# Who Do Sportsbooks Beat? An Inquiry into the Relationship between the Legalization of Online Sports Betting and Bankruptcy

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**Abstract**

I examine the impact of the legalization of online sports betting on changes in county-level bankruptcy rates across the United States. I start by outlining the policy context and motivating the research question. Given the limited existing literature on the topic, I review related studies that address comparable issues in the literature review. Using panel data from forty nine states, my regression reveals a modest short-term decline in bankruptcy rate changes, followed by a more pronounced long-term increase. The effects are most significant among financially constrained populations. Then I interpret these findings within the broader academic discourse and propose behavioral mechanisms that may underlie the observed trends. My results suggest that nationwide legalization of online sports betting may carry unintended consequences for the financial well-being of the average American.

# I.    Introduction

In 2009, Jack Markell, then Governor of Delaware, was sued by Major League Baseball

(MLB) for trying to legalize sports betting in Delaware, an unprecedented move at the time.

The MLB won the suit due to the Professional and Amateur Sports Protection Act (PASPA),

an act which in large part was implemented to prohibit the legalization of sports betting so that

the sanctity of the professional leagues across the country could be preserved. In 2014, a

similar situation occurred with then Governor of New Jersey Chris Christie. PASPA continued

to reign supreme. In June of 2015, then Dallas Cowboys quarterback Tony Romo attempted to

hold a fantasy football convention in Las Vegas which ended up being canceled by the

National Football League (NFL) due to the league's gambling policies. While the league was

not anti-gambling, league officials reiterated that it was anti-sports betting. This semantic

distinction drew criticism, as the league accepted sponsorships from casinos without on-site

sportsbooks and also participated in state lotteries. While the difference was subtle, it was

nevertheless present.

Hence, the future of the industry appeared to be forever confined to Nevada given such

unfavorable circumstances. In 2018, however, in a landmark decision, the U.S. Supreme Court

ruled that PASPA was unconstitutional. Unsurprisingly enough, the first two states to legalize

online sports betting were New Jersey and Delaware. Since the 2018 ruling, thirty states and

the District of Columbia have legalized online sports betting.[1] Since then, the sports betting

industry has expanded rapidly, making roughly $26 billion in the last six years; approximately

42% of that $26 billion came from 2023 alone.[2] Since the repealment of PASPA, sports betting

has become a normalized part of daily life. It has swiftly been adopted by the entertainment

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[1] See Figure 2 in the Visual Aids Section of the Appendix for a Map
[2] *Sports Betting Revenue US 2023*. Statista. (June 3, 2024)

industry and these professional leagues which were initially against it. Sports betting has become deeply embedded in the daily lives of consumers—from the broadcasts of games aired to the jerseys which teams wear and billboards across interstates.

Even post-repealment, the legalization of sports betting has remained a topic of debate. Policy makers continue to debate the trade-offs between increased state revenue to the tune of $2.5 billion in 2023 and the risks of exposing consumers, particularly those who are financially constrained, to such easily accessible forms of gambling that have become so normalized.[3] Many opponents argue that sports betting is a way for sportsbooks to exploit financially illiterate and vulnerable consumers. They urge lawmakers to repeal such laws, citing the copious gambling scandals that professional and amateur players have been caught up with, the most noteworthy of which include Brad Bohannon in 2023, the Notre Dame men's swim team in 2024, and Jontay Porter in 2024.[4][5][6] What these examples suggest, critics argue, is that these leagues, amateur and professional alike, are lacking that much more in professional integrity because of the legalization of online sports betting. Those in favor cite factors such as entertainment value, and as mentioned, tax revenue. The tax revenue generated is easily observable, and the potential negative effects on individuals are intuitively easy to understand, especially when one has a thorough understanding of the nature of gambling.

There exists a limited amount of literature on how the legalization of sports betting affects consumers in the United States. These studies focus on, but are not limited to, loan

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[3] Schultz, Matt. "State Tax Revenue From Sports Betting Jumps 35% in 2023; 19 States Show Double-Digit Growth." Edited by Dan Shepard, *LendingTree*, 3 May 2024

[4] Purdum, David. "Alabama Baseball Coach Brad Bohannon Fired after Link to Suspicious Bets, Sources Say." *ESPN*, ESPN Internet Ventures, 4 May 2023

[5] Press, Associated. "Gambling Violations Prompt Notre Dame Men's Swim Team Suspension." *ESPN*, ESPN Internet Ventures, 15 Aug. 2024,

[6] Purdum, David, et al. "Sources: NBA Eyes Raptors' Jontay Porter for Betting Issues." *ESPN*, ESPN Internet Ventures, 25 Mar. 2024

delinquencies, credit score, mortgage payments, and similar data. A paper by Espadafor and Martinez (2021) looked at how sports betting affected opportunities on human capital formation. In the same spirit as my paper, they found that betting houses around vulnerable populations increased inequality of educational opportunities.[7] Regardless, the literature, however, on perhaps the biggest—or at least most noteworthy—indicator of credit health, namely bankruptcy, is sparse. Despite the minimal research into online sports betting, abundant research exists on the causal effects of introducing other forms of gambling on the financial outcomes of individuals. There is strong evidence that the introduction of casinos and lottery games significantly increases bankruptcy rates of consumers who live in their proximity.[8] [9] In that same vein, the people most affected by the introduction of gambling opportunities are the more financially constrained who spend a proportionally greater amount of their income on gambling-related expenses.[10]

If the legalization of online sports betting has the same effect on bankruptcies in affected populations as other forms of gambling, it would be incredibly valuable for policymakers to be aware of such a phenomenon to try to once and for all put an end to this perpetual debate between the costs and benefits of the legalization of online sports betting. The debate, though, seems to have almost worked itself out without the help of the findings in this paper, as in thirty eight states some form of sports betting is legal. Nevertheless, in thirty states that online sports betting is legal, the findings presented in this paper, the behavioral mechanisms that potentially cause these findings, and the subsequent policy implications

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[7] Espadafor, M., & Martínez, S. (2021). The negative consequences of sports betting opportunities on human capital formation: Evidence from Spain. *PloS one*, *16*(10), e0258857

[8] Goss, Ernest, and Morse, Edward A, and Deskins, John. *Have Casinos Contributed to Rising Bankruptcy Rates? International Advances in Economic Research*, 15(4) (August 12, 2009), 456–469

[9] Kearney, M. S. (2005). *State Lotteries and Consumer Behavior*. *Journal of Public Economics*, 89(11–12), 2269–2299

[10] Baker, Scott R. and Balthrop, Justin and Johnson, Mark J. and Kotter, Jason D. and Pisciotta, Kevin, *Gambling Away Stability: Sports Betting's Impact on Vulnerable Households* (October 23, 2024)

could prove beneficial in contextualizing the debate from a different point of view.[11]

Bankruptcy is often a last resort for people in serious debt and is the ultimate sign of a severe

financial problem. This fact creates adequate motivation for studying the effects of sports

betting on bankruptcy. A large influx of financial problems amongst consumers would offset

the benefits of increased state revenue and should intuitively prompt policymakers to

re-evaluate legalization. Given that existing literature has found that the increase in access to

gambling opportunities, such as casinos and lottery games, causes an increase in bankruptcy

rates in affected areas, it is reasonable to expect the legalization of online sports betting to

cause increases in bankruptcy rates in the states and therefore counties where it is legal.

Additionally, given that existing literature shows that financially constrained individuals are

more likely to engage in problem gambling and, when doing so, allocate a proportionally

greater amount of their income as opposed to wealthier individuals, intuitively, the

introduction of online sports betting should cause greater increases in bankruptcy rates in

counties with lower per-capita income.


## II.   Literature Review

Exploring how the legalization of online sports betting affects consumer financial outcomes is

not a novel idea. While the current empirical literature is important, it is also useful to

examine earlier theoretical work to understand the foundations of gambling behavior. Perhaps

the most famous theoretical inquiry into the world of gambling was done by Friedman and

Savage in 1948 with their *The Utility Analysis of Choices Involving Risk*. First, though, to

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[11] These numbers are as of September, 2024 from the American Gaming Association. Consult Figures 1, and 2 in the Visual Aids section of the Appendix for a visual.

ascertain its relevance, I pose several key questions: why do consumers take risks? If consumers do like to take risks, to what extent do they prefer to take risks? And most importantly, is there a causal relationship between income level and propensity to risk take and by extension gamble?

Friedman and Savage asserted that the utility of income is some non-negative cubic function where each change in sign denotes a different socioeconomic class.[12] From this, it is easy to conclude that incremental shifts up in income level yield diminishing marginal utility, i.e., shifts along the curve, while larger, exponential jumps lead to increasing marginal utility. This theorized utility function helps rationalize the behavior of low income, risk-averse consumers in the initial convex segment, they argue.[13] Namely, when taking on said risk, they prefer either low-risk, low-reward or high-risk, high-reward outcomes to medium-risk medium-reward outcomes. The reasoning is presumably as follows: instead of desiring a mere shift up the income totem pole and the potential ramifications of a medium-risk, medium reward decision, risk takers prefer either to take the small chance gamble that lifts them up out of their current socioeconomic class, e.g., a lottery ticket or some other 'fair' gamble. They further even prefer to take an even greater risk with their career path, another form of resource allocation, to jump from one socioeconomic class to another and thus "distinguish themselves" among their peers, doing so with the ramifications of a loss in mind. Whether or not they know that the expected utility of that move is potentially positive is the topic of another paper. Many empirical tests have been done on the Friedman-Savage model and they tend to corroborate the theoretical propositions of Friedman and Savage. For example, consumers who are dissatisfied with their current income level are more likely to purchase

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[12] Friedman, M., and Savage, L. J. (1948). *The Utility Analysis of Choices Involving Risk. The Journal of Political Economy*, 56(4), 279–304.
[13] Consider Figure 3 in the Visual Aids Section of the Appendix for situational awareness.

lottery tickets.[14] Additionally, the sensitivity of lottery demand to jackpot size was higher for lower income consumer units, further vindicating Friedman and Savage.[15] While critics argue that financial illiteracy drives risky behavior, Frieman and Savages' model suggests that consumers may be motivated more by the potential of significant upward mobility. However, this behavior may also reflect limited financial literacy, a theme briefly explored in the Policy and Conclusion section of this paper.

In order to understand the implications of the Friedman-Savage model as they apply to online sports betting, it is important to look at sports betting patterns. A 2023 study found that, on average, sports betting attracts a younger crowd.[16] Similar to the sports entertainment industry as a whole, the online sports betting industry's largest demographic is young men; 39% of men aged 18-49 use online sports betting platforms and of this 39%, 60% interact with such sites at least once a week.[17] According to a different study observing a similar age range, 25-54 year olds are the most likely age range to file for bankruptcy.[18] A 2013 meta-analysis conducted by Nowak and Aloe at the University of Buffalo found that one out of ten college students is a pathological gambler. Recall that this study was published before PASPA was repealed.[19] In short, the demographic that is most likely to go bankrupt is also the demographic that is most likely to be participating in online sports betting.

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[14] Brunk, G. G. (1981). *A Test of the Friedman-Savage Gambling Model*. *The Quarterly Journal of Economics*, 96(2), 341–348.
[15] Dorn, Daniel and Sengmueller, Paul F. and Jones Dorn, Anne, *Why Do People Trade?* (December 3, 2015). *Journal of Applied Finance* (Formerly *Financial Practice and Education*)
[16] Can, Ege and Nichols, Mark W. and Pavlopoulos, Vasileios, *The Effects of Sports Betting on Casino Gambling and Lottery* (December 9, 2023)
[17] Hollenbeck, Brett and Larsen, Poet and Proserpio, Davide, *The Financial Consequences of Legalized sports betting* (July 23, 2024)
[18] Goss, Ernest and Morse, Edward A., *The Impact of Casino Gambling on Individual Bankruptcy Rates from 1990-2002* (August 25, 2005)
[19] Nowak, Donald E., and Ariel M. Aloe. "The Prevalence of Pathological Gambling among College Students: A Meta-Analytic Synthesis, 2005–2013 - Journal of Gambling Studies." *SpringerLink*, Springer US, 11 July 2013

The additive nature of sports betting is also critical. A group of researchers found that the size of deposits made to online betting platforms significantly grew with each deposit and that 40% of bettors deposit money over ten times.[20] This suggests a sunk cost fallacy when it comes to this type of gambling. This result is parallel with other behavioral studies done in other forms of gambling such as poker, blackjack, and slots. Studies have also found that the introduction of sports betting or any form of gambling has prompted rather than a decrease in gambling expenditures but in non-gambling expenditures further affirming the addictive grasp that gambling can have on the most impressionable of consumers.[21] Can et al. (2023) found there to be a complementary relationship between in-person gambling and sports betting.[22] It appears evident, therefore, that once a consumer is 'taken' in the gambling industry whether it be through continuous low-risk, low-reward plays such as $10 straight bets, low risk, high reward lottery games, or incredibly financially irresponsible bets in an attempt to 'beat the odds' and thereafter increase one's utility of income, said consumers are caught in a compounding cycle of financial loss. In certain cases, consumers may not be able to climb out such a hole without the alleviation of the financial strain they would be able to obtain from filing for bankruptcy.

Although less evidence is present regarding the specific causal effect between online sports betting legalization and bankruptcy, there are many conclusive studies on gambling as an industry regarding this relationship. Goss et. al (2009) investigated the effect that the introduction of a casino had on U.S. county bankruptcy filing rates in the first couple of years

[20] Baker, Scott R. and Balthrop, Justin and Johnson, Mark J. and Kotter, Jason D. and Pisciotta, Kevin, *Gambling Away Stability: Sports Betting's Impact on Vulnerable Households* (October 23, 2024)
[21] Kearney, M. S. (2005). *State Lotteries and Consumer Behavior*. *Journal of Public Economics*, 89(11–12), 2269–2299.
[22] Can, Ege and Nichols, Mark W. and Pavlopoulos, Vasileios, *The Effects of Sports Betting on Casino Gambling and Lottery* (December 9, 2023)

of operation and concluded that the rates subsequently increased. While the method of gambling I am studying is different, it is reasonable to suspect a similar outcome. A related study on the introduction of instant lottery games found a 3.1% reduction in household quarterly non-gambling expenditures in those states relative to others where there was no introduction of an instant game.[23] This substitution between gambling and non gambling related expenditures is exacerbated when it comes to financially-constrained households.[24] A similar study found that the introduction of sports betting led to a decrease of about 14% in net investments for individuals.[25]

Another study found that the presence of pari-mutuel gambling in a 25 mile radius of a community increased bankruptcy rates by 9.25%.[26] Casinos, instant lottery games, and pari-mutuel gambling are all different vehicles through which 'gambling companies' provide consumers with increasingly attractive and accessible forms of gambling, and all resulted in an increase in bankruptcies. Concerningly, these are all in-person activities. Online sports betting is even more accessible than these activities. These findings, along with evidence that gambling related activities are not crowded out by other gambling activities but rather complement each other create a snowball effect that is quite hard to stop which, in the worst cases, can lead to a declaration of bankruptcy. These findings imply that eventually, ceteris paribus, gambling related expenditures will altogether crowd out those that are not related to gambling – a losing proposition indeed.

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[23] Kearney, M. S. (2005). *State Lotteries and Consumer Behavior*. *Journal of Public Economics*, 89(11–12), 2269–2299.
[24] ibid
[25] Baker, Scott R. and Balthrop, Justin and Johnson, Mark J. and Kotter, Jason D. and Pisciotta, Kevin, *Gambling Away Stability: Sports Betting's Impact on Vulnerable Households* (October 23, 2024)
[26] Boardman, B., and Perry, J. J. (2007, March 8). *Access to Gambling and Declaring Personal Bankruptcy*. ScienceDirect.

With this in mind, it is important to consider the financial impact that the legalization of sports betting has, especially on financially constrained households, those which are most likely to gamble problematically. Baker et al. explored this relationship quite extensively, finding that it "significantly increases the probability that low savings households max out their credit cards".[27] These same households reduced their credit card payments by an average of $550 dollars after legalization and while this itself does not further exacerbate the financial constraints placed on said households, it suggests that creditors will be less likely to loan money to these households as they have already displayed a level of financial irresponsibility. I intend to build on this existing literature by testing the relationship between online sports betting legalization and bankruptcy rates, particularly amongst financially constrained subsets of populations. Upon the presentation of my results, I will shift to comparative causal evidence from three different sources, and then provide a brief overview of some behavioral mechanisms that I believe contribute to the phenomenon observed both in my research and also across other literature.

## III.    Empirical Methodology

### III. a. Data

I used data from multiple sources but for the sake of brevity I note only those that I believe are the most important. In total, I collected data from forty nine states and Washington DC, omitting Nevada because of its unique gambling laws. All of the online sports betting legalization data came from the American Gaming Association, including the states in which

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[27] Baker, Scott R. and Balthrop, Justin and Johnson, Mark J. and Kotter, Jason D. and Pisciotta, Kevin, *Gambling Away Stability: Sports Betting's Impact on Vulnerable Households* (October 23, 2024)

online sports betting is legal and the years in which the legalization occurred.[28] In my

regression, I use per-capita income data which I source from the Bureau of Economic

Analysis. To calculate the change in bankruptcy rate since 2017, I adopt data from the United

States Courts website and county population data from the Bureau of Economic Analysis. The

data were cleaned and structured into panel format for a fixed effects regression.

## III. b. Limitations

There are a few limitations regarding the data. Above all, the amount of easily accessible,

consistent data that has been posted through 2023 is sparse. In order to keep the effects as

consistent and measured as possible to account for any potential measurement error, I ensured

that data were consistently sourced to minimize discrepancies in my estimation method which

could bias my results. Furthermore, online sports betting has not been legalized long enough

to measure longer term impacts beyond six years, a standard problem given the present short

lifespan of online legalized sports betting.

Other potential limitations in the research include the fact that I treat the legalization

of sports betting within a state as being the same, no matter what time of the year the

legalization occurred. For example, if one state legalized gambling in January, I would expect

it to have a different effect in the first year compared to a state that legalized it in December.

However, due to the fact that the data I used for my regression is collected on a yearly basis, I

had no way of delineating between these different scenarios in a way that would allow me to

conduct a proper regression. Another limitation is that I had to exclude a couple observations

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[28] See Figures 1 and 2 in the Visual Aids section of the Appendix for a map of the states where sports betting was legal.

from the sample in order to ensure that I had strongly balanced panel data. For example, if a specific county only had data from 2017-2019, I excluded that county entirely. This could introduce omitted variable bias or other specification errors which could potentially distort the results of the regression. I also must acknowledge the limitations of county-level data more generally. With county-level data as my foundation, I am unable to observe individual behavior, making it harder to estimate how the individual consumer is affected.

## III. c. Model Specification and Estimation Strategy

My model specification relies on the fixed effects estimation strategy. As I have a limited number of periods and heterogeneity bias is more than likely going to occur, I used a fixed effects model to address this potential bias. It is necessary to use fixed effects in order to capture their effects, given that there are numerous time-invariant, unobserved, county-specific characteristics that have the potential to affect the change in bankruptcy rate. Consequently, as a result of such time-invariant unobserved characteristics, there is a potential for my standard errors to cluster which will bias results. To mitigate this possibility, I arbitrarily cluster the standard errors by county to handle county specific constant effects at play. By doing so, I also make my standard errors robust, reducing the need for additional robustness checks. I now provide the regression equation:

$$y_{it} = yearssincelegal_{it} + yearssincelegal_{it} \, x \, Constrained_{it} + Year_t + \chi_{it} + a_i + u_{it}$$

The dependent variable, $y_{it}$ is change in bankruptcy rate as compared to the base year of 2017, when sports betting was legal in Nevada alone. It is entity and time specific. The first four dummy variables of interest, labeled $yearssincelegal_{it}$ represent instances in which a

county is one year, two years, three years, and four years removed (if applicable) from legalizing online sports betting. I created $yearssincelegal_{it}$ by subtracting the year of legalization from the $Year_t$ variable and omitting negative instances. The model excludes an indicator variable for the year of legalization due to inconsistent timing across states, e.g., some states legalized sports betting at the beginning of the year and others waited until the end. I also did not include a dummy variable indicating 'year zero' which would be the year of legalization. The reason for these exclusions is that some states legalized sports betting in January and others in December, which could lead to potential problems, especially in the year of legalization. In order to deal with this, previous literature has used the quarter system instead of the year system but due to the lack of data availability, I worked solely with the year as the base unit and implemented the aforementioned fix. I also hypothesize that the effects lag, negating the purpose for a zero year. A simple Difference in Differences regression was infeasible because states, and by extension, counties, have staggered legalizations for sports betting. I expect positive coefficients for the $yearssincelegal_{it}$ variables, indicating that legalization increases bankruptcy rates. As has been discussed, sports betting and gambling in general is addictive. The deposits for most therefore are additive. From this I would also assume that the coefficients get larger as the years go on, especially given the fact that the sports betting industry has grown exponentially in terms of media coverage and therefore revenue which leads to a potential, as mentioned, lagged effect.

The interaction term '$yearssincelegal_{it} \, x \, Constrained_{it}$' reports the effect that the legalization of sports betting has on financially constrained households. The variable $Constrained_{it}$ is a simple indicator variable that takes on a value equal to one when the

county per-capita income is less than \$32,500, which roughly 5% of counties had in a given year, otherwise it takes on the standard value zero. I then interact it with the four dummy variables for the amount of years it has been since it was legalized. This created additional dummy variables that represent the specific impact of legalization on financially constrained counties. Similar to the $yearssincelegal_{it}$ dummy variables, I expect positive coefficients. Positive coefficients would imply that financially constrained counties are more likely than control units, namely, the general population to go bankrupt as a result of sports betting legalization.

Within the model, I also include dummy variables for specific years denoted by $Year_t$ to control for time-varying effects that affected all states equally. This was in order to control for exogenous events, such as the COVID pandemic, which affected all counties in largely similar ways. These dummy variables capture overall yearly trends in change in bankruptcy rate since 2017. If I had not included these variables, the model may have improperly attributed overall decreases in bankruptcy rate caused by COVID to the legalization of online sports betting.

A set of exogenous control variables are also included to capture other sources of bankruptcy rate changes, denoted by $x_{it}$. They are observed variables that are unit-specific, time-varying, and were chosen from economic intuition and followed precedents and methods used by previous papers. To illustrate the role of control variables, I provide models both with and without them. $a_i$ represents any county-specific time-invariant unobserved effects that may cause bias to the estimators. As mentioned, there are numerous county specific characteristics that could hamper the results and their consequent interpretation. In using fixed

effects, $a_i$ is removed, negating the possibility. Finally I denote the standard error term by $u_{it}$.

For a rudimentary understanding of the regression, the summary statistics of the regressors are provided in the appendix along with the regression results and sources.

## IV.    Results

To determine the impact of the legalization of online sports betting on bankruptcy rates, I now turn to the results of the regression. The regression results, provided in the Appendix, include three different versions. The three versions are as follows: one model that omits $x_{it}$ control variables and the interaction terms covering financially constrained individuals, one model that includes everything except the $x_{it}$ control variables, and one model that includes everything in the model specified in the proposed regression equation. These models are labeled "Model 1", "Model 2", and "Model 3" respectively.

The model, "Model 3," will be the primary focus, but it is still valuable to compare the results in "Model 3" with the other models. For the sake of brevity, the reader can go to the Appendix to inspect the results more closely. In this section, I will only walk through the parts of the regression that should be considered surprising. Notably, the sign and significance of the "Two Years Legal" variable differ across the three models. While Model 1 and Model 2 both produced statistically insignificant, negative coefficients, Model 3 produced a statistically significant positive coefficient at the 5% threshold. This discrepancy may reflect endogeneity issues in Models 1 and 2 while Model 3 was impacted by such issues to less of an extent.

The regression results for Model 3 produced largely expected coefficients but the negative coefficient for the variable "One Year Legal" should seem at least somewhat counterintuitive to the reader on top of the fact that this result was significant at the 1% significance level. A similar phenomenon is present in the results of Model 1 and Model 2 as well. Since all three models yield similar relationships, it is difficult to dismiss any of them as inaccurate. Moving down through the results, the coefficients are what is expected both intuitively and in the context of existing literature. Upon comparison, the reader should notice that across models the significance and the sign of the coefficients for the variables "Three Years Legal" and "Four Years Legal" are consistent with each other. As opposed to "Two Years Legal" specifically, all three models suggest a similar relationship between the legalization of online sports betting and the change in bankruptcy rates.

Moving to the dummy variables for the years 2019 through 2022, an intuitive outcome is present. As expected, the coefficients on the variables for 2020, 2021, and 2022 are all negative at the 1% significance level. During the COVID-19 period, non-business bankruptcy filings dropped an approximate twenty eight percent so it would be methodologically concerning if these coefficients were not negative and insignificant.[29] This would suggest a possible error with the cleaning of the data or elsewhere along the process. In a similar vein to the results regarding the 'Years Legal' subset of variables, I must mention the unexpected coefficient in the third model for the "Year = 2019" variable. While the first two models report statistically significant at the .1% level positive coefficients, Model 3 reports a statistically insignificant, negative coefficient. The cause of this discrepancy is unclear and may warrant further investigation.

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[29] "Bankruptcy Filings Drop 6.3 Percent." *United States Courts*, 6 Feb. 2023

The interaction terms measuring the specific effect on financially constrained counties had similar results. The coefficients in the first two years for Models 2 and 3 alike were statistically insignificant yet positive. The coefficients in Years 3 and 4 continued to stay positive while simultaneously becoming statistically significant at the 1% level for Model 3 and at the .1% level for Model 2. Also of note is the fact that the coefficients between Model 2 and Model 3 were congruent.While the overall numbers reported by my regression may seem small, when considering the fact that most people do not participate in online sports betting, and that extreme financial loss is required to file for bankruptcy, positive and negative coefficients alike represent a meaningful increase or decrease in the change in bankruptcy rates.

Shifting to the control variables, percentage of the population with a high school degree, poverty rate, natural log of the population, and civil unemployment rate all produced statistically significant coefficients at varying significance levels. The fact that civil unemployment rate along with percent of population in poverty, and percent of the population that attained a high school diploma or high, have negative coefficients is unexpected intuitively speaking. All the other control coefficients were insignificant in the regression, but that does not mean that they were not necessary to include in the regression as they all were included based on economic intuition. Excluding these variables from Model 3 would likely have increased the potential for omitted variable bias. A brief review of those statistically insignificant variables elicits mostly positive coefficients, an expected outcome. Of note, however, is that the natural log of median earnings has a negative coefficient.

# V.   Comparative Causal Evidence

To contextualize my findings within the broader empirical literature, I review recent causal studies that examine the financial consequences of gambling legalization. As mentioned, due to the sparsity of literature on the specific subject matter, my area of interest and subsequent results do not directly correspond with any single prior study but they contribute uniquely to the subject matter by focusing on county-level bankruptcy outcomes complementing existing micro-level analyses on related topics. Thus, my findings are unique and contribute to the literature in a way that no other paper that I know of has. Despite this, I hope that the contextualization of my results within the broader range of results on the subject matter helps the reader understand some of the trends and overall relationships between a consumer's financial health and the legalization of onlines sports betting. I next examine three studies, summarizing their methodologies and highlighting how their findings should yield confidence in my own results.

## V. a. Evidence from Baker, Balthrop, Johnson, Kotter, and Pisciotta (2024)

Baker et al. employ a two-way fixed effects (TWFE) difference-in-differences estimation method based off of transaction-level data from a dataset of U.S. consumers that houses individuals' consumption and investment decisions over time. They identify online sports betting activity by searching for deposits to online sportsbooks. Baker et al.'s findings support my overall results as they document a lagged financial impact of online sports betting legalization. Upon legalization, deposits increase immediately but continue to grow throughout the post-legalization period. My results closely align with those of Baker et al.'s in

this regard. The coefficients for my 'x Years Legal' variables increase monotonically, suggesting that the additive nature of sports betting, wherein consumers bet more and more each time they play, is what pushes bettors to the brink of bankruptcy. Much like Baker et al. note, the increase in amounts deposited over time must also play a role in this additive nature which likely reflects the deteriorating financial position of problem gamblers which consequently impacts their psychological condition. \

## V. b. Evidence from Hollenbeck, Larsen, and Proserpio, (2024)

Hollenbeck et al. pull their data from the University of California Consumer Credit Panel which contains individual-level records of a nationally representative sample of U.S. adults with a credit report. They employ the CS estimator, as proposed by Callaway and Sant'Anna (2021). They aggregate their data to the county-level and weight according to the average number of individuals. They find that access to online sports betting alone significantly increases the likelihood of bankruptcy by as much as 25-30% and identify a two-year lag between legalization and increased bankruptcy filings, which is consistent with my finding that the most significant effects are present in the third and fourth years post-legalization. Since bankruptcy is often a last resort for the most financially burdened consumers, in the face of bet limits and other inhibitors it makes sense that such a lag exists.

While Hollenbeck et al. have the flexibility to focus specifically on young men in low-income counties, my findings are again consistent in trend with theirs as they find that young men in low-income counties experience higher bankruptcy rates and on a more nuanced level, use consolidation loans more than any other group. Although the control

variable that accounts for the percent of the population that is a male between the ages of 19 and 49 is insignificant at the 5% level, its positive sign aligns with the prior findings of Hollenbeck et al.

## V. c. Evidence from Taylor, McCarthy, and Wilbur (2024)

Taylor et al. take a different approach to their analysis of online gambling. Nevertheless, their findings are pivotal in contextualizing the broader argument. They adopt balanced panel data from 717,724 gamblers over a five year span for a generalized synthetic control framework. They find "change in bottom-tercile income earners spending at least 10% of income on gambling is about 5 times larger than the change in top-tercile income earners." This, in confluence with the fact that such policy changes as legalization have "large effects" on irresponsible gambling by low-income gamblers, provides empirical support for my expectation that the subset of variables denoted by 'Financially Constrained at Legal = x' would be positive. Given their findings, I am confident with the signs and magnitudes of the coefficients reported by this subset of variables. These coefficients are not only positive but also larger in magnitude than the 'x Years Legal' subset of variables. Although the 'Financially Constrained' variable itself is not statistically significant, the sign of the coefficient produced gives me further confidence in my results. Taylor et al. also contribute to the subject matter with their analysis of suicides in light of the legalization of online gaming casinos. Returning to the suggested deteriorating psychological condition of frequent bettors, Taylor et al. do not find that the legalization of online gaming casinos has a significant effect on suicides. This does not imply, however, that there is not a change in the psychological condition of bettors, whether or not they are frequent as Arnesen and Matsuzawa note in their

2024 paper. Through an extension of Card & Dahl (2011)'s model, they find that legalized gambling increases the impact of upset losses on intimate partner violence by 10%. In a unique contribution to gambling literature, their findings suggest that financial losses from gambling exacerbate emotional cues due to unexpected team losses.

## VI.    Discussion

Given the existing literature linking sports betting, bankruptcy rates, and financial vulnerability, I expected to find that the legalization of online sports betting in American counties increased bankruptcy rates, especially in poorer counties. In the exploration on the causal effect of legalizing online sports betting on personal bankruptcy filings, I found mixed evidence that the policy change increases bankruptcy rates in the first year post-legalization, but strong evidence that by the third year, it increases bankruptcy rates. I also found strong evidence that in financially constrained counties, the causal effect of legalizing online sports betting on bankruptcy rates is even greater.

Looking more closely at the specific results, the regression found evidence that in the year following the legalization of online sports betting, bankruptcy rates among individuals in those counties actually decreased relative to the base, by a small margin of about 0.005%, which translates to 5 fewer bankruptcy filings per 100,000 people. This is an unexpected result, especially when considering that it was significant at the 1% level. A potential explanation is that sportsbooks often offer a generous amount of free money for new consumers to wager on their site along with boosted odds on certain games, tournaments, and events. It is possible that in the first year post-legalization bettors are actually better off

because of this promotional money. In the long-run, of course, the sportsbooks make their money back on these promotions as the promotional money dries up and becomes sparser.

Moving onto the second year following legalization, when using the primary model as the basis for conclusions, I found that bankruptcy rates increased by a larger and larger margin each year. The model suggests that the legalization of online sports betting does not have an effect on bankruptcy rate in the first year, but in the following years, a causal relationship blossoms. This makes sense when considering that according to existing literature, online sports betting deposits tend to increase over time on an individual basis.[30] Bankruptcy is a sign of an extremely unhealthy financial situation, so for online sports betting to cause bankruptcy it requires larger bets to be placed on a continually increasing basis in regards to frequency.

When looking at the effect of the policy change specifically on financially constrained populations, I found similar results. In the first two years following legalization, the coefficients I measured were positive, however, neither one of them was significant at the 10% level. By the third year and fourth year the coefficients jumped, to 0.1% and 0.09% respectively, significant at the 1% level. These percentages reflect a similar increase in effect by year three and four that I found across all counties. Moreover, the change in bankruptcy rates was even more pronounced, indicating that financially constrained populations are much more susceptible to the negative effects of sports betting legalization. This result aligns with the previous literature and intuition.

VII.    Behavioral Mechanisms

[30] Baker, Scott R. and Balthrop, Justin and Johnson, Mark J. and Kotter, Jason D. and Pisciotta, Kevin, *Gambling Away Stability: Sports Betting's Impact on Vulnerable Households* (October 23, 2024).

The literature on sports betting and financial outcomes, along with my own findings, raises the question: why is it that the legalization of online sports betting causes an increase in bankruptcy filings? Are there specific mechanisms that contribute to such a phenomenon? In this section I aim to explore why this increase occurs, not merely acknowledging its existence. With these potential causes in mind, I will thereafter transition to section VII. where I provide some policy implications, naive and idealistic though they may be.

At the forefront of behavioral mechanisms that affect a gambler's propensity to continue to bet is a misunderstanding of probabilities. While this most aptly applies to spins at the roulette wheel, or hands at the blackjack table, we can certainly attribute the misunderstanding of probabilities to specific gambling fallacies that thereby affect a gambler's cognitive wellbeing. The foremost fallacy for typical gambling is the Gambler's fallacy. In my unpacking of the relationship between this fallacy and a bettors cognitive state, I will refer to Zentall (2021)'s definition of the fallacy.[31] Xu and Harvey detail this relationship in their 2014 paper. They found that gamblers who lost were more likely to lose again, however, those that won were also more likely to win again, in contradiction to the Hot Hand Fallacy. Presumably, those who lost made bets with riskier odds to try to make back all of their money as they expected their luck to change, an instance of the Gambler's fallacy. Their findings reflect a gambler's subscription to the idea that their next win is 'due' and are a testimony to the lagged effect that my and similar models report. The primary driver of financial harm may be not one large bet but rather the accumulation of frequent smaller bets that grow in size as the losses pile up.

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[31] Zentall defines the Gambler's fallacy as "the erroneous belief that if, in the recent past, a particular event occurs more frequently than expected, and it is less likely to happen in the future because probabilities should even out."

Adjacent to the Gambler's fallacy is the next behavioral mechanism I wish to study, the near-miss fallacy. As the name suggests, a near-miss is a failure that comes close to being successful. It is not hard to see how this type of fallacy poses a significant risk to the cognitive health of bettors. In particular, I wish to look at the near-miss fallacy with respect to a special case of sports betting: the parlay. For those not familiar, a parlay is a combination of several different bets into one bigger bet. Typically, the bettor only receives their winnings from the parlay if every single bet, or leg, hits. Even if, for example, twenty out of twenty one legs of a parlay hit, the bettor still loses. Tangentially, some sportsbooks have offered promotions where even if all of the legs of the parlay do not hit, the consumer can still make money. Regardless, parlays can obviously be lucrative if they hit, but in that same breath, they are incredibly profitable for the sportsbooks themselves. In New Jersey, high-margin parlay bets accounted for 53.7% of the gross revenue in July.[32] In September 2024 in New Jersey, parlays accounted for 72.5% of sportsbooks' gross revenue.[33] Parlays exemplify how the near-miss fallacy's influence on bettor behavior may contribute to declining rational decision-making among frequent bettors, thereby affecting their probability to win. Evidentially, Clark et al. 's 2009 paper highlights that near-miss events increase gambling propensity as they increase their experimental subjects' desire to play. While the setting for their experiment was slot machines, the findings undoubtedly translate to parlays and maybe even more so due to the fact that bettors have control over the legs that they can put into the parlay whereas in slots it is entirely random. The prevalence of parlays too also is a testimony to Friedman and Savage's 1948 paper. The reason being that the small chance of winning a comparatively more

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[32] "U.S. Sports-Betting Market Leaders Continue Parlay Wager Push." *VIXIO Regulatory Intelligence*, 23 Aug. 2022

[33] Health, Birches. "As Parlays Rise in Popularity, Moderation Remains Key." *PGA TOUR*, 20 Nov. 2024

amount of money for consumers in essence increases the perceived utility and the odds of making such a wager.

The final behavioral mechanism I will explore is the typical sunk cost effect. The sunk cost effect is perhaps the most intuitive of the mechanisms that I am exploring to understand in its relationship to sports betting. Sunk costs are resources that cannot be retrieved and should not thereafter factor into future investment decisions, but nevertheless they do. Fujino et al. (2018) study decision making under sunk costs in gambling disorder experimenting on gambling disorder patients and healthy controls. While they did not find that people with gambling disorder (GD) have a stronger sunk cost effect than healthy units, they did find that people with longer gambling histories were more likely to show the sunk cost effect. More troubling, however, is that they found that GD patients showed reduced activity in the dorsal medial prefrontal cortex (dmPFC) during sunk cost decisions, the region of the brain that is associated with self control and rational thinking. This implies that GD patients may struggle with making rational decisions when faced with the sunk cost effect. Furthermore, for those with GD, the levels of activation in this area were negatively correlated with the length of time they have gambled for. That is to say, Fujino et al.'s findings suggest that the rationality of those who gamble problematically decreases over time. When we translate this to sports betting, a similar phenomenon surely applies.

As an addendum, I should also briefly mention the end-of-day betting effect pioneered by Ali (1977) and McGlothin (1956). In not so many words, this behavioral mechanism biases bettors to choose higher-risk higher-reward gambles at the end of their betting session. Obviously, this is quite parallel to the sunk cost effect and the Gambler's Fallacy as bettors were making those higher-risk higher-reward bets to try and make up for earlier losses.

# VIII.    Policy Implications and Conclusion

I am largely confident in the results, and must discuss their implications. While the $2.5 billion in tax revenue from sports betting in fiscal year 2023 represents a significant financial benefit, the findings suggest that the legalization of online sports betting also exposes certain individuals, particularly financially constrained individuals, to negative financial outcomes.[34]

For policy makers in the one dozen states that have not yet legalized sports betting and the twenty that have not legalized it online, these potential negative outcomes are important to consider when making decisions concerning the legalization of sports betting. It is unlikely that sports betting will be repealed in the states where it is already legalized. However, there are still certain regulations that could help mitigate the financial harm experienced by vulnerable individuals while still allowing the majority of those that derive entertainment from gambling to continue to do so.

Policy changes could take many forms. Browne et al. find that exposure to messages that deceivingly convey false odds were linked to a greater likelihood of betting in Australia. Thus, it could prove beneficial for U.S. policy makers to consider a ban on particular exploitative types of advertisements. In this same vein, the United Kingdom, Netherlands, and Belgium among countries across Europe have implemented some form of prohibition on gambling ads across different media.[35] Policy makers may also choose to take inspiration from Sweden where temporary legislation was enacted starting on July 2, 2020 that imposed a maximum deposit limit. A self-report survey study run by Håkansson et al. found that among

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[34] Schultz, Matt. "State Tax Revenue From Sports Betting Jumps 35% in 2023; 19 States Show Double-Digit Growth." Edited by Dan Shepard, *LendingTree*, 3 May 2024

[35] Cohen, Joshua P. "As Ads for Sports Betting Proliferate in U.S., Europe Clamps down Due to Potential Risk of Compulsive Gambling." *Forbes*, Forbes Magazine, 20 Aug. 2023

those who were aware of the aforementioned legislation, 38.7% thought it decreased their overall gambling.[36]

One broader and more actionable solution is to implement financial literacy education at the high school level. Currently, of all public high schools in the United States, only 26.3% offer a personal finance course, leading to a defined proportion of the United States population left reeling from the potential of the consequences of learning from their financial mistakes when it comes to unwise financial decisions as a result of a lack of previously instilled knowledge.[37] Mandating financial literacy classes at such formative years could prove quite beneficial for the long-term collective financial health of the United States. As evidence, I turn to Watanapongvanich et al. (2021) who estimate the relationship between financial literacy, financial education, and gambling frequency using the education of the father from respondents of a nationwide survey in Japan from Osaka University as an instrumental variable. Their findings indicate that higher financial literacy is significantly associated with lower gambling frequency, suggesting that enhancing financial literacy among the general populace could help reduce problem gambling.

As the plethora of financial investments, wise or unwise, continues to evolve, and inevitably creates yet more markets for consumers to engage in their own specific monetary allocation preferences, it seems prudent for U.S. policy makers to continue to weigh the benefits and disadvantages of the legalization of sports betting. My results, alongside other causal evidence, presented behavioral mechanisms, and observable social anecdotes seem to

[36] Håkansson, Anders, et al. "Effects of a National Preventive Intervention against Potential COVID-19–Related Gambling Problems in Online Gamblers: Self-Report Survey Study." *JMIR Formative Research*, JMIR Publications Inc., Toronto, Canada, 9 Mar. 2022,
[37] Rael, Hannah. "Number of U.S. Public High School Students Guaranteed to Take a Personal Finance Course on Track to Double to 53% by 2030." *Next Gen Personal Finance*, 15 Apr. 2024

indicate that, at the minimum, limiting the accessibility of sports betting may be essential for ensuring the long-term financial health of the most impressionable among us.

## IX.  Supplemental Appendix

Summary Statistics of Regressors

| Variables | Obs | Mean | Std. Dev. | Min | Max | 1st percentile | 99th percentile |
|---|---|---|---|---|---|---|---|
| R.O.C of Bankruptcy | 17551 | -0.046 | 0.08 | -0.719 | 0.53 | -0.3 | 0.117 |
| Years since legalization | 3687 | 1.208 | 1.148 | 0 | 4 | 0 | 4 |
| Ln(median household income) | 18625 | 10.53 | 0.195 | 9.636 | 11.54 | 10.089 | 11.063 |
| % pop. males between 19 – 49. | 18315 | 18.517 | 3.402 | 10.022 | 58.667 | 12.979 | 31.789 |
| % pop. with highschool diploma or eq. | 18631 | 34.16 | 7.333 | 5.5 | 57.4 | 15.2 | 49.3 |
| % pop. in poverty | 18652 | 14.713 | 5.852 | 2.6 | 56.7 | 5.2 | 34.1 |
| Population (Total) | 18483 | 104000 | 335000 | 43 | 10123521 | 863 | 1317560 |
| Civil Labor Force unemployment rate | 18657 | 5.469 | 2.768 | 0 | 32.4 | 0.5 | 15 |
| % of pop. in poverty * Civil Labor Force unemployment rate | 18651 | 90.389 | 86.42 | 0 | 1530.9 | 5.81 | 443.7 |
| % of pop. that are adults | 18315 | 75.525 | 3.802 | 19.403 | 96.274 | 64.169 | 84.542 |
| Indicator Variable for financially constrained counties | 18829 | 0.049 | 0.216 | 0 | 1 | 0 | 1 |

# Regression Results

| Regression Results | | | |
| --- | --- | --- | --- |
| | Model 1 | Model 2 | Model 3 |
| One Year Legal | -0.00906***<br>(-4.83) | -0.00937***<br>(-4.90) | -0.00528**<br>(-2.59) |
| Two Years Legal | -0.00111<br>(-0.37) | -0.00150<br>(-0.50) | 0.00801*<br>(2.52) |
| Three Years Legal | 0.0187***<br>(4.09) | 0.0181***<br>(3.98) | 0.0326***<br>(6.74) |
| Four Years Legal | 0.0289***<br>(4.80) | 0.0275***<br>(4.65) | 0.0589***<br>(9.03) |
| Year=2019 | 0.0141***<br>(4.43) | 0.0140***<br>(4.33) | -0.00774<br>(-1.54) |
| Year=2020 | -0.0564***<br>(-15.50) | -0.0559***<br>(-14.59) | -0.0830***<br>(-14.64) |
| Year=2021 | -0.0944***<br>(-22.47) | -0.0935***<br>(-21.40) | -0.124***<br>(-21.88) |
| Year=2022 | -0.107***<br>(-22.34) | -0.106***<br>(-21.63) | -0.140***<br>(-22.66) |
| Financially Constrained at Legal = 1 | NaN<br>NaN | 0.0261<br>(1.17) | 0.0209<br>(0.89) |
| Financially Constrained at Legal = 2 | NaN<br>NaN | 0.0364<br>(1.48) | 0.0408<br>(1.63) |
| Financially Constrained at Legal = 3 | NaN<br>NaN | 0.136***<br>(6.88) | 0.107**<br>(3.28) |
| Financially Constrained at Legal = 4 | NaN<br>NaN | 0.131***<br>(6.57) | 0.0933**<br>(2.89) |
| Financially Constrained | NaN<br>NaN | 0.0114<br>(0.59) | 0.00965<br>(0.61) |
| Natural Log of Median Earnings | NaN<br>NaN | NaN<br>NaN | -0.0133<br>(-0.78) |
| % of pop. Male & 19-49 y/o | NaN<br>NaN | NaN<br>NaN | 0.000601<br>(0.81) |
| % of pop. attained HS Diploma or Higher | NaN<br>NaN | NaN<br>NaN | -0.00166***<br>(-6.05) |
| Percent of Population in Poverty | NaN<br>NaN | NaN<br>NaN | -0.00256*<br>(-2.44) |
| Natural Log of Population | NaN<br>NaN | NaN<br>NaN | -0.0161***<br>(-7.78) |
| Civil Labor Force Unemployment Rate | NaN<br>NaN | NaN<br>NaN | -0.00624*<br>(-2.41) |
| Percent in Poverty * Unemployment Rate | NaN<br>NaN | NaN<br>NaN | 0.000206<br>(1.40) |

| Percent of Population that are an Adult | NaN | NaN | 0.00103 |
|---|---|---|---|
| | NaN | NaN | (1.75) |
| Constant | -0.00973*** | -0.0104*** | 0.342 |
| | (-3.63) | (-3.68) | (1.74) |

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| Observations | 3553 | 3553 | 3536 |
|---|---|---|---|

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t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

## Visual Aids

Figure 1[38]
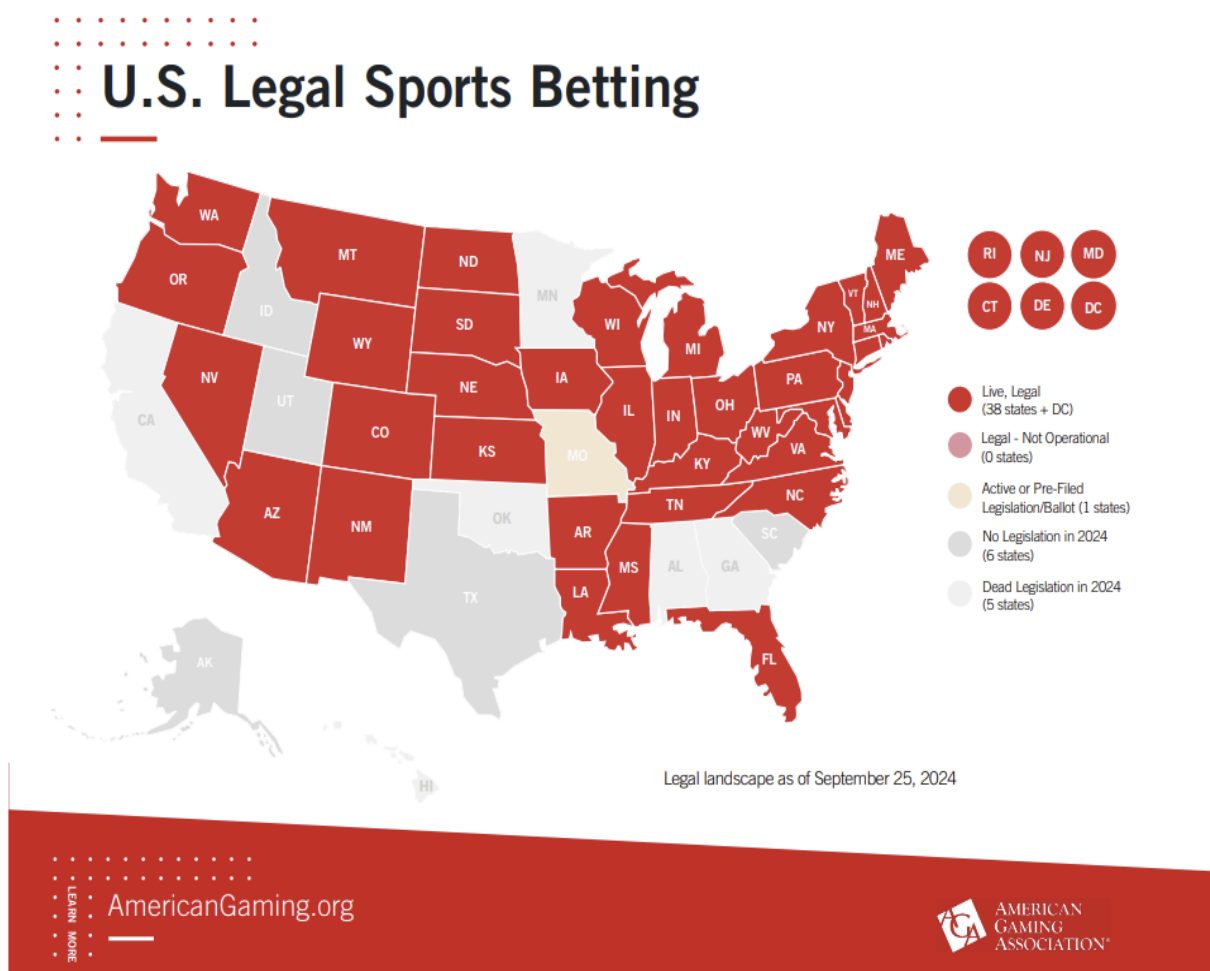
[38] "Gaming Map." *American Gaming Association*, 25 Sept. 2024

Figure 2[39]
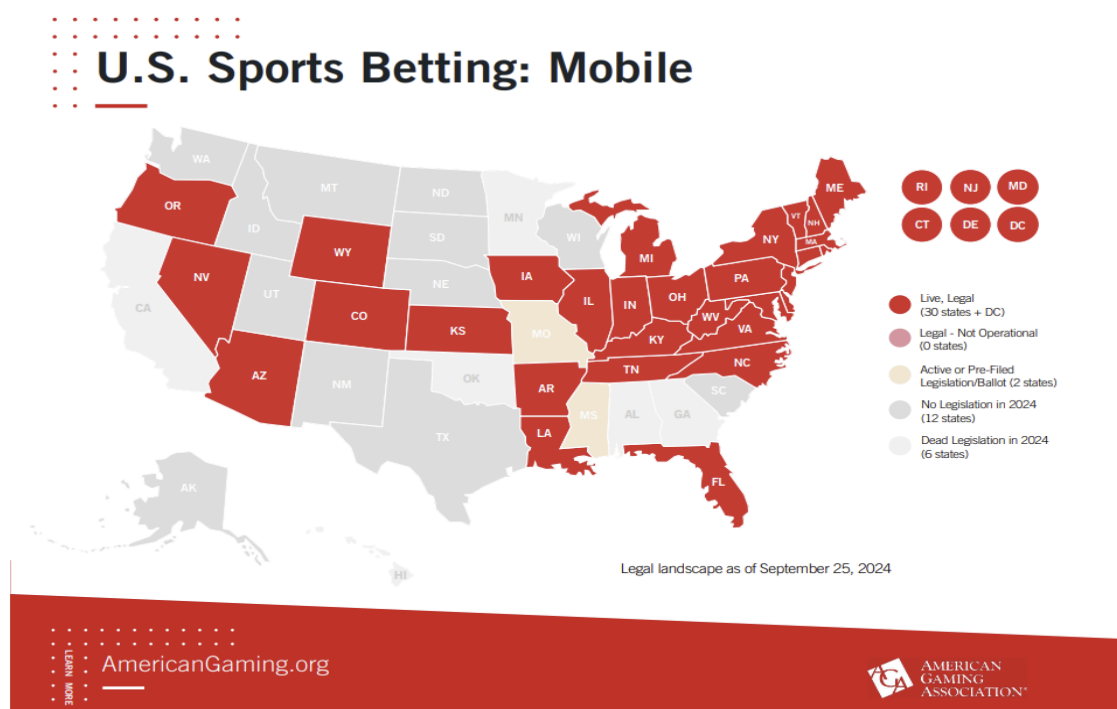


Figure 3[40]
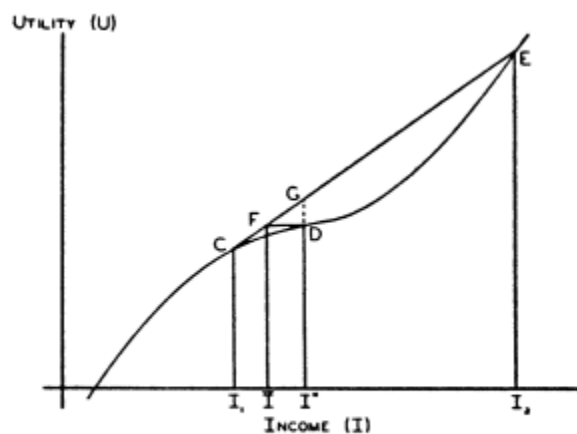


FIG. 2.—Illustration of utility function consistent with willingness of a low-income consumer unit both to purchase insurance and to gamble.

[39] ibid
[40] Taken from: Friedman, M., and Savage, L. J. (1948). *The Utility Analysis of Choices Involving Risk*, pg. 295.

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