Appendix

Game Predictions

***Denote*: P_j is any player that is not P_i.**

Game Predictions

Game of 2 firms:

Table 1: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj[1]**	**Vj(Sj, Si)[2]**
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 1]	[0 , 0.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 0]	[0 , 0]
$\sum_{i=1}^{n} S_i \geq K$	1	0.0	[2 , 2]	[0.5 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	2	0.5	[2 , 2]	[0.5 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[2 , 2]	[0.5 , 0.5]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j = 0$, with payoff $V_j(S_j, S_i) = 0$. With 1 other firm choosing 0 and viceversa.

That is: 1 firms choose 0 units, with a payoff of 0 . 1 firm chooses 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 3 firms:

Table 2: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj**[1]	**Vj(Sj, Si)**[2]
$\sum_{i=1}^{n} S_i < K$	0	0.000	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.500	[0 , 1]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	1	-0.167	[1 , 2]	[-0.167 , 0.167]
$\sum_{i=1}^{n} S_i \geq K$	2	0.167	[1 , 2]	[-0.167 , 0.167]
$\sum_{i=1}^{n} S_i \geq K$	0	0.000	[1 , 2]	[-0.167 , 0.167]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with vi(Si, S_i) = 1.5 , if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 1], with payoff $V_j(S_j, S_i) =$ [0 , 0.5]. With 1 other firm choosing 0 and 1 other firm choosing 1 and viceversa.

That is: 1 firms choose 0 units, with a payoff of 0 . 1 firm chooses 2 units, with a payoff of 1.5 . 1 firms choose 1 units, with a payoff of 0.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 4 firms:

Table 3: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj**[1]	**Vj(Sj, Si)**[2]
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	0.0	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	2	0.5	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[1 , 2]	[0 , 0.5]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 1 other firm choosing 2 ; 0 other firms choosing 1 , and 2 other firms choosing 0 , and viceversa.

That is: 2 firms choose 0 units, with a payoff of 0 . 0 firms choose 1 units, with a payoff of 0 . 2 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 5 firms:

Table 4: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj**[1]	**Vj(Sj, Si)**[2]
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	-0.1	[1 , 2]	[-0.1 , 0.3]
$\sum_{i=1}^{n} S_i \geq K$	2	0.3	[1 , 2]	[-0.1 , 0.3]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[1 , 2]	[-0.1 , 0.3]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 1 other firm choosing 2 ; 1 other firm choosing 1 , and 2 other firms choosing 0 , and viceversa.

That is: 2 firms choose 0 units, with a payoff of 0 . 1 firms choose 1 units, with a payoff of 0 . 2 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 6 firms:

Table 5: Game Payoffs

Scenarios	Si	Vi(Si, Sj)	Sj[1]	Vj(Sj, Si)[2]
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	0.0	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	2	0.5	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[1 , 2]	[0 , 0.5]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j = [\ 0\ ,\ 2\ ]$, with payoff $V_j(S_j, S_i) = [\ 0\ ,\ 1.5\ ]$. With 2 other firms choosing 2 ; 0 other firms choosing 1 , and 3 other firms choosing 0 , and viceversa.

That is: 3 firms choose 0 units, with a payoff of 0 . 0 firms choose 1 units, with a payoff of 0 . 3 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 7 firms:

Table 6: Game Payoffs

Scenarios	Si	Vi(Si, Sj)	Sj[1]	Vj(Sj, Si)[2]
$\sum_{i=1}^{n} S_i < K$	0	0.000	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	-0.071	[1 , 2]	[-0.071 , 0.357]
$\sum_{i=1}^{n} S_i \geq K$	2	0.357	[1 , 2]	[-0.071 , 0.357]
$\sum_{i=1}^{n} S_i \geq K$	0	0.000	[1 , 2]	[-0.071 , 0.357]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 2 other firms choosing 2 ; 1 other firm choosing 1 , and 3 other firms choosing 0 , and viceversa.

That is: 3 firms choose 0 units, with a payoff of 0 . 1 firms choose 1 units, with a payoff of 0 . 3 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 8 firms:

Table 7: Game Payoffs

Scenarios	Si	Vi(Si, Sj)	Sj[1]	Vj(Sj, Si)[2]
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	0.0	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	2	0.5	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[1 , 2]	[0 , 0.5]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 3 other firms choosing 2 ; 0 other firms choosing 1 , and 4 other firms choosing 0 , and viceversa.

That is: 4 firms choose 0 units, with a payoff of 0 . 0 firms choose 1 units, with a payoff of 0 . 4 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 9 firms:

Table 8: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj**[1]	**Vj(Sj, Si)**[2]
$\sum_{i=1}^{n} S_i < K$	0	0.000	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	-0.056	[1 , 2]	[-0.056 , 0.389]
$\sum_{i=1}^{n} S_i \geq K$	2	0.389	[1 , 2]	[-0.056 , 0.389]
$\sum_{i=1}^{n} S_i \geq K$	0	0.000	[1 , 2]	[-0.056 , 0.389]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 3 other firms choosing 2 ; 1 other firm choosing 1 , and 4 other firms choosing 0 , and viceversa.

That is: 4 firms choose 0 units, with a payoff of 0 . 1 firms choose 1 units, with a payoff of 0 . 4 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 10 firms:

Table 9: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj**[1]	**Vj(Sj, Si)**[2]
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	0.0	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	2	0.5	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[1 , 2]	[0 , 0.5]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j = [\ 0\ ,\ 2\ ]$, with payoff $V_j(S_j, S_i) = [\ 0\ ,\ 1.5\ ]$. With 4 other firms choosing 2 ; 0 other firms choosing 1 , and 5 other firms choosing 0 , and viceversa.

That is: 5 firms choose 0 units, with a payoff of 0 . 0 firms choose 1 units, with a payoff of 0 . 5 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 11 firms:

Table 10: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj**[1]	**Vj(Sj, Si)**[2]
$\sum_{i=1}^{n} S_i < K$	0	0.000	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	-0.045	[1 , 2]	[-0.045 , 0.409]
$\sum_{i=1}^{n} S_i \geq K$	2	0.409	[1 , 2]	[-0.045 , 0.409]
$\sum_{i=1}^{n} S_i \geq K$	0	0.000	[1 , 2]	[-0.045 , 0.409]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 4 other firms choosing 2 ; 1 other firm choosing 1 , and 5 other firms choosing 0 , and viceversa.

That is: 5 firms choose 0 units, with a payoff of 0 . 1 firms choose 1 units, with a payoff of 0 . 5 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 12 firms:

Table 11: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj[1]**	**Vj(Sj, Si)[2]**
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	0.0	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	2	0.5	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[1 , 2]	[0 , 0.5]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 5 other firms choosing 2 ; 0 other firms choosing 1 , and 6 other firms choosing 0 , and viceversa.

That is: 6 firms choose 0 units, with a payoff of 0 . 0 firms choose 1 units, with a payoff of 0 . 6 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 13 firms:

Table 12: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj**[1]	**Vj(Sj, Si)**[2]
$\sum_{i=1}^{n} S_i < K$	0	0.000	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	-0.038	[1 , 2]	[-0.038 , 0.423]
$\sum_{i=1}^{n} S_i \geq K$	2	0.423	[1 , 2]	[-0.038 , 0.423]
$\sum_{i=1}^{n} S_i \geq K$	0	0.000	[1 , 2]	[-0.038 , 0.423]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 5 other firms choosing 2 ; 1 other firm choosing 1 , and 6 other firms choosing 0 , and viceversa.

That is: 6 firms choose 0 units, with a payoff of 0 . 1 firms choose 1 units, with a payoff of 0 . 6 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 14 firms:

Table 13: Game Payoffs

Scenarios	Si	Vi(Si, Sj)	Sj[1]	Vj(Sj, Si)[2]
$\sum_{i=1}^{n} S_i < K$	0	0.0	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.5	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	0.0	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	2	0.5	[1 , 2]	[0 , 0.5]
$\sum_{i=1}^{n} S_i \geq K$	0	0.0	[1 , 2]	[0 , 0.5]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 6 other firms choosing 2 ; 0 other firms choosing 1 , and 7 other firms choosing 0 , and viceversa.

That is: 7 firms choose 0 units, with a payoff of 0 . 0 firms choose 1 units, with a payoff of 0 . 7 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Game of 15 firms:

Table 14: Game Payoffs

Scenarios	**Si**	**Vi(Si, Sj)**	**Sj[1]**	**Vj(Sj, Si)[2]**
$\sum_{i=1}^{n} S_i < K$	0	0.000	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	1	0.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i < K$	2	1.500	[0 , 2]	[0 , 1.5]
$\sum_{i=1}^{n} S_i \geq K$	1	-0.033	[1 , 2]	[-0.033 , 0.433]
$\sum_{i=1}^{n} S_i \geq K$	2	0.433	[1 , 2]	[-0.033 , 0.433]
$\sum_{i=1}^{n} S_i \geq K$	0	0.000	[1 , 2]	[-0.033 , 0.433]

[1] Sj = Range of values that Player j can choose.

[2] Vj(Sj, Si) = Range of payoffs for Player j, for their possible strategies.

—- Pareto Equilibrium — Pareto Optimality is reached when: $S_i = 2$ with $V_i(S_i, S_j) = 1.5$, if $\sum_{i=1}^{n} S_i < K$ & $S_j =$ [0 , 2], with payoff $V_j(S_j, S_i) =$ [0 , 1.5]. With 6 other firms choosing 2 ; 1 other firm choosing 1 , and 7 other firms choosing 0 , and viceversa.

That is: 7 firms choose 0 units, with a payoff of 0 . 1 firms choose 1 units, with a payoff of 0 . 7 firms choose 2 units, with a payoff of 1.5 .

—- Nash Equilibrium — There are 2 Nash Equilibriums .

(1) Nash Equilibrium 1 , for $\sum_{i=1}^{n} S_i < K$: 3 firms choose 1 units, each with a payoff of 0.5 .

(2) Nash Equilibrium 2 , for $\sum_{i=1}^{n} S_i \geq K$: 3 firms choose 2 units, each with a payoff of 0.1666667 .

Reference for Students

Your payoff in each scenario, with 1 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = $[0, 1]$

You get = 1.5 , if you choose = 2 & the rest of the firms choose = $[0, 0]$

You get = 0 , if you choose = 1 & the rest of the firms choose = $[2, \infty]$

You get = 0.5 , if you choose = 2 & the rest of the firms choose = $[1, \infty]$

Your payoff in each scenario, with 2 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = $[0, 2]$

You get = 1.5 , if you choose = 2 & the rest of the firms choose = $[0, 1]$

You get = -0.1666667 , if you choose = 1 & the rest of the firms choose = $[3, \infty]$

You get = 0.1666667 , if you choose = 2 & the rest of the firms choose = $[2, \infty]$

Your payoff in each scenario, with 3 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = $[0, 3]$

You get = 1.5 , if you choose = 2 & the rest of the firms choose = $[0, 2]$

You get = 0 , if you choose = 1 & the rest of the firms choose = $[4, \infty]$

You get = 0.5 , if you choose = 2 & the rest of the firms choose = $[3, \infty]$

Your payoff in each scenario, with 4 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = $[0, 4]$

You get = 1.5 , if you choose = 2 & the rest of the firms choose = $[0, 3]$

You get = -0.1 , if you choose = 1 & the rest of the firms choose = $[5, \infty]$

You get = 0.3 , if you choose = 2 & the rest of the firms choose = $[4, \infty]$

Your payoff in each scenario, with 5 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = [0, ∞]

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 5]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 4]

You get = 0 , if you choose = 1 & the rest of the firms choose = [6 , ∞]

You get = 0.5 , if you choose = 2 & the rest of the firms choose = [5 , ∞]

Your payoff in each scenario, with 6 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = [0, ∞]

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 6]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 5]

You get = -0.07142857 , if you choose = 1 & the rest of the firms choose = [7 , ∞]

You get = 0.3571429 , if you choose = 2 & the rest of the firms choose = [6 , ∞]

Your payoff in each scenario, with 7 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = [0, ∞]

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 7]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 6]

You get = 0 , if you choose = 1 & the rest of the firms choose = [8 , ∞]

You get = 0.5 , if you choose = 2 & the rest of the firms choose = [7 , ∞]

Your payoff in each scenario, with 8 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = [0, ∞]

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 8]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 7]

You get = -0.05555556 , if you choose = 1 & the rest of the firms choose = [9 , ∞]

You get = 0.3888889 , if you choose = 2 & the rest of the firms choose = [8 , ∞]

Your payoff in each scenario, with 9 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = [0, ∞]

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 9]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 8]

You get = 0 , if you choose = 1 & the rest of the firms choose = [10 , ∞]

You get = 0.5 , if you choose = 2 & the rest of the firms choose = [9 , ∞]

Your payoff in each scenario, with 10 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 10]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 9]

You get = -0.04545455 , if you choose = 1 & the rest of the firms choose = $[\ 11\ ,\ \infty]$

You get = 0.4090909 , if you choose = 2 & the rest of the firms choose = $[\ 10\ ,\ \infty]$

Your payoff in each scenario, with 11 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 11]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 10]

You get = 0 , if you choose = 1 & the rest of the firms choose = $[\ 12\ ,\ \infty]$

You get = 0.5 , if you choose = 2 & the rest of the firms choose = $[\ 11\ ,\ \infty]$

Your payoff in each scenario, with 12 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 12]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 11]

You get = -0.03846154 , if you choose = 1 & the rest of the firms choose = $[\ 13\ ,\ \infty]$

You get = 0.4230769 , if you choose = 2 & the rest of the firms choose = $[\ 12\ ,\ \infty]$

Your payoff in each scenario, with 13 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 13]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 12]

You get = 0 , if you choose = 1 & the rest of the firms choose = $[\ 14\ ,\ \infty]$

You get = 0.5 , if you choose = 2 & the rest of the firms choose = $[\ 13\ ,\ \infty]$

Your payoff in each scenario, with 14 other firms:

You get = 0 , if you choose = 0 & the rest of the firms choose = $[0, \infty]$

You get = 0.5 , if you choose = 1 & the rest of the firms choose = [0, 14]

You get = 1.5 , if you choose = 2 & the rest of the firms choose = [0, 13]

You get = -0.03333333 , if you choose = 1 & the rest of the firms choose = $[\ 15\ ,\ \infty]$

You get = 0.4333333 , if you choose = 2 & the rest of the firms choose = $[\ 14\ ,\ \infty]$