Game Output

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15 Simulations of the Game

```
#### run all
 game_simulations(15, best_resp="Yes")
```

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## Game of  2  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0            0.0             1.5
## 2  Sum_Si<K  1       0        1       0.5            0.0             0.5
## 3  Sum_Si<K  2       0        0       1.5            0.0             0.0
## 4 Sum_Si=>K  1       2        2       0.0            0.5             0.5
## 5 Sum_Si=>K  2       2        2       0.5            0.5             0.5
## 6 Sum_Si=>K  0       2        2       0.0            0.5             0.5
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj =  0  , wi
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
## Game of  3  firms:
##    Scenario Si Sj_left Sj_right  Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2  0.0000000      0.0000000       1.5000000
## 2  Sum_Si<K  1       0        2  0.5000000      0.0000000       1.5000000
## 3  Sum_Si<K  2       0        1  1.5000000      0.0000000       0.5000000
## 4 Sum_Si=>K  1       1        2 -0.1666667     -0.1666667       0.1666667
## 5 Sum_Si=>K  2       1        2  0.1666667     -0.1666667       0.1666667
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## 6 Sum_Si=>K  0       1        2  0.0000000     -0.1666667       0.1666667
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
##
## Game of  4  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0              0             1.5
## 2  Sum_Si<K  1       0        2       0.5              0             1.5
## 3  Sum_Si<K  2       0        2       1.5              0             1.5
## 4 Sum_Si=>K  1       1        2       0.0              0             0.5
## 5 Sum_Si=>K  2       1        2       0.5              0             0.5
## 6 Sum_Si=>K  0       1        2       0.0              0             0.5
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
##
## Game of  5  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0            0.0             1.5
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## 2  Sum_Si<K  1       0        2       0.5            0.0             1.5
## 3  Sum_Si<K  2       0        2       1.5            0.0             1.5
## 4 Sum_Si=>K  1       1        2      -0.1           -0.1             0.3
## 5 Sum_Si=>K  2       1        2       0.3           -0.1             0.3
## 6 Sum_Si=>K  0       1        2       0.0           -0.1             0.3
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
## Game of  6  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0              0             1.5
## 2  Sum_Si<K  1       0        2       0.5              0             1.5
## 3  Sum_Si<K  2       0        2       1.5              0             1.5
## 4 Sum_Si=>K  1       1        2       0.0              0             0.5
## 5 Sum_Si=>K  2       1        2       0.5              0             0.5
## 6 Sum_Si=>K  0       1        2       0.0              0             0.5
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
## Game of  7  firms:
##    Scenario Si Sj_left Sj_right   Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2  0.00000000     0.00000000       1.5000000
## 2  Sum_Si<K  1       0        2  0.50000000     0.00000000       1.5000000
## 3  Sum_Si<K  2       0        2  1.50000000     0.00000000       1.5000000
## 4 Sum_Si=>K  1       1        2 -0.07142857    -0.07142857       0.3571429
## 5 Sum_Si=>K  2       1        2  0.35714286    -0.07142857       0.3571429
## 6 Sum_Si=>K  0       1        2  0.00000000    -0.07142857       0.3571429
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
##
## Game of  8  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0              0             1.5
## 2  Sum_Si<K  1       0        2       0.5              0             1.5
## 3  Sum_Si<K  2       0        2       1.5              0             1.5
## 4 Sum_Si=>K  1       1        2       0.0              0             0.5
## 5 Sum_Si=>K  2       1        2       0.5              0             0.5
## 6 Sum_Si=>K  0       1        2       0.0              0             0.5
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
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##
## Game of  9  firms:
##    Scenario Si Sj_left Sj_right   Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2  0.00000000     0.00000000       1.5000000
## 2  Sum_Si<K  1       0        2  0.50000000     0.00000000       1.5000000
## 3  Sum_Si<K  2       0        2  1.50000000     0.00000000       1.5000000
## 4 Sum_Si=>K  1       1        2 -0.05555556    -0.05555556       0.3888889
## 5 Sum_Si=>K  2       1        2  0.38888889    -0.05555556       0.3888889
## 6 Sum_Si=>K  0       1        2  0.00000000    -0.05555556       0.3888889
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
##
## Game of  10  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0              0             1.5
## 2  Sum_Si<K  1       0        2       0.5              0             1.5
## 3  Sum_Si<K  2       0        2       1.5              0             1.5
## 4 Sum_Si=>K  1       1        2       0.0              0             0.5
## 5 Sum_Si=>K  2       1        2       0.5              0             0.5
## 6 Sum_Si=>K  0       1        2       0.0              0             0.5
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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  .
##
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##   ( 1 ) Nash Equilibrium  1 , for  Sum_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
##
## Game of  11  firms:
##    Scenario Si Sj_left Sj_right   Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2  0.00000000     0.00000000       1.5000000
## 2  Sum_Si<K  1       0        2  0.50000000     0.00000000       1.5000000
## 3  Sum_Si<K  2       0        2  1.50000000     0.00000000       1.5000000
## 4 Sum_Si=>K  1       1        2 -0.04545455    -0.04545455       0.4090909
## 5 Sum_Si=>K  2       1        2  0.40909091    -0.04545455       0.4090909
## 6 Sum_Si=>K  0       1        2  0.00000000    -0.04545455       0.4090909
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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##
##
## Game of  12  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0              0             1.5
## 2  Sum_Si<K  1       0        2       0.5              0             1.5
## 3  Sum_Si<K  2       0        2       1.5              0             1.5
## 4 Sum_Si=>K  1       1        2       0.0              0             0.5
## 5 Sum_Si=>K  2       1        2       0.5              0             0.5
## 6 Sum_Si=>K  0       1        2       0.0              0             0.5
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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 .
```

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##
## ---- Nash Equilibrium ---
## There   are  2  Nash Equilibriums  .
##
##   ( 1 ) Nash Equilibrium  1 , for  Sum_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
##
## ------------------------------------------------------
##
##
## Game of  13  firms:
##    Scenario Si Sj_left Sj_right   Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2  0.00000000     0.00000000       1.5000000
## 2  Sum_Si<K  1       0        2  0.50000000     0.00000000       1.5000000
## 3  Sum_Si<K  2       0        2  1.50000000     0.00000000       1.5000000
## 4 Sum_Si=>K  1       1        2 -0.03846154    -0.03846154       0.4230769
## 5 Sum_Si=>K  2       1        2  0.42307692    -0.03846154       0.4230769
## 6 Sum_Si=>K  0       1        2  0.00000000    -0.03846154       0.4230769
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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## ------------------------------------------------------
##
##
## Game of  14  firms:
##    Scenario Si Sj_left Sj_right Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2       0.0              0             1.5
## 2  Sum_Si<K  1       0        2       0.5              0             1.5
## 3  Sum_Si<K  2       0        2       1.5              0             1.5
## 4 Sum_Si=>K  1       1        2       0.0              0             0.5
## 5 Sum_Si=>K  2       1        2       0.5              0             0.5
## 6 Sum_Si=>K  0       1        2       0.0              0             0.5
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
```

```
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
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## ------------------------------------------------------
##
##
## Game of  15  firms:
##    Scenario Si Sj_left Sj_right   Si_Payoff Sj_Payoff_left Sj_Payoff_right
## 1  Sum_Si<K  0       0        2  0.00000000     0.00000000       1.5000000
## 2  Sum_Si<K  1       0        2  0.50000000     0.00000000       1.5000000
## 3  Sum_Si<K  2       0        2  1.50000000     0.00000000       1.5000000
## 4 Sum_Si=>K  1       1        2 -0.03333333    -0.03333333       0.4333333
## 5 Sum_Si=>K  2       1        2  0.43333333    -0.03333333       0.4333333
## 6 Sum_Si=>K  0       1        2  0.00000000    -0.03333333       0.4333333
##
## ---- Pareto Equilibrium ---
## Pareto Optimality is reached when: Si =  2  with vi(Si, S_i) =  1.5 , if  Sum_Si<K  &  Sj = [ 0  ,  1
##
## 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_Si<K :
##    3  firms choose  1  units, each with a payoff of  0.5 .
##   ( 2 ) Nash Equilibrium  2 , for  Sum_Si=>K :
##    3  firms choose  2  units, each with a payoff of  0.1666667 .
##
##
## ------------------------------------------------------
```