ECON30580 Economics of Betting Markets
3. Basics of Betting Markets:
Odds, Margins and Probabilities

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Part I

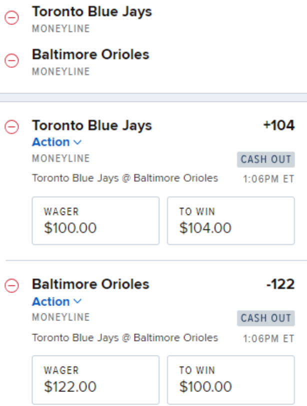
Betting Odds

Different Kinds of Odds

- The potential winning payoff on a €1 bet is known as the **odds** of the bet. There are lots of ways to express odds, with practice varying around the world.
- **Decimal (or European) Odds**
  - The simplest method and my favourite one and thus the one we will use in the module.
  - Decimal odds of €X mean that if your €1 bet is successful, the bookmaker pays you back €X. Note that this includes your original €1.
- **Fractional Odds**
  - The most common method in the UK and Ireland.
  - If the odds are $X/1$ (pronounced X-to-1), then you will make a profit of €X if your €1 bet is successful. In other words, the bookie will pay you back €X + €1.
  - Fractional odds come with their own idiosyncrasies.
    - ★ Nobody ever says the odds are 1.5 to 1. Instead, they will say 3/2.
    - ★ If a €1 bet makes a profit of €1 when successful, this is called "Evens"
    - ★ If your €1 bet will make a profit of less than €1 if successful, bettors will often describe the bet by flipping the fraction and adding the phrase "on". For example, odds of 4/7 (so you win €4 from a €7 bet if successful) will be described as "7/4 on"

American Odds

- These are an abomination but the US is becoming an increasingly important part of the global betting market, so I want you to understand them.
- Here's an example. The odds are for a Major League Baseball game between the Toronto Blue Jays and the Baltimore Orioles.



American Odds

- If winning a \$1 bet makes you a profit of more than \$1, the American odds are positive and they tell you the profit you would make from a \$100 bet. In this case, odds of +104 on Toronto mean betting \$100 will make a profit of \$104 if the Blue Jays win. Equivalent to decimal odds of 2.04.
- If winning a \$1 bet makes you a profit of less than \$1, the American odds are negative and they tell you how much you need to bet to make a profit of \$100. In this case, odds of -122 on Baltimore mean betting \$122 will make a profit of \$100 if the Orioles win. Equivalent to decimal odds of $1.82 = 1+100/122$.

General Formulas for American Odds

- Positive American odds of X are equivalent to decimal odds of $1 + \frac{X}{100}$
- Negative American odds of $-Y$ are equivalent to decimal odds of $1 + \frac{100}{Y}$

- Crazy, huh?

Breakeven Win Rates

- One reason it is better to use decimal odds is they make it really clear what the conditions are for you to potentially win at betting.
- Obviously, for each individual bet, you will either win or lose it but it is best to think of the decision based on the idea of it being a repeated bet.
- If you are offered multiple bets with decimal odds of D and you win a fraction f of the time, then your average payout on 1 unit bets will be fD.
- If $fD = 1$, then you will on average break even taking these bets. You will on average be getting back to the unit that you have risked.

Breakeven rate definition

Your breakeven win rate is just

$$f = \frac{1}{D}$$

- If $f > \frac{1}{D}$, then you will on average make a profit from betting.
- Remember this equation: People thinking their probability of winning is greater than $\frac{1}{D}$ plays a big role in this module.

Part II

Probabilities, Margins and Efficiency

Calculating Expected Payouts with Decimal Odds

- We will consider the outcome of sporting events to be **Bernoulli variables**. Named after mathematician Jacob Bernoulli, these variables have the property that

$$X = \begin{cases} 1 & \text{with probability } p \\ 0 & \text{with probability } 1 - p \end{cases}$$

  where $X = 1$ means an event happens and $X = 0$ means it does not happen.

- Consider a bet that the event will happen. The payout π on a bet is the amount of money you receive back from your bet. For a one unit bet with decimal odds of D, the payout is either D (if you win) or zero (if you lose).

$$\pi = \begin{cases} D & \text{with probability } p \\ 0 & \text{with probability } 1 - p \end{cases}$$

- When the one unit bet has a probability p of winning, the **expected payout** is

$$E(\pi) = pD + (1 - p)(0) = pD$$

- In other words, the expected payout is the probability that the bet wins times the decimal odds.

On the Meaning of "Expected Payouts"

- Previously on the assignment, I asked students to calculate the expected payouts on bets.
- Many students would answer, that if the decimal payout on the bet was $D = 5$, then the expected payout on the bet was 5.
- This is not correct. 5 is "the expected payout assuming you win". But you may or may not win (... and if the decimal odds are 5 then you probably won't win).
- By expected payout, I mean "the average across the probability distributions of possible payouts".
- This is a probability-weighted average of zero (what you get when you lose) and D (what you get when you win).
- So the expected payout is pD not D.

Fair Odds

- The concept of **fair odds** is as follows: These are the odds so that the expected payout on a €1 bet equals €1.
- In other words, for a bet with probability p of winning, the fair decimal odds satisfy

$$E(\pi) = pD^{fair} = 1 \Longrightarrow D^{fair} = \frac{1}{p}$$

- This means that, on average, the amount of money being placed in bets will be equal to the amount of money being paid out. We will further discuss what is meant by "on average" in the next lecture.
- Fair odds have a special feature. You can calculate the probability of the bet's success directly from the odds as

$$p = \frac{1}{D^{fair}}$$

- So, for example, if the decimal odds are 3, then the probability of success is $1/3$.

Incorporating the Bookmaker's Margin

- The world is not fair and bookmakers do not offer fair odds.
- In practice, bookmakers set odds as

$$D = \frac{1 - m}{p}$$

- Look at this carefully because it's the most important equation in the course.
- Whenever a bookmaker offers odds on a bet, they have used two inputs
  - **Probability**: They have an estimate of the probability, p, that the bet will win.
  - **Margin**: Their expected profit margin, m.
- To see that m is the expected profit margin, note that bookmaker's expected payout to the customer on a one-unit bet is

$$E(\pi) = pD = p\left(\frac{1 - m}{p}\right) = 1 - m$$

- When a bookmaker accepts a one unit bet, they expect (on average) to pay back $1 - m$ so that they are (again, on average) keeping m.

On Long-Run Performance As a Bettor

- Bookmakers make profits on average.
- Their net profits per bet are lower than $1 - m$ because they have operational costs
  - Costs of running retail betting shops.
  - Website costs
  - Marketing costs
  - Costs of research
  - Other administrative costs: Risk management etc.
  - Special taxes on betting profits or revenues
- So, on average, bettors lose. But some do better than others. Our odds equation shows there are only two ways to do better:
  - **Probabilities**: Be better than the bookmaker at judging probabilities.
  - **Margins**: Choose bets with lower built-in margins.
- Economics can teach you nothing about how to do the first thing but it can teach you a lot about the second.
- We will show how margins differ systematically across different kinds of bets and explain why.

Bets as State-Contingent Securities

- A **state-contingent security** (often called an Arrow-Debreu security after the economists that first formalised this idea) is a basic concept in financial economics.

Example

- Suppose there are two possible outcomes tomorrow: "Rain" or "Sun".
- A security that pays out $\$X$ when Rain occurs and $\$Y$ when Sun occurs is an example of a state-contingent security.
- The value of this security will depend on the values of X and Y and on the probability of Rain occurring.

- Betting on an event can be considered a purchase of a state-contingent security. Its value will depend on the resolution of the uncertainty about how the event will end.
- Typically, a bet will pay you back more than your initial stake if the event ends in a specific outcome (e.g. Liverpool beat Chelsea) and will pay you back nothing otherwise (e.g. if Chelsea beat Liverpool or the match ends in a draw).

Efficiency in Financial Markets

- Viewing bets as state-contingent assets means they can be thought of as a kind of financial instrument.
- There is a huge literature in financial economics on whether various financial markets are **efficient**.

Definition: Financial Market Efficiency

Financial markets are considered efficient if they incorporate all relevant available information into the prices of the assets being traded.

- One implication of market efficiency is that people should not be able to easily make more money buying financial assets that are cheaper than their true worth or selling financial assets that are more expensive than their true worth.
- Starting from the work of Nobel prize winner, Eugene Fama, loads of research has been done testing this idea and, while various anomalies have sometimes been detected, they have tended to disappear over time.
- There is no simple way to "beat the market" by buying and selling financial assets. And buying and selling incurs trading costs. Generally, you're better off to passively hold a large and diversified portfolio of assets.

Efficiency in Betting Markets: Two Definitions

- Defining efficiency in betting markets is a bit trickier. On average, people lose money when placing bets.
- The optimal thing to do is probably to not purchase an investment that has a negative expected return i.e. don't bet.
- However, in a famous 1988 paper Richard Thaler (a 2017 Economics Nobel prize winner) and William Ziemba put forward two definitions.

Definition 1: Weak Betting Market Efficiency

A betting market is considered weakly efficient if every bet placed in it has a negative expected value.

- This is a "weak" definition because you should expect it to hold.
- If bookmakers are offering bets that have a positive expected value for bettors, then they are making losses and unlikely to stay in business for long.
- It is possible, of course, for there to be occasional market mis-pricing that allows bettors to identify positive expected value bets but this is unlikely to be true of a vast majority of bets.

Strong Efficiency

- Thaler and Ziemba's second definition of market efficiency is one that is going to be more useful for our purposes.

Definition 2: Strong Betting Market Efficiency

Betting markets are considered strongly efficient if all possible bets on an event have the same expected rate of return.

- In other words, people don't systematically lose more or less money by picking one competitor in an event over another.
- In this case, there is no point in "studying the form" or looking for mis-pricing in the bookmaker's odds. The average return will be the same no matter which team or horse (or whatever) that you pick.
- This is a useful definition because, if this form of efficiency holds, then you can figure out the both p and m for each bet.
- Let's show how you can do that.

Part III

Using Strong Efficiency to Calculate Margins and Probabilities

Implications of Strong Efficiency

- Mathematically, strong betting market efficiency implies the following.
- If there are N possible outcomes of an event, where outcome i has probability P_i of occurring and the bookmaker offers decimal odds of D_i, then strong betting market efficiency means the decimal odds for outcome i must satisfy

$$P_i D_i = 1 - m$$

  for all $i = 1, 2, ..., N$, so they have the same expected return.
- For each possible outcome we have

$$P_i = \frac{1-m}{D_i}$$

- This means the ratios of probabilities must equal the inverse of the ratios of the decimal odds

$$\frac{P_i}{P_j} = \frac{D_j}{D_i}$$

Calculating the Margin

- We know that the bookmaker's probability for outcome i is

$$P_i = \frac{1-m}{D_i}$$

  and we can observe the odds D_i.
- So if we knew m we could recover each P_i.
- But we can also infer m from a simple fact: **the probabilities must sum to one**.
- For example, with two possible outcomes,

$$P_1 + P_2 = \frac{1-m}{D_1} + \frac{1-m}{D_2} = 1$$

- Rearranging,

$$\frac{1}{1-m} = \frac{1}{D_1} + \frac{1}{D_2} \qquad \Longrightarrow \qquad 1-m = \frac{1}{\frac{1}{D_1}+\frac{1}{D_2}}.$$

- Strong market efficiency means we can calculate m.

Calculating the Margin: General Version

- More generally, with N outcomes

$$P_1 + P_2 + ... + P_N = \frac{1-m}{D_1} + \frac{1-m}{D_2} + ... + \frac{1-m}{D_N} = 1.$$

- Rearranging,

$$\frac{1}{1-m} = \frac{1}{D_1} + \frac{1}{D_2} + ... + \frac{1}{D_N}$$

- So the margin is

$$m = 1 - \frac{1}{\frac{1}{D_1} + \frac{1}{D_2} + ... + \frac{1}{D_2}}.$$

- And we can calculate each probability as

$$P_i = \frac{1-m}{D_i}$$

The Overround

- Again consider an event with 2 possible outcomes.
- With fair odds, meaning $m = 0$, we can do the following calculation

$$\frac{1}{D_1} + \frac{1}{D_2} = P_1 + P_2 = 1$$

The sum of the inverses of the odds equals 1.

- When there is a positive bookmaker's margin, this is not the case. We have

$$\frac{1}{D_1} + \frac{1}{D_2} = \frac{P_1}{1-m} + \frac{P_2}{1-m} = \frac{1}{1-m} > 1$$

- The sum of the implied "probabilities" from taking the inverse decimal odds is greater than one. And the bigger the bookmaker's margin m, the larger this sum is. Clearly, the inverse decimal odds can no longer be considered probabilities since the sum of all probabilities should equal 1.
- The sum of the inverses of the decimal odds ($\frac{1}{D_1} + \frac{1}{D_2}$ here) is known in the bookmaking business as "**the overround**".

Relationship Between the Overround and the Margin

- People often think that if the overround is 1.05, then then the bookmaker's margin is 5% ($m = 0.05$).
- But it's not: You can calculate the margin from the overrounds but they are not the same thing.
- The margin is actually one minus the inverse of the overround.
- $$m = 1 - \frac{1}{\frac{1}{D_1} + \frac{1}{D_2} + ... + \frac{1}{D_N}}$$
- Note that if the overround is 1.05, this will generally imply $m \approx 0.05$ and thus a margin of about 5%. This works because for small values of x

$$\frac{1}{1+x} \approx 1 - x$$

but it does not work well as margins get bigger, e.g. an overround of 1.1 implies $m = 0.09$.

Normalised Probabilities

- We have shown how to calculate the probabilities.
- Let's show what the full calculation looks like
- For each possible outcome i, we have

$$P_i = \frac{1-m}{D_i}$$

- And we know that

$$1-m = \frac{1}{\frac{1}{D_1} + \frac{1}{D_2} + ... + \frac{1}{D_N}}$$

- This means we can calculate the probabilities as

$$P_i = \frac{\frac{1}{D_i}}{\frac{1}{D_1} + \frac{1}{D_2} + ... + \frac{1}{D_N}}$$

- This calculation is often known as **normalised probabilities**. By re-scaling the inverse odds by dividing them all by the overround, we get a set of estimated probabilities that sum to one.

Baseball Example: Toronto versus Baltimore

- Recall that the decimal odds for this game were 2.04 for Toronto and 1.82 for Baltimore.
- The overround for these odds is

$$\frac{1}{2.04} + \frac{1}{1.82} = 0.49 + 0.55 = 1.04$$

- We can estimate the expected payoff on a \$1 bet $1 - m$ as

$$1 - m = \frac{1}{1.04} = 0.962$$

  and the bookmaker's margin as

$$m = 0.038$$

  Note that this 3.8% margin is close to 4% (which you'd get from subtracting one from the overround) as we had indicated it would be.
- We can now calculate the win probabilities as
- Toronto: $\frac{0.962}{2.04} = 0.47$
- Baltimore: $\frac{0.962}{1.82} = 0.53$

Soccer Example: Spurs v Villa

- Odds from Paddy Power for a game on January 10, 2026.

Tottenham	The Draw	Aston Villa
13/8	12/5	6/4

- Decimal odds for Tottenham are $1 + 13/8 = 2.625$.
- Decimal odds for the draw are $1 + 12/5 = 3.4$
- Decimal odds for Aston Villa are $1 + 6/4 = 2.5$
- Overround is $\frac{1}{1-m} = \frac{1}{2.625} + \frac{1}{3.4} + \frac{1}{2.5} = 0.381 + 0.294 + 0.250 = 1.075$
- The expected payoff for each bet is $1 - m = \frac{1}{1.075} = 0.93$
- Bookmaker's gross margin is $m = 0.07$.
- Probability of Tottenham winning is $\frac{1}{1.075}\frac{1}{2.625} = 0.354$.
- Probability of a draw is $\frac{1}{1.075}\frac{1}{3.4} = 0.273$.
- Probability of Aston Villa winning is $\frac{1}{1.075}\frac{1}{2.5} = 0.372$.
- Aston Villa won 2-1.

Reminder About the Steps

How to calculate the margin and probabilities.

1. Convert all odds to decimal.
2. Calculate the inverse of all of the odds.
3. Sum up the inverses. This is the overround and it equals $\frac{1}{1-m}$.
4. Calculate the inverse of the overround. This gives you $1 - m$.
5. Subtract this from 1 to get the margin m.
6. **Only once you have calculated the overround** do you then divide the inverse of the odds by the overround to calculate normalised probabilities.

Remember: Calculate the overround first, then the probabilities.

Warning About Margins and Normalised Probabilities

- A warning about normalised probabilities.
  - We showed that when the betting market is strongly efficient—meaning the expected return on all betting options in a contest is the same—then the normalised probabilities will equal the true probabilities.
  - However, we will present evidence that **many betting markets are not strongly efficient**.
  - In particular, there is lots of evidence that betting markets often exhibit a **favourite-longshot** bias, meaning the return to bets on high odds contestants (longshots) are lower than returns for bets on low odds contestants (favourites).
  - In this case, the normalised probabilities are not good measures of the underlying probabilities: We will show later that they overstate the probability of the longshot winning and understate the probability of the favourite winning.
- Similarly with our calculation of the margin: When there is a favourite-longshot bias, the average margin across each of our bets will be higher than the calculation implied by strong efficiency.
- More on this later.

Part IV

Riskiness of Bets: Calculating the Variance

The Variance of Payouts

- You might think any two bets with the same expected payoff will be treated identically by bettors.
- But two bets have the same payoff and still have different properties. The **variance** of the payouts may be different.
- Consider a \$1 bet with payout $\pi = D$ when you win and $\pi = 0$ otherwise.
- If the probability of winning is p, then the expected payout is $E(\pi) = pD$
- What about the variance of π? This can be calculated as

$$\begin{aligned}
\text{Var}(\pi) &= p(D - pD)^2 + (1-p)(-pD)^2 \\
&= D^2\left(p(1-p)^2 + (1-p)p^2\right) \\
&= D^2\left(p\left(1 - 2p + p^2\right) + p^2 - p^3\right) \\
&= D^2\left(p - 2p^2 + p^3 + p^2 - p^3\right) \\
&= D^2 p(1-p)
\end{aligned}$$

Variance Increases as p Falls

- If markets are strongly efficient and the expected payout on all bets is $1 - m$ so

$$D = \frac{1-m}{p}$$

then the variance of payouts is

$$\text{Var}\left(\pi\right) = (1-m)^2 \left(\frac{1}{p} - 1\right)$$

- This means variance rises as p falls.
- And it rises sharply too as the probability of winning gets ever smaller e.g. for $p = 0.5$, the variance is $(1-m)^2$, for $p = 0.25$ it is $3\left(1-m\right)^2$, for $p = 0.1$, it is $9\left(1-m\right)^2$.
- Note that this higher-variance payoff applies for both bettor and bookmaker and may influence both of their perceptions of the attractiveness of bets with low p but high D.
- We will return to this feature later.

Part V

The Grim Arithmetic of Accumulators

Accumulator Bets

- Accumulator bets work as follows.
- Suppose you are betting on soccer. You choose a number of matches to bet on and pick which outcome (home win, away win, draw) to back for each one.
  - If your first bet wins, instead of returning your money to you, the money is placed on your pick for the second match.
  - If your second bet loses, you lose all your money. But if your second bet wins, the payoff on that bet is placed on your pick for the third match.
  - And so on.
- So if you bet on a 5-leg accumulator, all 5 of your bets must win for you to get any money back.
- Generally, this is pretty unlikely to happen.
- But if you do win, you will get a very good return. If all 5 of the bets had decimal odds of D, then a €1 bet will return a payout of D^5.
- Your €1 will have become a payout after the first match of D, which went on the second bet and gave a payout of D^2, which went on the third bet and so on.

Expected Losses on Accumulators

- Consider bets with probability of success p such that your expected payout on a €1 bet is
$$E(\pi) = pD = 1 - m < 1$$
- If you bet 20 cents each on 5 of these bets, your expected payout will also be $1 - m$. Your expected percentage loss on your 5 bets is the same as if you had placed all your money on one of the bets.
- But if you bet your €1 on a five-team accumulator, then your probability of success is p^5. All 5 bets have to win.
- If you do win, your payout will be D^5.
- Your expected payout on your €1 accumulator bet is thus
$$E(\pi) = p^5 D^5 = (pD)^5 = (1 - m)^5$$
- More generally, your expected payout from accumulators of N of these bets is $(1 - m)^N$. Because $1 - m < 1$, your expected payout gets smaller the bigger the number of legs on the accumulator.

Loss Rates and Boosts

- Average loss rates are larger for accumulators, and get larger the more matches you add, because bettors are at a disadvantage.
- On average, bets placed with bookmakers lose. If you come out ahead from a bet, it's because you got lucky.
- By committing yourself to rolling over your money and using it to take more bets, you are compounding your disadvantage.
- You might get lucky and win the accumulator but, on average, your loss rates will be bigger than just taking bets separately.
- Bookmakers know accumulators have very big profit margins for them, so they promote them heavily.
- Some bookmakers offer "boosts" to odds for bets taken as part of accumulators. People think they are getting a good deal because they can bet on the same set of games but get better odds.
- The calculations on the final page use a bookmaker's margin of 5.8% (the average in a big European soccer dataset) to show that the boosts don't stop the expected payout getting worse as you add more matches.

bet365's Boosts for Accumulator Bets

Number of Legs	Percentage Boost
2	2.5%
3	5%
4	7.5%
5	10%
6	12.5%
7	15%
8	20%
9	25%
10	30%
11	35%
12	40%
13	45%
14	50%
15	55%

Expected Payouts with and without Boosts

Number of Legs	Acca	Acca with Boost
2	0.903	0.919
3	0.857	0.894
4	0.815	0.871
5	0.774	0.848
6	0.735	0.825
7	0.698	0.802
8	0.663	0.795
9	0.630	0.787
10	0.599	0.778
11	0.569	0.768
12	0.540	0.756
13	0.513	0.744
14	0.488	0.731
15	0.463	0.695

Evidence on Multi-Leg Profits for Bookmakers

- In the US, some states require separate reporting by bookmakers of volumes and profits on "parlays." This is the US term for accumulators and also "bet builders" e.g. City to win and Haaland to score two goals.
- **The data are stark:**
  - **Colorado:** Parlays margin is 17.5% vs 6.7% for other bets.
  - Parlays generate 45% of online sports betting profits in Colorado, despite being only 24% of bets.
  - **New Jersey:** Parlays margin 18.7% vs 4.7% for other bets.
  - Parlays generate 64% of profits in New Jersey, despite being only 31% of bets.
- **What firms tell investors:** earnings calls and releases repeatedly describe parlays as higher-margin products.
  - Flutter CFO Rob Coldrake (early 2025): "**It's the Parlay and the same game Parlay that helped compound up to why we've got the best structural margin in the sector.**"
  - Kambi (a betting service provider, early 2025): Bet Builder shows strong engagement and is a "**higher margin, lower staking** product."

Risk Explodes with the Number of Legs

- The expected payout is

$$E(\pi) = p^N D^N = (1-m)^N$$

- Using the same method as we did before, we can also show that the variance of the accumulator payoff is

$$\text{Var}(\pi) = (1-m)^{2N}\left(\frac{1}{p^N} - 1\right)$$

- As N increases, you don't just have a steady decline in the expected payout.
- The variance also explodes. You have tiny chances of huge wins and very frequent total losses.
- Apart from a high loss rate and huge variance, what's not to like?

Higher Margin or Higher Volumes?

- In *The Logic of Sports Betting*, an interesting US-focused book, betting experts Matthew Davidow and Ed Miller argue that multi-leg bets get a bad rap: they say they don't really have higher margins, but higher **volume**.
- Example: 5-leg Acca, each leg has decimal odds $D = 3$ and win probability $p = 0.3$.

$$pD = 0.9 \quad \Rightarrow \quad 10\% \text{ margin per leg}$$

- Expected payout rate on the Acca:

$$E(\text{payout rate}) = (pD)^5 = 0.9^5 = 0.59$$

  So on average you get back 59c per €1: a **41% expected loss**.

- Davidow/Miller reframing: think of the bettor as repeatedly "rolling over" winnings, so expected **volume bet** is higher:

$$1 + 0.3 \cdot 3 + 0.3^2 \cdot 9 + 0.3^3 \cdot 27 + 0.3^4 \cdot 81 \approx 4.1$$

  Expected loss is 41p on an "effective" €4.1 stake: **10% again**.

- Bottom line: call it higher margins or higher volumes if you like. Your account statement still says: **stake €1, expected payout 59c.**

Having an Edge But "Hiding Among the Suckers"?

- Accumulators could possibly be good bets if you have an edge:

$$\text{If } pD > 1, \quad E(\text{payout rate on an } N\text{-leg multiple}) = (pD)^N$$

  More legs then **raises** expected return.

- But assuming a steady supply of $pD > 1$ bets is the real issue. If you can reliably find those bets, the "Acca or not?" question is second order.
- Another Davidow-Miller argument: Accas help you avoid limits at soft bookmakers and make you look like a "recreational" bettor.
- In practice:
  - Win even a modest number of big accumulators and you are still likely to get limited.
  - If you truly have $pD > 1$ at a soft bookmaker, you are likely smart enough to get better odds at a sharp bookmaker (or an exchange) that won't throw you out for winning.
- There is economics on what to do when you genuinely have an edge. It is not "bet on Accas to hide among the suckers".

Supplementary Material in the Draft Book

- Chapter 3: Odds and Win Rates
- Chapter 4: Market Efficiency and Margins
- Chapter 5: Calculating Margins and Probabilities
- Chapter 6: The Grim Arithmetic of Accumulators