Examining the Influence of Sports Betting Legalization on State and Local Lotteries

by

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This thesis investigated the impact of the legalization of sports betting on state lottery revenue in the United States. Using regression analysis (particularly the difference in differences method) and a comprehensive dataset spanning multiple years and states, I analyzed the effects of sports betting legalization on total lottery revenue, tax revenue generated from sports betting, and combined revenue from lottery and sports betting taxes. The findings revealed significant effects of sports betting legalization on state lottery revenue. Firstly, states that legalized sports betting experienced a notable decrease in total lottery revenue compared to states that did not legalize sports betting. This decrease was statistically significant, indicating a substantial shift in revenue patterns following legalization. Additionally, the analysis showed that the introduction of sports betting led to an increase in tax revenue generated from sports betting activities, as expected. Looking at the overall state revenue implications, I found that states lost an average of $38.7 million when comparing the gains from sports betting tax revenue and the losses from lottery revenue. These findings underscore the importance of considering both the direct and indirect revenue implications of sports betting legalization, especially for policymakers, stakeholders, and researchers seeking to understand the economic and social effects of sports betting expansion.

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I would like to being by expressing my deep appreciation to my Primary Thesis Advisor, Professor Ben Hansen. His guidance in helping me formulate my question, his support in responding to my countless number of emails, and his mentorship throughout this process have been invaluable. I would also like to thank Cameron Mulder, a statistical consultant for the University of Oregon, for constantly helping me overcome my coding bugs. His assistance was instrumental in the completion of this project. I would also like to thank Dr. Ellen Fitzpatrick for being my honors college representative. This has certainly been a stressful project. It's always reassuring to know I have a supportive family there for me in times of need, and for that, I say a huge thanks to my mom, dad, and brother.

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Project Description and Research Questions

In 2018, the United States witnessed a monumental transformation in its gambling landscape when the Supreme Court overturned the Professional and Amateur Sports Betting Act. This historic decision marked a pivotal moment, granting individual states the chance to craft and implement their own laws governing sports betting. Since the ruling, the sports betting industry has thrived. Americans placed over $220 billion in legal sports bets in the first five years since the shift in policy (Parry, 2023). This shift not only started the rise of a new and dynamic industry but has also stirred fundamental questions about its implications for well-established sources of revenue, notably state and local lotteries.

This thesis will utilize extensive datasets on U.S. state lottery revenue and sports betting data to conduct a comprehensive analysis of how the legalization of sports betting has influenced state and local lottery revenues. The primary objective is to provide state governments with insights into the consequences of legalizing sports betting. Will the legalization diminish overall tax revenue by diverting funds away from lotteries? Alternatively, could it boost tax revenue by introducing another taxable source of betting? Or perhaps, will the impact be minimal? These crucial questions drive the exploration, aiming to contribute valuable perspectives to the ongoing discussion surrounding the intersection of sports betting and state financial dynamics.

I hypothesize that states where sports betting was legalized will see a decrease in their state lottery revenue because of cannibalization. However, I also hypothesize that the gains from sports betting tax revenue will at least offset these potential losses given how large the sports betting market is.

Literature Review

This literature review focuses on investigating the complex relationship between the legalization of sports betting and state lotteries. It emphasizes that there is a notable gap in the existing academic discourse, a gap that warrants attention. I seek to answer a fundamental question: How has the legalization of sports betting affected the revenue being brought in by state lotteries? The review will focus on four main areas of interest: In the first section I will look at the changing perception of the state and local lotteries as a source of revenue throughout time, in the second section I will talk about the emergence of sports betting and its revenue implications, in the third section I will look at how the addition of sports betting legalization has shifted state and local lottery use for consumers, and in the last section I will talk about the similarities and differences in sports betting tax revenue vs lottery revenue.

Section 1

Since as early as 1862, when states searched for means to generate funds for Civil War expenditures, state governments have continuously explored avenues to increase state revenue ("Historical Highlights of the IRS | Internal Revenue Service," n.d.). Yet, it wasn't until 1964 that New Hampshire became the first state to introduce the idea of a state lottery. Upon implementation of the lottery there were many skeptics. As shown in a paper by Mikesell and Zorn, skeptics believed the lottery received far more legislative attention than its fiscal significance. This prompted Mikesell and Zorn to examine the history of state lottery revenue. They found that with the 17 state lotteries operating by 1984, the net revenue from these lotteries averaged just 1.95 percent of the state's own-source revenue. And in only two states, Pennsylvania and Maryland, did the lotteries account for more than 4 percent of revenue

(Mikesell and Zorn 1988). And not only was the lottery revenue an insignificant revenue source, but it was also unstable. Mikesell and Zorn additionally showed that only five jurisdictions experienced no negative growth over the time of 1977-1985. This notion was seconded by Roy Kaplan saying that, “although they do raise revenue, they are not able to generate sufficient funds to make significant contributions to the state,” (Kaplan 1984). Kaplan goes on to say that while the lottery generates an impressive amount of money, in the large scheme of things, it’s relatively insignificant.

As time went on, more and more lotteries began to form in states. By 1992 there were 33 state lotteries (Szakmary and Szakmary 1995). This warranted a reexamination of state lotteries. As discussed in Szakmary’s 1995 paper, lotteries were just beginning throughout the 1980’s. And it wasn’t until the early to mid 1980’s that lotto (a game that features long odds and huge jackpots that build from one drawing to the next if there are no winners) was introduced. By the early 1990s lottery revenues accounted for well over 2% of total state revenues (Szakmary and Szakmary 1995). But there is also the argument that lotteries are significantly regressive, meaning the revenue generated from the lottery is targeting the poorer households. From an analysis in 2022, households within the most economically disadvantaged 1% of zip codes containing lottery retailers, the typical American adult allocates approximately $600 annually, equivalent to nearly 5% of their income, toward purchasing lottery tickets. In contrast, individuals residing in the wealthiest 1% of zip codes only dedicate $150, or 0.15% of their income, to purchasing lottery tickets. In other words, households with significantly less money are spending around 30 times more of their income on lottery ticket purchases (“The Economics of American Lotteries” 2024).

Currently, as of 2023, the 48 jurisdictions that run a lottery system in the United States bring in a government revenue of over $30 billion per year. This number has been steadily increasing over time with more than a $10 billion dollar increase since 2009 ("U.S. State and Local Lottery Revenue 1977-2020," n.d.). And that's just pure revenue, ticket sales are also at an all-time high of hitting over $100 billion in 2023, which would make American lotteries the ninth most profitable business in the country ("The Economics of American Lotteries" 2024).

Section 2

Betting on sports dates to ancient times, whether it was betting on the Ancient Olympic Games or placing wagers on chariot races at the Circus Maximus in Rome (Matheson 2021). But with the passing of The Professional and Amateur Sports Protection Act of 1992 (PAPSA) sports betting became restricted throughout the United States. While this law was in place, it created an avenue for sports bettors to bet illegally, through the means of illegal bookies. It was estimated that there was $150 billions of illegal wagers per year on sports betting in the United States (Liptak and Draper 2018). In May of 2018, the policy change in the legality of sports betting marked a significant transformation in the American gambling landscape. New Jersey and Delaware legalized the activity immediately upon the Supreme Court's decision, and many states followed suit. By the end of 2020, 20 states and the District of Columbia had legalized sports gambling. Now, there are over 30 states (Arizona, Arkansas, Colorado, Connecticut, Delaware, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Virginia, Washington, West Virginia, Wisconsin, and Wyoming) that have legalized sports betting, with others coming soon (Bengel and McCarriston 2023). Similarly to how people

thought of lottery revenue in the early stages, in a paper by Auxier (2019) he states, “politicians overestimating gambling revenue or overpromising its significance is not new or limited to sports betting. Many states that dedicate lottery revenue to elementary and secondary education emphasize this in advertisements for the state lottery, but such revenue is a mere fraction of what states spend on schools,” (Auxier 2019). Again, this was also when the product was in its infancy.

In the same paper mentioned previously by Matheson (2021), he shows that in the fiscal year immediately preceding the COVID-19 pandemic-induced shutdowns, sports betting establishments in the United Kingdom, having been legal since 1960, yielded $3.7 billion in revenue, while online gambling platforms added another $2.8 billion to the overall net gambling revenue, as reported by the UK Gambling Commission in 2020. This data indicates that UK gamblers collectively placed approximately $130 billion in wagers during 2019, equating to an average of about $2,000 per person in the country. If one was to extrapolate these figures and apply a similar level of popularity to the American market, the implications are substantial. It suggests that the United States could potentially witness over $600 billion in annual wagers (Matheson 2021). Achieving such impressive revenue numbers would likely necessitate the widespread adoption of legalized mobile sports gambling and the introduction of in-game betting on individual plays, rather than solely relying on wagers related to game outcomes. Currently, as of 2023, we see the revenue coming in from sports betting ($10.9 billion) being greater than the total revenue of most professional sports leagues, excluding only the NBA, MLB, and NFL in the United States.

When PAPSA was overturned in 2018 it created a large amount of business opportunity. As previously stated, New Jersey was one of the first states to take advantage of this. And once

New Jersey took advantage of the gains to sports betting, many other states followed suit. This created a race to the bottom scenario, which is seen frequently when states deal with the chance of increased revenue. The race to the bottom theory refers to a situation where governments compete by decreasing standards or quality to gain a competitive advantage or maximize their own benefits. This is often in the form of increasingly generous tax breaks and incentives to attract businesses, investors, or wealthy individuals. This competition leads to a downward spiral in tax rates and regulations as each jurisdiction tries to outdo the others in offering the most favorable terms. State and local governments across the United States allocate roughly $45 billion annually toward tax incentives with the objective of enticing businesses to establish themselves or to expand the size of existing enterprises. In a study conducted in 2020, it was found that by adding another competitor within a 25-kilometer radius, it raised the likelihood of at least one business in a town getting an exemption from 25 percent to 30 percent and significantly boosting the overall amount of tax breaks (Mast 2020). This goes to show that by one state legalizing sports betting, it will put pressure on neighboring states to also legalize sports betting for fear of losing out on taxes and increased economic activity.

Section 3

In the context of gambling behavior, a significant question emerges: Does the introduction of sports betting lead to a substitution effect, where consumers shift their gambling preferences away from lotteries to partake in sports betting? This question was partially investigated by Humphreys (2021), adding to the very little amount of literature on the topic. He discovered that in West Virginia, from September 2018 to March 2020, legalized sports betting generated about $2.6 million in new tax revenues. But, due to the substitution into sports betting, video lottery terminals saw tax revenues fall by about $45 million over the same period, creating

a substantial opportunity cost in the form of forgone tax revenues (Humphreys 2021). Although, we see in a paper by Kearney (2005), that despite the initial belief that lotteries would replace or serve as an alternative to other forms of gambling, her research results suggest that when people spend on lotteries, they are not abandoning or replacing their participation in other types of gambling activities, instead they are just allocating more money towards gambling (Kearney 2005). This would lead one to believe that the introduction of sports betting would not take away from lottery sales. We also see that upon the introduction of lotto in the 1980's, there was no reduction in sales of existing games at the time, in many states the growth rate increased for all other games (Clotfelter and Cook 1990). The idea of cannibalization -- the reduction of one source of revenue due to the introduction of a potential substitute -- is not new, it has been seen in many areas of consumption. But due to the more recent nature of sports betting, there hasn't been a thorough investigation into the sports betting and state lottery potential cannibalization.

Section 4

For state run lotteries, the overall revenue is calculated by subtracting the prize money handed out from winnings and all the administrative costs of setting up the lottery from the total amount of tickets sold. In terms of total lottery income, prizes take up 64%, state revenue is 32%, and the administrative costs are 4% (Ingraham 2018) And this is the same across every state. What the lottery money goes towards does vary by state though. Lottery revenues are allocated to support different programs based on the guidelines of each jurisdiction. These funds are put towards a wide variety of initiatives, including education, environmental preservation, services for senior citizens, promotion of tourism, tax alleviation, municipal aid, initiatives for economic growth, support for veterans, and more ("WheretheMoneyGoes" n.d.).

State revenue from sports betting is different from state lottery revenue. There are more parties involved than just the state and the consumer in sports betting. Sportsbooks (such as DraftKings, Fanduel, BetMGM, Caesars and many others) have a large stake in the industry. Sportsbooks generate revenue by subtracting the total amount paid out to winning bettors from the total amount of bets placed by bettors before any payouts or winnings are distributed. Then, depending on each state, that revenue generated by the sports book is taxed a certain percentage, creating the state sports betting tax revenue. The tax rate on the sportsbooks ranges from 6.75% in Iowa and Nevada to 51% in New Hampshire, New York, and Rhode Island ("How Do Taxes on Lotteries, Casinos, Sports Betting, and Other Types of State-Sanctioned Gambling Work?," n.d.). This state revenue goes towards very similar funds as the state lottery revenue.

Data and Methods

Data Collection

Within this analysis, panel data (repeated observations over time on the same set of cross-sectional units) was gathered to identify the impact of the legalization of sports betting on state and local lotteries. I started by obtaining lottery revenue data (ticket sales minus prizes) for each state that was available from 2005-2023. The years 2005 through 2021 were obtained via the Tax Policy Center ("Lottery Revenue" 2023), and the last two years were obtained from the North American Association of State and Provincial Lotteries (NASPL). Next, I divided the states into two groups; the first was the treatment group, states that legalized sports betting at some point, giving them a treatment value of one upon their legalization year. All the states that never legalized sports betting had a treatment value of zero. Then, using the Legal Sports Report (Ramsey 2024), which covers the legal online sports wagering industry, I gathered the total revenue received from sports betting for each state in the treatment group, and the taxes each state obtained from all the wagers (with 2023 being the last year). To control for the population size of states, I found the population of each state from 2005 to 2023 found on the Federal Reserve Economic Data (FRED) website. With the population data, I made variables for per capita lottery revenue, per capita total sports betting revenue, and per capita tax revenue from sports betting for each state. To be able to control for economic conditions, I used the unemployment rates from 2005 to 2023 to serve as a proxy variable for economic trends that might influence lottery revenue, this data was also obtained via FRED.

All the data I accrued was downloaded into a .csv file and uploaded into R programming coding language. After this, I created two more variables in my data set, one called State_Factor, and the other called Year_Factor. These two variables created indicator or dummy variables

(variables used in statistical modeling to represent categorical data) for every state and every year, essentially creating a different intercept for each year and each state. This allowed me to control for state fixed effects and year fixed effects, which in theory also allows for control of unobserved heterogeneity across states and time. Once having my data set filled out, I was able to run regressions and create figures through coding in R.

Graphs

I made several graphs to see the overall trends in the data. The first graph I created shows the trend of aggregate per capita lottery from 2005 to 2021 (Figure 1). The second graph I made shows the aggregate per capita lottery revenue, but divided into two lines, one line showing the trend of all the states that legalized sports betting at some point, and the other showing the trend of states that never legalized sports betting (Figure 2). The third graph shows the per capita lottery revenue grouped by legalization year of sports betting, with N/A meaning the state still hasn't legalized (Figure 3). And the last graph I created shows the aggregate per capita tax revenue states collected from sports betting from 2018 to 2023 (Figure 4).

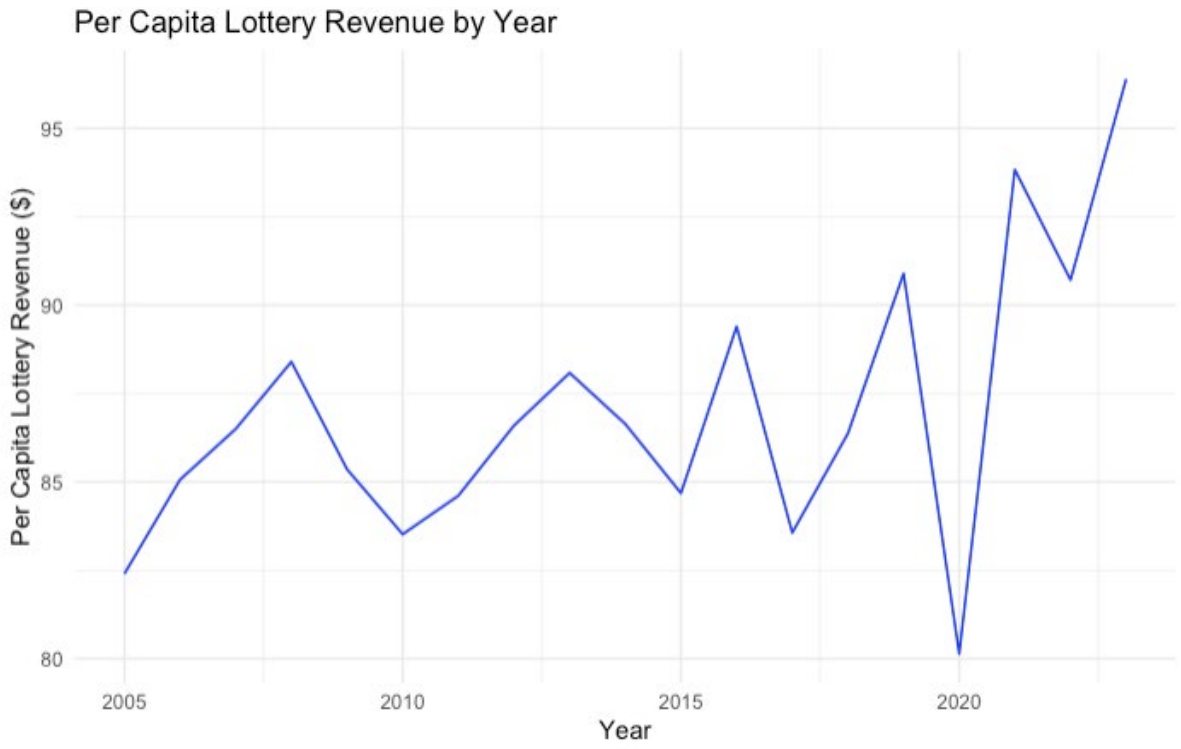

Figure 1. Aggregate per capita state lottery revenue from 2005 to 2023. This graph displays the volatility in lottery revenue from year to year, with a very large decrease in per capita revenue happening in 2020, when much of the United States shut down due to the Covid-19 pandemic.

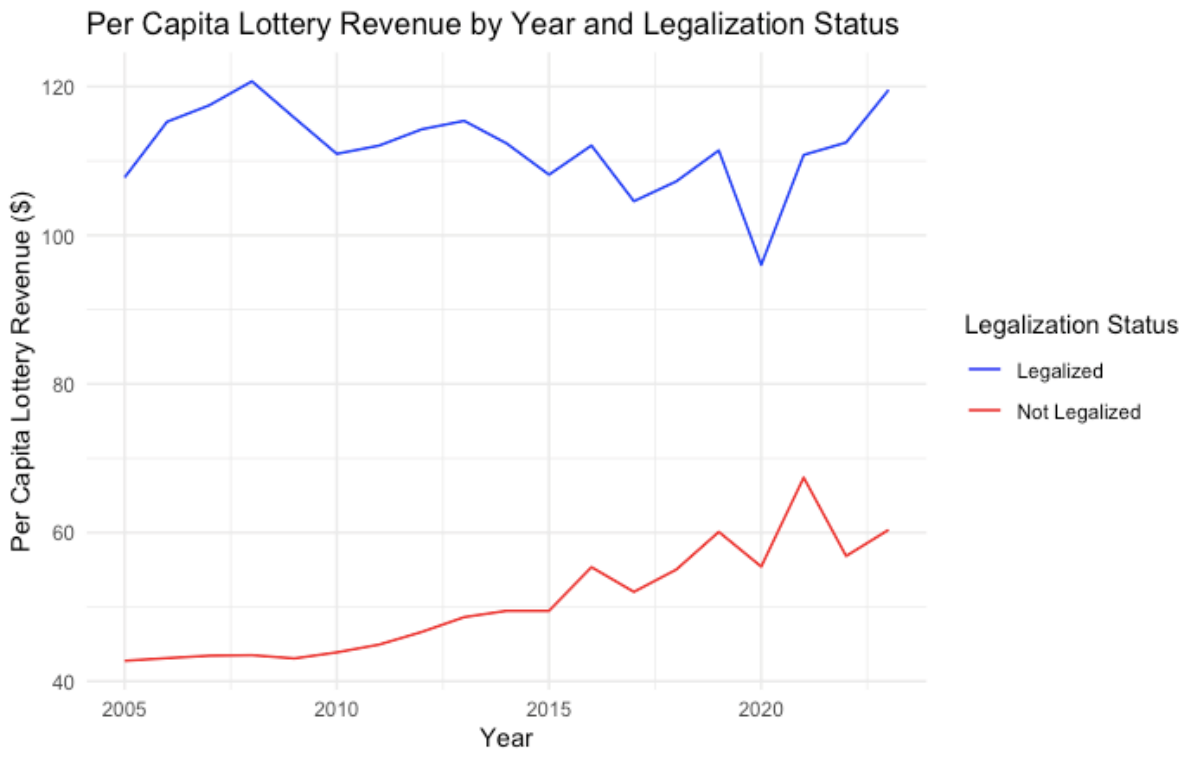

Figure 2. This graph shows the trends in aggregate per capita lottery revenue in U.S. states that legalized sports betting at some point vs states that never legalized sports betting.

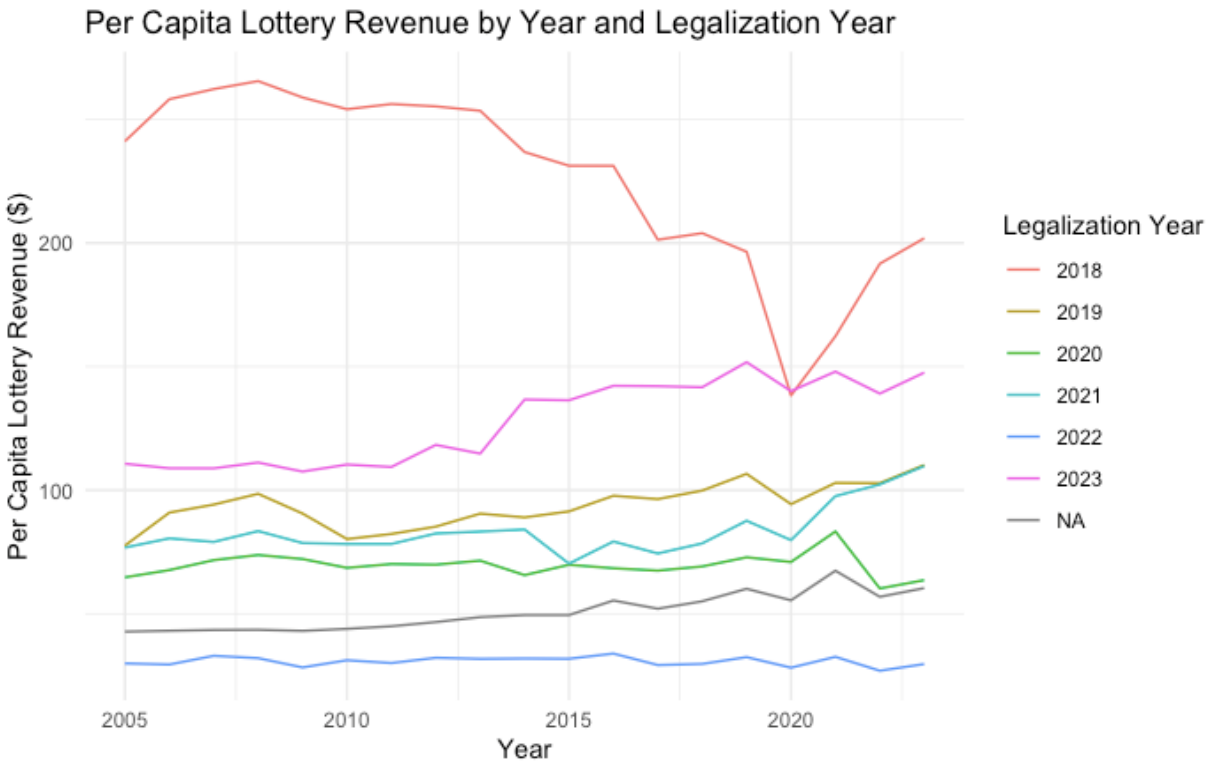

Figure 3. This graph shows the per capita lottery revenue for all states in the same legalization year of sports betting, with N/A indicating no legalization.

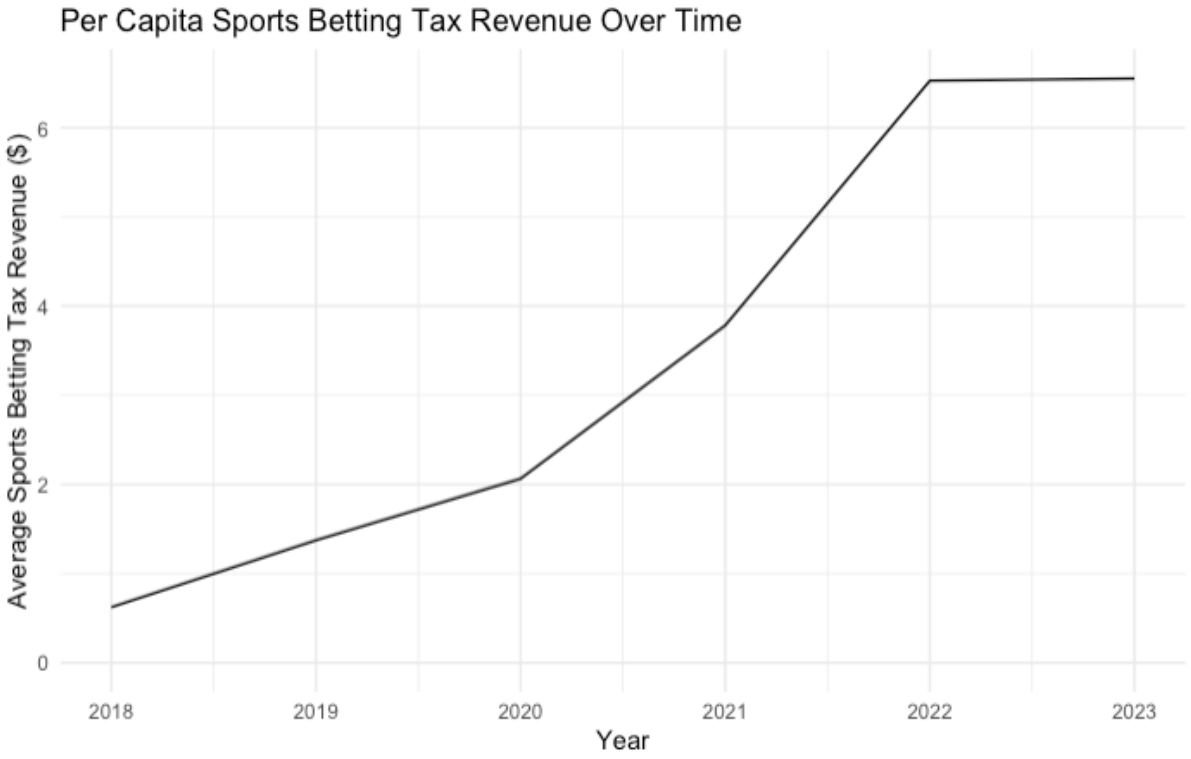

Figure 4. This graph shows the aggregate per capita tax revenue generated from sports betting from 2018 to 2023.

Regressions

By definition, a linear regression at its core is a way to model how a given dependent variable is related to an independent variable(s) and the error term. It is usually expressed in the form of:

$$Y = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 X_1 + u$$

In this basic scenario, Y is the dependent variable, the variable of interest, X is the independent variable, the variable that is being controlled for, the betas are the unknown parameters that are being estimated by the model, and u is the disturbance or error term. In this simple model, a one unit increase in the independent variable (X) would lead to a $\boldsymbol{\beta}_1$ unit change in the dependent variable Y. In terms of answering the question I have proposed, a specific type of linear regression was utilized, the Difference-in-Differences regression. This model takes the form of:

$$DID = (y_{t^A} - y_{t^B}) - (y_{c^A} - y_{c^B})$$

Where **A** and **B** represent outcomes before and after treatment, while **t** and **c** represent treatment and control groups. The y bar indicates that it's taking the average of all the outcomes from the particular group (for example the treatment group before treatment -- y_{t^A}). Difference-in-Differences regression (DID) is a statistical method used to determine the impact of an event by comparing two groups: one where the event occurred (the treatment group) and one where it did not (the control group). The fundamental idea behind DID is that by observing these two groups over time, we can see how their outcomes change relative to each other after the event. The assumption is that if the event didn't happen, the differences between the treatment and control groups would remain constant over time. This allows us to isolate the causal effect of the event by examining changes in outcomes before and after the event occurs. For my research, I ran

several Difference-in-Differences regressions each aimed at seeing the effects on different independent variables.

The general regression I am running is:

$$\mathbf{Y_{s,t} = \beta * binary\_treatment_{s,t} + \alpha_s + \tau_t + \gamma * Unemployment\_Rate_{s,t} + \varepsilon_{s,t}}$$

These coefficients can be interpreted as the following: The coefficient for binary_treatment (β), the coefficient of interest, captures the estimated change in the outcome variable associated with a one-unit change in the treatment variable, binary_treatment, while holding all other variables constant. This coefficient essentially captures the average treatment effect on the outcome variable across states and time periods. The coefficients for the state variable ($\boldsymbol{\alpha_s}$) and year variable ($\boldsymbol{\tau_t}$) represent the effects of state and year fixed effects, respectively. These variables shift the intercept based on geographic space and time variation. They explain the average differences in the outcome variable across different states and years relative to the reference state and year. Lastly, the coefficient for Unemployment_Rate ($\boldsymbol{\gamma}$) represents the estimated change in the outcome variable associated with a one-unit change in the unemployment rate, while controlling for other variables in the model. The error term, denoted by epsilon ($\boldsymbol{\varepsilon_{s,t}}$), represents the unobserved factors that influence the outcome variable but are not explicitly accounted for in the regression model. It captures the discrepancy between the observed values of the outcome variable and the values predicted by the regression equation. For my analysis I will have six different outcome variables for six different regressions. The first regression I ran was:

$$\mathbf{Lottery\ Revenue_{s,t} = \beta * binary\_treatment_{s,t} + \alpha_s + \tau_t + \gamma * Unemployment\_Rate_{s,t} + \varepsilon_{s,t}}$$

This regression aimed at finding the effects of lottery revenue before and after the legalization of sports betting, with the coefficient of interest being the one attached to the binary_treatment variable. The second regression I ran was:

$$\textbf{Sports Betting Tax Revenue}_{s,t} = \beta * \textbf{binary\_treatment}_{s,t} + \alpha_s + \tau_t + \gamma * \textbf{Unemployment\_Rate}_{s,t} + \varepsilon_{s,t}$$

This regression looks at the impact of sports betting legalization on sports betting tax revenue. The coefficient on the binary treatment variable (β) would capture the estimated increase (or decrease) in tax revenue related to sports betting because of legalization. For the third regression I ran the following:

$$\textbf{Lottery Revenue plus Sports Betting Tax Revenue}_{s,t} = \beta * \textbf{binary\_treatment}_{s,t} + \alpha_s + \tau_t + \gamma * \textbf{Unemployment\_Rate}_{s,t} + \varepsilon_{s,t}$$

The outcome variable of this regression is lottery revenue added to the tax revenue made from sports betting. The coefficient (β) on the binary treatment variable would capture the estimated change in combined revenue from lottery and sports betting taxes associated with the legalization of sports betting. If the coefficient is positive and statistically significant, it would suggest that the legalization of sports betting is associated with an increase in combined revenue from lottery and sports betting taxes. Conversely, if the coefficient is negative, it would indicate a decrease in combined revenue after legalization. The next three regressions are like the first three, but now they consider per capita effects, accounting for population size. Regression 4:

$$\textbf{Per Capita Lottery Revenue}_{s,t} = \beta * \textbf{binary\_treatment}_{s,t} + \alpha_s + \tau_t + \gamma * \textbf{Unemployment\_Rate}_{s,t} + \varepsilon_{s,t}$$

Again, looking at the coefficient of the treatment variable to see the effects, the coefficient (β) on the binary treatment variable would capture the estimated change in per capita lottery revenue associated with the legalization of sports betting. Next, I ran regression 5:

$$\textbf{Sports Betting Tax Revenue Per Capita}_{s,t} = \beta * \textbf{binary\_treatment}_{s,t} + \alpha_s + \tau_t + \gamma * \textbf{Unemployment\_Rate}_{s,t} + \varepsilon_{s,t}$$

Here, the coefficient (β) on the binary treatment variable would capture the estimated change in per capita sports betting tax revenue associated with the legalization of sports betting. The last regression ran, regression 6:

$$\textbf{Lottery Revenue Per Capita plus Tax Revenue Per Capita}_{s,t} = \beta * \textbf{binary\_treatment}_{s,t} + \alpha_s + \tau_t + \gamma * \textbf{Unemployment\_Rate}_{s,t} + \varepsilon_{s,t}$$

Like the last two regressions, the coefficient (β) on the binary treatment variable would capture the estimated change in per capita combined revenue from lottery and tax revenue associated with the legalization of sports betting.

Results

The key estimates from my regression are represented in the table below (Table 1).

Table 1

	Lottery Revenue	**Sports Betting Tax Revenue**	**Lottery Revenue + Sports Betting Tax Revenue**
Panel A Total $ (estimates)	-67,253,033**	27,602,775***	-38,740,648*
Standard error	21,712,748	4,359,447	22,849,193
Panel B Per Capita $ (estimates)	-14.53***	4.38***	-10.17*
Standard error	3.54	0.29	3.52
a. These are point estimates from ordinary least squares with controls for state fixed effects, year fixed effects, and unemployment rates. b. ***, ** and *, respectively, denote significance at the 1%, 5% and 10% levels.			

Regression 1 (Lottery Revenue)

I first conducted a regression analysis to investigate the impact of the legalization of sports betting on total lottery revenue. The binary treatment variable represented states with and without legalized sports betting, and the control variables included state fixed effects, year fixed effects, and the unemployment rate. The coefficient estimate for the binary treatment variable was approximately -67,253,033 (standard error = 21,712,748), indicating that, on average, states that legalized sports betting experienced a decrease in total lottery revenue of approximately $67.25 million per year compared to states that did not legalize sports betting (Table 1, panel A).

The statistical significance of this result is notable, with a p-value of 0.002, suggesting that the observed effect is statistically significant at the 5% level.

Regression 2 (Sports Betting Tax Revenue)

Next, I conducted a regression analysis to assess the impact of the legalization of sports betting on tax revenue generated from sports betting. Like previous analyses, the binary treatment variable represented states with and without legalized sports betting, and the control variables included state fixed effects, year fixed effects, and the unemployment rate. The coefficient estimate for the binary treatment variable was approximately 27,602,775 (standard error = 4,359,447), indicating that, on average, states that legalized sports betting experienced an increase in sports betting tax revenue of approximately $27.6 million per year compared to states that did not legalize sports betting (Table 1, panel A). This result is highly statistically significant, with a p-value of 3.83e-10, suggesting a strong association between the legalization of sports betting and higher tax revenue from sports betting.

Regression 3 (Lottery Revenue + Sports Betting Tax Revenue)

For this regression I examined the combined effect of lottery revenue and sports betting tax revenue, I employed the binary treatment variable to distinguish between states with and without legalized sports betting. The model included state fixed effects, year fixed effects, and the unemployment rate as control variables. The coefficient estimate for the binary treatment variable was approximately -38,740,648 (standard error = 22,849,193) (Table 1, panel A). This suggests that, on average, states that legalized sports betting experienced a decrease in total revenue from lottery and sports betting taxes of approximately $38.7 million per year compared to states that did not legalize sports betting. However, the statistical significance of this result is

marginal, with a p-value of 0.0904, suggesting that the observed effect is not statistically significant at conventional levels.

Regression 4 (Per Capita Lottery Revenue)

Continuing the investigation, I conducted a regression analysis focusing on per capita lottery revenue. The model included the binary treatment variable to distinguish states with and without legalized sports betting, alongside state fixed effects, year fixed effects, and the unemployment rate. The coefficient estimate for the binary treatment variable was approximately -14.53 (standard error = 3.54) (Table 1, panel B). This indicates that, on average, states that legalized sports betting experienced a decrease in per capita lottery revenue by approximately $14.53 per year compared to states that did not legalize sports betting. Importantly, this result is statistically significant ($p < 0.001$), suggesting a robust impact of sports betting legalization on per capita lottery revenue.

Regression 5 (Per Capita Sports Betting Tax Revenue)

This regression analysis examined the impact of the legalization of sports betting on per capita sports betting tax revenue. The binary treatment variable represented states with and without legalized sports betting, while the control variables included state fixed effects, year fixed effects, and the unemployment rate. The coefficient estimate for the binary treatment variable was 4.38 (standard error = 0.29) (Table 1, panel B). This indicates that, on average, states that legalized sports betting experienced an increase in per capita sports betting tax revenue by approximately $4.38 per year compared to states that did not legalize sports betting. The coefficient estimate was highly statistically significant ($p < 0.001$), suggesting a strong

association between the legalization of sports betting and higher per capita sports betting tax revenue.

Regression 6 (Per Capita Lottery Revenue + Per Capita Sports Betting Tax Revenue)

This regression investigated the impact of the legalization of sports betting on combined per capita revenue from lottery and sports betting taxes. The binary treatment variable represented states with and without legalized sports betting, while the control variables included state fixed effects, year fixed effects, and the unemployment rate. The coefficient estimate for the binary treatment variable was approximately -10.17 (standard error = 3.52) (Table 1, panel B). This suggests that, on average, states that legalized sports betting experienced a decrease in combined per capita revenue from lottery and sports betting taxes by approximately $10.17 per year compared to states that did not legalize sports betting. Notably, this result is statistically significant ($p < 0.01$), indicating a significant impact of sports betting legalization on combined per capita revenue from these two sources.

Discussion and Conclusion

The landscape of sports betting in the United States changed in 2018 when the Supreme Court took away the Amateur Sports protection act. Since the removal of this law, more than 30 states have legalized sports betting looking to generate a new source of income. This raised the question of how this change in policy affected the consumption of state and local lotteries in the United States, a long and consistent form of state revenue. My hypothesis, that states where sports betting was legalized would see a decrease in their state lottery revenue, and that the gains from sports betting tax revenue would at least offset these potential losses, was partially correct. Lottery revenue did see a significant decrease of approximately $67.25 million per year in states that legalized sports betting compared to states that didn't. But the generated tax revenue from sports betting was not enough to offset the losses. The tax revenue from sports betting generated an increase of approximately $27.6 million per year compared to states that did not legalize sports betting, leading to a decrease in total revenue of approximately $38.7 million per year. In terms of per capita revenue this was approximately a loss of $10.17 per person per year. These findings are directly in line with Brad Humphreys findings (2021) showing that the introduction of sports gambling significantly decreased overall state gaming tax revenues, as gains from sport gambling taxes were far outweighed by decreases in tax revenues from video lottery terminals. These results show that policy makers should take pause before rushing to legalize sports betting.

A new question arises after looking at this data: why would states legalize sports betting if their overall tax revenue is seeing a significant decrease? First, there are some limitations to my analysis. Sports betting has only been legal for five years, making it still relatively new. If this analysis were to be run again after allowing more time for sports betting to grow and

develop, the numbers could be different. The rate at which sports betting tax revenue grows could at some point start to outweigh the losses from lottery revenue declines. Looking at the graph in Figure 2, it is evident that states where sports betting was legalized had a much higher per capita lottery revenue than states that didn't legalize sports betting. This may be evidence that these states were willing to take a hit to their lottery revenue to bring in new types of revenue from sports betting. Overall, states are only losing an average of $38.7 million, a small fraction of the total tax revenue generated by states.

There may also be reasons not included in my analysis that could incentivize states to legalize sports betting, other than just tax revenue. For instance, states may legalize sports betting to stimulate economic activity, create jobs, and attract tourism. While direct revenue from sports betting and the lottery may be lower, the overall economic benefits, such as increased spending in local businesses, hotel bookings, and job creation, could outweigh the revenue loss. And when neighboring states see this increased attraction happening just across the border, they may feel the pressure to legalize sports betting too, and not lose out on certain economic activity that would otherwise go to these neighboring states or to illegal bookies. Also, states that don't legalize sports betting could still experience the losses and distractions away from lottery revenue, by people sports betting in nearby states, or people using a virtual private network, while cashing in on none of the gains from sports betting. In 2017, it was estimated that legal sports betting operations, encompassing employee compensation such as wages, salaries, benefits, and tips, were projected to bolster a total labor income of $11.0 billion. The total employment supported, comprising direct, indirect, and induced jobs, was anticipated to reach 216,671 positions. And legal sports betting was forecasted to make a significant contribution of

$22.4 billion to the gross domestic product (GDP) of the United States ("Economic Impact of Legalized Sports Betting" 2017).

On the contrary, there are also reasons states may not want to legalize sports betting. The adverse effects of gambling extend beyond individual concerns, encompassing broader societal and public health implications. Studies have equated the harm caused by gambling to the toll associated with major depressive disorders and substance abuse (Browne et al. 2016). Research also links the relationship between problem gambling and various health and social challenges, spanning to individual well-being (Suomi, Dowling, and Jackson 2014), familial dynamics and relationships, and even instances of intimate partner and family violence (Dowling et al. 2019). Importantly, these negative repercussions of gambling disproportionately affect economically and socially disadvantaged communities perpetuating existing social and health disparities (Cowlishaw and Kessler 2015) and showing another instance of the regressivity of gambling. Additionally, another paper highlights specific demographic groups, including older adults, young men, and children, as particularly vulnerable to the adverse effects of gambling (Deans et al. 2016).

We also see it hurting the integrity of sports. In the past several years there have been dozens of professional and collegiate athletes suspended or fired for violations regarding sports gambling. Most recently, in a major scandal, Jontay Porter, a former professional basketball player for the Toronto Raptors, was banned from the National Basketball Association for life after it was revealed he was providing confidential information to bettors, and purposefully limiting his playing time for certain bets placed on himself to "hit". ("A Timeline of Sports Gambling Scandals since 2018"). And even worse, we see people ending up in jail. Shohei Otahni, the international baseball star who signed a $700 million dollar contract this past year,

had around $16 million dollars stolen from him by his translator Ippei Mizuhara to fuel his gambling addiction. Mizuhara was charged with bank fraud after taking this money to pay for his sports gambling debts (Arango & Schmidt, 2024).

The two largest states, California and Texas, are still yet to legalize sports betting, and with the addition of them, there's no telling how big the sports betting world will grow. Policy makers have plenty to think about while making this decision, but this study shows that states will be losing a significant amount of lottery revenue with the legalization of sports betting.

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