

# ECON30580 Economics of Betting Markets

## 8. Information and Market Structure

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# Part I

## Competition and Information in Betting Markets

# Micro 101 Recap on Perfectly Competitive Markets

- A perfectly competitive market is one in which all firms are small relative to the total size of the market and act as “price takers”, selling their products at the market price.
- The market price is set by total market demand and supply.
- These markets are assumed to have free entry and exit and firms operating in the market are able to earn a “normal” expected rate of return.
- If an increase in demand raises the market price and thus provides “super-normal” expected returns to the firms, this triggers entry of new firms. The increase in supply from the new entrants brings the price back down.
- If a decrease in demand reduces the market price and firms start earning below normal expected returns (or are losing money), then firms start to exit the market and the lower supply brings the price back up.
- This provides a useful way to think about how the market for betting with bookmakers might work.

# A Perfectly Competitive Bookmaking Market

- Our version of a perfectly competitive betting market is as follows.
- There are several bookmakers who compete against each other for business.
- Bettors are aware of the odds set by all the firms and will only ever place a bet with the bookmaker offering the highest odds on any bet.
- The competitive equilibrium requires each firm to make an expected profit rate of  $\theta$  on each bet, reflecting the need to earn a “normal” rate of profit.
- If expected profit rates are higher than this, new bookmakers enter the market and offer lower odds to bring the profit rate back to  $\theta$ .
- Costs for bookmakers are a fraction  $\mu$  of the total amount of bets.
- For a bet that has probability  $p$  of winning and decimal odds of  $D$ , the competitive equilibrium profit rate of  $\theta$  implies the following equation for revenue minus expected costs on a €1 bet

$$1 - \mu - pD = \theta$$

- So the equilibrium odds are

$$D = \frac{1 - \mu - \theta}{p}$$

# Efficiency in the Competitive Market

- Note that the free entry condition among bookmakers, so that each bet has the same rate of return means this is a strongly efficient market.
- The equilibrium odds for a bet with probability  $p$  of winning are

$$D = \frac{1 - \mu - \theta}{p}$$

- So the expected payout on this bet is

$$pD = 1 - \mu - \theta$$

which means all bets have the same expected payout (and all bets lose the same amount on average).

- This is a strong prediction: **A competitive bookmaking market driven by an expected profit free entry condition should not produce a favourite-longshot bias pattern because any excess profits from offering bad odds on the longshots would be competed away by new entrants who are happy to offer better odds that earn them the market rate of return.**

## Rolling Costs and Normal Profit into One Margin

- In the competitive model, bookmakers need to (i) cover operating costs and (ii) earn a normal rate of return.
- We have written these separately as:
  - ▶ Costs as a fraction of stakes:  $\mu$
  - ▶ Competitive equilibrium profit rate:  $\theta$
- For pricing, these enter in exactly the same way: they are both a wedge that reduces the expected payout.
- Define the total margin needed to cover costs and earn a normal return as

$$m \equiv \mu + \theta$$

- Then the competitive pricing rule can be written compactly as

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

which you may recall from before.

# Uncertainty About Probabilities

- What if competitive bookmakers start out with an estimate of  $p$  and it is not correct?
- Suppose as before that potential bettors have subjective beliefs  $\tilde{p}$  with median equal to  $p$ : Half the public have a belief above the true value and the other half have a belief below it.
- A bookmaker that offers odds on a bet that are more generous than

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

will find that this bet attracts volume from people who clearly think  $p$  is higher than the bookmaker.

- Since the public are on average correct about the probability, the bookmaker can perhaps take this as a signal that they have been too generous with these odds and bets at these odds are likely to be a winner for the bettors and a loser for the bookmaker.
- Similarly, odds that are too low may not attract much volume.

# How Bookmakers' Odds Reflect the Wisdom of Crowds

- Even if bookmakers don't know the probabilities, if they see their odds on a particular option attracting lots of money, they should take that as a signal that perhaps the public knows the probability better than they do.
- This means that the betting patterns of the public are likely to move bookmaker odds towards the perfectly competitive equilibrium level where the bets reflect the true probability.
- Even if no individual actually starts out knowing the true value of  $p$ , the betting markets can aggregate public opinions so the odds on a bet reflects this true value.
- This result relates to a wider discussion in economics of how prices reflect information.
- One of the most famous papers in economics is Nobel Prize winner Friedrich Hayek's "*The Use of Knowledge in Society*" which argued that markets were able to aggregate all sorts of information to arrive at the right price when no central planner would be able to do so. See the quote on the next page.

# Hayek (1945) on the Use of Knowledge in Society

accomplishes. Assume that somewhere in the world a new opportunity for the use of some raw material, say tin, has arisen, or that one of the sources of supply of tin has been eliminated. It does not matter for our purpose—and it is very significant that it does not matter—which of these two causes has made tin more scarce. All that the users of tin need to know is that some of the tin they used to consume is now more profitably employed elsewhere, and that in consequence they must economize tin. There is no need for the great majority of them even to know where the more urgent need has arisen, or in favor of what other needs they ought to husband the supply. If only some of them know directly of the new demand, and switch resources over to it, and if the people who are aware of the new gap thus created in turn fill it from still other sources, the effect will rapidly spread throughout the whole economic system and influence not only all the uses of tin, but also those of its substitutes and the substitutes of these substitutes, the supply of all the things made of tin, and their substitutes, and so on; and all this without the great majority of those instrumental in bringing about these substitutions knowing anything at all about the original cause of these changes. The whole acts as one market, not because any of its members survey the whole field, but because their limited individual fields of vision sufficiently overlap so that through many intermediaries the relevant information is communicated to all. The mere fact that there is one price for any commodity—or rather that local prices are connected in a manner determined by the cost of transport, etc.—brings about the solution which (it is just conceptually possible) might have been arrived at by one single mind possessing all the information which is in fact dispersed among all the people involved in the process.

# Hayek's Mechanism: Prices as Messages

- Hayek's point was not that markets are magically wise or perfect.
- His point was that information is dispersed: each person has a small, local slice of knowledge.
- People act on what they know, even if they don't know the whole story.
- The price system then **aggregates** these scattered actions into a single number.
- Prices are therefore messages: they summarise what others know and transmit it to everyone else.
- An example – coffee prices.
  - ▶ A storm hits coffee plantations in Brazil.
  - ▶ Farmers see ruined crops, traders bid up prices.
  - ▶ Cafes raise prices later, without knowing anything about Brazilian weather.
  - ▶ The higher price tells consumers something real: coffee has become scarcer.

# Sharp Bookmakers: Closest to the Competitive Ideal

- The sharp segment of the industry comes closest to the textbook competitive benchmark.
- Their customers are professional bettors and syndicates who
  - ▶ Place large stakes
  - ▶ Are highly price sensitive
  - ▶ Are quick to exploit weak odds
- These firms operate in countries that don't have taxes on betting.
- They have thin margins and rely on very high volumes.
- A small pricing mistake can be hit hard and fast.
- So sharp bookmakers must treat betting action as an information source and update aggressively.

# How Sharps Set Odds in Practice

- They begin with an opening price based on internal models.
- Early in the process, when uncertainty is highest, they set relatively low limits.
- They profile the records of all their customers.
- This means they monitor **who** is betting and in which direction:
  - ▶ Not all money is equally informative
  - ▶ Smart money is an information signal
- If informed customers pile in at the opening line, they move the odds quickly.
- As information accumulates and the odds stabilise, they raise limits and take larger bets.

# Why “Winners Welcome” Makes Sense

- Some sharp bookmakers such as Pinnacle have a “winners welcome” policy.
- Winners are welcome to place smaller bets at first and larger bets once the bookmaker is comfortable with the odds.
- Keeping such customers allows the bookmaker to:
  - ▶ Learn which odds are wrong.
  - ▶ Adjust faster in the future.
  - ▶ Improve the overall quality of the odds.
- In this sense, volume from sharp customers is not just taking a risk; it is **acquiring information**.
- Thin-margin, high-volume bookmaking only works if the odds are very accurate.
  - ▶ They can't afford to lose from high volumes on overly-generous odds.
  - ▶ And don't want to lose volume by offering odds that are clearly too low.
- So sharp bookmakers effectively “buy” information by accepting action from informed bettors.

# Part II

## Information and the Two-Tier Structure

# Information is Costly

- Some information is free
  - ▶ League tables
  - ▶ Public information on injuries
  - ▶ Basic statistics on team and player performances
- But the information that creates a genuine edge is costly:
  - ▶ Time watching film and processing details
  - ▶ Data, computing, and modelling
  - ▶ Expertise and experimentation
- If betting odds already reflected all relevant information perfectly, there would be no incentive to pay these costs.
- Yet sharp bookmakers and professional bettors clearly do invest heavily in information.
- This leads to a famous paradox in economics.

# The Grossman-Stiglitz Paradox

- Suppose prices fully reflect all available information. Nobody would pay to gather information.
- But in a famous 1980 paper, Sandy Grossman and Joe Stiglitz pointed out something that's obvious once you see it: **if nobody gathers information, prices cannot reflect it.**
- Therefore, “fully informationally efficient” prices are impossible when information is costly.
- Prices must be **imperfect enough** that informed traders can earn returns that cover information costs.
- The more costly information is, the less efficient market prices are.
- In betting, there must remain some scope for informed profits, otherwise information production disappears.
- This helps explain why:
  - ▶ sharp books invest in modelling and monitoring
  - ▶ professional bettors keep searching for small edges
  - ▶ we still observe occasional mispricings even in very liquid markets

# Grossman-Stiglitz and the Two-Tier Bookmaking Market

- The Grossman-Stiglitz paradox provides a further explanation for the two-tier (sharps versus softs) structure of the global bookmaking market.
- The industry ends up with a natural hierarchy.
- **Sharps** are information creators:
  - ▶ they invest in modelling and monitoring
  - ▶ they learn from the action of informed bettors
  - ▶ they produce high-quality prices in real time
- **Softs** are information distributors:
  - ▶ they focus on retail apps, promotions, brand, and customer acquisition
  - ▶ they often follow sharp prices directly or buy odds / trading services
- Odds look accurate in retail markets partly because information produced at the top tier gets transmitted downward.
- And there is another difference between sharp and soft bookmaker markets:  
**The soft bookmaker market is not as competitive.**

# Factors Determining Competitiveness of Betting Markets

- We have just discussed a model in which the betting market is highly competitive and bookmakers all set the same odds, which are determined by market conditions.
- In the real world, some types of bookmakers compete against each other intensely by offering odds with very low profit margins.
- These sharp bookmakers operate largely in off-shore locations outside Europe or the US (usually with no taxes on betting) and have customers such as professional bettors and syndicates that bet in large volumes and are very sensitive to odds.
- One could imagine that the market for retail betting—via betting shops or websites tailored for normal bettors who place relatively small amounts—might also be highly competitive.
- Surely anyone can set up a website and start taking bets from punters, right?
- No, not right. There are significant **barriers to entry** for this market and this discourages competition.

# Modern Retail Bookmaking

Modern retail bookmaking is a highly complex multi-faceted business.

- 1 It is a **technology** business: Bookmakers require reliable websites and phone apps capable of taking large amounts of bets and quoting the latest odds that accurately reflect probabilities by either pulling in these odds from external providers or from complex in-house models.
- 2 It is a **retail** business: Bookmakers track the performance of all their customers, tailoring special offers or perhaps betting limits for them. Advertising and brand building is very important.
- 3 It is a **financial** business: Bookmakers need to handle large amounts of inward-bound and outward-bound payments and make sure that these payments are handled correctly.
- 4 It is a **highly regulated** business: Bookmakers must satisfy Know Your Customer rules aimed at preventing money laundering and increasingly have to satisfy regulations aimed at protecting consumers.

All this makes it difficult for new entrants to come into the business.

# Lack of Competition: Implications for Odds

- In addition to the complexities and barriers to entry that restrict competition, there is another factor that gives bookmakers pricing power.
- Maintaining multiple accounts with different bookies is time-consuming and annoying: **The median bettor has only 2 active accounts.**
- So despite the appearance of lots of competition, most bookmakers know there is limited shopping around going on.
- We will show how bookmakers that are monopolies or oligopolies will set odds – but the key point is that the odds will be lower than if the market was truly price competitive.
- Some possible exceptions:
  - ▶ In some markets where the number of customers is growing fast, such as in the US, customer acquisition is the key to long-term profit growth.
  - ▶ Odds on certain high-profile sports may be crucial in attracting new customers and so these are more likely to be priced competitively.
  - ▶ And (this is also a US reference ...) sometimes there are social conventions about certain odds being “fair.”

## Supplementary Material in the Draft Book

- Chapter 11: Odds, Information and the Two-Tier Bookmaking Market
- Chapter 12: Barriers, Frictions and Competition in Betting Markets