ECON30580 Economics of Betting Markets
18. Impacts of Gambling and Taxation Issues

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Part I

The Impact of Sports Betting

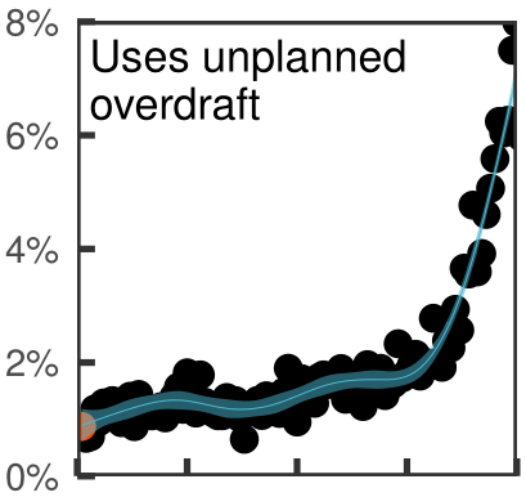
What Impact Does Sports Betting Have?

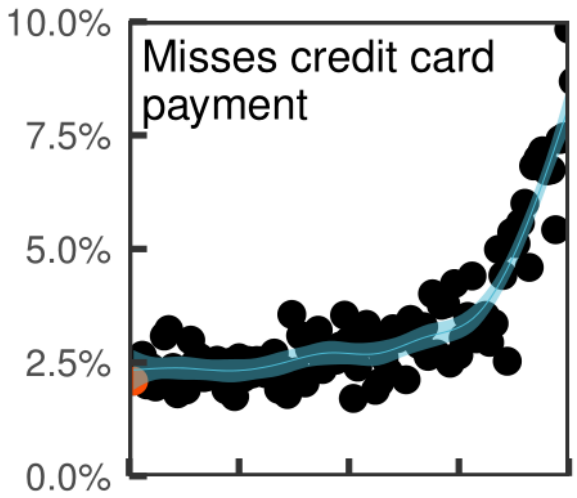
- What impact does betting on sports have on your finances and lifestyle?
- I will highlight two interesting studies, both of which have used data obtained from banks that allowed the researchers to assess how sports betting impacted other parts of people's lives.
  1. Muggleton et al (2021) is a UK study using data from Lloyds Bank customers.
  2. Baker et al (2024) is a US study using data from an un-named bank that allows researchers to see changes in people's financial positions before and after they start online betting on sports.

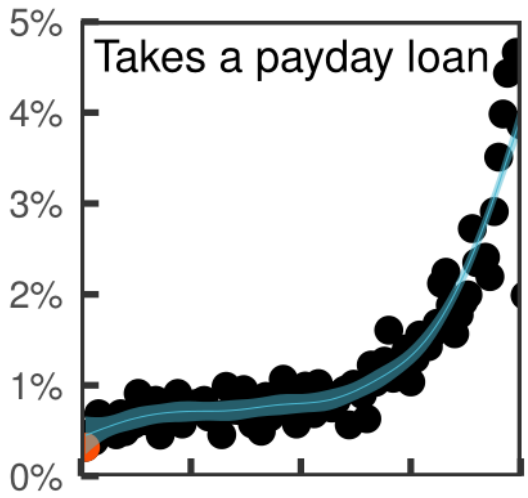
Muggleton: Impact on Finances and Lifestyle

- Muggleton et al (2021) is an important study that gives us insight into how gambling activity impacts people's finances and lifestyles.
- They examine a large sample of people who have accounts with Lloyds Bank.
- The graphs show a red dot for people who didn't gamble online and then 100 dots, one for each of the percentiles of the share of spending that went on online gambling-related businesses.
- The lines in the middle are the fitted values from predicting the dependent variables as a cubic function of the percentile and the shading shows the standard errors of these fitted values.
- Higher gambling activity is associated with a higher likelihood of
  1. Using an unplanned overdraft.
  2. Using a credit card and also missing credit card payments.
  3. Using a payday loan service.
  4. Missing mortgage and personal loan payments.
  5. Making payments to a debt recovery firm.
  6. Being awake at night (measured by late night payments).
  7. Spending less on travel, social activities and "self care"

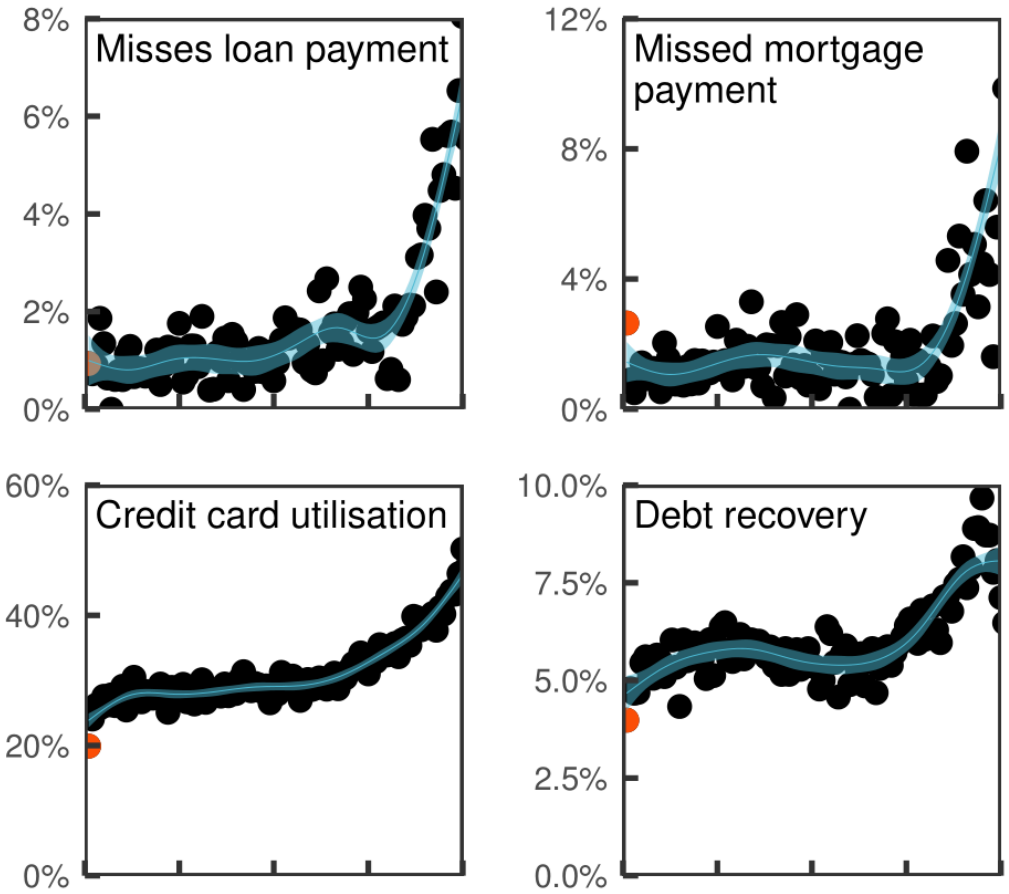
Gambling Activity and Financial Outcomes



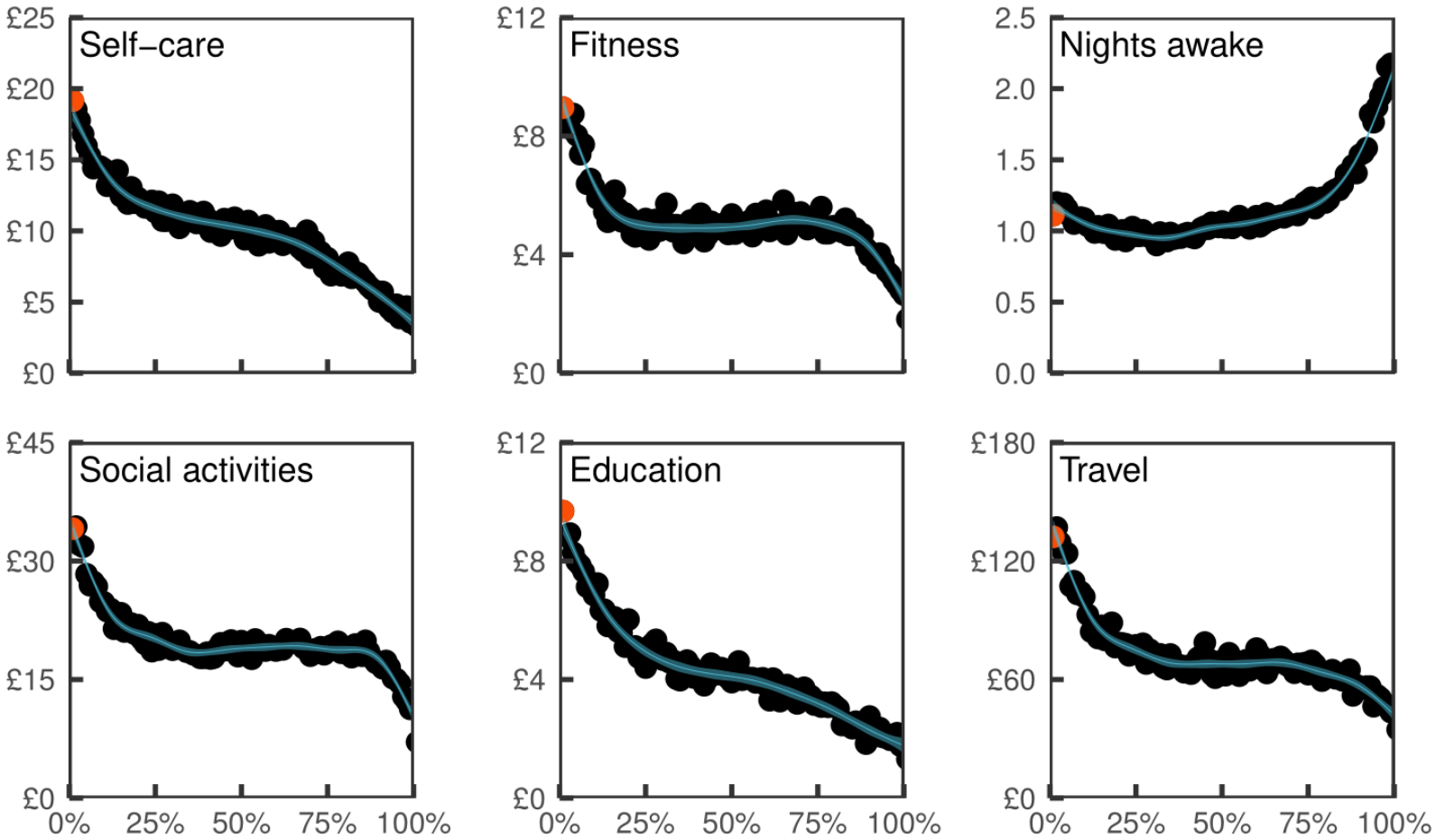




Gambling Activity and Financial Outcomes



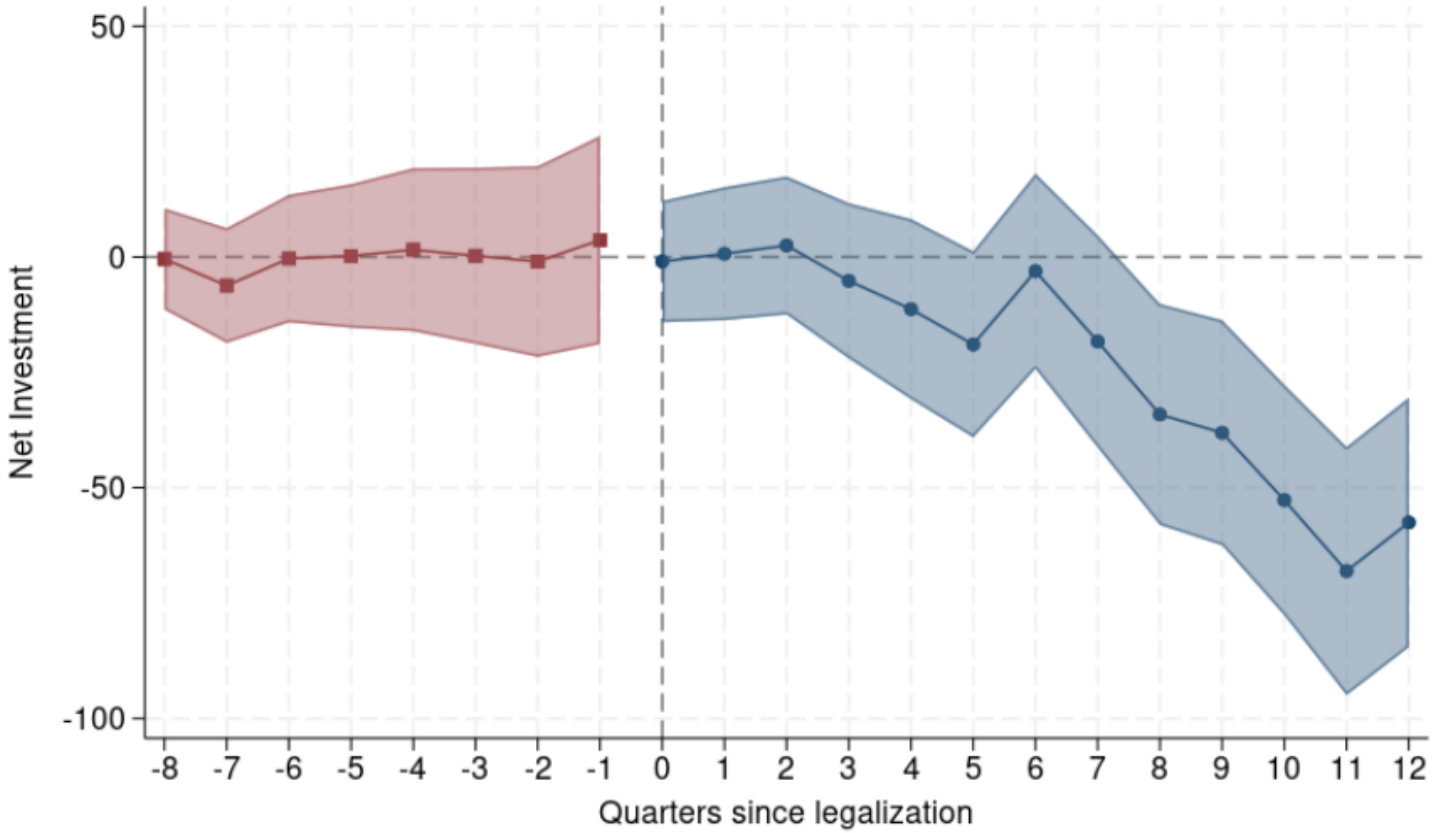
Gambling Activity and Spending Patterns



Baker et al (2024): Impact of US Legalisation

- One possible critique of the Muggleton study is that perhaps some people choose to bet on sports as their "vice" and if we banned sports betting, then they would just switch to a different vice. Perhaps they just would get into day trading or cryptocurrencies and the like?
- To get around this kind of critique, it is useful to have a "natural experiment" where we go from not having online sports betting to it being introduced as an option.
- The US legalisation of sports betting after 2018 provided exactly this kind of natural experiment.
- Baker et al (2024) use data from an un-named US bank that allowed them to identify when people started betting on sports online after its legalisation in their state.
- The chart on the next page shows the net financial investment (i.e. saving) of bettors prior to and after their state legalised online betting on sports.
- The negative effect builds over time, with bettors saving over \$50 less per quarter after a few years. Sports betting is clearly bad for your financial health.

Savings of bettors before and after legalisation



Part II

Problem Gambling

Problem Gambling

- Most people that gamble do so in moderation and don't let it have a significant negative effect on their lives.
- But for some people, gambling becomes an addiction and this can have hugely negative effects on their lives.
- Estimating the fraction of people with gambling problems is difficult and survey estimates vary widely.
- Researchers have developed a **Problem Gambling Severity Index (PGSI)** based on a set of questions shown on the next page.
- UK research suggests 3.9% of people have some level of problems with gambling as indicated by the questions in the PGSI.
- A recent ESRI study for Ireland suggested this figure was as high as 15% of the population.
- The problem is most prevalent among young men.
- Survey evidence asking people how much they bet also points to problem gamblers accounting for a large share of the revenue of gambling firms.

Questions Used to Construct the PGSI

Have you bet more than you could really afford to lose?

Have you needed to gamble with larger amounts of money to get the same excitement?

When you gambled, did you go back another day to try and win back the money you lost?

Have you borrowed money or sold anything to get money to gamble?

Have you felt that you might have a problem with gambling?

Has gambling caused you any mental health problems, including stress or anxiety?

Have people criticised your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?

Has your gambling caused any financial problems for you or your household?

Have you felt guilty about the way you gamble or what happens when you gamble?

Problem Gambling by Type of Gambling

- We have focused almost exclusively on online sports betting.
- There are a few reasons for this:
  - It's easy to get data on odds and outcomes for this kind of betting.
  - It's also easier to try to reconcile this kind of betting with models in which people are rational: People can disagree about probabilities and those who bet may often believe their bet has a positive expected profit.
- But the evidence points to other kinds of betting activities as more likely to be associated with problem gambling. See, for example, the figures on the next page from a report on gambling in England.
- Problem gambling rates are particularly high for those who play online slots or casino games or use fixed-odds betting terminals (FOBTs) in betting shops.
- It is harder to build a fully rational model of this kind of activity because unlike sports, there are no probabilities to disagree about: Over the long run, you are certain to lose on average. But this type of gambling is always available and for many this type of always-on gambling becomes a more addictive habit than waiting for there to be sports events to bet on.

Percentage of Gamblers with PGSI-Defined Problems, By Type of Gambling

Table 20. At-risk gamblers among those who participate in gambling by type of activity, England 2012, 2015, 2016, 2018

	At-risk gamblers among those who participate in gambling (%)
Lotteries and related products	
National Lottery	6.8
Scratchcards	11.9
Other lotteries	8.0
Machines and games	
Football pools	29.1
Bingo (not online)	12.9
Slot (electronic gaming) machines	25.7
Machines in a bookmakers	46.4
Casino table games (not online)	31.5
Poker played in pubs or clubs	45.6
Online gambling on slots, casino or bingo games	44.2
Betting activities	
Online betting with a bookmaker	26.3
Betting exchange	44.0
Horse races (not online)	15.6
Dog races (not online)	26.6
Sports events (not online)	30.5
Other events or sports (not online)	43.6
Spread-betting	52.0
Private betting	25.0
Other gambling activity	
Any other gambling	33.8

Gambling Addiction and Economic Theory: Myopia

- The negative effects of gambling addiction are sufficiently bad that one could simply classify it as irrational and thus outside the bounds of normal economic theory. But one can point to two elements that are used often enough in discussions of consumption and investment decisions and likely play key roles in people ending up addicted to gambling.
- One element is **myopia** or (more technically) **non-geometric discounting**.
- Most economic theory assumes people maximise something like

$$W_t = U(C_t) + \beta U(C_{t+1}) + \beta^2 U(C_{t+2}) + \beta^3 U(C_{t+3}) + ...$$

  where $\beta < 1$, so that people are impatient and place more value on consumption today than consumption tomorrow.
- In this typical formulation, the de-weighting of future utility takes a geometric form β^k. This means the relative weighting of today versus tomorrow is the same as the relative weight of tomorrow versus the day after, or 10 days from now versus 11 days from now.
- This allows for consistent decision making. When I wake up on Monday, my relative prioritising of Monday over Tuesday is the same as it was on Sunday.

Gambling Addiction and Economic Theory: Myopia

- But some economists, particularly Harvard's David Laibson, have argued that at least some people act to maximise something more like

$$W_t = U(C_t) + \delta\left[\beta U(C_{t+1}) + \beta^2 U(C_{t+2}) + \beta^3 U(C_{t+3}) ...\right]$$

where $0 < \delta < 1$, so people prioritise today over tomorrow, more than tomorrow over the day after or 10 days from now versus 11 days from now etc.

- This means people no longer make consistent plans. When I wake up on Monday, I now prioritise getting utility today over Tuesday more than I had been on Sunday. This means people will always prioritise short-term utility over longer-term consistent plans.
- Those with serious gambling problems (or have other addictions such as drugs or alcohol) likely recognise that it is bad for their longer-term financial health but, every day, they prioritise short-term utility over the longer-term outcomes.
- This kind of myopia also affects financial decision-making. Laibson and others have researched the potential long-run welfare benefits that come from "commitment" devices that push people towards making better financial decisions. In the UK, you can sign up to Gamstop and this will exclude you from online betting.

Gambling Addiction and Economic Theory: Shifting Preferences

- Another aspect of addiction is that it tends to change people's preferences over time.
- For example, some have modelled people's utility functions as depending more on the consumption of addictive consumption goods or services if they have consumed more of these substances in the past.
- Other approaches have assumed that some people have a greater tendency to become addicted than others but that people do not at first know their type and may already become too dependent on the addictive good or service by the time they realise.
- I have posted a paper in Brightspace "Myopia and Addictive Behaviour" by Athanasios Orphanides and David Zervos.
- The mathematical level of the paper is well beyond undergraduate economics but you can still get a sense of how economists can use their tools to model these issues from looking at it.

Part III

Taxation of the Gambling Sector

A Case for Pigouvian Taxation?

- The ability to raise tax revenue from gambling has been a key factor motivating governments to legalise and deregulate online gambling.
- Banning it is impossible and people prefer to gamble with licensed operators, so you might as well legalise it and use it as a source of tax revenue.
- But how should it be taxed?
- Economists have long thought about how best to tax products that can inflict harm. They talk about **Pigouvian taxes**, named after Arthur Pigou, an early 20th century economist who promoted the idea that taxes could be used to discourage socially undesirable activities.
- Pigou believed it was often best to discourage harmful activities via taxation and perhaps use the revenue raised to offset the harm.
- Economists' favourite policy for addressing climate change â a carbon tax â is pure Pigou.
- Gambling clearly generates some harm. But in most countries, its taxation is not Pigouvian at all.

Four Options for Taxation

- Let's use our monopoly model with disagreement among bettors to figure out how different approaches to taxation would affect betting odds and volumes.
- We will consider 4 approaches.
  1. A tax on bookmakers' profits.
  2. A tax on "gross gaming revenue" (meaning bets accepted minus payouts).
  3. A turnover tax on betting volume, paid by bookmakers.
  4. A levy on bets placed, paid by bettors

A Reminder of the Monopoly Model

- Beliefs about the probability p that a bet will win are uniformly distributed over $[L, H]$.
- Bettors are risk-neutral and place unit bets when $\tilde{p}D > 1$.
- The demand for bets at odds of D (where $\frac{1}{H} < D < \frac{1}{L}$) is just the fraction of people with beliefs above $\frac{1}{D}$. This is

$$B(D) = \frac{H - \frac{1}{D}}{H - L}$$

- The monopolist's expected profit on the bet is

$$E(\Pi) = (1 - \mu - pD) B(D)$$

- Differentiating with respect to D and setting equal to zero, the profit-maximising odds are

$$D = \sqrt{\frac{1 - \mu}{p} \frac{1}{H}}$$

- Odds equal the square-root of the breakeven odds and the odds the most optimistic bettor would accept.

Option 1: A Profit Tax

- Bookmakers already pay corporate income taxation on their profits but they could be charged a higher rate.
- Consider bookmakers seeking to maximise
- The monopolist's expected profit on the bet is

$$E(\Pi) = (1-\tau)(1-\mu-pD)B(D)$$

where τ is the profit tax rate.

- The D that maximises after-tax profits is the same value that maximises pre-tax profits.
- So taxing corporate profits is **not Pigouvian**: It does not change betting odds or reduce the amount that people bet.

Option 2: A Gross Gaming Revenue (GGR) Tax

- The most common approach to taxing betting around the world in the UK and across various US states.
- Bookmakers tax the profits that come from taking bets minus paying out on winners but don't allow an offset for other costs (the stuff we called $\mu B(D)$).
- The monopolist's expected profit on the bet is now

$$E(\Pi) = (1-\tau)(1-pD)B(D) - \mu B(D)$$

or alternatively

$$E(\Pi) = (1-\tau)\left(1 - \frac{\mu}{1-\tau} - pD\right)B(D)$$

- The non-tax-deductibility of non-payout costs makes them more expensive to cover from post-tax profits. Effectively, you replace μ with $\frac{\mu}{1-\tau}$ so the tax acts like an increase in unit costs.
- Effectively this does the same thing as raise μ, resulting in lower odds and lower volumes.
- But μ is generally very small. At moderate values of τ, this is **not very Pigouvian**.

Option 3: A Turnover Tax for Bookmakers

- This taxes betting volumes rather than profits.
- This is the form of betting tax currently in Ireland.
- The monopolist's expected profit on the bet is now

$$E(\Pi) = (1 - \gamma - \mu - pD) B(D)$$

  where γ is turnover tax rate.
- Effectively this replaces μ with $\gamma + \mu$, again resulting in lower odds and lower volumes.
- This can have more powerful Pigouvian effects because it directly discourages betting as opposed to indirectly raising costs for bookmakers.

Option 4: A Betting Duty for Bettors

- The form of tax that was in place in the UK before the Internet-related reforms of 2001.
- When placing a bet of size 1, bettors have to hand over $1+\tau$, with τ going straight to the government.
- The bettor's rule then becomes to bet if $pD > 1+\tau$.
- Odds still feature the odds the most optimistic bettor will take but now those odds are $\frac{1+\tau}{H}$ and the profit-maximising odds are

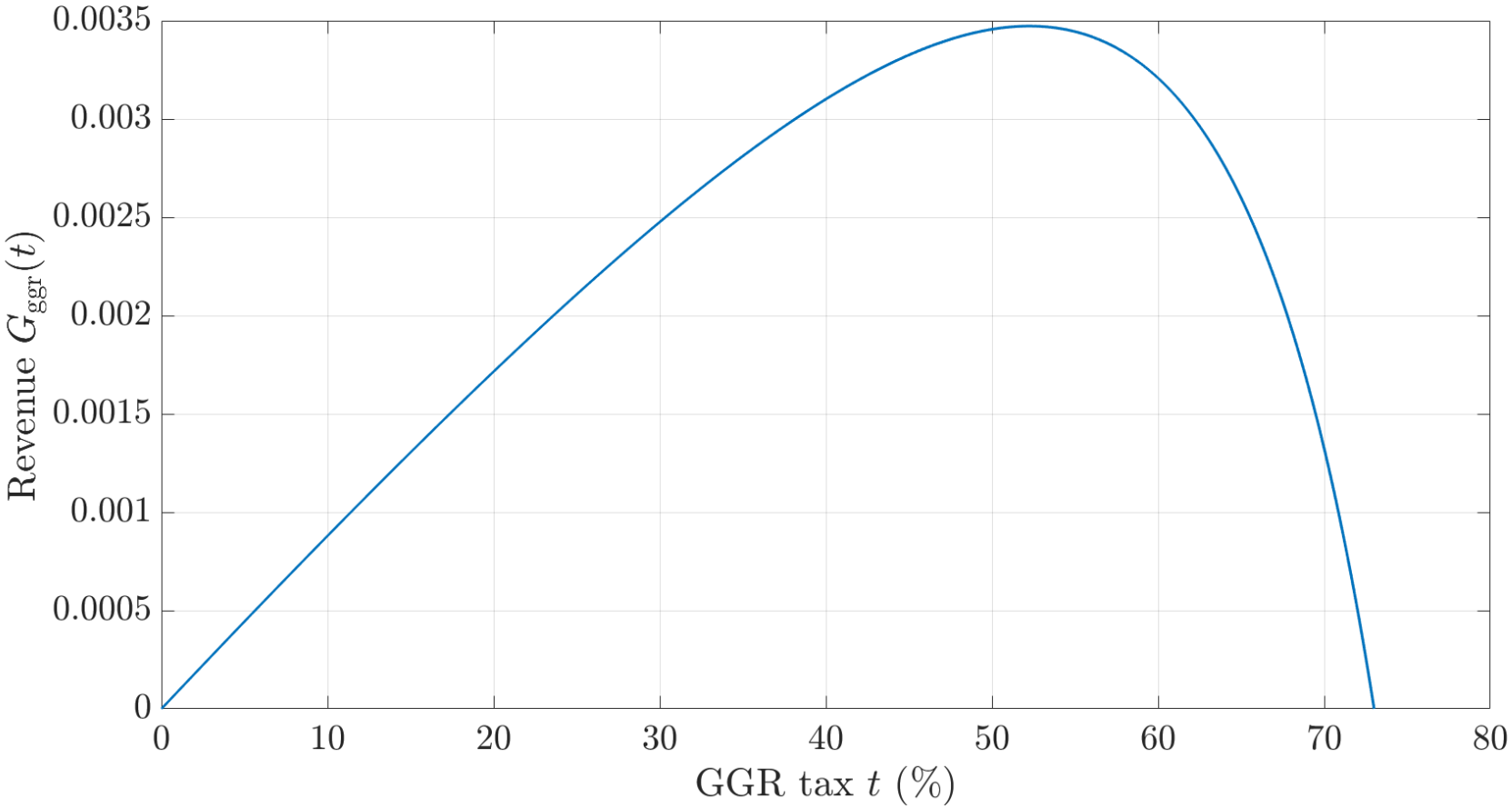
$$D = \sqrt{\frac{1-\mu}{p}\frac{1+\tau}{H}}$$

- This results in higher odds — the customers are now more sensitive to the odds because of the levy — but lower volumes (the indirect effect of the higher odds on demand is smaller than the direct effect of the levy).
- This can also have more powerful Pigouvian effects because it directly discourages betting as opposed to indirectly raising costs for bookmakers.

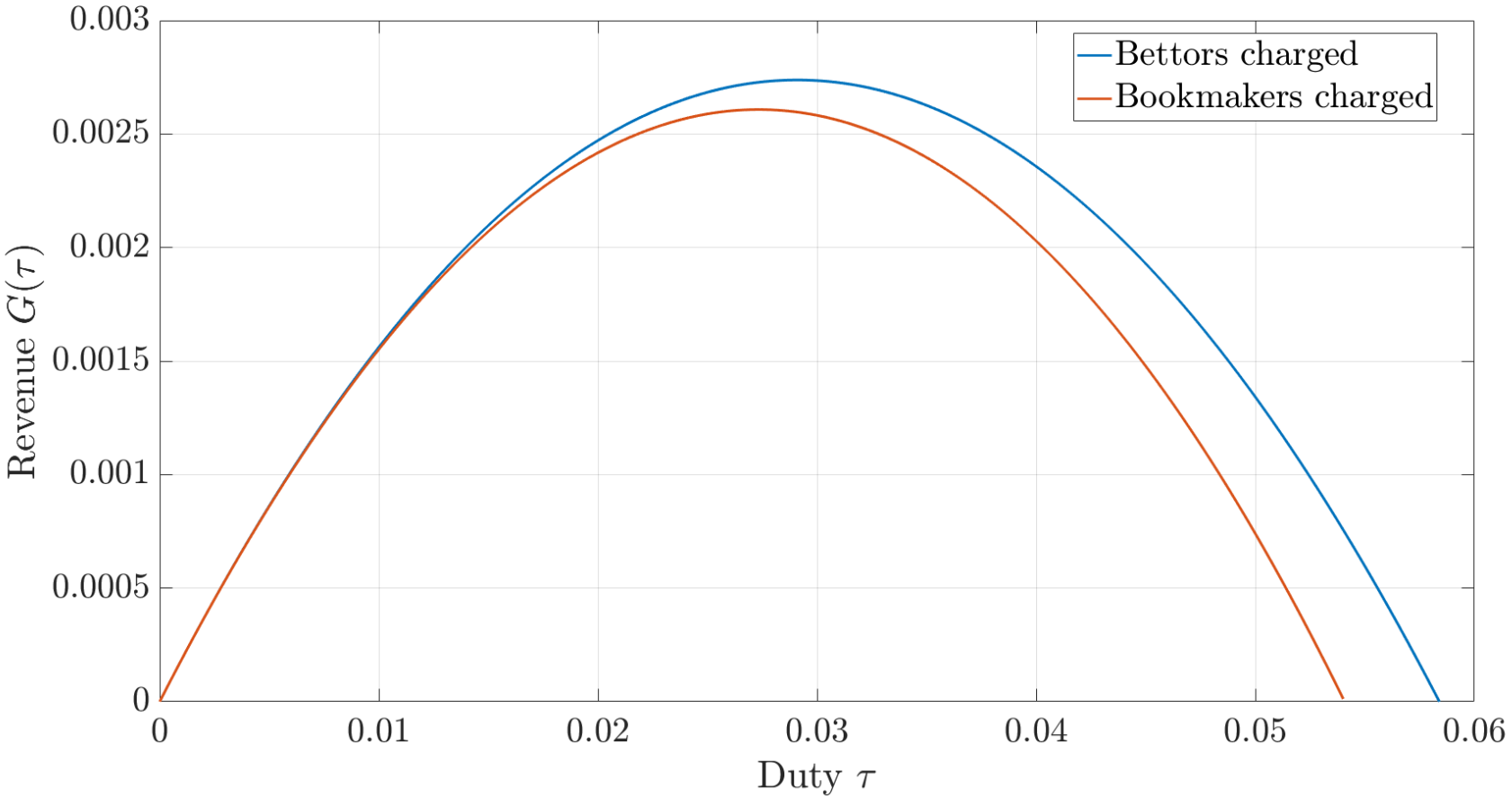
Laffer Curves

- Tax economists have long debated whether there are **Laffer curves** for various taxes: where you cut the tax rate and revenues rise rather than fall because the tax base expands.
- There is very little evidence for Laffer curve effects for income taxes but it is quite credible for betting taxes and we documented a Laffer-like effect earlier, when discussing the 2001 UK tax reform.
- Our model also predicts Laffer curve effects.
  - The model has been calibrated as $\sigma = 0.04$, $\mu = 0.02$ and $p = 0.5$, which implies $D = 1.91$, consistent with the classic US point spread bet of -110 on both sides.
  - The GGR tax rate at first shows an almost linear rise in revenue because it has a limited impact on odds and betting volumes but it curves over at rates above 30% and eventually revenue falls.
  - The betting duties also show Laffer curve patterns.
- Betting industry claims that increasing tax rates on their sector could end up producing lower revenues may sometimes be correct. But not at the low GGR rates that most US taxes apply.

Revenue as a function of GGR tax rate τ with $\mu = 0.02$, $\sigma = 0.04$ and $p = 0.50$



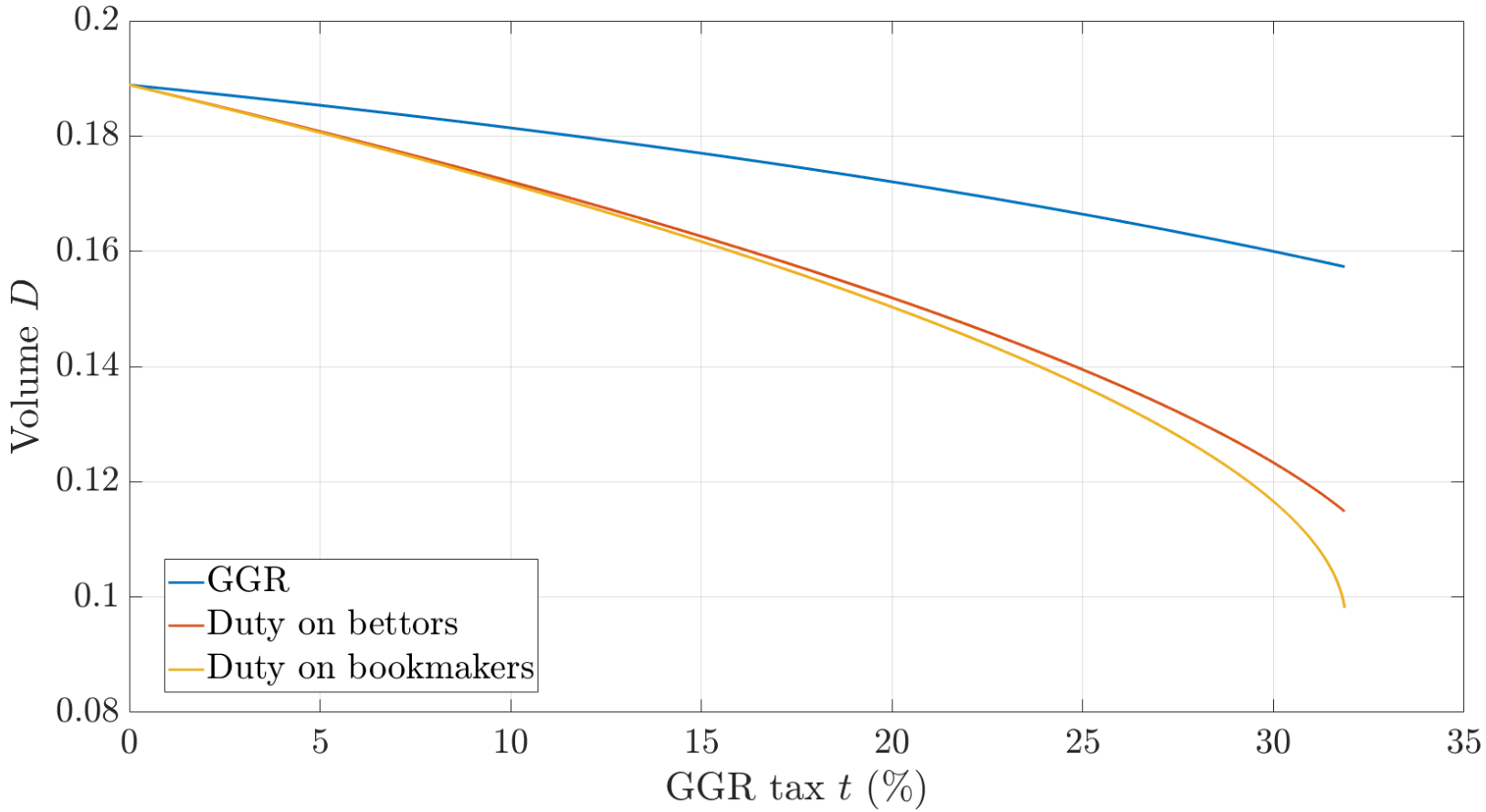
Revenue as a function of duty rates τ with $\mu = 0.02$, $\sigma = 0.04$ and $p = 0.50$



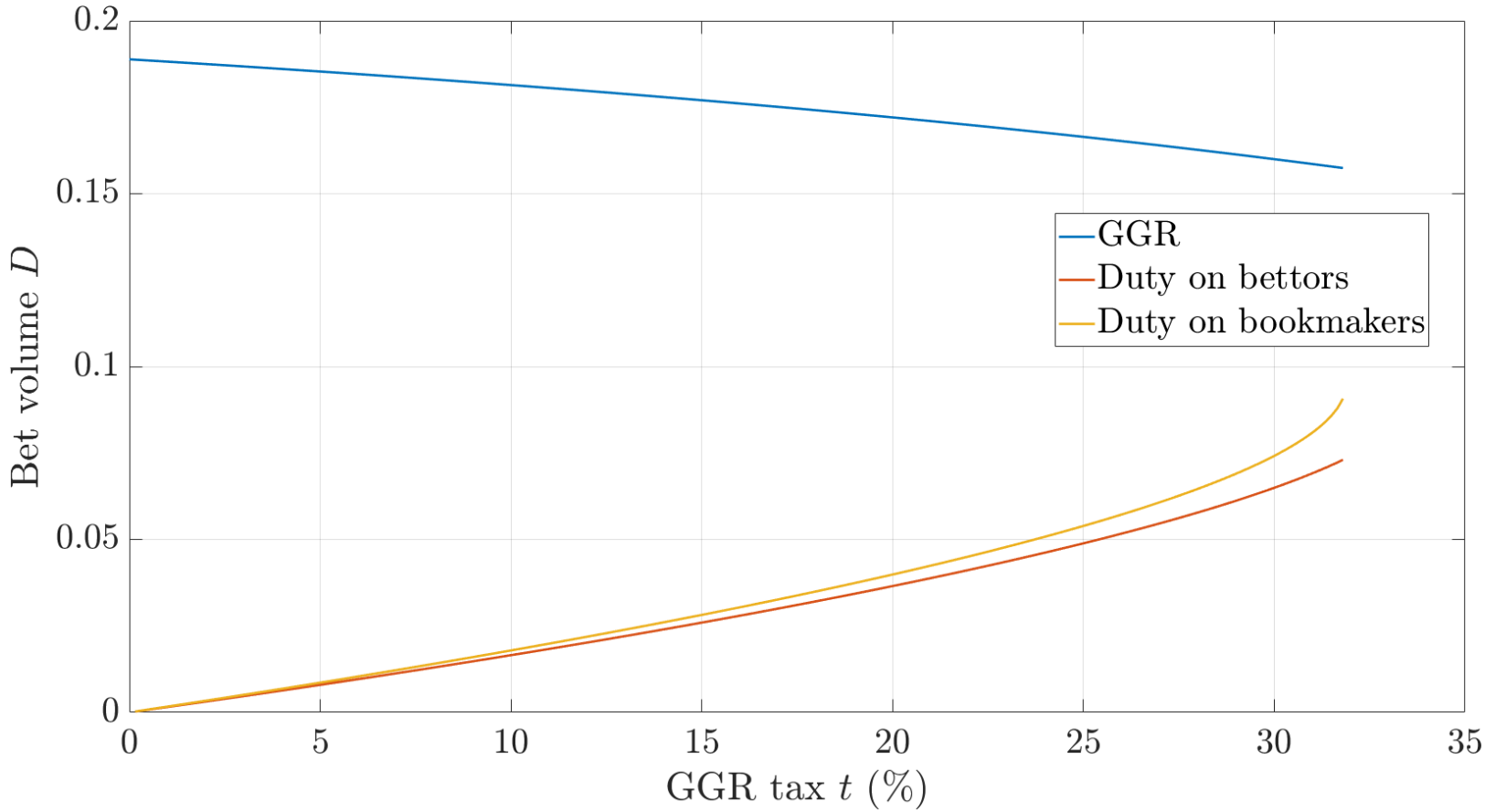
Revenue Raising versus Pigouvian Taxation

- One way to compare the different tax regimes—GGR tax, turnover tax and bettor-facing duty—is to work out the amount of tax you can raise from the GGR tax at various rates.
- Then you can calculate the rates of the other taxes that give the same amount of revenue (up to their Laffer curve peaks).
- For both the turnover tax and the bettor duty, there are two different tax rates that can match a specific level of revenue from the GGR tax:
  1. One **below** the tax's Laffer curve peak.
  2. One **above** the tax's Laffer curve peak.
- Then you can compare betting volume under different regimes that raise the same amount of money.
- Check out the charts on the next few pages.
- Within realistic GGR tax ranges (say 15% to 30%) the other taxes produce less betting volume while raising the same revenue. The above-Laffer-peak tax rates produce **much less volume**.

Betting volumes with equal revenue with $\mu = 0.02$, $\sigma = 0.04$ and $p = 0.50$: Lower τ value



Betting volumes with equal revenue with $\mu = 0.02$, $\sigma = 0.04$ and $p = 0.50$: Higher τ value



Are Very High Taxes Realistic? Probably Not

- The high-tax regime for betting looks optimal according to our model: It raises the same amount of revenue but strongly discourages betting.
- But this is probably not realistic.
  - High taxes on betting likely push people into the unlicensed gambling sector.
  - That used to mean backstreet bookies but today it means **offshore unlicensed and unregulated operators**.
  - These operators do not have to follow responsible gambling rules at all.
  - This means the Laffer curve falling revenue points may happen at lower tax rates than predicted by our model.
- But you can do more to discourage betting than the low GGR tax rate seen in many countries and across many states.
- A move to something more like Ireland's turnover tax may be a better compromise between revenue-raising and harm-reduction goals.