2\}\}$, $p_1^{O*} = \max\{q-tx, w_1^{O*}\}$ and $p_2^{O*} = \max\{q-t(1-x), w_2^{O*}\}$, respectively;*
- (iii) *when the platform shares information with both suppliers, the suppliers' optimal wholesale prices and platform's retail prices are $w_i^{B*} = \min\{t, \max\{q/2, q-t/2\}\}$, $p_1^{B*} = \max\{q-tx, w_1^{B*}\}$ and $p_2^{B*} = \max\{q-t(1-x), w_2^{B*}\}$, respectively.*

Appendix C: Customization

In this section, we consider that suppliers have the option to decide whether to customize their products when they are informed by the platform. We will analyze the supplier's optimal customization decisions and its impact on the platform's optimal information sharing strategy. To focus on the competition between the two suppliers, we assume that the quality is not sufficiently low, that is, $q > t$. To avoid trivial case that supplier 2's demand is non-positive, we assume $c > \frac{\beta t}{2}$ under the marketplace model.

C1. Marketplace Model

Case O

In this case, the platform shares preference information with supplier 1 only, supplier 1 decides whether to customize its product. When supplier 1 chooses the policy T , the outcome aligns with **Case O** under the marketplace model in Appendix B, and we omit the detailed discussion here.

Policy (C, T) : Only supplier 1 customizes its products

In this case, the platform shares preference information with supplier 1 only, allowing supplier 1 to customize its product at a unit cost of c . Obviously, if $m = \frac{c}{1-\phi} \geq q$ or $m > p_1(x)$, customization makes the informed supplier unprofitable. Therefore, we focus on the case where $q > m$. For consumers, the net utility of purchasing supplier 1's customized product is defined as: $U_1 = q - p_1(x)$, where $q \geq p_1(x) \geq m$. Consumers will choose supplier 1's product if and only if $U_1 \geq \max\{0, U_2\}$. Under this condition, supplier 1 optimally sets its personalized price as $p_1(x) = \max\{m, \min\{q, p_2 + t(1-x)\}\}$. From uninformed supplier 2's perspective, supplier 1's personalized price is: $\mathbf{E}(p_1(x)|b=y) = \max\{m, \min\{q, p_2 + t(1 - \mathbf{E}(x|b=y))\}\}$.

Supplier 2 can only capture those consumers who cannot be reached by supplier 1, even if supplier 1 sets its personalized price at the marginal cost, $p_1(x) = m$. These consumers will opt for supplier 2's product if and only if $\mathbf{E}(U_2|b=y) \geq \max\{q - m, 0\} = q - m$. Given this condition, supplier 2's demand is $\tilde{D}_2 = \max\{0, \min\{1 - \tilde{x}_c, 1\}\}$, where $\tilde{x}_c = \frac{p_2 - m}{(1-\beta)t} + \frac{2-\beta}{2(1-\beta)}$ is the threshold at which consumers are indifferent between purchasing from suppliers 1 and 2. To avoid trivial case that supplier 2's demand is non-positive, we assume $\tilde{x}_c < 1$ under the marketplace model, that is, $m > \frac{\beta t}{2}$. Supplier 2's problem is to maximize its profit as

$$\max_{p_2} \pi_2^O = (1 - \phi)p_2\tilde{D}_2 \quad (C1)$$

From the FOC, supplier 2's optimal price is $p_2^{O*} = \max\{\frac{2m-\beta t}{4}, m + \frac{(2-\beta)t}{2}\}$. Using the same approach in case O of Appendix B2, we can derive the optimal solutions of policy (C, T).

(i) If $m < \frac{(4-3\beta)t}{2}$ and $m < q < \frac{2m+(4-\beta)t}{4}$, then $p_2^{O*} = \frac{2m-\beta t}{4}$ and $0 < x_2 < x_c < 1$, where $x_2 = \frac{p_2 - q + t}{t}$ and $x_c = \frac{p_2 - m + t}{t}$. The profits of supplier 1 and the platform are $\pi_1^{O*}(C, T) = \frac{(q-m)(m+q-2t)(1-\phi)}{2t}$, and $\pi_o^{O*}(C, T) = \frac{(4m^2+8q(2t-q)-4m\beta t-\beta^2 t^2)\phi}{16t}$, respectively. (ii) If $m < \frac{(4-3\beta)t}{2}$ and $q > \frac{2m+(4-\beta)t}{4}$, then $p_2^{O*} = \frac{2m-\beta t}{4}$ and $x_2 < 0 < x_c < 1$. The profits of supplier 1 and the platform are $\pi_1^{O*}(C, T) = \frac{(1-\phi)((4-\beta)t-2m)((4+\beta)t-6m)}{32t}$ and $\pi_o^{O*}(C, T) = \frac{t\phi}{2} + \frac{(2m-3t\beta)(2m+t\beta)\phi}{32t}$, respectively. (iii) If $m > \frac{(4-3\beta)t}{2}$ and $m < q < \frac{2m+\beta t}{2}$, then $p_2^{O*} = m + \frac{(2-\beta)t}{2}$ and $0 < x_2 < x_c < 1$. The profits of supplier 1 and the platform are $\pi_1^{O*}(C, T) = \frac{(q-m)(m+q-2t)(1-\phi)}{2t}$ and $\pi_o^{O*}(C, T) = \frac{(2m^2-2q^2+4qt-t^2(-2+\beta)^2)\phi}{4t}$, respectively. (iv) If $m > \frac{(4-3\beta)t}{2}$ and $q > \frac{2m+\beta t}{2}$, then $p_2^{O*} = m + \frac{(2-\beta)t}{2}$ and $x_2 < 0 < x_c < 1$. The profits of supplier 1 and the platform are $\pi_1^{O*}(C, T) = \frac{(1-\phi)((4-\beta)t-4m)\beta}{8}$ and $\pi_o^{O*}(C, T) = \frac{(4(2-\beta)m-t(8-3(4-\beta)\beta))\phi}{8}$, respectively. (v) If $m > q$, we obtain $x_c < 0 < 1$ and no consumers will purchase from supplier 1 and $\pi_1^{O*}(C, T) = 0$.

Supplier 1 will choose to customize its product if and only if the profit from customization exceeds the profit from non-customization, that is, $\pi_1^{O*}(C, T) > \pi_1^{O*}(T, T)$, which is equivalent to $\beta < \frac{3-\sqrt{6}}{3}$, $q < q_o^M$ and $c < \max\{c_{o1}^M, c_{o2}^M\}$, where $q_o^M = \frac{(3-\beta)t}{2} - \frac{t\sqrt{1+2\beta-\beta^2}}{2\sqrt{2}}$, $c_{o1}^M = \frac{(1-\phi)(2\sqrt{2}t-\sqrt{t(8q(1-\beta)+t(6-\beta)\beta-t)})}{2\sqrt{2}}$ and $c_{o2}^M = \frac{(1-\phi)((8-\beta)t-\sqrt{48qt(3-\beta)-2t^2(19-(10-\beta)\beta)-48q^2})}{6}$. Otherwise, if $\pi_1^{O*}(C, T) < \pi_1^{O*}(T, T)$, supplier 1 will opt not to offer customized product, as the standardized product provides greater profitability.

Case B

In this case, the platform shares consumer preference information with both suppliers, who then decide their customization policies simultaneously.

Policy (C, T): Only supplier 1 customizes its product

In this case, only supplier 1 customizes its product. The consumer net utility of buying supplier 1's product is $U_1 = q - p_1(x)$. To ensure that consumers prefer supplier 1 over supplier 2, the condition $U_1 \geq \max\{0, U_2\}$ should be satisfied, implying that supplier 1's personalized price $p_1(x)$ must be set to: $p_1(x) =$

$\max\{m, \min\{q, p_2(x) + t(1-x)\}\}$, where $m = c/(1-\phi)$. Faced with supplier 1's competitive price and customization advantage, supplier 2 can only respond by lowering its retail price, $p_2(x)$, to compete. This leads supplier 2 to set $p_2(x) = 0$, and supplier 1's personalized price becomes: $p_1(x) = \max\{m, \min\{q, t(1-x)\}\} = \max\{m, t(1-x)\}$ for $q > t$ in equilibrium. Thus, supplier 2 can only capture those consumers who would not purchase from supplier 1, even if supplier 1 sets its price at $p_1(x) = m$. Then, supplier 2 will set its price at $p_2(x) = \max\{0, m - t(1-x)\}$ to attract the remaining demand. The condition under which consumers choose to buy from supplier 2 instead of supplier 1 can be expressed as: $E(U_2|b=y) \geq \max\{q-m, 0\} = q-m$. This inequality implies that consumers will prefer supplier 1's product if $x < x_c$ and will switch to supplier 2's product if $x > x_c$, where the indifference point x_c is given by: $x_c = 1 - \frac{m}{t}$.

This result highlights a clear division in the market between the two suppliers: consumers with preferences below x_c will purchase from supplier 1 due to the higher perceived utility from customization, while those with preferences above x_c will purchase from supplier 2. This segmentation reflects the equilibrium distribution of demand in response to supplier 1's customization policy and supplier 2's pricing response. To analyze the conditions under which supplier 1 benefits from customizing its product in competition with supplier 2, we examine two cases:

(i) If $m \leq t$, the profit of suppliers 1 and 2 are: $\pi_1^{B*}(C, T) = (1-\phi) \int_0^{x_c} (p_1(x) - m) dx = \frac{(m-t)^2(1-\phi)}{2t}$ and $\pi_2^{B*}(C, T) = (1-\phi) \int_{x_c}^1 p_2(x) dx = \frac{m^2(1-\phi)}{2t}$. The profit of the platform derived from the revenue sharing with both suppliers, is $\pi_o^{B*}(C, T) = \phi \left(\int_0^{x_c} p_1(x) dx + \int_{x_c}^1 p_2(x) dx \right) = \frac{t\phi}{2}$. (ii) If $m > t$, the profit of suppliers 1 and 2 are: $\pi_1^{B*}(C, T) = (1-\phi) \int_0^0 (p_1(x) - m) dx = 0$ and supplier 1 will not customize its product.

Supplier 1 will customize its product only if the profit from customization exceeds its profit without customization, that is, $\pi_1^{B*}(C, T) > \pi_1^{B*}(T, T)$, which is equivalent to $\beta < 2 - \sqrt{2}$ and $c < \frac{(2-\sqrt{2})t(1-\phi)}{2}$. In this case, supplier 1's customization policy will reduce supplier 2's profit, that is, $\pi_2^{B*}(C, T) < \pi_2^{B*}(T, T)$.

Policy (T, C): Only supplier 2 customizes its products

Similar to the analysis of policy (C, T).

Policy (C, C): Both suppliers customize their products

If both suppliers choose to customize their products, both suppliers engage in Bertrand competition, and the equilibrium price for each supplier becomes: $p_i(x) = m$. Given that the prices are driven down to the marginal costs, there is no profit margin left for either supplier, leading to $\pi_i^{B*}(C, C) = 0$.

Equilibrium Customization Policy

Based on the above analysis, we can summarize the equilibrium policies under two different conditions as shown in Tables C1 and C2. To facilitate our analysis, we simplify the representation of suppliers' profits, where $\Delta_1 > 0$ and $0 < \Delta_2 < d$.

(i) If $\beta < 2 - \sqrt{2}$ and $c < c_B^M$, when only one supplier offers customization, it will increase the profit of the supplier offering customization (i.e., $\pi_1^{B*}(C, T) > \pi_1^{B*}(T, T)$), while reducing the profit of the other supplier, i.e., $\pi_2^{B*}(C, T) < \pi_2^{B*}(T, T)$. However, if both suppliers simultaneously choose customization, their profits will drop to zero due to intense price competition. This leads to an *anti-coordination game* (Bramoullé, 2007; McCain and Hamilton, 2014). In this anti-coordination game, adopting the same policy (i.e., both suppliers choose customization) results in the lowest payoffs for both suppliers. Thus, the asymmetric policies (C, T) and (T, C), where one supplier customizes whereas the other does not, form stable Nash equilibria. In the asymmetric equilibria, neither supplier has an incentive to unilaterally deviate from their policies. As a result, these two equilibria (C, T) and (T, C) are stable Nash equilibria under this condition.

(ii) Otherwise, if $\beta > 2 - \sqrt{2}$ or $c > c_B^M$, supplier i 's customization will lead to a reduction in its own profit, that is, $\pi_1^{B*}(C, T) < \pi_1^{B*}(T, T)$. Therefore, the stable equilibrium policy is the symmetric Nash equilibria (T, T), where both suppliers choose to offer standardized products.

Let $\mathcal{R}_O^M = \{(\beta, q, c) | 0 < \beta < (3 - \sqrt{6})/3, q < q_o^M, c < \max\{c_{o1}^M, c_{o2}^M\}\}$ and $\mathcal{R}_B^M = \{(\beta, q, c) | 0 < \beta < 2 - \sqrt{2}, c < c_B^M\}$. Lemma C1 depicts the suppliers' optimal customization policies in

strategies O and B.

Lemma C1 (Equilibrium Customization Policies). *In the marketplace model,*

- (i) *when the platform shares information with one supplier only, the informed supplier will customize its product if and only if $(\beta, q, c) \in \mathcal{R}_O^M$, and otherwise not;*
- (ii) *when the platform shares information with both suppliers, in equilibrium, the two suppliers will choose the customization policy (C, T) or (T, C) if and only if $(\beta, q, c) \in \mathcal{R}_B^M$, and (T, T) otherwise;*
- (iii) $\mathcal{R}_O^M \subseteq \mathcal{R}_B^M$.

C2. Reselling Model

Case O

In this case, the platform shares preference information with supplier 1 only, supplier 1 decides whether to customize its product.

Policy (C, T) : Only supplier 1 customizes its products.

In this case, the platform shares preference information only with supplier 1, allowing supplier 1 to customize its product at a unit cost of c . To make customization profitable, supplier 1 will only consider customize its product when $q > c$. To maximize its profit, the platform will always sell the most profitable product to consumers. From the uninformed suppliers' perspectives, the platform will charge the largest price for each consumer that satisfies $\mathbf{E}(U_i|b = y) = 0$, but is not lower than the wholesale price w_i , that is, $p_1(x) = \max\{w_1, q\}$ and $p_2(x) = \max\{w_2, q - t(1 - x)\}$. If $w_1 \geq q$, the marginal profit of selling supplier 1's product is zero and the platform will only sell supplier 2's products. Then, we only need to consider the case $q > w_1$. The platform will sell supplier 1's product with price $p_1(x) = \max\{w_1, q\} = q$ to consumers if $q - w_1 > q - w_2 - t(1 - x)$, that is, $x < x_c = \frac{t - w_1 + w_2}{t}$ and sell supplier 2's product with price $p_2(x) = \max\{w_2, q - t(1 - x)\} = q - t(1 - x)$ to consumers located at $x \geq x_c$. From the perspective of the uninformed supplier 2, it lacks private information, and the platform will sell supplier 1's product with price $p_1(x) = q$ to consumers located at $x < \tilde{x}_c = \frac{2t - t\beta + 2w_2 - 2w_1}{2(1 - \beta)t}$ and sell supplier 2's product with price $p_2(x) = q - t(1 - \mathbf{E}(x|b = y))$ to consumers located at $x > \tilde{x}_c$. From the perspective of the uninformed supplier 2, suppliers 1 and 2's expected demands are: $\tilde{D}_2 = \max\{0, \tilde{x}_c\}$ and $\tilde{D}_2 = \max\{0, 1 - \tilde{x}_c\}$. Suppliers 1 and 2's problems are:

$$\begin{aligned} \max_{w_1} \pi_1^{OC} &= (w_1 - c)\tilde{D}_1 \\ \max_{w_2} \pi_2^{OC} &= w_2\tilde{D}_2 \end{aligned} \tag{C2}$$

Since the analysis approach is similar to the marketplace model, we omit it here.

Case B

In this case, the platform shares consumer preference information with both suppliers, who then decide their customization policies simultaneously. Since the analysis approach is similar to the marketplace model, we omit it here. In policy (C, T) , supplier 1 will choose to customize its product if and only if the profit from customization exceeds the profit from non-customization, that is, $\pi_1^{B*}(C, T) > \pi_1^{B*}(T, T)$, which is equivalent to $q < q_B^R$ and $c < c_B^R$, where $q_B^R = \frac{(25 - \beta(8 - \beta))t}{18}$, $c_B^R = \frac{4t - 3\sqrt{(2q - t)t}}{2}$. In addition, supplier 1's customization policy will reduce supplier 2's profit, that is, $\pi_2^{B*}(C, T) < \pi_2^{B*}(T, T)$. Conversely, if $\pi_1^{B*}(C, T) < \pi_1^{B*}(T, T)$, supplier 1 will opt not to offer customized products, as the standardized product provides greater profitability. Let $\mathcal{R}_O^R = \{(\beta, q, c) | 0 < \beta < 2/5, q < q_B^R, c < c_B^R\}$ and $\mathcal{R}_B^R = \{(\beta, q, c) | 0 < \beta < 1, q < q_B^R, c < c_B^R\}$.

Lemma C2. (Equilibrium Customization Policy). *In the reselling model,*

- (i) *when the platform shares information with one supplier only, the informed supplier will customize its product if and only if $(\beta, q, c) \in \mathcal{R}_O^R$, and otherwise not;*
- (ii) *when the platform shares information with both suppliers, the two suppliers, (a) the equilibrium customization policy is (C, T) or (T, C) if and only if $(\beta, q, c) \in \mathcal{R}_B^R$; (b) otherwise, the equilibrium customization policy is (T, T) .*

(iii) $\mathcal{R}_O^R \subseteq \mathcal{R}_B^R$.

Appendix D: Details of Extensions

Appendix D1: Asymmetric Suppliers

In this section, we consider the two suppliers are asymmetric. Without loss of generality, we assume that the product qualities of the two suppliers are $q + \delta$ and q , respectively, where $\delta > 0$ is the quality difference. To avoid the trivial case in which the demand from each supplier is non-positive, we assume $\delta < \bar{\delta} = (1 - \beta)t$.

Marketplace model: When q is sufficiently low, there is no competition between the two suppliers. In this case, the dominated information effect motivates the platform to share information with both suppliers under the marketplace model. Therefore, we focus on the competitive regime—that is, when $q > \frac{(3-\beta)t-\delta}{2}$ —in which the platform must balance the trade-off between the information effect and Bertrand competition. Given $q > \frac{3t-2t\beta-\delta}{2}$, before charging the side payments, the optimal profits of the involved parties with asymmetric suppliers under the marketplace model are summarized in Table D1.1.

Table D1.1 Optimal solutions with asymmetric suppliers under the marketplace model

	Case N	Case H	Case L	Case B
π_1^{X*}	$\frac{(3(1-\beta)t+\delta)^2(1-\phi)}{18t(1-\beta)}$	$\frac{(t(3-\beta)+\delta)^2(1-\phi)}{16t}$	$\frac{(t-t\beta+\delta)(t+t\beta+\delta)(1-\phi)}{8t}$	$\frac{(t+\delta)^2(1-\phi)}{4t}$
π_2^{X*}	$\frac{(3(1-\beta)t-\delta)^2(1-\phi)}{18t(1-\beta)}$	$\frac{(t+t\beta-\delta)(t(1-\beta)-\delta)(1-\phi)}{8t}$	$\frac{(t(3-\beta)-\delta)^2(1-\phi)}{16t}$	$\frac{(t-\delta)^2(1-\phi)}{4t}$
π_o^{X*}	$\frac{\delta^2\phi}{9t} + \phi(1-\beta)t$	$\frac{(t^2(11-\beta(6+\beta))+2t(1-\beta)\delta+3\delta^2)\phi}{16t}$	$\frac{(t^2(11-\beta(6+\beta))-2t(1-\beta)\delta+3\delta^2)\phi}{16t}$	$\frac{(t^2+\delta^2)\phi}{2t}$

Proposition D1. (Optimal Sharing Strategy with Asymmetric Suppliers). *In the marketplace model, when q is high enough to induce competition (i.e., $q > \frac{3t-t\beta-\delta}{2}$),*

- (i) *if and only if $\beta < 1/2$, $\delta < \min\{\delta_N^M, \bar{\delta}\}$ and $\phi_1^M < \phi < \min\{\phi_2^M, 1\}$, the platform will not share information with any supplier (Strategy N);*
- (ii) *if and only if $\beta < \beta_H^M$, $\delta < \min\{\delta_H^M, \bar{\delta}\}$ and $\max\{0, \frac{3\beta-1}{2}\} < \phi < \min\{\phi_1^M, \phi_3^M\}$, the platform will only share information with the high-quality supplier (Strategy H);*
- (iii) *if and only if $1/3 < \beta < \beta_L^M$, $\max\{0, \delta_{L1}^M\} < \delta < \min\{\delta_{L2}^M, \bar{\delta}\}$ and $\phi < \min\{\frac{3\beta-1}{2}, \phi_4^M\}$, the platform will only share information with the low-quality supplier (Strategy L);*
- (iv) *otherwise, the platform will share information with both suppliers (Strategy B).*

Reselling model: When q is sufficiently high (i.e., $q > \frac{(3-\beta)t-\delta}{2}$), combined double marginalization effect and competition effect always dominate the information effect. Consequently, the platform does not share information with any supplier. We therefore focus on the low-quality regime (i.e., $q < \frac{(1-\beta)t-\delta}{2}$), in which the platform's sharing decision becomes nontrivial. Given $q < \frac{(1-\beta)t-\delta}{2}$, before charging the side payments, the optimal profits of the involved parties with asymmetric suppliers under the reselling model are summarized in Table D1.2.

Table D1.2 Optimal solutions with asymmetric suppliers under the reselling model

	Case N	Case H	Case L	Case B
π_1^{X*}	$\frac{(2q-t\beta+2\delta)^2}{16t(1-\beta)}$	$\frac{(q+\delta)^2}{4t}$	$\frac{(2q-t\beta+2\delta)(2q+t\beta+2\delta)}{16t}$	$\frac{(q+\delta)^2}{4t}$
π_2^{X*}	$\frac{(2q-t\beta)^2}{16t(1-\beta)}$	$\frac{q^2}{4t} - \frac{t\beta^2}{16}$	$\frac{q^2}{4t}$	$\frac{q^2}{4t}$
π_o^{X*}	$\frac{(2q+t\beta)^2+2(2q+t\beta)\delta+2\delta^2}{16t}$	$\frac{(2q+\beta t)^2+4(q+\delta)^2}{32t}$	$\frac{(2q+\beta t)^2+4(q+\delta)^2+4t\beta\delta}{32t}$	$\frac{2q^2+2q\delta+\delta^2}{8t}$

Proposition D2. (Optimal Sharing Strategy with Asymmetric Suppliers). *In the reselling model, when q is low (i.e., $q < \frac{t(1-\beta)-\delta}{2}$),*

- (i) if and only if $\beta < \frac{1}{3}$, $q < \hat{q}_1^R$ and $\delta_1^R < \delta < \delta_2^R$, the platform will only share information with the high-quality supplier (Strategy H);
- (ii) if and only if $\beta < \frac{1}{3}$, $\hat{q}_1^R < q < \hat{q}_2^R$ and $\delta > \delta_2^R$, the platform will only share information with the low-quality supplier (Strategy L);
- (iii) if and only if $\beta < \frac{1}{3}$, $\hat{q}_1^R < q < \hat{q}_2^R$ and $\delta < \delta_2^R$, the platform will share information with both suppliers (Strategy B);
- (iv) otherwise, the platform will not share information with any supplier (Strategy N).

Appendix D2: Endogenized Accuracy of the Shared Signal

In this section, we develop a more flexible and continuous framework for information sharing, which enables us to examine the optimal accuracy of the shared information. The shared signal $g_i = \theta_i s + (1 - \theta_i)b$, where $\theta_i \in [0, 1]$ represents the accuracy level of the information shared. From the proof of conditional expectation misfit in Appendix B1, given the signal g_i , we have $E(x|g_i) = \frac{\gamma_i}{2} + (1 - \gamma_i)x$, where $\gamma_i = (1 - \theta_i)\beta$ and $\gamma_i \in [0, \beta]$. The optimal profits of involved parties under the marketplace model are summarized in Table D3 (before charging the side payments). Without loss of generality, we assume that $\theta_1 \geq \theta_2$. Under the marketplace model, since only the shared supplier is able to engage in personalized pricing, the sharing arrangements can still be categorized into three cases: (1) $\theta_1 = \theta_2 = 0$ (case N); (2) $\theta_1 > \theta_2 = 0$ (case O); (3) $\theta_1 \geq \theta_2 > 0$ (case B). In the marketplace model, under Case O, supplier 2's price remains the same as in the basic model, while supplier 1 sets a personalized price based on the posterior belief $E(x|g_1) = \frac{\gamma_1}{2} + (1 - \gamma_1)x$. In Case B, both suppliers infer their rival's information according to their own posterior beliefs and determine personalized prices accordingly. However, consumers make purchasing decisions based on their true preferences, resulting in optimal solutions for the parties involved, as shown in Tables D2.1 and D2.2.

Table D2.1 Optimal solutions with endogenized accuracy of the shared signal under the marketplace model

Case O			
	$q \leq \frac{(4-\beta)t}{6}$	$\frac{(4-\beta)t}{6} < q \leq \frac{(3-\beta)t}{4}$	$q > \frac{(3-\beta)t}{4}$
π_1^{O*}	$\min \left\{ \frac{(1-\phi)(2q-t\gamma_1)^2}{8t(1-\gamma_1)}, \frac{(1-\phi)(4q-t-t\gamma_1)}{8} \right\}$	$\frac{(1-\phi)(4q-t-t\gamma_1)}{8}$	$\frac{(1-\phi)(2k^2t+2k(2q-t(3-\beta))-t(2-\beta)+(1+2(-1+k)k)t\gamma_1)}{4}$
π_2^{O*}	$\frac{(4q^2-t^2\beta^2)(1-\phi)}{16t}$	$\frac{(t-q)(2q-t)(1-\phi)}{t}$	$\frac{(1-\beta)t(1-\phi)}{2} \max \left\{ \frac{3t-t\beta-2q}{2t}, \frac{1}{2} \right\}$
π_0^{O*}	$\frac{(4q^2-t^2\beta^2)\phi}{16t} + \min \left\{ \frac{\phi(2q-t\gamma_1)^2}{8t(1-\gamma_1)}, \frac{\phi(4q-t-t\gamma_1)}{8} \right\}$	$\frac{\phi(28qt-16q^2-9t^2-t^2\gamma_1)}{8t}$	$\frac{\phi(2k^2t+2k(2q-t(3-\beta))-t(2-\beta)+(1+2(-1+k)k)t\gamma_1)}{4} + \frac{(1-\beta)t\phi}{2} \max \left\{ \frac{3t-t\beta-2q}{2t}, \frac{1}{2} \right\}$

Case B				
	$q \leq \frac{t}{2}$	$\frac{t}{2} < q < \frac{(2-\gamma_2)t}{2}$	$\frac{(2-\gamma_2)t}{2} < q < \frac{(2-\gamma_1)t}{2}$	$q > \frac{(2-\gamma_1)t}{2}$
π_1^{B*}	$\frac{(1-\phi)(2q-t\gamma_1)^2}{8t(1-\gamma_1)}$	$\frac{(1-\phi)(2(4qt-2q^2-t^2)-t\gamma_1(4q-t\gamma_1))}{8t(1-\gamma_1)}$	$\frac{(1-\phi)(2(4qt-2q^2-t^2)-t\gamma_1(4q-t\gamma_1))}{8t(1-\gamma_1)}$	$\frac{(1-\phi)(1-\gamma_1)t}{4}$
π_2^{B*}	$\frac{(1-\phi)(2q-t\gamma_2)^2}{8t(1-\gamma_2)}$	$\frac{(1-\phi)(2(4qt-2q^2-t^2)-t\gamma_2(4q-t\gamma_2))}{8t(1-\gamma_2)}$	$\frac{(1-\phi)(1-\gamma_2)t}{4}$	$\frac{(1-\phi)(1-\gamma_2)t}{4}$
π_0^{B*}	$\frac{\phi((2q-t\gamma_1)^2 + (2q-t\gamma_2)^2)}{8t}$	$\frac{\phi(2(4q-t)t + \frac{(2q-t)^2}{1-\gamma_1} + \frac{(2q-t)^2}{1-\gamma_2} - t^2(\gamma_1+\gamma_2))}{8t}$	$\frac{\phi(4q(2t-q)-t(\gamma_1(4q+2t-t\gamma_1)+2t(1-\gamma_1)\gamma_2))}{8t(1-\gamma_1)}$	$\frac{\phi(2-\gamma_1-\gamma_2)t}{4}$

Table D2.2 Optimal solutions with endogenized accuracy of the shared signal under the reselling model

Case O			
	$q \leq \frac{(2-\beta)t}{2}$	$\frac{(2-\beta)t}{2} < q \leq \frac{(3-2\beta)t}{2}$	$\beta > \frac{1+\gamma_1}{2}, \frac{(3-2\beta)t}{2} < q \leq \frac{(8-4\beta-\gamma_1)t}{6}$
π_1^{O*}	$\frac{q^2}{4t} - \frac{t\gamma_1^2}{16}$	$\frac{2q-t}{4}$	$\frac{q^2}{4t} - \frac{t\gamma_1^2}{16}$
π_2^{O*}	$\frac{q^2}{4t} - \frac{t\beta^2}{16}$	$\frac{2q-t}{4}$	$(q - t(1 - \beta))(1 - \beta)$

π_o^{O*}	$\frac{8q^2+4qt\beta+t^2\beta^2+t\gamma_1(4q+t\gamma_1)}{32t}$	$\frac{t}{4}$	$\frac{4(5q^2-8qt(1-\beta)+4t^2(1-\beta)^2)+t\gamma_1(4q+t\gamma_1)}{32t}$
	$\max\left\{\frac{(3-2\beta)t}{2}, \frac{(8-4\beta-\gamma_1)t}{6}\right\} < q \leq \frac{(6-3\beta-\gamma_1)t}{4}$		$q > \frac{(6-3\beta-\gamma_1)t}{4}$
π_1^{O*}	$\frac{(q-t(2-\beta))(2q-t(2-\beta))}{t}$		$\frac{(2-\beta+\gamma_1)(2-\beta-\gamma_1)t}{8}$
π_2^{O*}	$(q-t(1-\beta))(1-\beta)$		$\frac{t(1-\beta)(2+\beta-\gamma)}{4(1-\gamma)}$
π_o^{O*}	$\frac{2q^2-2qt(3-2\beta)+t^2(5-2(3-\beta)\beta)}{2t}$		$\frac{(16q-t(20-\beta(12+\beta)))+t\gamma_1(4-2\beta+\gamma_1)}{16}$
Case B			
	$q \leq \frac{(2-\gamma_2)t}{2}$	$\gamma_2 < \frac{1+\gamma_1}{2}, \frac{(2-\gamma_2)t}{2} < q \leq \frac{(2-\gamma_1)t}{2}$	$\gamma_2 < \frac{1+\gamma_1}{2}, \frac{(2-\gamma_2)t}{2} < q \leq \frac{(3-2\gamma_2)t}{2}$
π_1^{B*}	$\frac{q^2}{4t} - \frac{t\gamma_1^2}{16}$	$\frac{q^2}{4t} - \frac{t\gamma_1^2}{16}$	$\frac{(2q-t)}{4}$
π_2^{B*}	$\frac{q^2}{4t} - \frac{t\gamma_2^2}{16}$	$\frac{(2q-t)}{4}$	$\frac{(2q-t)(2q-t(5-2\gamma_2))}{8t}$
π_o^{B*}	$\frac{(2q-\gamma t)^2}{16t(1-\gamma)}$	$\frac{4t^2+(2q+t\gamma_1)^2}{32t}$	$\frac{t}{4}$
	$\gamma_2 \geq \frac{1+\gamma_1}{2}, \frac{(2-\gamma_1)t}{2} < q \leq \frac{(3-2\gamma_2)t}{2}$		$\gamma_2 \geq \frac{1+\gamma_1}{2}, \frac{(3-2\gamma_2)t}{2} < q \leq \frac{(2-\gamma_1)t}{2}$
π_1^{B*}	$\min\left\{\frac{4q^2-t^2\gamma_1^2}{16t}, \frac{(2q-t\gamma_1)(2q+t(2+\gamma_1))}{32t}\right\}$		$\min\left\{\frac{4q^2-t^2\gamma_1^2}{16t}, \frac{(2q-t\gamma_1)((8-4\gamma-2+\gamma_1)t-2q)}{32t}\right\}$
π_2^{B*}	$\min\left\{\frac{(2q-t)}{4}, \frac{(2q-t)((6-\gamma_1)t-2q)}{16t}\right\}$		$\min\left\{(q-t(1-\gamma_2))(1-\gamma_2), \frac{(1-\gamma_2)(2q+4t\gamma_2-t\gamma_1)}{8}\right\}$
π_o^{B*}	$\min\left\{\frac{4t^2+(2q+t\gamma_1)^2}{32t}, \frac{(2q+t(2+\gamma_1))^2}{64t}\right\}$		$\min\left\{\frac{16(q-t(1-\gamma_2))^2+(2q+t\gamma_1)^2}{32t}, \frac{4q^2+4qt(8+4\gamma_2-\gamma_1)-t^2(16(2-\gamma_1)-(4\gamma_2-\gamma_1)^2)}{64t}\right\}$
	$\gamma_2 \geq \frac{1+\gamma_1}{2}, \frac{(2-\gamma_1)t}{2} < q \leq \frac{(3-2\gamma_1)t}{2}$		$q > \frac{(3-2\gamma_1)t}{2}$
π_1^{B*}	$\min\left\{\frac{(2q-t)}{4}, \frac{(2q-t)((5-2\gamma_2)t-2q)}{8t}\right\}$		$\frac{t(1-\gamma_2+\gamma_1)(1-\gamma_1)}{2}$
π_2^{B*}	$\min\left\{(q-t(1-\gamma_2))(1-\gamma_2), \frac{(1-\gamma_2)(2q-t(1-2\gamma_2))}{4}\right\}$		$\frac{t(1-\gamma_2)(1+\gamma_2-\gamma_1)}{2}$
π_o^{B*}	$\min\left\{\frac{4q^2-8qt+5t^2+8qt\gamma-8t^2\gamma+4t^2\gamma^2}{8t}, \frac{(2q-t(1-2\gamma_2))^2}{64t}\right\}$		$q - \frac{t(5-\gamma_2^2-2\gamma_2(1-\gamma_1)-\gamma_1(2+\gamma_1))}{4}$

From the equilibrium solutions in Tables D2.1 and D2.1 of Appendix D1, after charging the side payments, under Case O, the platform's profit $\pi_o^{O*} + \pi_1^{O*} - \pi_1^{N*}$ is monotonic in α_1 . Similarly, under Case B, the platform's profit $\pi_o^{B*} + \pi_1^{B*} + \pi_2^{B*} - \pi_1^{N*} - \pi_2^{N*}$ is monotonic in both α_1 and α_2 . Therefore, under both the marketplace and reselling models, the optimal information accuracy level α_i^* for supplier i is either 0 or 1.

Appendix E: Proofs

Proof of Proposition 1.

From the equilibrium solutions under the marketplace model in Table B1 of Appendix B2, the platform will charge a side payment $I_1^{O*} = \pi_1^{O*} - \mathbf{E}[\pi_1^N]$ for supplier 1 in case O and $I_i^{B*} = \pi_i^{B*} - \mathbf{E}[\pi_i^N]$ for supplier i ($i \in \{1,2\}$) in case B. Let π_o^{X**} denotes the optimal profit of the platform in strategy X after charging the commission fee. After charging the side payments, the platform's optimal profits in cases N, O and B are: $\pi_o^{N**} = \pi_o^{N*}$, $\pi_o^{O**} = \pi_o^{O*} + \pi_1^{O*} - \mathbf{E}[\pi_1^N]$, and $\pi_o^{B**} = \pi_o^{B*} + \pi_1^{B*} + \pi_2^{B*} - \mathbf{E}[\pi_1^N] - \mathbf{E}[\pi_2^N]$. (1) When $q \leq t$, we obtain $\pi_o^{N**} < \max\{\pi_o^{O**}, \pi_o^{B**}\}$ always holds, then the platform will choose strategy O or B. If $q < \min\left\{\frac{(12-11\beta)t+2\sqrt{2\beta}(1-\beta)t}{2(9-8\beta)}, \frac{\beta t+\sqrt{2(1+\beta)}(1-\beta)t}{2}\right\}$, $\pi_o^{B**} > \pi_o^{O**}$ always holds. If $\min\left\{\frac{(12-11\beta)t+2\sqrt{2\beta}(1-\beta)t}{2(9-8\beta)}, \frac{\beta t+\sqrt{2(1+\beta)}(1-\beta)t}{2}\right\} < q < t$, $\pi_o^{B**} > \pi_o^{O**}$ increases with ϕ . Then, if and only if $(\pi_o^{B**} - \pi_o^{O**})|_{\phi=0} < 0$, which is equivalent to $\hat{q}_1^M < q < t$, there exists a threshold such that $\pi_o^{B**} < \pi_o^{O**}$ if $\phi < \min\{\phi_o^M, 1\}$, where $\hat{q}_1^M = \min\left\{\frac{(2+\beta(1-2\beta))+\sqrt{(1-\beta)(7-\beta(12-\beta(13-6\beta)))}}{6-4\beta}, \frac{2\beta+\sqrt{2(5-3(2-\beta)\beta)}}{4}, \frac{2(1+\beta)+\sqrt{2(5-3\beta(2+\beta))}}{4}\right\}t$, and $\phi_o^M = 1 - \frac{(1-\beta)(8qt(1+\beta)+t^2(3\beta^2-6\beta-1)-8q^2)}{4q^2-4qt\beta-t^2(2-(2-\beta)\beta(1+2\beta))}$ if $q < \frac{(2-\beta)t}{2}$ and $\phi_o^M = \frac{t^2(5-\beta)(1-\beta)+8qt\beta-8q^2}{2t(4q-t(3-\beta^2))}$ if $q > \frac{(2-\beta)t}{2}$. (2) When

$q > t$, (i) the constraint $\pi_o^{N**} > \max\{\pi_o^{O**}, \pi_o^{B**}\}$ holds if and only if $\beta < 1/2$, $q > \hat{q}^M$ and $\phi > \phi_N^M$, where $\hat{q}^M = \frac{(2(1-\beta)+\sqrt{2(1+\beta)(3-\beta)})t}{4}$, $\phi_N^M = \frac{8qt(2-\beta)-8q^2-(5-\beta)(1-\beta)t^2}{2t(4q-t(3-\beta^2))}$ if $q \leq \frac{(3-2\beta)t}{2}$, $\phi_N^M = \frac{8qt(3-\beta)-8q^2-t^2(17-14\beta+\beta^2)}{2t^2(1-\beta)(3-\beta)}$ if $\frac{(3-2\beta)t}{2} < q \leq \frac{(3-\beta)t}{2}$, $\phi_N^M = \frac{(1+\beta)^2}{2(1-\beta)(3-\beta)}$ if $q > \frac{(3-\beta)t}{2}$. Then the platform will not share information with any supplier (Strategy N). (ii) The constraint $\pi_o^{B**} > \max\{\pi_o^{O**}, \pi_o^{N**}\}$ holds if and only if $\beta > 1/2$ and $\phi > \max\{\phi_B^M, 0\}$, where $\phi_B^M = \frac{8qt(3-\beta)-8q^2-t^2(9+2\beta+\beta^2)}{2t^2(1-\beta)(3-\beta)}$ if $q \leq \frac{(3-\beta)t}{2}$ and $\phi_B^M = \frac{9-14\beta+\beta^2}{2(1-\beta)(3-\beta)}$ if $q > \frac{(3-\beta)t}{2}$. Then the platform will share information with both suppliers (Strategy B). (iii) Otherwise, the platform will share information with one supplier only (Strategy O). $\square$

Proof of Proposition 2.

From the equilibrium solutions under the reselling model in Table B2 of Appendix B3, After charging the side payments, the platform's optimal profits in cases N, O and B are: $\pi_o^{N**} = \pi_o^{N*}$, $\pi_o^{O**} = \pi_o^{O*} + \pi_1^{O*} - \mathbf{E}[\pi_1^N]$, and $\pi_o^{B**} = \pi_o^{B*} + \pi_1^{B*} + \pi_2^{B*} - \mathbf{E}[\pi_1^N] - \mathbf{E}[\pi_2^N]$. We obtain $\pi_o^{O**} < \max\{\pi_o^{N**}, \pi_o^{B**}\}$ always holds, then the platform will not choose strategy O. By comparing the platform's optimal profits in strategies N and B, we obtain $\pi_o^{B**} > \pi_o^{N**}$ if and only if $\beta < \frac{1}{3}$ and $\hat{q}_1^R < q < \hat{q}_2^R$, where $\hat{q}_1^R = \frac{(1+\beta)t-t\sqrt{(1-\beta)(1-3\beta)}}{4}$ and $\hat{q}_2^R = \frac{(1+\beta)t+t\sqrt{(1-\beta)(1-3\beta)}}{4}$, and the platform will share information with both suppliers (Strategy B). Otherwise, the platform will not share information with any supplier (Strategy N). $\square$

Proof of Proposition 3.

We use superscripts "M" and "R" to distinguish marketplace model and reselling model. From the proofs of Propositions 1 and 2, when $\pi_o^{RB**} > \pi_o^{RN**}$, one can easily verify that $\pi_o^{RB**} < \max\{\pi_o^{MN**}, \pi_o^{MO**}, \pi_o^{MB**}\}$ always holds. Let $\pi_o^{M*} = \max\{\pi_o^{MN**}, \pi_o^{MO**}, \pi_o^{MB**}\}$, the profit difference $\pi_o^{RN**} - \pi_o^{M*}$ strictly decreases in ϕ . If $\pi_o^{RN**} - \pi_o^{M*}|_{\phi=1} > 0$, which is equivalent to $q > q_2^F$, $\pi_o^{RN**} > \pi_o^{M*}$ always holds, where q_2^F is the solution of $\pi_o^{RN**} = \pi_o^{M*}|_{\phi=1}$. If $\pi_o^{RN**} - \pi_o^{M*}|_{\phi=1} < 0$ and $\pi_o^{RN**} - \pi_o^{M*}|_{\phi=0} > 0$, which is equivalent to $q_1^F < q \leq q_2^F$, there exists a threshold ϕ^F such that $\pi_o^{RN**} > \pi_o^{M*}$ if $\phi < \phi^F$, where q_1^F is the solution of $\pi_o^{RN**} = \pi_o^{M*}|_{\phi=0}$ and ϕ^F is the solution of $\pi_o^{RN**} = \pi_o^{M*}$. Then, if and only if (a) $q_1^F < q \leq q_2^F$ and $\phi < \phi^F$ or (b) $q > q_2^F$, the platform will choose the reselling model. $\square$

Proof of Proposition 4.

From the analysis in Appendix C1, in case O under the marketplace model, the informed supplier will customize its product if and only if $(\beta, q, c) \in \mathcal{R}_O^M = \{(\beta, q, c) | 0 < \beta < \frac{3-\sqrt{6}}{3}, q < q_o^M, c < \max\{c_{o1}^M, c_{o2}^M\}\}$, where $q_o^M = \frac{(3-\beta)t}{2} - \frac{t\sqrt{1+2\beta-\beta^2}}{2\sqrt{2}}$, $c_{o1}^M = \frac{(1-\phi)(2\sqrt{2}t-\sqrt{t(8q(1-\beta)+t(6-\beta)\beta-t)})}{2\sqrt{2}}$ and $c_{o2}^M = \frac{(1-\phi)((8-\beta)t-\sqrt{48qt(3-\beta)-2t^2(19-(10-\beta)\beta)-48q^2})}{6}$. In case B under the marketplace model, an asymmetric customization policy (C, T) or (T, C) is an equilibrium if and only if $(\beta, q, c) \in \mathcal{R}_B^M = \{(\beta, q, c) | 0 < \beta < 2 - \sqrt{2}, c < c_B^M\}$, where $c_B^M = \frac{(2-\sqrt{2})t(1-\phi)}{2}$. If $(\beta, q, c) \in \mathcal{R}_{O1}^M$, the optimal profits of supplier 1 and the platform in case O are: $\pi_1^{O*}(C, T) = \frac{(q-c)(2t-q-c)(1-\phi)}{2t}$ and $\pi_o^{O*}(C, T) = \frac{(8q(q-2t)+4ct\beta+t^2\beta^2-4c^2)\phi}{16t}$; if $(\beta, q, c) \in \mathcal{R}_{O2}^M$, the optimal profits of supplier 1 and the platform in case O are: $\pi_1^{O*}(C, T) = \frac{((4-\beta)t-2c)((4+\beta)t-6c)(1-\phi)}{32t}$ and $\pi_o^{O*}(C, T) = \frac{t\phi}{2} + \frac{(2c-3t\beta)(2c+t\beta)\phi}{32t}$, where $\mathcal{R}_{O1}^M = \{(\beta, q, c) | 0 < \beta < \frac{3-\sqrt{6}}{3}, q < \frac{(13-3\beta)t-t\sqrt{(23-3(6-\beta)\beta)}}{8}, \frac{4q-(4-\beta)t}{2} < c < c_{o1}^M\}$ and $\mathcal{R}_{O2}^M = \{(\beta, q, c) | 0 < \beta < \frac{3-\sqrt{6}}{3}, q < q_o^M, c < \min\{\frac{(1-\phi)(4q-(4-\beta)t)}{2}, c_{o2}^M\}\}$. The optimal profits of two suppliers and the platform in case B are: $\pi_1^{B*}(C, T) = \frac{(t-c)^2(1-\phi)}{2t}$, $\pi_2^{B*}(C, T) = \frac{c^2(1-\phi)}{2t}$ and $\pi_o^{B*}(C, T) = \frac{t\phi}{2}$. After charging the side payments, the platform's optimal profits in cases O and B are: $\pi_o^{O**}(C, T) = \pi_o^{O*}(C, T) +$

$\pi_1^{O*}(C, T) - \mathbf{E}[\pi_1^N]$, and $\pi_o^{B**}(C, T) = \pi_o^{B*}(C, T) + \pi_1^{B*}(C, T) + \pi_2^{B*}(C, T) - \mathbf{E}[\pi_1^N] - \mathbf{E}[\pi_2^N]$.

(i) When $(\beta, q, c) \in \mathcal{R}_O^M$, policy (C, T) is an equilibrium in both cases O and B for $\mathcal{R}_O^M \subseteq \mathcal{R}_B^M$. Since $\pi_o^{B**}(C, T) < \pi_o^{N**}$ for any $(\beta, q, c) \in \mathcal{R}_O^M$, the platform will not share information with both suppliers. (a) If $(\beta, q, c) \in \mathcal{R}_{O1}^M$, we obtain $\pi_o^{O**} > \max\{\pi_o^{N**}, \pi_o^{B**}\}$, then the platform will always choose strategy O in this region when customization is not available to suppliers. However, when customization is an option for suppliers, $\pi_o^{N**} > \pi_o^{O**}(C, T)$ if and only if $\phi > \phi_{o1}^M = \frac{4(2c^2 - 2q^2 - 4ct + 2qt + t^2)}{4c^2 - 4ct(4 - \beta) + t(8q + t(-4 + \beta^2))}$. (b) If $(\beta, q, c) \in \mathcal{R}_{O2}^M$, the platform will choose between strategies N and O in this region when customization is not available to suppliers. However, when customization is an option for suppliers, $\pi_o^{N**} > \pi_o^{O**}(C, T)$ if and only if $\phi_{o2}^M < \phi < \min\{\phi_N^M, 1\}$, where $\phi_{o2}^M = \frac{12c^2 - 4ct(8 - \beta) - t(16q - t(24 - \beta^2))}{8c^2 - 8ct(4 - \beta) + 2t(8q - t(4 - \beta^2))}$. Combining with (a) and (b), customization option will shift the platform's strategy O to N if $(\beta, q, c) \in \mathcal{R}_O^M$ and $\min\{\phi_{o1}^M, \phi_{o2}^M\} < \phi < \min\{\phi_N^M, 1\}$.

(ii) When $(\beta, q, c) \in \mathcal{R}_B^M - \mathcal{R}_O^M$, policy (C, T) is an equilibrium only in case B. Since $\pi_o^{B**}(C, T) < \max\{\pi_o^{N**}, \pi_o^{O**}\}$ for any $(\beta, q, c) \in \mathcal{R}_B^M$ and $\beta < 1/2$, customization option does not change the platform's information sharing strategy. Next, we only need to consider $\frac{1}{2} < \beta < 2 - \sqrt{2}$. If $\frac{1}{2} < \beta < 2 - \sqrt{2}$, the platform may choose strategy N, O or B in this region when customization is not available to suppliers. However, when customization is an option for suppliers, the optimal profits satisfy $\pi_o^{B**}(C, T) > \max\{\pi_o^{N**}, \pi_o^{O**}\} > \pi_o^{B*}(C, T)$ if and only if $\phi_B^M < \phi < \min\{\phi_{H1}^M, \phi_{H2}^M\}$, where $\phi_{H1}^M = \frac{2c^2 - 2ct - t^2 + 2t^2\beta}{2c^2 - 2ct}$

and $\phi_{H2}^M = \begin{cases} \frac{16c^2 + 8q^2 - 16ct - 8qt(3 - \beta) + t^2(9 + \beta(2 + \beta))}{2(8c^2 - 8ct - t^2(3 - \beta)(1 - \beta))} & \text{if } q \leq \frac{(3 - \beta)t}{2} \\ \frac{16c^2 - 16ct - t^2(9 - (14 - \beta)\beta)}{2(8c^2 - 8ct - t^2(3 - \beta)(1 - \beta))} & \text{if } q > \frac{(3 - \beta)t}{2} \end{cases}$. Specifically, if and only if $\phi \leq \phi_{H3}^M$, $\pi_o^{O**} \geq \pi_o^{N**}$, where $\phi_{H3}^M = \begin{cases} \frac{8qt(3 - \beta) - 8q^2 - t^2(17 - 14\beta + \beta^2)}{2t^2(3 - 4\beta + \beta^2)} & \text{if } q \leq \frac{(3 - \beta)t}{2} \\ \frac{(1 + \beta)^2}{2(1 - \beta)(3 - \beta)} & \text{if } q > \frac{(3 - \beta)t}{2} \end{cases}$. Then, customization option will

shift the platform's strategy B to O if $\phi \leq \phi_{H3}^M$, and strategy B to N if $\phi > \phi_{H3}^M$.

(iii) When $(\beta, q, c) \notin \mathcal{R}_B^M$, no supplier will customize its products. Then the customization option will not change the platform's information sharing strategy under the marketplace model. $\square$

Proof of Proposition 5.

From the analysis in Appendix C2, in case O under the reselling model, the informed supplier will customize its product if and only if $(\beta, q, c) \in \mathcal{R}_O^R = \{(\beta, q, c) | 0 < \beta < \frac{2}{5}, q < q_O^R, c < c_O^R\}$, where $q_O^R = \frac{5(20 - \beta(16 - 5\beta))t}{72}$, $c_O^R = \frac{(8 - 3\beta)t - 6\sqrt{(2q - t)t}}{4}$. In case B under the reselling model, an asymmetric customization policy (C, T) or (T, C) is an equilibrium if and only if $(\beta, q, c) \in \mathcal{R}_B^R = \{(\beta, q, c) | 0 < \beta < 1, q < q_B^R, c < c_B^R\}$, where $q_B^R = \frac{(25 - \beta(8 - \beta))t}{18}$, $c_B^R = \frac{4t - 3\sqrt{(2q - t)t}}{2}$. The optimal profits of supplier 1 and the platform in case O are: $\pi_1^{O*}(C, T) = \frac{((8 - 3\beta) - 4c)^2}{144t}$ and $\pi_o^{O*}(C, T) = q + \frac{16(c - 11t)(c + t) + 24(c + 4t)\beta t + 9\beta^2 t^2}{288t}$. The optimal profits of two suppliers and the platform in case B are:

$\pi_1^{B*}(C, T) = \frac{(c - 2t)^2}{9t}$, $\pi_2^{B*}(C, T) = \frac{(c + t)^2}{9t}$ and $\pi_o^{B*}(C, T) = q + \frac{(c - 11t)(c + t)}{18t}$. After charging the side payments, the platform's optimal profits in cases O and B are: $\pi_o^{O**}(C, T) = \pi_o^{O*}(C, T) + \pi_1^{O*}(C, T) - \mathbf{E}[\pi_1^N]$, and $\pi_o^{B**}(C, T) = \pi_o^{B*}(C, T) + \pi_1^{B*}(C, T) + \pi_2^{B*}(C, T) - \mathbf{E}[\pi_1^N] - \mathbf{E}[\pi_2^N]$.

(i) When $(\beta, q, c) \in \mathcal{R}_O^R$, policy (C, T) is an equilibrium in both cases O and B for $\mathcal{R}_O^R \subseteq \mathcal{R}_B^R$. Since $\pi_o^{B**}(C, T) < \pi_o^{N**}$ for any $(\beta, q, c) \in \mathcal{R}_O^R$, the platform will not share information with both suppliers in region $(\beta, q, c) \in \mathcal{R}_O^R$. We only need to compare cases O(C, T) with case N. In addition, $\pi_o^{O**} > \max\{\pi_o^{N**}, \pi_o^{B**}\}$ always holds for any $q > t$ (our assumption), then the platform will always choose strategy N in this region when customization is not available to suppliers. However, when customization is an option for suppliers, the optimal profits satisfy $\pi_o^{O**}(C, T) > \pi_o^{N**}$ if and only if $c < \hat{c}_O^R$, where $\hat{c}_O^R = \frac{3(4 - \beta)t - 2\sqrt{40t^2 - 12qt - 18t^2\beta}}{4}$. Then, under these constraints, customization option will shift the platform's

strategy N to O. (ii) When $(\beta, q, c) \in \mathcal{R}_B^R - \mathcal{R}_O^R$, policy (C, T) is an equilibrium only in case B. Since $\pi_o^{B**} >$

$\max\{\pi_o^{O**}, \pi_o^{B**}\}$ always holds for any $q > t$ (our assumption), then the platform will always choose strategy N in this region when customization is not available to suppliers. We only need to compare case B(C, T) and case N in the region $(\beta, q, c) \in \mathcal{R}_B^R - \mathcal{R}_O^R$. When customization is an option for suppliers, the optimal profits satisfy $\pi_o^{B**}(C, T) > \pi_o^{N**}$ if and only if $\beta < \frac{14-3\sqrt{14}}{5}$ and $c < \hat{c}_B^R$, where $\hat{c}_B^R = \frac{(14-3\sqrt{14})t}{10}$. Then, under these constraints, customization option will shift the platform's strategy N to B. (iii) When $(\beta, q, c) \notin \mathcal{R}_B^R$, no supplier will customize its products, then customization option will not change the platform's information sharing strategy under the reselling model. $\square$

Proof of Proposition 6.

From the optimal solutions in Appendices B and C, consumer surplus and social welfare in cases N, O, B under the marketplace model are: $CS^N = \frac{t}{4}$, $SW^N = q - \frac{t}{4}$; $CS^O(T, T) = \frac{(2q-(1-\beta)t)^2}{8t}$ and $SW^O(T, T) = q - \frac{(5-(2-\beta)\beta)t}{16}$. If $q \leq \frac{(3t-t\beta)}{2}$, $CS^B(T, T) = q - \frac{3t}{4}$ and $SW^B(T, T) = q - \frac{t}{4}$; if $q > \frac{(3t-t\beta)}{2}$, $CS^B(T, T) = q - \frac{(2t-t\beta)}{2}$ and $SW^B(T, T) = q - \frac{(5-(2-\beta)\beta)}{16}$. $CS^O(C, T) = \frac{2q^2-(t-c)((2-\beta)t-4c)}{4t}$ if $(\beta, q, c) \in \mathcal{R}_{O1}^M$ and $CS^O(C, T) = \frac{48ct+32qt-28c^2-32t^2-12ct\beta+8t^2\beta+t^2\beta^2}{32t}$ if $(\beta, q, c) \in \mathcal{R}_{O2}^M$, and $SW^O(C, T) = \frac{t(16q-t(8-(4-\beta)\beta))+c^2(4-8\phi)-4ct(2-(4-\beta)\phi)}{16t}$; $CS^B(C, T) = \frac{(q+c-t)t-c^2}{t}$ and $SW^B(C, T) = q - \frac{t}{2} + c\phi - \frac{c^2\phi}{t}$.

(i) When $(\beta, q, c) \in \mathcal{R}_O^M$, from the proof of Proposition 3, customization option may shift the equilibrium strategy $O(T, T)$ to $O(C, T)$ or N. Because $CS^O(C, T) < CS^O(T, T) < CS^N$ and $SW^O(C, T) < SW^O(T, T) < SW^N$ always holds in the region $(\beta, q, c) \in \mathcal{R}_O^M$, then the shift from strategy $O(T, T)$ to strategy $O(C, T)$ (resp. N) decreases (resp. increases) both consumer surplus and social welfare. (ii) When $(\beta, q, c) \in \mathcal{R}_B^M - \mathcal{R}_O^M$, from the proof of Proposition 3, customization option may shift the equilibrium strategy $B(T, T)$ to $B(C, T)$, $O(T, T)$ or N. Because $\max\{CS^N, CS^B(C, T)\} < CS^B(T, T) < CS^O(T, T)$ and $SW^B(T, T) > \max\{SW^N, SW^O(T, T), SW^B(T, T)\}$ always holds in the region $(\beta, q, c) \in \mathcal{R}_B^M - \mathcal{R}_O^M$, then the shift from strategy $B(T, T)$ shift to $O(T, T)$ increases consumer surplus but decreases social welfare, while shift to $B(C, T)$ or N decrease both consumer surplus and social welfare. (iii) Otherwise, no supplier will customize its products, then customization option will not change consumer surplus and social welfare under the marketplace model. Incorporating (i), (ii) and (iii), if $(\beta, q, c) \in \mathcal{R}_O^M$ and $\min\{\phi_{O1}^M, \phi_{O2}^M\} < \phi < \min\{\phi_N^M, 1\}$, the equilibrium strategy $O(T, T)$ shift to N. Then customization will increase both consumer surplus and social welfare. If $(\beta, q, c) \in \mathcal{R}_{BC}^M = \left\{(\beta, q, c) \left| \frac{1}{2} < \beta < 2 - \sqrt{2}, q < \frac{(3-\beta)t}{2}, c < c_B^M \right.\right\}$ and $\phi_B^M < \phi < \min\{\phi_{H2}^M, \phi_{H3}^M\}$, the equilibrium strategy $B(T, T)$ shift to $O(T, T)$. Then customization will increase consumer surplus but decrease social welfare; otherwise, customization will not increase both consumer surplus and social welfare.

From the optimal solutions in Appendices B and C, consumer surplus and social welfare in cases N, O, B under the reselling model are: $CS^N = \frac{c+6q-2t}{6}$ if $\beta < \frac{1}{2}$, $t < q \leq \frac{(3-2\beta)t}{2}$ and $CS^N = \frac{c+t(7-6\beta)}{6}$ if $q > \max\left\{t, \frac{(3-2\beta)t}{2}\right\}$, $SW^N = q - \frac{t}{4}$; $CS^B(T, T) = q - \frac{3t}{4}$ and $SW^B(T, T) = q - \frac{t}{4}$; $CS^O(C, T) = \frac{8ct(8-3\beta)+t^2(32-3\beta(8+3\beta))-16c^2}{96t}$ and $SW^O(C, T) = \frac{32c^2-4ct(20-3\beta)+t(144q-t(40-3(4-3\beta)\beta))}{144t}$; $CS^B(C, T) = \frac{4ct-c^2+2t^2}{6t}$ and $SW^B(C, T) = q + \frac{4c^2-10ct-5t^2}{18t}$. From the proof of Proposition 4, (i) When $(\beta, q, c) \in \mathcal{R}_O^R$, customization option may shift the equilibrium strategy N to $O(C, T)$. Because $CS^O(C, T) < CS^N$ and $SW^O(C, T) < SW^N$ always holds in the region $(\beta, q, c) \in \mathcal{R}_O^R$, then the equilibrium strategy N shift to $O(C, T)$ decrease both consumer surplus and social welfare. (ii) When $(\beta, q, c) \in \mathcal{R}_B^R - \mathcal{R}_O^R$, customization option may shift the equilibrium strategy N to $B(C, T)$. Because $CS^B(C, T) < CS^N$ and $SW^B(C, T) < SW^N$ always holds in the region $(\beta, q, c) \in \mathcal{R}_O^R$, $\beta < \frac{14-3\sqrt{14}}{5}$ and $c < \hat{c}_B^R$, then the equilibrium strategy N shift to $B(C, T)$ also decreases both consumer surplus and social welfare. (iii) Otherwise, no supplier will customize its products, then customization option will not change consumer surplus and social welfare. $\square$

Proof of Proposition D1.

From the equilibrium solutions under the marketplace model in Table D1 of Appendix D1, after charging

the side payments, the platform's optimal profits in cases N, H, L and B are: $\pi_o^{N**} = \pi_o^{N*}$, $\pi_o^{H**} = \pi_o^{H*} + \pi_1^{H*} - \mathbf{E}[\pi_1^N]$, $\pi_o^{L**} = \pi_o^{L*} + \pi_1^{L*} - \mathbf{E}[\pi_1^N]$, and $\pi_o^{B**} = \pi_o^{B*} + \pi_1^{B*} + \pi_2^{B*} - \mathbf{E}[\pi_1^N] - \mathbf{E}[\pi_2^N]$. Given $q > \frac{3t-t\beta-\delta}{2}$ and $\delta < \bar{\delta} = t - t\beta$, we obtain (i) $\pi_o^{N**} \geq \max\{\pi_o^{H**}, \pi_o^{L**}, \pi_o^{B**}\}$ if and only if $\beta < 1/2$, $\delta < \min\{\delta_N^M, \bar{\delta}\}$ and $\phi_1^M < \phi < \min\{\phi_2^M, 1\}$, where $\phi_1^M = \frac{9t^2(1-\beta)(1+\beta)^2+6t(1-\beta)(1-3\beta)\delta-(1-9\beta)\delta^2}{12t(1-\beta)\delta+2(5-\beta)\delta^2-18t^2(3-\beta)(1-\beta)^2}$ and $\phi_2^M = \frac{9t^2(1-\beta)(1-2\beta)-(7-9\beta)\delta^2}{2\beta\delta^2}$, and δ_N^M is the solution of $\phi_1^M - \phi_2^M = 0$; (ii) $\pi_o^{H**} \geq \max\{\pi_o^{N**}, \pi_o^{L**}, \pi_o^{B**}\}$ if and only if $\beta < \beta_H^M$, $\delta < \min\{\delta_H^M, \bar{\delta}\}$ and $\max\{0, \frac{3\beta-1}{2}\} < \phi < \min\{\phi_1^M, \phi_3^M\}$, where β_H^M is the solution of $3\beta^3 - 14\beta^2 + 27\beta - 12 = 0$, $\delta_H^M = \sqrt{\frac{3t^2(12-\beta(27-\beta(14-3\beta)))}{20-9\beta}}$, $\phi_3^M = \frac{9t^2(1-\beta)(9-(14-\beta)\beta)+6t(1-\beta)(1-3\beta)\delta-(55-63\beta)\delta^2}{2(9t^2(3-\beta)(1-\beta)^2-6t(1-\beta)\delta-(5-9\beta)\delta^2)}$; (iii) $\pi_o^{L**} \geq \max\{\pi_o^{N**}, \pi_o^{H**}, \pi_o^{B**}\}$ if and only if $1/3 < \beta < \beta_L^M$, $\max\{0, \delta_{L1}^M\} < \delta < \min\{\delta_{L2}^M, \bar{\delta}\}$ and $\phi < \min\{\frac{3\beta-1}{2}, \phi_4^M\}$, where $\phi_4^M = \frac{9t^2(1-\beta)(9-(14-\beta)\beta)+6t(1-\beta)(3\beta-1)\delta-(55-63\beta)\delta^2}{2(9t^2(3-\beta)(1-\beta)^2+6t(1-\beta)\delta-(5-9\beta)\delta^2)}$, β_L^M is the solution of $9\beta^3 - 119\beta^2 + 168\beta - 62 = 0$, δ_{L1}^M and δ_{L2}^M are the solution of $\phi_4^M = 0$; (iv) otherwise, $\pi_o^{B**} \geq \max\{\pi_o^{N**}, \pi_o^{L**}, \pi_o^{H**}\}$. $\square$

Proof of Proposition D2.

Under the reselling model, given $q < \frac{t(1-\beta)-\delta}{2}$ and $\delta < \bar{\delta} = t - t\beta$, we obtain (i) $\pi_o^{H**} \geq \max\{\pi_o^{N**}, \pi_o^{L**}, \pi_o^{B**}\}$ if and only if $\beta < \frac{1}{3}$, $q < \hat{q}_1^R$ and $\hat{\delta}_1^R < \delta \leq \hat{\delta}_2^R$, where $\hat{\delta}_1^R = \hat{q}_1^R - q$ and $\hat{\delta}_2^R = \hat{q}_2^R - q$; (ii) $\pi_o^{L**} \geq \max\{\pi_o^{N**}, \pi_o^{H**}, \pi_o^{B**}\}$ if and only if $\beta < \frac{1}{3}$, $\hat{q}_1^R < q < \hat{q}_2^R$ and $\delta > \hat{\delta}_2^R$; (iii) $\pi_o^{B**} \geq \max\{\pi_o^{N**}, \pi_o^{L**}, \pi_o^{H**}\}$ if and only if $\beta < \frac{1}{3}$, $\hat{q}_1^R < q < \hat{q}_2^R$ and $\delta \leq \hat{\delta}_2^R$; (iv) otherwise, $\pi_o^{N**} \geq \max\{\pi_o^{H**}, \pi_o^{L**}, \pi_o^{B**}\}$. $\square$

Proof of Lemma B1.

Please see Appendix B2 for detailed proofs of Lemma B1. $\square$

Proof of Lemma B2.

Please see Appendix B3 for detailed proofs of Lemma B2. $\square$

Proof of Lemma C1.

Please see Appendix C1 for detailed proofs of Lemma C1. $\square$

Proof of Lemma C2.

Please see Appendix C2 for detailed proofs of Lemma C2. $\square$

References

- Bramoullé Y (2007) Anti-coordination and social interactions. *Games and Economic Behavior* 58(1):30-49.
- Kwark Y, Chen J, Raghunathan S (2014) Online product reviews: Implications for retailers and competing manufacturers. *Information systems research* 25(1):93-110.
- Li L, Chen J, Raghunathan S (2018) Recommender system rethink: Implications for an electronic marketplace with competing manufacturers. *Information Systems Research* 29(4):1003-1023.
- McCain RA, Hamilton R (2014) Coordination games, anti-coordination games, and imitative learning. *Behavioral and Brain Sciences* 37(1):90.