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Supplementary: Tables

Table S1. Optimal Results under the Four Cases of Basic Model.

Optimal Results	**Four cases**			
	(C,C)	(C,L)	(L,C)	(L,L)
q_1	$\frac{2(a-\delta\xi-ts)}{9}$	$\frac{10a+4tus-14ts+4\xi-14\delta\xi}{45}$	$\frac{10a-14\xi+4\delta\xi+4ts-14tus}{45}$	$\frac{2(a-tus-\xi)}{9}$
π_{M_1}	$\frac{2(a-\delta\xi-st)^2}{27}$	$\frac{2(5a+2\xi-7\delta\xi-7st+2stu)^2}{675}$	$\frac{2(5a-7\xi+2\delta\xi+2st-7stu)^2}{675}$	$\frac{2(a-\xi-stu)^2}{27}$
q_2	$\frac{2(a-\delta\xi-ts)}{9}$	$\frac{10a+4\delta\xi-14\xi+4ts-14tus}{45}$	$\frac{10a+4\xi-14\delta\xi-14ts+4tus}{45}$	$\frac{2(a-\xi-tus)}{9}$
π_{M_2}	$\frac{2(a-\delta\xi-st)^2}{27}$	$\frac{2(5a-7\xi+2\delta\xi-7stu+2st)^2}{675}$	$\frac{2(5a+2\xi-7\delta\xi-7st+2stu)^2}{675}$	$\frac{2(a-\xi-stu)^2}{27}$
p	$\frac{5a+4(\delta\xi+ts+c)}{9}$	$\frac{5a+4c+2(\delta\xi+\xi+ts+tus)}{9}$	$\frac{5a+4c+2(\delta\xi+\xi+ts+tus)}{9}$	$\frac{5a+4(tus+c+\xi)}{9}$
π_{R_1}	$\left(\frac{2a-2\delta\xi-2ts}{9}\right)^2$	$\frac{4(5a-7\delta\xi+2\xi-7st+2stu)^2}{2025}$	$\frac{4(5a+2\delta\xi-7\xi-7stu+2st)^2}{2025}$	$\frac{4(a-\xi-stu)^2}{81}$
π_{R_2}	$\left(\frac{2a-2\delta\xi-2ts}{9}\right)^2$	$\frac{4(5a+2\delta\xi-7\xi+2st-7stu)^2}{2025}$	$\frac{4(5a-7\delta\xi+2\xi-7st+2stu)^2}{2025}$	$\frac{4(a-\xi-stu)^2}{81}$

Table S2. Optimal Results under the Four Cases of Imperfect Substitutes.

Optimal results	Four cases			
	(C,C)	(C,L)	(L,C)	(L,L)
q_1	$\frac{2(a-E)}{(b+2)(4-b)}$	$\frac{2\left(B+\left(8-b^2\right)E-2bF\right)}{\left(16-b^2\right)\left(b^2-4\right)}$	$\frac{2\left(B+\left(8-b^2\right)F-2bE\right)}{\left(16-b^2\right)\left(b^2-4\right)}$	$\frac{2(a-F)}{(b+2)(4-b)}$
π_{M_1}	$\frac{2(a-E)^2(2-b)}{(b+2)(b-4)^2}$	$\frac{2\left(B+\left(8-b^2\right)E-2bF\right)^2}{(b-4)^2(b+4)^2\left(4-b^2\right)}$	$\frac{2\left(B+\left(8-b^2\right)F-2bE\right)^2}{(b-4)^2(b+4)^2\left(4-b^2\right)}$	$\frac{2(a-F)^2(2-b)}{(b+2)(b-4)^2}$
q_2	$\frac{2(a-E)}{(b+2)(4-b)}$	$\frac{2\left(B+\left(8-b^2\right)F-2bE\right)}{\left(16-b^2\right)\left(b^2-4\right)}$	$\frac{2\left(B+\left(8-b^2\right)E-2bF\right)}{\left(16-b^2\right)\left(b^2-4\right)}$	$\frac{2(a-F)}{(b+2)(4-b)}$
π_{M_2}	$\frac{2(a-E)^2(2-b)}{(b+2)(b-4)^2}$	$\frac{2\left(B+\left(8-b^2\right)F-2bE\right)^2}{(b-4)^2(b+4)^2\left(4-b^2\right)}$	$\frac{2\left(B+\left(8-b^2\right)E-2bF\right)^2}{(b-4)^2(b+4)^2\left(4-b^2\right)}$	$\frac{2(a-F)^2(2-b)}{(b+2)(b-4)^2}$
p_1	$\frac{ab^2-6a-2(b+1)E}{(b+2)(b-4)}$	$\frac{\left(6-b^2\right)(2bF-G)-2E\left(3b^2-8\right)}{(b-4)(b+4)(b-2)(b+2)}$	$\frac{\left(6-b^2\right)(2bE-G)-2F\left(3b^2-8\right)}{(b-4)(b+4)(b-2)(b+2)}$	$\frac{ab^2-6a-2F(b+1)}{(b+2)(b-4)}$
p_2	$\frac{ab^2-6a-2(b+1)E}{(b+2)(b-4)}$	$\frac{\left(6-b^2\right)(2bE-G)-2F\left(3b^2-8\right)}{(b-4)(b+4)(b-2)(b+2)}$	$\frac{\left(6-b^2\right)(2bF-G)-2E\left(3b^2-8\right)}{(b-4)(b+4)(b-2)(b+2)}$	$\frac{ab^2-6a-2F(b+1)}{(b+2)(b-4)}$
π_{R_1}	$\frac{4(a-E)^2}{(b+2)^2(b-4)^2}$	$\frac{4\left(B+\left(8-b^2\right)E-2bF\right)^2}{\left(16-b^2\right)^2\left(b^2-4\right)^2}$	$\frac{4\left(B+\left(8-b^2\right)F-2bE\right)^2}{\left(16-b^2\right)^2\left(b^2-4\right)^2}$	$\frac{4(a-F)^2}{(b+2)^2(b-4)^2}$
π_{R_2}	$\frac{4(a-E)^2}{(b+2)^2(b-4)^2}$	$\frac{4\left(B+\left(8-b^2\right)F-2bE\right)^2}{\left(16-b^2\right)^2\left(b^2-4\right)^2}$	$\frac{4\left(B+\left(8-b^2\right)E-2bF\right)^2}{\left(16-b^2\right)^2\left(b^2-4\right)^2}$	$\frac{4(a-F)^2}{(b+2)^2(b-4)^2}$

Note: $B=ab^2+2ab-8a$, $E=\delta\xi+st$, $F=\xi+st\beta$, $G=ab^2+2ab-8$.

Table S3. Optimal Results under the Four Cases of Price Game.

Optimal results	Four cases			
	(C,C)	(C,L)	(L,C)	(L,L)
p_1	$\frac{D(2a+\delta\xi+st)+2a}{(2-d)N}$	$\frac{R_1^1 st+R_1^2\xi+aR_1^3}{MN(2-d)(d+2)}$	$\frac{R_2^1 st+R_2^2\xi+R_2^3 a}{MN(2-d)(2+d)}$	$\frac{D(\xi+\beta st)+2a(3-d^2)}{(2-d)N}$
π_{M_1}	$\frac{D(d+2)(a+(\delta\xi+st)(d-1))^2}{(2-d)N^2}$	$\frac{D(B_1^1 st+B_1^2\xi+B_1^3 a)^2}{M^2N^2(2-d)(d+2)}$	$\frac{R_2^1 st+R_2^2\xi+R_2^3 a}{MN(2-d)(2+d)}$	$\frac{D((\xi+st)(d-1)+a)^2(d+2)}{(2-d)N^2}$
p_2	$\frac{D(2a+\delta\xi+st)+2a}{(2-d)N}$	$\frac{R_2^1 st+R_2^2\xi+R_2^3 a}{MN(2-d)(2+d)}$	$\frac{R_1^1 st+R_1^2\xi+aR_1^3}{MN(2-d)(2+d)}$	$\frac{D(\xi+\beta st)+2a(3-d^2)}{(2-d)N}$
π_{M_2}	$\frac{D(d+2)(a+(\delta\xi+st)(d-1))^2}{(2-d)N^2}$	$\frac{(B_2^1 st+B_2^2\xi+aB_2^3)^2 D}{M^2N^2(2-d)(d+2)}$	$\frac{D(B_1^1 st+B_1^2\xi+B_1^3 a)^2}{M^2N^2(2-d)(d+2)}$	$\frac{D((\xi+st)(d-1)+a)^2(d+2)}{(2-d)N^2}$
π_{R_1}	$\frac{D^2((d-1)(\delta\xi+st)+a)^2}{(2-d)^2N^2}$	$\frac{D^2((\beta st+\xi)(d-1)+a)^2}{(d-2)^2N^2}$	$\frac{D^2((\beta st+\xi)(d-1)+a)^2}{(2-d)^2M^2}$	$\frac{D^2(a+(d-1)(\xi+\beta st))^2}{(2-d)^2N^2}$
π_{R_2}	$\frac{D^2((st+\delta\xi)(d-1)+a)^2}{(2-d)^2N^2}$	$\frac{D^2((\beta st+\xi)(d-1)+a)^2}{(2-d)^2M^2}$	$\frac{D^2((\beta st+\xi)(d-1)+a)^2}{(2-d)^2N^2}$	$\frac{D^2(a+(d-1)(\xi+\beta st))^2}{(2-d)^2N^2}$

Note: $M=4-2d^2+d$, $N=4-2d^2-d$, $D=2-d^2$, $H_1^1=d\beta(2-d^2)+(2d^4-8d^2+8)$, $H_1^2=(2d^4-8d^2+8)\delta+d(2-d^2)$, $H_1^3=(4d+3)(2-d^2)+2(1+d)$, $H_2^1=2d-d^3-8d^2\beta+2d^4\beta+8\beta$, $H_2^2=2d\delta-d^3\delta+2d^4-8d^2+8$, $H_2^3=8-2d^3-3d^2+6d$, $R_1^1=2d^5\beta-10d^3\beta+12d\beta+3d^4-14d^2+16$, $R_1^2=(2d^5-10d^3+12d)+(3\delta d^4-14\delta d^2+16\delta)$, $R_1^3=(d^4-6d^2+9)4d-6d^2+16+2(3d^4-14d^2+16)$, $R_2^1=2d(d^4-5d^2+6)+(3d^4-14d^2+16)\beta$, $R_2^2=(3d^4-14d^2+16)+(d^4-5d^2+6)2d\delta$, $R_2^3=4d^5-24d^3+36d+6d^4-34d^2+48$, $B_1^1=(2d^4-9d^2+8)+d\beta(d^2-2)$, $B_1^2=2d^4\delta-9d^2\delta+8\delta+d^3-2d$, $B_1^3=2d^3+3d^2-6d-8$, $B_2^1=2d^4\beta-9d^2\beta+8\beta+d^3-2d$, $B_2^2=2d^4-9d^2+8+d^2d\delta-2d\delta$, $B_2^3=2d^3+3d^2-6d-8$.