

ECON 5103 Nash bonus video 2

A Nash equilibrium example using payoff matrices

Ken owns a hot dog stand and Barbie owns a pretzel stand; they are fierce competitors. Boomtown allows hot dog and pretzel stands to locate on either of these streets--Main St. and Circle Dr.

Ken and Barbie must (separately) choose where to locate. There are 4 possible outcomes:

1. They both locate on Main St
2. They both locate on Circle Dr.
3. Ken locates on Main St. and Barbie on Circle Dr.
4. Barbie locates on Main St. and Ken on Circle Dr.

5103-nash-2 Page 1

		Ken	
		Main St.	Circle Dr.
Barbie	Main St.	-10, 21	200, 250
	Circle Dr.	150, 300	50, 100

(Weekly Profits)

5103-nash-2 Page 2

Is the outcome $(-10, 21)$ a Nash equilibrium?

1. Can Ken make himself better off by changing his strategy (assuming that Barbie does not change her strategy)? **Yes, by moving to circle drive his profits would rise from 21 to 250.**

2. Can Barbie make herself better off by changing her strategy (assuming that Ken does not change his strategy)?

If the answer to both questions is "NO," then the outcome IS a Nash equilibrium. In all other cases, the outcome is NOT a Nash equilibrium. **Conclusion: the outcome $(-10, 21)$ is not a Nash equilibrium**

Is the outcome $(200, 250)$ a Nash equilibrium?

1. Can Ken make himself better off by changing his strategy (assuming that Barbie does not change her strategy)? **No, if he moves to main st his profits will fall from 250 to 21.**

2. Can Barbie make herself better off by changing her strategy (assuming that Ken does not change his strategy)? **No, if she moves to circle st her profits will fall from 200 to 50.**

If the answer to both questions is "NO," then the outcome IS a Nash equilibrium. In all other cases, the outcome is NOT a Nash equilibrium. **Conclusion: $(200, 250)$ is a Nash equilibrium.**

Is the outcome (150, 300) a Nash equilibrium?

1. Can Ken make himself better off by changing his strategy (assuming that Barbie does not change her strategy)? **No because his profits would fall from 300 to 100 if he moves to circle dr.**

2. Can Barbie make herself better off by changing her strategy (assuming that Ken does not change his strategy)? **No because her profits would fall from 150 to -10 if she moves to main st.**

If the answer to both questions is "NO," then the outcome IS a Nash equilibrium. In all other cases, the outcome is NOT a Nash equilibrium. **Conclusion: (150, 300) is a Nash equilibrium.**

Is the outcome (50, 100) a Nash equilibrium?

1. Can Ken make himself better off by changing his strategy (assuming that Barbie does not change her strategy)?

2. Can Barbie make herself better off by changing her strategy (assuming that Ken does not change his strategy)? **Yes; if Barbie moves to main st her profits will rise from 50 to 200**

If the answer to both questions is "NO," then the outcome IS a Nash equilibrium. In all other cases, the outcome is NOT a Nash equilibrium. **Conclusion: (50, 100) is NOT a Nash equilibrium**