Appendix A. Supplementary Material to "Salience, Competition, and Decoy Goods" by F. Herweg, D. Müller, and P. Weinschenk

Proof of Proposition 2.

Part (i): Suppose p_b^* is such that $q_b/p_b^* > q_f/c_f$. Consider a decoy good with price $p_d = p_b^*$ and quality $q_d = \alpha q_b + (1-\alpha)q_f$, with $\alpha \in (0,1)$. The reference good is

$$\bar{q}_{\hat{\mathcal{C}}} = \frac{1+\alpha}{3}q_b + \frac{2-\alpha}{3}q_f,\ \bar{p}_{\hat{\mathcal{C}}} = \frac{2}{3}p_b^* + \frac{1}{3}c_f. \tag{A.1}$$

We now show that, for suitable levels of α, this decoy good is appropriate. First, note that if constraint (SC_b) is satisfied such that quality is salient for the brand product, then constraint (DC) is satisfied for all $\alpha \in (0,1)$ because the brand product dominates the decoy good.

It thus remains to show that there are levels of α such that the two salience constraints, (SC_b) and (SC_f), are satisfied. Notice that for all $\alpha \in (0,1)$ it holds that $q_b > \bar{q}_{\hat{\mathcal{C}}} > q_f$ and $p_b^* > \bar{p}_{\hat{\mathcal{C}}} > c_f$, where we have used that $q_b > q_f$ and $p_b^* \geq c_b > c_f$. Thus, neither the brand nor the fringe product dominates the reference good or is dominated by it. By Proposition 1 of Bordalo et al. (2013), the salience constraints are equivalent to

$$\frac{q_b}{p_b^*} > \frac{\bar{q}_{\hat{\mathcal{C}}}}{\bar{p}_{\hat{\mathcal{C}}}} \tag{SC_b}$$

$$\frac{q_f}{c_f} < \frac{\bar{q}_{\hat{\mathcal{C}}}}{\bar{p}_{\hat{\mathcal{C}}}}. \tag{SC_f}$$

Inequality (SC_b) is equivalent to

$$\alpha < 1 + \frac{q_b c_f - p_b^* q_f}{p_b^*(q_b - q_f)} =: \hat{\alpha}_b. \tag{A.2}$$

By assumption it holds that $q_b/p_b^* > q_f/c_f$ and thus $\hat{\alpha}_b > 1$. Hence, constraint (SC_b) is always satisfied. Inequality (SC_f) is equivalent to

$$\alpha > \frac{q_f(p_b^* - c_f) + p_b^* q_f - c_f q_b}{c_f(q_b - q_f)} =: \hat{\alpha}_f. \tag{A.3}$$

For $\alpha \to 1$ the above inequality simplifies to $q_b/p_b^* > q_f/c_f$, which holds by assumption. This implies that $\hat{\alpha}_f < 1$. Thus, all decoy goods with $\alpha \in (\hat{\alpha}_f, 1)$ are appropriate.

Finally, note that the constraints are all slack (strict inequalities). Hence, there also exist decoy goods with $p_d > p_b^*$ and $q_d \in (q_f, q_b)$.

Part (ii): Suppose p_b^* is such that $q_b/p_b^* < q_f/c_f$. The brand product's quality and price are above average in the extended choice set $\hat{\mathcal{C}}$ if and only if $q_d < 2q_b - q_f$ and $p_d < 2p_b^* - c_f$. Recall that $q_b < 2q_b - q_f$ and $p_b^* < 2p_b^* - c_f$! In this case, according to Proposition 1 of Bordalo et al. (2013), the salience constraint (SC_b) is satisfied if and only if

$$\frac{q_b}{p_b^*} > \frac{\bar{q}_{\hat{\mathcal{C}}}}{\bar{p}_{\hat{\mathcal{C}}}} \;\Leftrightarrow\; q_d < \frac{q_b}{p_b^*} p_d + c_f \left(\frac{q_b}{p_b^*} - \frac{q_f}{c_f} \right) =: \hat{q}(p_d). \tag{A.4}$$

Likewise, the fringe product's quality and price are below average in the extended choice set $\hat{\mathcal{C}}$ if and only if $q_d > 2q_f - q_b$ and $p_d > 2c_f - p_b^*$. Recall that $q_f > 2q_f - q_b$ and $c_f > 2c_f - p_b^*$! In this case, according to Proposition 1 of Bordalo et al. (2013), the salience constraint (SC_f) is satisfied if and only if

$$\frac{q_f}{c_f} > \frac{\bar{q}_{\hat{\mathcal{C}}}}{\bar{p}_{\hat{\mathcal{C}}}} \;\Leftrightarrow\; q_d < \frac{q_f}{c_f} p_d - p_b^* \left(\frac{q_b}{p_b^*} - \frac{q_f}{c_f} \right) =: \tilde{q}(p_d). \tag{A.5}$$

As

$$\hat{q}(p_d) < \tilde{q}(p_d) \;\Leftrightarrow\; (p_b^* + c_f + p_d) \left(\frac{q_b}{p_b^*} - \frac{q_f}{c_f} \right) < 0, \tag{A.6}$$

for $p_d \geq 0$ we have $\min\{\hat{q}(p_d), \tilde{q}(p_d)\} = \hat{q}(p_d)$.

Defining $\bar{p}_d$ implicitly by $\hat{q}(\bar{p}_d) = q_b$, we find that

$$\bar{p}_d = p_b^* - q_f \left(\frac{c_f}{q_f} - \frac{p_b^*}{q_b} \right) \in (p_b^*, 2p_b^* - c_f). \tag{A.7}$$

In consequence, any decoy good (q_d, p_d) with $q_d = q_b$ and $p_d \in (\bar{p}_b, 2p_b^* - c_f)$ is appropriate, as it satisfies not only (SC_b) and (SC_f), but also is perceived as strictly inferior to the brand product by every consumer type $\theta \in [\underline{\theta}, \bar{\theta}]$ irrespective of whether quality or price is salient for the decoy good, i.e., it also satisfies (DC).

Finally, note that

$$\frac{q_d}{p_d} < \frac{\bar{q}_{\hat{\mathcal{C}}}}{\bar{p}_{\hat{\mathcal{C}}}} \;\Leftrightarrow\; q_d < \frac{q_b + q_f}{p_b^* + c_f} p_d =: \bar{q}(p_d). \tag{A.8}$$

As $\bar{q}(p_d) > \hat{q}(p_d)$, for a decoy good with above-average price $p_d \in (\bar{p}_d, 2p_b^* - c_f)$ and above-average quality $q_d \in (q_b, \min\{2q_b - q_f, \hat{q}(p_b)\})$, price is salient according to Proposition 1 of Bordalo et al. (2013). In consequence, as long as q_d is sufficiently close to q_b, the price-salient decoy good will still be perceived as strictly inferior to the quality-salient brand product – i.e., there also exist decoy goods with $p_d > p_b^*$ and $q_d > q_b$ that are appropriate. □

References

Bordalo, P., Gennaioli, N., Shleifer, A., 2013. Salience and consumer choice. Journal of Political Economy 121 (5), 803–843.