

## Technical Appendix

Table T1: Optimal Profits of the Two Retailers in Stage 2

Case	Retailer H
YY	$\Pi_H^{YY*} = \frac{2(225t - 4(7 - 3\delta)^2 \theta^2)(15t(4(1 - 2a)t + 5(V - w))\lambda - 16((1 - 2a)t + (V - w))\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2} - F$
NY	$\Pi_H^{NY*} = \frac{2(225t - 4(7 - 3\delta)^2 \theta^2)(15t(4(1 - 2a)t + 5(V - w) - 7c)\lambda - 16((1 - 2a)t + (V - w) - 2c)\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2}$
YN	$\Pi_H^{YN*} = \frac{2(225t - 4(7 - 3\delta)^2 \theta^2)(15t(4(1 - 2a)t + 5(V - w) + 2c)\lambda - 16((1 - 2a)t + (V - w) + c)\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2} - F$
NN	$\Pi_H^{NN*} = \frac{2(225t - 4(7 - 3\delta)^2 \theta^2)(15t(4(1 - 2a)t + 5(V - w) - 5c)\lambda - 16((1 - 2a)t + (V - w) - c)\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2}$
Case	Retailer L
YY	$\Pi_L^{YY*} = \frac{2\lambda(225t\lambda - 64\theta^2)(15t((1 - 2a)t + 5(V - w)) - 4(7 - 3\delta)(3(V - w) + (1 - 2a)(1 - \delta)t - 2\delta(V - w))\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2} - F$
NY	$\Pi_L^{NY*} = \frac{2\lambda(225t\lambda - 64\theta^2)(15t(2c + (1 - 2a)t + 5(V - w)) - 4(7 - 3\delta)(3(V - w) + (1 - 2a)(1 - \delta)t + c\delta - 2\delta(V - w))\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2} - F$
YN	$\Pi_L^{YN*} = \frac{2\lambda(225t\lambda - 64\theta^2)(15t((1 - 2a)t + 5(V - w) - 7c) - 4(7 - 3\delta)(3(V - w) + (1 - 2a)(1 - \delta)t - c(3 - \delta) - 2\delta(V - w))\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2}$
NN	$\Pi_L^{NN*} = \frac{2\lambda(225t\lambda - 64\theta^2)(15t((1 - 2a)t + 5(V - w) - 5c) - 4(7 - 3\delta)(3(V - w) + (1 - 2a)(1 - \delta)t - c(3 - 2\delta) - 2\delta(V - w))\theta^2)^2}{(3375t^2 \lambda - 60t\theta^2(16 + (7 - 3\delta)^2 \lambda) + 64(2 - \delta)(7 - 3\delta)\theta^4)^2}$

Table T2: Optimal Wholesale Prices and Profits of the Manufacturer

Case	Wholesale Price
YY	$w^{YY*} = \frac{\lambda(75(1-2a)t^2 + 2t(75(V+\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V+\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V + \kappa)}{4(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$
NY	$w^{NY*} = \frac{\lambda(75(1-2a)t^2 + 2t(75(V+\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V+\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V + \kappa) - c(75t\lambda - 4\theta^2(8-\delta(7-3\delta)\lambda))}{4(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$
YN	$w^{YN*} = \frac{\lambda(75(1-2a)t^2 + 2t(75(V+\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V+\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V + \kappa) - c(75t + 16\theta^2 - 4(3-\delta)(7-3\delta)\theta^2)}{4(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$
NN	$w^{NN*} = \frac{\lambda(75(1-2a)t^2 + 2t(75(V+\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V+\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V + \kappa) - c(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}{4(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$
Case	Manufacturer's Profit
YY	$\Pi_M^{YY*} = \frac{15(\lambda(75(1-2a)t^2 + 2t(75(V-\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V-\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V - \kappa))^2}{4(3375t^2\lambda - 60t\theta^2(16 + (7-3\delta)^2\lambda) + 64(2-\delta)(7-3\delta)\theta^4)(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$
NY	$\Pi_M^{NY*} = \frac{15(\lambda(75(1-2a)t^2 + 2t(75(V-\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V-\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V - \kappa) - c(75t\lambda - 4\theta^2(8-\delta(7-3\delta)\lambda)))^2}{4(3375t^2\lambda - 60t\theta^2(16 + (7-3\delta)^2\lambda) + 64(2-\delta)(7-3\delta)\theta^4)(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$
YN	$\Pi_M^{YN*} = \frac{15(\lambda(75(1-2a)t^2 + 2t(75(V-\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V-\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V - \kappa) - c(75t + 16\theta^2 - 4(3-\delta)(7-3\delta)\theta^2))^2}{4(3375t^2\lambda - 60t\theta^2(16 + (7-3\delta)^2\lambda) + 64(2-\delta)(7-3\delta)\theta^4)(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$
NN	$\Pi_M^{NN*} = \frac{15\lambda(75(1-2a)t^2 + 2t(75(V-\kappa) - 2(1-2a)(1-\delta)(7-3\delta)\theta^2) - 4\theta^2(V-\kappa)(21-\delta(23-6\delta))) - 16\theta^2((1-2a)t + V - \kappa) - c(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))^2}{4(3375t^2\lambda - 60t\theta^2(16 + (7-3\delta)^2\lambda) + 64(2-\delta)(7-3\delta)\theta^4)(75t\lambda - 2\theta^2(4 + (3-2\delta)(7-3\delta)\lambda))}$