Chapter 19
Subgame Perfect Equilibrium: Matchmaking And Strategic Investments

We analyze three games using our new solution concept, subgame perfect equilibrium (SPE). The first game involves players' trusting that others will not make mistakes. It has three Nash equilibria but only one is consistent with backward induction. We show the other two Nash equilibria are not subgame perfect: each fails to induce Nash in a subgame. The second game involves a matchmaker sending a couple on a date. There are three Nash equilibria in the dating subgame. We construct three corresponding subgame perfect equilibria of the whole game by rolling back each of the equilibrium payoffs from the subgame. Finally, we analyze a game in which a firm has to decide whether to invest in a machine that will reduce its costs of production. We learn that the strategic effects of this decision--its effect on the choices of other competing firms--can be large, and if we ignore them we will make mistakes.

Information sets - Imperfect information
Strategies - Instructions for each information sets
Subgames - Games within games
Subgame Perfection - Nash Equilibrium in every subgame

Strategic Investments
2 firms playing Cournot
Prices = 2 - (⅓)*(qa - qb)
Marginal cost c = $1 per ton
Cournot equilibrium = (a-c)/(3*b) = (2 - 1)/(3*(⅓)) = 1 million
Prices = 2 - (⅓)(1 + 1) = ⅓
Profits = 1 million * ⅓ = ⅓ million.

New machine features
1. It only works for A.
2. It costs $0.7 million in rents per year.
3. It will lower A’s costs to 50 cents a ton.

To rent or not to rent?

1 Accountant’s answer
Producing million tons a year. New machine saves 50 cents a ton = 0.5 million in variable costs. It costs you 0.7 million. Not rent.

2 Economist’s answer
Take into account residual margin revenue, residual margin curve = 0.5 million + 0.19 million = 0.69 million < 0.7 million. Not rent.

3 Game Theorist’s answer aka the right answer

As qa increases, qb decreases. This is good for firm A. We could recalculate the new Nash Equilibrium. We get an extra 0.31 million dollars. Total profit = 0.31 million + 0.69 million = 1 million. Rent. This was a strategic effect.