Session 2.4
The Best Reply to the Empirical Distribution in Extensive Form Games

This session gives an example of how to compute the best reply to an empirical distribution that one of my classes played. The next slide gives a formal definition of the best reply in extensive form games. The example follows Session 2.3.

Best reply to the empirical distribution

- The best reply to the empirical distribution is also defined for the extensive form of a game.

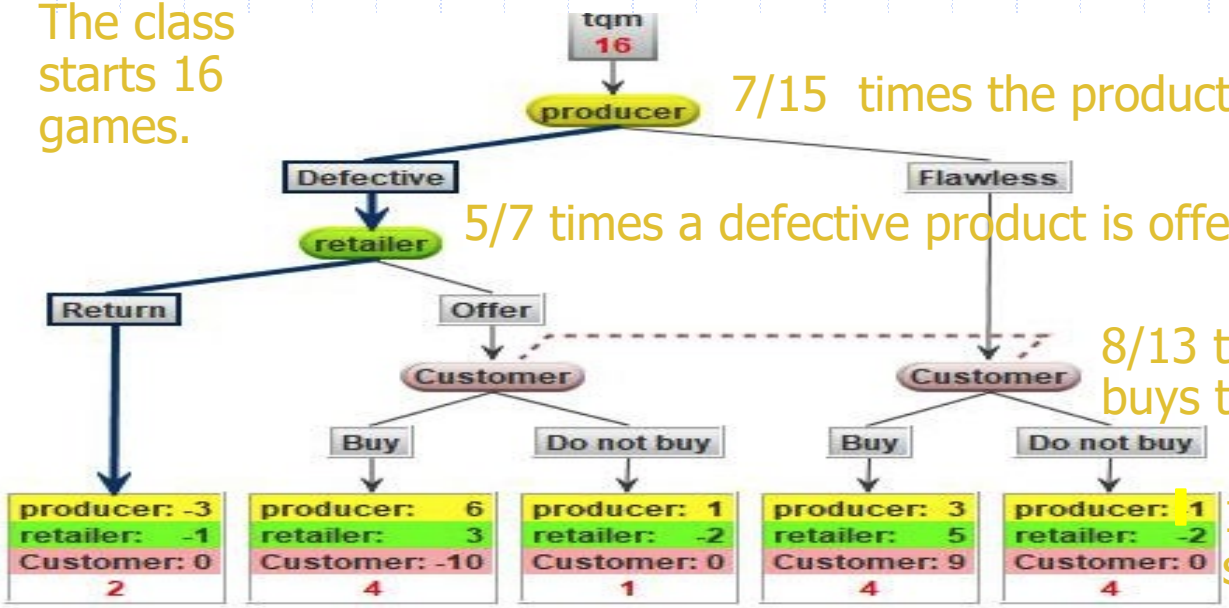
- In the extensive form the best reply for a player is:

  those moves at all the player's information sets yielding the highest expected payoff to the player, given the empirical strategy of all the other players.

The empirical distribution of TQM

- We compute the best replies of each player in an extensive form game in a similar manner.
- It is convenient to focus on the outcomes that can follow a particular player's decision, weighting them by the relative frequency of their occurrence.

The class starts 16 games.



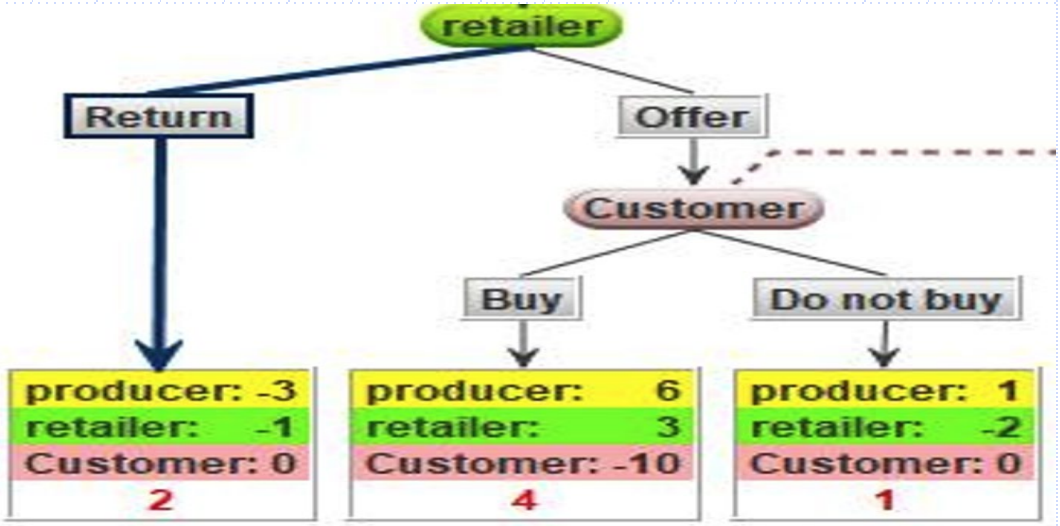
7/15 times the product is defective.

5/7 times a defective product is offered to the market.

8/13 times the customer buys the product.

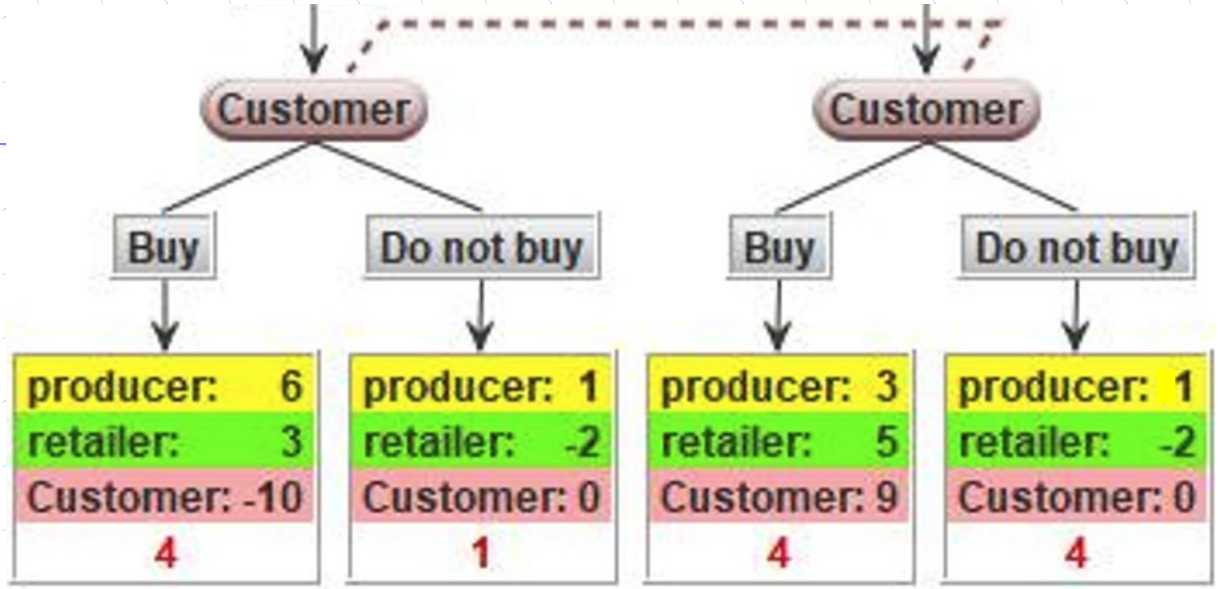
15 of the 16 games started are completed.

Retailer's best reply in TQM



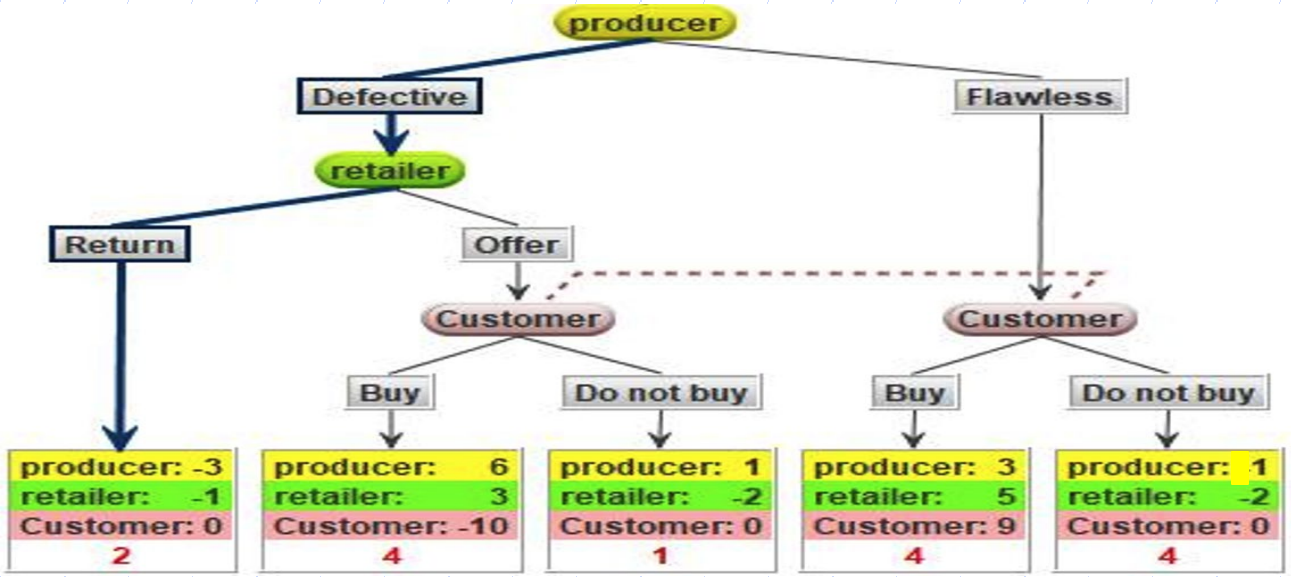
- Given the customer's empirical strategy, the expected payoff to retailer from:
  - returning the product is: -1.
  - offering the product is: (4*3 - 1*2)/5 = 2.
- Therefore the retailer's best reply to the customer's empirical distribution is to offer a defective product.

Customer's best reply in TQM



- Given the empirical strategies of the other two players, the expected payoff to the consumer from:
  - buying the product is: (-4*10 + 4*9)/8 = -1/2.
  - not buying the product is: 0.
- Therefore the customer's best reply to the empirical distribution is to not buy the product.

Producer's best reply in TQM



- Given the empirical strategies of the others, the expected payoff to the producer from:
  - manufacturing a defective product is: (-2*3 + 4*6 +1*1)/7 = 19/7
  - manufacturing a flawless product is: (4*3 - 4*1)/8 = 1.
- Therefore the producer's best reply to the empirical distribution is to produce a defective product.