GAMBLING I

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UNC STOR 390

SPORTS GAMBLING 101

- Bookmaker
  - Person/Organization Who Takes Bets and Pays Off Bets in Sports
  - AKA a Bookie (Individual)
  - AKA a Sportsbook (Organization)
  - AKA The Real Winner
  - AKA Someone Who Profits Off Stupidity

- Five Online Sportsbooks for US Bettors
  - Bovada
  - 5Dimes
  - BetOnline
  - GTBets
  - Youwager

SPORTS GAMBLING 101

- UNC is Favored by 12 Points Over Duke
  - Why? Because I Like Working at UNC
  - Known as the “Point Spread”
  - Often Expressed: $UNC\ -12\ \ /\ DUKE+12$
  - Bookmaker

    $P(UNC-DUKE>12)=P(UNC-DUKE<12)\approx 50\%$
  - Negative Implies Favorite
  - UNC Wins and Score is 87 to 65
  - Bet on UNC = Winning Bet $(UNC\ -DUKE)-12>0\backslash$

- Total Points is Expected to Be 150
  - Known as the “Over/Under”
  - Similar to Betting on Point Spread
  - Even Probability Below 150 and Above 150

SPORTS GAMBLING 101

- Unit
  - Popular Term in Sports Betting
  - Measurement of the Size of Someone's Bet
  - +25 Units Doesn't Mean Anything and is Arbitrary
  - What is Better?
    - Person 1: Started with $100 and Now Has $800
    - Person 2: Started with $1000 and Now Has $8000
  - If Each Unit is $1,
    - Person 1 is Up 700 Units
    - Person 2 is Up 7000 Units
  - If Each Unit is 1% of Bankroll,
    - Person 1 is Up 700 Units
    - Person 2 is Up 700 Units

SPORTS GAMBLING 101

- Odds
  - Ratio of Probability of Winning to Probability of Losing
  - Fractional Representation:
    - 10/1
    - 1/1
    - 1/10 or 0.1/1
  - American Representation:
    - +1000
    - 100 or -100
    - -1000
  - Interpretation for Payout
    - Bet $1 to Win $10 or Bet $100 to Win $1000
    - Bet $1 to Win $1 or Bet $100 to Win $100
    - Bet $1 to Win $0.10 or Bet $1000 to Win $100

SPORTS GAMBLING 101

- Payout Odds
  - Bookmakers Use Odds to Payout
  - Suppose Team Has 50% Chance of Winning
    - Fair Odds is 1/1 (100 or -100)
    - Most Common Odds is 10/11 (-110)
  - Interpretation of Typical Odds
    - Bet $11 to Win $10 (Total=$21)
    - Bet $110 to Win $100
  - Bookmaker Makes 10% Profit on Bets
  - Formula: Total Amount If You Win

    $$Total = Base + Bet \times Fractional\ Odds$$
  - Formula: Total Amount If You Lose

    $$Total = Base - Bet$$

SPORTS GAMBLING 101

- How Bettors Make Money
  - p = Probability Gambler Wins a Point Spread Bet
  - When is Expected Profit \$0 If Betting \$11

    $E[Profit] = 10p - 11(1-p) = 0 \longrightarrow p = 0.524$
  - If Gambler Wins More Than 52.4% of Time, Gambler Wins Long Term

- How Bookmakers Make Money
  - Vig = Bookmaker's Mean Profit Per Dollar Bet
  - Suppose We Bet \$11 on Bet With Odds 10/11 and Win
  - Suppose Bo Bets \$11 on Same and Loses
  - Bookmaker Gets \$22 and Pays \$21 to Us

$$Vig = \frac{\$1}{22} = 4.5\%$$

SPORTS GAMBLING 101

- Money Line
  - Gamblers Don't Only Have to Bet on Events with 50% Chance
  - Money Line Allows Bettor to Bet on Who Wins Outright
  - Money Line in 2007 NBA Finals
    - -450 Spurs
    - +325 Cavaliers
  - Negative Implies Favored
  - Interpretation
    - Bet $450 on Spurs and Get $100 if Spurs Win
    - Bet $100 on Cavaliers and Get $325 If Cavs Win

SPORTS GAMBLING 101

- Money Line
  - Strategy for Betting on Spurs
    - Want Expected Profit to Be More Than $0
    - p = Probability Spurs Win

$$E[Profit] = (100) \times p + (-450) \times (1 - p) > 0$$

    - Believe Spurs Have 82% Chance of Winning or Higher
  - Strategy for Betting on Cavs
    - Want Expected Profit to Be More Than $0

$$E[Profit] = (-100) \times p + (325) \times (1 - p) > 0$$

    - Believe Spurs Have 76% Chance of Winning or Lower

SPORTS GAMBLING 101

- Arbitrage Betting Opportunity
  - Combination of Bets Without Risk
  - Consider the Following Betting Lines

Bookie 1	Colts −122	Bears +112
Bookie 2	Colts −135	Bears +125

  - Bookie 1 Offers Better Odds on Colts = Take Colts
  - Bookie 2 Offers Better Odds on Bears = Take Bears

SPORTS GAMBLING 101

- Arbitrage Betting Opportunity
  - Suppose You Bet x Dollars with Bookie 1
  - Suppose You Bet \$100 Dollars with Bookie 2
  - Profit if Colts Win

$$\left(\frac{100}{122}\right)x - 100 > 0 \qquad if \;\; x > \$122$$

  - Profit if Bears Win

$$125 - x > 0 \qquad if \;\; x < \$125$$

  - Betting Between \$122 and \$125 With Bookie 1 Guarantees Win

SPORTS GAMBLING 101

- Parlay
  - Multi-Event Wager Involving Typically 2 to 10 Bets
  - Can Involve Mixture of Completely Different Bets/Events
  - Gives You Worse Odds to Win, But Larger Potential Reward
  - All Bets Must Win for You to Win
  - Suppose You Parlay Two Bets
    - Each Bet Has 50% Chance of Winning
    - $P(Win) = 0.5 \times 0.5 = 0.25$
    - $P(Lose) = 0.5 \times 0.5 + 0.5 \times 0.5 + 0.5 \times 0.5 = 0.75$
    - Fair Odds = 3/1
    - Losing is 3 Times More Likely
    - Actual Odds 2.6/1

SPORTS GAMBLING 101

- Parlay
  - House Edge for Parlay if Betting $100
    - For Fair Odds, Expected Profit is $0
    - For 2.6/1 Odds, Expected Profit is …

      $E[Profit] = 0.25 \times 260 + 0.75 \times 100 = -10$
    - House Expected to Win $10
    - Percent of Bet = +10%
  - Table of Payoffs

Number of Bets	Actual Odds	Standard Payout Odds	House Percentage Edge
2	3–1	2.6–1	10
3	7–1	6–1	12.50
4	15–1	12–1	18.75
5	31–1	25–1	18.75
6	63–1	35–1	43.75

SPORTS GAMBLING 101

- Parlay
  - Correlated Events in Parlays
    - Bet 1: Tom Brady Throws Touchdown to Gronkowski

      $P(Win\ Bet\ 1) = 0.5 = 50\%$
    - Bet 2: Tom Brady Throw 3 Touchdowns

      $P(Win\ Bet\ 2) = 0.5 = 50\%$
    - Notice the Following Conditional Probability

      $P(Win\ Bet\ 1 | Win\ Bet\ 2) = 90\%$
    - Fair Odds If Events are Independent: 3/1
    - Probability of Winning Parlay

      $P(Win\ Parlay) = P(Win\ Bet\ 2) \times P(Win\ Bet\ 1 | Win\ Bet\ 2) = 45\%$
    - Fair Odds for This Parlay: 1.22/1
    - Suppose You Bet $100 and Win
      - You Should Win $122
      - You Will Win $300

SPORTS GAMBLING 101

- Teaser
  - Multi-Event Wager Like a Parlay But Pay Less
  - Two Events and Need to Win Both
  - *K*-Point Teaser (Bettor Alters Point Spreads by *K*)
  - Situation
    - Game 1: $UNC\ -12\ \ /\ DUKE+12$
    - Game 2: $\mathrm{NC}\ STATE\ -6\ \ /\ WF+6$
  - Example of 4-Point Teaser Taking UNC and WF
    - Game 1: $UNC\ -8\ \ /\ DUKE+8$
    - Game 2: $\mathrm{NC}\ STATE\ -10\ \ /\ WF+10$
    - To Win Teaser, We Need …
      - UNC to Win by More Than 8 Points
      - WF to Lose by Fewer Than 10 Points
  - Notice that the Point Spreads Got “Better”

SPORTS GAMBLING 101

- Teaser
  - Either Game "Pushes" = Teaser "Pushes
  - In Football, Teasers Usually Involve 6, 6.5, or 7 Points
  - Typical Teaser Payoff Grid

Number of Teams	6-Point Teaser	6.5-Point Teaser	7-Point Teaser
2	−110	−120	−130
3	+180	+160	+150
4	+300	+250	+200
5	+450	+400	+350
6	+700	+600	+500

→ Bet $130 to Win $100

→ Bet $100 to Win $500

  - History of 7-Point Teasers
    - Win 70.6% of the Time
    - Push 1.5% of the Time
    - Lose 27.9% of the Time

SPORTS GAMBLING 101

- **Teaser**
  - **Probability of Winning Teaser**

    $P(Win) = 0.706 \times 0.706 = 0.4984$
  - **Probability of Pushing Teaser**

    $P(Push) = 0.015 \times 0.015 + 0.015 \times 0.985 + 0.985 \times .015 = 0.0298$
  - **Probability of Losing Teaser**

    $P(Lose) = 0.279 \times 0.279 + 0.279 \times 0.721 + 0.721 \times .279 = 0.4802$
  - **Expected Profit of 7-Point Teaser Bet of $130**

    $E[Profit] = 0.4984 \times 100 + 0.0298 \times 0 + 0.4802 \times (-130) = -\$12.58$

FREAKONOMICS FOR BOOKIES

- Steven Levitt
  - Famous for *Freakonomics*
  - Showed Bookmakers Can Get a Profit Exceeding 4.5% Per Dollar Bet
  - People Believe Bookmakers Try to Set "Prices" So Half on Both Sides
  - NFL Data Shows Contradiction to This Notion
  - ½ of Games Have Uneven Split of Bets
  - Specifically Seen in Games Where Home Team is Underdog
  - Most Wagers on Visiting Team In These Cases
  - Bookmakers Set Unfair Spreads to Exploit Systematic Biases
    - Bias Toward Favorites
    - Bias Toward Visiting Teams
  - Bookmakers are Gambling With Gamblers

FREAKONOMICS FOR BOOKIES

- Implications on Gamblers
  - Percent of Bets That Win

	Underdog	Favorite
Home	57.7%	49.1%
Away	50.4%	47.8%

  - Conclusion: Favorites Are Not Good Bets (<50%)

- Example
  - UNC is 10 Points Better Than Duke
  - You Know Most People Will Bet on UNC
  - Bookmaker Line: UNC -12/ Duke +12
  - Trap People Who Have Definite Biases

FREAKONOMICS FOR BOOKIES

- Expected Earnings
  - Probability Bookie Wins = 50.55%
  - Probability Bookie Loses = 49.45%
  - Expected Earnings Per $10 Bet (10/11 Odds

$$E[Earnings] = (-10) \times 0.4945 + (11) \times 0.5055 = 0.6156$$

  - If Bets Were Evenly Split on Both Sides

$$E[Earnings] = (-10) \times 0.5 + (11) \times 0.50 = 0.50$$

- Bettor Should Bet on All Home Underdogs
- Results Independent of Size of Spread
- Results Consistent Over Time

FREAKONOMICS FOR BOOKIES

- Work by Flepp, Nuesch, and Franck
  - Analyzed This For Over/Under Bet in Soccer Matches
  - Focused on Over/Under of 2.5 Goals
  - Most Fans Are Biased to Bet on Over
  - 80% of Money Waged on the Over Bet
  - Average Number of Goals Between 2.4 and 2.6
  - Discovered that Bettors Don't Attempt to Modify the Over/Under Bet to Take Advantage of Bettors
  - Why Do You Think This is the Case?

FINAL INSPIRATION

The only cure for a gambling addiction is losing all your money.

-Mahatma Mario