Risk Taking Begets Risk Taking: Evidence from Casino Openings and Investor Portfolios*

Chi M. Liao†
Rotman School of Management
University of Toronto

January 2014

JOB MARKET PAPER

Abstract

In this study, we provide evidence that stimulation from non-investment risk taking can affect investors' willingness to take investment risk in their portfolios. Risk taking itself is an activity that elicits positive emotions such as excitement, which Kuhnen and Knutson (2011) show can subsequently induce greater financial risk taking. To test this hypothesis, we use the initial legalization and opening of commercial casinos in the United States as a natural experiment to examine the effect of increased stimulation from gambling on investors' portfolio risk taking. When a casino opens in close geographical proximity to investors, we find that those likely to visit a casino and gamble (likely gamblers) take on more risk in their portfolios relative to investors unlikely to visit a casino. We also find that likely gamblers are compensated for the increased portfolio risk and subsequently earn higher returns, but do not improve the overall mean-variance efficiency of their portfolios. These findings provide insight into the nature of risk taking and the amplifying effect that taking risks in one context may have on portfolio risk taking.

* I am deeply indebted to Lisa Kramer for her encouragement and guidance. I also thank Susan Christoffersen and David Goldreich for much valuable discussion and advice. I am grateful for the helpful suggestions of Ling Cen, Peter Cziraki, Stefano DellaVigna (discussant), Mark Kamstra, Jan Mahrt-Smith, participants at the 2013 NBER Behavioral Economics Working Group Meeting, and seminar participants at the University of Toronto. I thank Terry Odean for use of the discount brokerage data. All errors are my own.

† Rotman School of Management, University of Toronto, 105 St. George Street, Toronto, Ontario, M5S 3E6, Canada. Email: cliao@rotman.utoronto.ca

1 Introduction

The nature of risk taking is fundamental to decision making in economics and finance. Our understanding of risk taking has bearing on every aspect of portfolio design, from asset allocation to asset selection to performance evaluation. Standard models in economics and finance assume that agents are endowed with stable, well-defined risk preferences. More recently, however, studies have shown that risk preferences can vary throughout an individual's lifetime as a result of economic experiences (Malmendier and Nagel, 2011; Appendino, 2013), environmental factors that influence mood (Saunders, 1993; Hirshleifer and Shumway, 2003; Kamstra et al., 2003; Bassi et al., 2013), and emotions such as fear (Guiso et al., 2013), anxiety, and excitement (Kuhnen and Knutson, 2011). In a similar manner, we identify a specific factor that has the potential to alter individuals' willingness to take investment risk; in this case, the very act of taking risk is hypothesized to influence the level of risk subsequently taken in investor portfolios. More specifically, we empirically test whether stimulation from exposure to non-investment risk taking though casino gambling can increase investors' willingness to take investment risk in their portfolios. That is, we study *changes* in portfolio risk taking as a direct result of increased risk-taking behavior outside the domain of investment decisions.

One channel through which this effect may occur is through emotion. There is considerable evidence in the psychology literature that incidental emotions, which arise from environmental factors, can influence subsequent decision making in unrelated contexts.[1] Along these lines, risk taking is a stimulating activity that can be highly arousing and elicit positive emotional responses such as excitement (Anderson and Brown, 1984; Zuckerman, 1994), even in professional traders (Lo and Repin, 2002; Lo et al., 2005).[2] In related work, studies have shown that positive and arousing emotions such as excitement, which risk taking itself can generate, induce people to make riskier financial decisions (Knutson et al., 2008; Kuhnen and Knutson, 2011). Thus, it is plausible that the very act of taking risks may alter one's emotional state, thus increasing subsequent willingness to take investment risk in one's portfolio.[3] Conversely, negative and arousing emotions such as anxiety,

[1] For instance, incidental emotions have been shown to affect how much people are willing to pay for a good (Lerner et al., 2004), how satisfied people are with their lives (Schwarz and Clore, 1983), and the extent to which people are attracted to others (Dutton and Aron, 1974).

[2] In these studies, emotional responses are measured indirectly using the responses of the autonomic nervous system, such as changes in heart rate, respiration, body temperature, etc.

[3] Another potential channel, in addition to emotion, through which we may see casino gambling affect subsequent risk taking is loss chasing whereby investors increase risk taking after losing at a casino in hopes of "doubling down." However, the literature studying the effect of prior losses on subsequent risk taking provides mixed results. Coval and Shumway (2005) find that Chicago Board of Trade proprietary traders who suffer losses in the morning tend to assume above-average afternoon risk to recover from morning losses. Smith et al. (2009) find that experienced poker players play less cautiously after a big loss. In contrast, Thaler and Johnson (1990) show that individuals take less

fear, and disgust, can cause individuals to make more risk-averse financial decisions (Kuhnen and Knutson, 2011; Guiso et al., 2013; Fessler et al., 2004). Hence, it is also possible that the opening of a casino that encourages gambling is met with anxiety or disgust in non-gamblers morally opposed to gambling (Koleva et al., 2012; Gallup, 2011), potentially resulting in less risk taking by non-gamblers.

To test the above hypothesis that stimulation from gambling can influence portfolio risk taking, we use the initial legalization and opening of casinos in the United States as a natural experiment. In this setting, gambling is considered a consumption good that has the potential to stimulate and elicit excitement and not as a component of investors' financial portfolios. Gambling may be viewed as an extreme form of risk taking, but it is nonetheless a form of risk taking that generates excitement in those who participate and is thus a reasonable surrogate for the stimulation associated with risk taking.[4] Furthermore, casino openings are exogenous events with respect to the treatment group of investors likely to gamble and provide a useful natural experiment to test whether externalities that facilitate increased risk taking in one setting translate to subsequent increases in investment risk taking.[5]

Given the history of gambling legislation in the U.S., the early nineties is a prime sample period to study the initial impacts of casino openings. Up until the late 1980s, all forms of commercial gaming, except for bingo and horse racing, were illegal everywhere in the U.S. except for the state of Nevada and Atlantic City, New Jersey.[6] The legal climate for American casinos began to shift in the 1970s. Between 1978 and 1988, a number of states made serious efforts to legalize casinos, but no legislation was passed. Starting in 1989, Iowa enacted legislation to authorize limited stakes casino gambling on riverboats, quickly followed by several other states. Between 1991 and 1996, over one hundred new casinos opened across seven states that newly legalized casino gambling. Accordingly, this is the period we examine to exploit the initial wave of casino openings in the U.S.

risk after a small prior loss, unless a lottery allows them to break even. Shiv et al. (2005) find experimentally that participants take on less risk in response to prior losses. In the IPO market, Kaustia and Knüpfer (2008) find that investors are less likely to subscribe to an IPO if they previously subscribed to an IPO with negative initial returns. Thus, it is not clear ex ante the effect that losses from gambling at a casino will have on portfolio risk taking.

[4]Surveyed gamblers have identified excitement and entertainment as main motivations for gambling (Anderson and Brown, 1984; Kallick et al., 1979). Consistent with self-reported evidence, studies have found that individuals experience excitement measured using physiological arousal, such as increased heart rate, during gambling activities (Anderson and Brown, 1984; Leary and Dickerson, 1985). Furthermore, casinos themselves are designed to be full of stimuli, such as flashing lights and free drinks served by attractive people, to induce a state of positive arousal and increase risk taking in patrons.

[5]It is not necessary that the opening of a casino be completely exogenous; it is very possible that casinos open in places where higher demand is expected, but this would work against us because investors we identify as non-gamblers would actually be gamblers, attenuating the difference.

[6]We only look at casinos owned and operated by companies in this paper. We do not examine the openings of Native American casinos, race tracks, etc.

and to determine the potential effect that increased exposure to risk taking through gambling has on investment risk taking in investors' portfolios.

To test the impact of a newly-opened casino on portfolio risk taking, we must first identify the set of investors affected by the casino opening. Presumably, individuals who gamble are likely to visit a new casino and, as a result, be stimulated by the increased risk taking, whereas non-gamblers are not susceptible to the same stimulation from gambling. The data set used to analyze investors' portfolio risk taking is from a large U.S. discount brokerage and contains monthly portfolio positions from 1991 to 1996; we will refer to this data set as the "brokerage data". In addition, it contains demographic and zip code data for a subset of investors, but does not contain direct information about each investor's gambling behavior. Given this constraint, we use a propensity score approach to indirectly infer investors' propensity to gamble using their demographic and geographic characteristics.[7] To this end, we construct a second, supplemental survey data set, separate from and unconnected to the brokerage data, which we refer to as the "survey data."[8] This survey data contains responses from subjects regarding their gambling behavior, as well as their demographic and geographic characteristics. Using this survey data, we estimate a predictive model of gambling behavior where respondents' demographic and geographic characteristics are used to predict their gambling behavior. The parameter estimates from the fitted model are subsequently applied to the same set of demographic and geographic characteristics available in the brokerage data to construct a predicted "propensity to gamble score" for each investor. This score is the predicted likelihood that each investor will visit a casino to gamble, estimated based on their demographic and geographic characteristics.

The brokerage data is further supplemented with the opening dates and locations of U.S. casinos that opened in the sample period. The final sample of investors used in the main analysis is comprised of brokerage investors residing within 50 miles, or approximately a one-hour drive, from a casino that opened during the sample period.[9] Within this sample, the propensity to gamble score estimated for each investor allows us to differentiate likely gamblers exposed to increased non-investment risk taking by gaining casino access (the treatment group) from unlikely gamblers

[7] An individual's propensity to gamble has been shown to be influenced by his or her demographic, socioeconomic, and geographic characteristics as predictors (Brenner, 1990; Kallick et al., 1979; Walker, 1992).

[8] Several recent papers in the behavioral and household finance literatures rely on two distinct data sets when examining investment decisions in relation to a particular preference or behavior (see for example Guiso et al. (2013); Chang et al. (2013); Bonaparte et al. (2012)). The data set containing individual portfolio holdings and trades often does not include supplementary information to determine preferences or to understand the underlying mechanism of a particular effect; thus, the use of an additional, unrelated data set can provide additional insight into these relationships.

[9] We focus on the 50-mile subsample for our primary analysis, but for robustness, repeat the main analysis using a 100-mile subsample in Table 8 in Section 4.3.1.

not exposed to changes in non-investment risk taking (the control group). We use a difference-in-differences methodology to identify the differential effect of a casino opening on the portfolio risk taking of likely gamblers relative to unlikely gamblers.

As hypothesized, we find that those who are more likely to gamble, and thus more likely to be stimulated by non-investment risk taking in the presence of a casino, take on more risk in their portfolios after a casino opens relative to those who are unlikely to visit the casino. Furthermore, likely gamblers earn higher returns net of transaction costs as a result of this increase in portfolio risk, suggesting that they are compensated for the increased portfolio risk exposure. This implies that while investors are potentially influenced by stimulation from gambling, the economic outcome is a higher portfolio return on average and thus the increase in risk taking is not a "mistake." However, we find no change in mean-variance efficiency between likely and unlikely gamblers after the casino opening. We verify that the casino opening is the driving force of the effect by showing that the effect only appears after the casino opening and that the effect is smaller when looking at investors residing within a larger radius around the casino. For robustness, we confirm that the results hold when excluding the large population of investors in Chicago, when using a symmetric sample period, and when clustering observations by zip code or state to account for across investor correlation. Furthermore, when casino opening dates are randomly assigned to investors who live either near or away from casinos, there is no effect.

These results suggest that increased access to non-investment risk taking through casino gambling may induce excitement, which results in an increased willingness to take portfolio risk. The idea that stimulation from risk taking behavior can perpetuate further risk taking has been introduced in the gambling literature; studies find that exposure to casino gambling activities, such as roulette or blackjack, increase individuals' monetary risk taking in subsequent gambling trials (Ladouceur et al., 1986). Ladouceur et al. (1987) find that even with breaks of at least 24 hours between plays, subjects who had previously gambled subsequently bet more and took riskier bets than those who had not previously gambled. This paper is distinct because it provides the first evidence that increased risk taking in a non-investment context may elicit greater risk-taking in the domain of investment portfolios in a non-laboratory setting.

This study contributes to three strands of literature. First, we contribute to the literature that shows risk taking can vary over time due to economic experiences (Malmendier and Nagel, 2011; Appendino, 2013), weather and sunlight exposure that influence mood (Saunders, 1993; Hirshleifer and Shumway, 2003; Kamstra et al., 2003; Bassi et al., 2013), and emotions such as fear (Guiso et al., 2013), anxiety, and excitement (Kuhnen and Knutson, 2011). This paper is most closely related to the literature that studies the effect of emotion on financial risk taking. Recent experimental studies show that positive emotional states, such as excitement, induce individuals to make riskier financial choices (Knutson et al., 2008; Kuhnen and Knutson, 2011).. Conversely, negative emotions, such as anxiety, fear, or disgust, have the opposite effect and tend to result in less risky financial choices (Loewenstein et al., 2001; Kuhnen and Knutson, 2005; Knutson et al., 2008; Fessler et al., 2004).[10] Guiso et al. (2013) find that risk aversion increased substantially after the 2008 financial crisis and was driven primarily by fear, as opposed to standard factors such as wealth or background risk. This paper contributes to the literature by providing non-experimental evidence that increased portfolio risk taking can potentially result from changes in emotional state induced by stimulation from increased risk taking through casino gambling.

Second, this paper contributes to the literature linking investment behavior with gambling preferences and "sensation seeking," a personality trait defined by the search for varied, novel, and intense experiences and feelings. Gambling and sensation seeking have been linked with higher portfolio turnover (Dorn and Sengmueller, 2009; Grinblatt and Keloharju, 2009), preference for lottery-type stocks (Kumar, 2009), and more active positions on household balance sheets (Li, 2012). These papers study the cross-sectional relationship between gambling tendencies and investment behaviors, whereas in this paper, we study *changes* in portfolio risk taking as a direct result of increased non-investment risk taking.

Lastly, this paper contributes to the nascent literature that studies whether the desire to gamble is the underlying motive for trading by retail investors. Studies in this literature document a substitution effect, or negative correlation, between stock trading and lottery participation. Barber et al. (2009) find that the introduction of the government-sponsored lottery in Taiwan reduced turnover on the Taiwan Stock Exchange (TSE) by one-fourth. Using the size of lottery jackpots, Gao and Lin (2011) find that aggregate trading on the TSE decreases on days where lotteries with large jackpots are drawn. Similarly, Dorn et al. (2012) find a negative relationship between aggregate small trade participation in the stock market and the size of lottery jackpots in the U.S., as well as for individual investors in Germany. These studies conclude that gambling and trading can be viewed as substitutes because investors treat trading as a fun and exciting gambling activity,

[10] The neuroeconomics literature finds that the same part of the brain (the nucleus accumbens) involved in the processing of information about gains or rewards is also linked with experiencing positive emotions such as excitement when activated (Knutson et al., 2001; Bjork et al., 2004). Conversely, the part of the brain (the anterior insula) involved in the processing of information about losses or punishments is associated with experiencing negative emotions such as anxiety when activated (Chua et al., 1999; Simmons et al., 2004).

which they derive utility from. It is important to note that the focus of this paper is investment risk taking and not trading behavior or turnover. However, when we do consider the effect of a casino opening on portfolio turnover, we find in untabulated results a slight and, depending on the measure of propensity to gamble used, sometimes significant increase in portfolio turnover for likely gamblers relative to unlikely gamblers after a casino opening. Thus, we do not find evidence of a substitution effect between casino-type gambling and portfolio turnover. This is inconsistent with the reduction in aggregate turnover on the TSE after the introduction of a national lottery that Barber et al. (2009) find. There are, however, two differences between our setting and that of Gao and Lin (2011) and Dorn et al. (2012) that may contribute to the difference between our finding on turnover and theirs. First, state lotteries already exist in six of the seven states we examine by the start of our sample period, so the effect of casino openings that we evaluate is in addition to any effect that state lotteries may have on investment behavior. Second, the horizon of our analysis is generally longer; Gao and Lin (2011) and Dorn et al. (2012) examine short-term changes in turnover on the days and weeks of large lottery jackpot drawings using higher frequency data whereas our paper examines investment behavior and its persistence at a monthly frequency. It is thus possible that individuals trade less on the days they visit a casino, but without knowing exactly which days investors go to the casino, we are not able to precisely determine the short-term effects that casino visits have on turnover.

To the best of our knowledge, this is the first study to hypothesize and test the real world implications that the stimulation from risk taking in a non-investment context may have on investment risk taking in investor portfolios. The proposed setting uniquely allows us to infer a causal relationship between increased risk taking through gambling and subsequent increases in portfolio risk taking. In the remainder of the paper, we first provide institutional background on the initial legalization and opening of U.S. casinos. Next, we outline in more detail the two primary data sets and the methodology used. Lastly, we present results followed by discussion and conclusions.

2 Institutional Background: The Legalization and Opening of Commercial Casinos in the U.S

Gambling is legal under U.S. federal law, thus the responsibility to regulate gambling lies with the state. The modern era of casino gaming in the United States began in 1931 when Nevada legalized gaming and enjoyed a monopoly on U.S. gaming until Atlantic City began its casino industry in 1976. Recessionary economic conditions and Americans' changing attitudes toward gambling spurred the growth of the casino gaming industry in the late 1980s and 1990s. The initial growth was concentrated in the Midwest and spread to parts of the South. Iowa and South Dakota legalized commercial gambling in 1989, followed by Illinois, Mississippi, and Colorado in 1990, Louisiana in 1991, Missouri in 1992, and Indiana in 1993.[11] Of these states, seven saw the initial opening of casinos between 1991 and 1996. New casinos opened in Iowa starting in April 1991, in Colorado starting in October 1991, in Illinois starting in September 1991, in Mississippi starting in August 1992, in Louisiana starting in October 1993, in Missouri starting in May 1994, and in Indiana starting in December 1995.[12]

Between 1991 and 1996, over one hundred new casinos opened across these seven states, making it an ideal period to examine the effect that increased non-investment risk taking, facilitated by casino openings, has on investment risk taking. Figure 1 shows the 61 unique zip code locations where the new casinos opened in the sample period.

3 Data and Methodology

The goal of this paper is to test whether increased risk taking in one context translates to increased investment risk taking in investors' portfolios. Empirically, we want to identify the differential effect of the newly-opened casino on the portfolio risk taking of a treatment group of investors likely to visit a casino and a control group of investors unlikely to visit a casino. In this section, we describe the data and methodology needed to do this. First, we outline the survey data and the procedure used to estimate a propensity to gamble for each investor in the brokerage data. Next, we describe the brokerage data and the main subsample used in the analysis. Lastly, we will describe in detail the difference-in-differences methodology used to estimate the change in portfolio risk taking between gamblers likely to visit the casino and non-gamblers unlikely to visit the casino.

3.1 Constructing a Propensity to Gamble Score to Identify Gamblers

To determine the effect of casino openings on portfolio risk taking, we first distinguish investors likely to visit a casino and gamble from those unlikely to do so. The brokerage data contains the necessary portfolio holdings data, but does not identify which investors are likely to gamble; thus, we indirectly identify likely gamblers in the brokerage data in two steps. First, we use survey

[11] In addition to casinos, slot machines, poker machines, and video lottery terminals outside of casinos were also legalized in many states in the late 1980s and 1990s, but these devices are less centralized and tend to be spread over independent bars and taverns.

[12] Additional details on the history and economics of casino gambling in the U.S. can be found in Eadington (1999).

data to estimate a predictive model to determine the predictability of an individual's demographic and geographic characteristics for gambling behavior. For any given individual, this predictive model of gambling behavior allows us to estimate that individual's propensity to gamble (the dependent variable) if we know the values of their demographic and geographic characteristics (the explanatory variables). Second, we apply the parameter estimates from the predictive model, estimated using the survey data, to the same set of demographic and geographic characteristics available in the brokerage data to estimate each brokerage investor's propensity to gamble. This estimated "propensity to gamble score" distinguishes the set of investors who are likely to gamble, and thus visit a new casino, from the set of investors who are unlikely to do so. It is important to emphasize that the goal of the estimated propensity to gamble score is to construct a measure correlated with investors' true propensity to gamble. Gambling behavior is undoubtedly linked with other demographic, social, and environmental factors, but we are limited to the set of demographic characteristics available for each investor in the brokerage data. Thus, we are only interested in predicting an overall proxy for gambling likelihood and not in the individual parameter estimates from the predictive regression.

3.1.1 Amazon Mechanical Turk

We collect survey data using Amazon Mechanical Turk (MTurk), an online marketplace where individuals, referred to as workers, complete tasks over the internet in exchange for monetary compensation. Individual workers register on MTurk and browse through job tasks posted by requesters, which provide a summary detailing the nature of the task and the payment offered. Workers then select the tasks that they wish to work on and upon completion, Amazon transfers payment from requesters to workers.

MTurk has become increasingly popular among social scientists as a source of survey and experimental data.[13] This is attributable to the many advantages of MTurk relative to the use of human subjects in university laboratories. First, recent studies evaluate MTurk as a tool for research and consistently find that it is a valid and reliable means of collecting data (Rand, 2012; Mason and Suri, 2012). Furthermore, the behavior of subjects on MTurk is comparable to the behavior of laboratory subjects when replicating important experimental results in the political and behavioral sciences (Paolacci et al., 2010; Horton et al., 2011; Berinsky et al., 2012). The overall

[13] For example, researchers have used MTurk workers to judge the trustworthiness of loan borrowers from their appearance in a photograph (Duarte et al., 2012), conduct public good games (Rand and Nowak, 2011; Suri and Watts, 2010), interact in online labor markets (Horton et al., 2011; Amir et al., 2012), and study the effects of pay inequality on job satisfaction and turnover (Card et al., 2012).

quality of responses and attrition rates on MTurk compare well to other, more expensive survey platforms (Rand, 2012; Kuziemko et al., 2013); this is due in part to the reputational concerns for workers on MTurk. Each time a worker completes a task, the requester either approves the task and issues payment to the worker or rejects the task if the task was not completed to the requester's satisfaction and denies the worker payment. The approval or rejection of each task a worker completes contributes either positively or negatively to his or her overall completion rate, which affects the future employability of the worker. Furthermore, Oppenheimer et al. (2009) show that the use of instructional manipulation checks, or attention screens, which ask participants to follow very direct instructions to provide confirmation that they are indeed paying attention, are effective in increasing the statistical power and reliability of survey data. A second advantage of Mturk is that the MTurk population is more representative of the demographics of the U.S. than the set of undergraduate students traditionally used in laboratory studies (Buhrmester et al., 2011). The MTurk population does, however, tend to be younger, more female, and have lower household incomes than the population of the U.S. (see Paolacci et al. (2010), Ipeirotis (2010a), and Mason and Suri (2012) for more details about the MTurk population). Lastly, MTurk workers require a lower wage than laboratory subjects due to the absence of travel and scheduling costs for MTurk workers. Recent research finds that workers have a reservation wage of $1.38 per hour and an average effective hourly wage of $4.80 (Ipeirotis, 2010b). Moreover, Because the majority of workers use MTurk as "a fruitful way to spend free time and get some cash," many are willing to accept lower wages than they might otherwise (Ipeirotis, 2010b). Given the lower pay, there exists the concern that the work will be of lower quality. However, studies show that there seems to be little to no effect of wage on the quality of work (Marge et al., 2010; Mason and Watts, 2010) and that varying the size of incentives has little to no effect when going from a low payment to a higher one (Camerer and Hogarth, 1999).

3.1.2 Survey Sample

Following the methodological recommendations from these earlier studies, we take several steps to ensure the validity of the survey data. First, we limit survey respondents to those registered as U.S. residents on MTurk, which requires a U.S. address and social security number that Amazon independently verifies. Second, the survey was limited to workers with a past completion rate of at least ninety percent; this ensures we exclude robots and limit the sample to workers who take the tasks seriously. Third, we included instructional manipulation checks where subjects were asked to follow very specific instructions when answering questions in order to identify and screen out inattentive subjects. Fourth, we use survey software that tracks the amount of time each worker takes to complete the survey. Finally, the last question in the survey asked the respondent whether subjects had been dishonest at any point in the survey. Respondents were reassured that they would in no way be penalized for their answer and would be fully compensated regardless of their answer; they were informed that we were asking in order to maintain the integrity of the survey. Thus, respondents had minimal incentive to lie when answering this final question.

Data was collected from 1,883 unique respondents in the U.S. during October and November of 2012. All participants are at least 18 years of age, own financial investments, and are U.S. residents. After applying data consistency and attention screens, we have unique data on a sample of 1,750 investors. Panel A of Table 2 shows the characteristics of the survey sample. Comparing the survey sample to the full brokerage sample shown in Panel B, we see that the average survey respondent tends to be younger, more likely to be female and have at least one child, and less likely to be married or retired relative to the brokerage sample. The median age in the survey sample is 31 whereas the median age of the U.S. population in 2012 is 37.1 (Central Intelligence Agency, 2012). The proportion of males in the survey sample, 52.6%, is also lower than that of the brokerage sample (88.1%), but is comparable to the 49% of males in the U.S. population (Central Intelligence Agency, 2012). The median household income of $50,000 in the survey sample is lower than that of the brokerage data ($62,500), but is comparable to the median income of $50,502 in the U.S. in 2012 (U.S. Census Bureau, 2012).

3.1.3 Predicting the Likelihood of Gambling Participation

To identify the characteristics that predict an individual's propensity to gamble, we ask respondents about their gambling behavior and the types of gambling in which they partake. Panel A of Table 2 shows that 43.5% of the survey respondents currently participate in some form of gambling, including but not limited to lotteries, poker, blackjack, roulette, and slot machines. 37.8% of respondents have taken part in some form of gambling not including lotteries.

Table 3 shows the demographic characteristics of survey respondents who gamble versus those who do not. Panel A compares the mean characteristics of those who currently participate in some form of gambling versus those who do not. Panel B shows differences based on a refinement of this measure, which only includes individuals who currently gamble in some form outside of lotteries; this refined measure more precisely identifies those individuals who are most likely to visit casinos because they engage in casino-type gambling. The right-most column shows the difference and corresponding t-statistic between the characteristics of gamblers and non-gamblers. Consistent with findings in Li (2012), gamblers tend to be significantly older and have higher incomes. They are also more likely to be male, married, and retired, but not significantly so in this sample.

Next, we estimate a predictive model using survey respondents' gambling behavior as the dependent variable and their demographic and state of residence as the explanatory variables. State fixed effects proxy for geographically linked variables that influence gambling behavior such as religion (Kumar et al., 2011). Table 4 shows the parameter estimates from the predictive logit model estimated using the survey data with state dummies omitted for brevity. In column (1), the dependent variable is an indicator that equals one if the respondent currently gambles and zero otherwise. In column (2), the dependent variable equals one if the respondent currently gambles outside of lotteries and zero otherwise.[14] Generally, we see that consistent with the summary statistics, male, unmarried, older, and higher income individuals are more likely to gamble in this sample. To give an idea of the size of the marginal effects, the coefficient estimate on the indicator variable for males in column (2) is 0.207, which corresponds to a marginal effect of approximately 0.048. The coefficient of -0.235 for married investors corresponds to a marginal effect of -0.51. However, these coefficient estimates should be interpreted with some caution since the set of predictive variables used is limited to those available in the brokerage data; thus, there are omitted variables in this regression that may bias the estimates in Table 4. Our main interest, however, lies in constructing an overall propensity to gamble score correlated with the true value and not the in the individuals parameter estimates from the predictive regression.

The distribution of survey respondents' predicted propensity to gamble outside of lotteries is shown in Panel A of Figure 2. These predicted probabilities are estimated using the results of the predictive regression in column (2) of Table 4 and the corresponding demographic and geographic characteristics of each respondent. Given the broad sample of survey respondents, there is ample variation in the distribution of the predicted probabilities, which ranges from 0 to 1 with a mean of 0.38 and a standard deviation of 0.15.

[14] Using an indicator that equals one if the respondent has monthly gambling expenditures in the top third of the survey sample as the dependent variable produces similar results in both the predictive regression as well as the subsequent portfolio risk taking analysis.

3.2 Discount Brokerage Data and Sample

The data set used for the primary analysis contains monthly portfolio positions and trades from a large U.S. discount brokerage for 77,995 investors from January 1991 to November 1996.[15] Of this sample, 62,531 investors hold common stocks and demographic and zip code data is available for 40,097 of these investors.[16] The portfolio holdings data is supplemented with monthly and daily stock data from CRSP.

We apply the parameter estimates from Table 4 to the corresponding demographic and state variables in the brokerage data to estimate each investor's predicted propensity to gamble. The distribution of the predicted propensity to gamble outside of lotteries for each investor is shown in Panel B of Figure 2.[17] The distribution of predicted probabilities for brokerage investors still exhibits ample variation with a range of 0.14 to 0.88, mean of 0.54, and standard deviation of 0.14. The vertical lines delineate the high and low quintiles and terciles of the distribution, which will be used to compare likely and unlikely gamblers.

Table 5 shows the summary statistics for investors in the brokerage data set sorted into quintiles based on their predicted propensity for non-lottery gambling.[18] The right-most column contains the difference and corresponding t-statistics between characteristics of individuals with a predicted propensity to gamble in the lowest quintile and individuals with a predicted propensity to gamble in the highest quintile. Consistent with the survey sample, Panel A shows that those most likely to gamble are on average older, have higher incomes, more likely to be male and retired, and are less likely to be married or have children.

3.2.1 Investor Proximity to New Casinos

To supplement the brokerage data, we hand collect the opening dates and zip codes of all casinos that opened in the U.S. from the beginning of 1991 to the end of 1996.[19] The majority of this information is obtained from the annual reports and Web sites of state gaming associations.[20] The

[15] More details on the discount brokerage database are available in Barber and Odean (2000, 2001).

[16] The demographic measures were compiled by Infobase Inc. in June 1997.

[17] The distribution of predicted propensity to gamble in any form is similar for both the survey sample and the brokerage sample.

[18] Summary statistics for investors sorted into quintiles based on their predicted propensity to gamble including lotteries are similar, but omitted for brevity.

[19] We use casino opening dates, as opposed to gambling legalization dates by state, in order to isolate the effect that increased risk taking, as a result of visiting casinos, has on portfolio risk taking. Furthermore, the state's date of legalization is more likely to be correlated with changes in economic conditions and lobbying efforts and are thus less exogenous than the casino opening date, which the firm that owns the casino chooses.

[20] Some states do not provide historical annual reports going back to the early 1990's. In these cases, we track down the information from secondary sources such as the Museum of Gaming History Web site (http://www.museumofgaminghistory.org). Where possible, we verify the accuracy of secondary sources using mul-

sample of casino openings is chronologically listed in Table 1 along with the month and year of the opening, as well as the state and zip code where the casino was originally located. 101 casinos opened in 61 unique zip codes in the U.S. during the sample period. We are only concerned with the first casino that opens in a particular zip code; the reason for this is because we are interested in the date that an investor is first located within close proximity to a casino To identify the subsample of brokerage investors located within 50 miles of a casino, we calculate the distance between the zip code of each casino and each investor. The longitude and latitude for each zip code is obtained from the Gazetteer Place and Zip Code Database available from the U.S. Census Bureau (1990) and is supplemented with zip code data from the CivicSpace U.S. ZIP Code Database (CivicSpace Labs, 2004). We use a standard formula for calculating the shortest distance in miles between two points on a map, often referred to as the great-circle distance formula. The two points, $p = (a_1, b_1)$ and $q = (a_2, b_2)$, are represented as latitudes (a_1 and a_2) and longitudes (b_1 and b_2), and the distance between them, $d(p, q)$, is calculated as follows:

$$d(p,q) = r \times arccos[cos(a_1)cos(b_1)cos(a_2)cos(b_2) + cos(a_1)sin(b_1)cos(a_2)sin(b_2) + sin(a_1)sin(a_2)], \quad (1)$$

where r is the radius of the Earth, or approximately 3950 miles.

Using this formula, we calculate the distance between the location of each investor and the location of each new casino and record the opening date of the *first* casino that opens within 50 miles of each investor in the sample. We are only interested in the effect of the first casino that opens near an investor; thus, once a casino opens within 50 miles of an investor, that investor is linked with that casino and treatment date and no others. This is to ensure that we capture the effect of the initial casino opening. The casino opening date then serves as the treatment date we use to compare pre- and post-treatment differences in investors' portfolio risk taking. The two right-most columns of Table 1 report the number of unique investors in the brokerage data set that reside within 50- and 100-mile radiuses of each casino. The number of investors listed for each casino opening is incremental, meaning that if a particular investor is linked to a earlier casino opening, they are not included again in any subsequent casino opening. There are 1,769 unique investors living within 50 miles of a casino and will make up our main subsample; we will refer to this as the 50-mile subsample.[21]

tiple sources. In the case of riverboat casinos, the zip code of the headquarter or loading dock is used.

[21]In Table 1, the fourteenth casino opening (Empress I) in Illinois is located within 50 miles of Chicago and thus all investors in the sample living in or around Chicago are included in the sample. Since there is a large population in Chicago, this particular casino opening contributes to half of the total sample of investors who are located within 50 miles of a casino. To ensure that this one casino is not driving the results, we repeat all tests excluding the investors

3.3 Methodology

3.3.1 Difference-in-Differences Strategy

The empirical strategy in this paper takes advantage of several features of the setting to implement a difference-in-differences methodology and establish the causal effect of increased risk taking through access to newly-opened casinos on portfolio risk taking. The goal is to compare the change in portfolio risk taking of likely gamblers (the treatment sample) after the opening of the casino (the treatment) to the change in portfolio risk taking of a comparable group of unlikely gamblers (the control sample) who are presumably unaffected by the opening of the casino. In an ideal experimental setup, we would compare the portfolio risk taking of an individual before and after they begin to visit a new casino to the same individual's portfolio risk taking before and after the casino opening had they *not* visited the casino (the counterfactual). Since the counterfactual is unobservable, we instead use the risk-taking behavior of the control sample after the casino opens to proxy for the unobservable counterfactual risk-taking behavior of the treatment sample of likely gamblers had they *not* visited the casino. To the extent that the treatment and control groups are similar pre-treatment, any changes in risk-taking behavior post-treatment can be interpreted as the causal effect of visiting the newly-opened casino.

Two important assumptions are necessary for drawing a strong causal inference using the difference-in-differences approach (Imbens and Wooldridge, 2009). First, the treatment should be exogenous to the treated sample; that is, the opening of a casino should be exogenous to those who will visit it. The treatment group is identified based on the propensity to gamble score estimated from demographic and geographic characteristics that are predictive of gambling behavior. Some of these characteristics, such as age and gender, cannot be chosen by an individual; thus, members of the brokerage sample identified as likely gamblers did not elect to be part of the treatment group. Furthermore, it is not necessary that the opening of a casino be completely exogenous; it is very possible that casinos open in places where higher demand is expected, but this would make it harder to find an effect because investors we identify as non-gamblers would actually be gamblers, attenuating the difference. In robustness tests, we further address any remaining endogeneity concerns using period indicators to observe the dynamics of the observed result to ensure the result takes effect after the casino opening.

Second, a reliable causal inference requires that the treatment and control samples be drawn

who reside near and are linked to this casino opening and find that results are qualitatively identical, but slightly less significant because of the reduced sample size.

from similar distributions (Imbens and Wooldridge, 2009). This assumption implies that the likely gamblers should be similar to the unlikely gamblers in order to use the observable portfolio risk taking of the unlikely gamblers as a valid proxy for the likely gamblers' unobservable counterfactual. There are several reasons that support the validity of this assumption. First, by construction, predicting an investor's propensity to gamble using their demographic characteristics imposes restrictions on how similar likely and unlikely gamblers can be demographically. However, since portfolio risk taking is the variable of interest, it is most important to show that likely and unlikely gamblers hold similar portfolios before the casino opens. Panel B in Table 5 compares the portfolio characteristics of investors sorted into quintiles based on their predicted propensity to gamble outside of lotteries *prior* to the casino opening. We see that portfolio characteristics, particularly those measuring portfolio risk exposure, look remarkably similar across quintiles and do not differ significantly between those least likely to gamble and those most likely to gamble. There is, however, a significant difference in Sharpe ratio between investors in the lowest quintile and those in the highest quintile, which appears to be an artefact of the data; the correlation between propensity to gamble and Sharpe ratio is 1.4% and statistically insignificant. Second, due to the staggering of casino openings over time, likely gamblers are first control investors (before the casino opening) and then treatment investors. Lastly, we control for portfolio size and the number of stocks in investor portfolios to account for any changes in financial wealth or diversification.

3.3.2 Estimation Equation

We implement the difference-in-differences approach using a regression framework to estimate the change in portfolio risk taking in the treatment group relative to the control group before and after the casino opening. This methodology uses panel data and thus requires monthly measures of portfolio risk taking for each investor. Accordingly, we quantify portfolio risk taking using three ex ante measures of portfolio risk, which are computed on a monthly basis and reflect the risk investors would expect at the time of portfolio formation based on prior performance.[22] First, ex ante weighted stock beta is a monthly value-weighted average of the CAPM betas of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months.[23] Second, ex ante weighted stock volatility is the value-weighted average of the volatility of each stock in the investor's portfolio estimated for each month using monthly performance data over the preceding

[22] These measures or variations of these measures have been used to measure portfolio risk for similar data (Mitton and Vorkink, 2007; Bonaparte et al., 2012).

[23] All results are very similar using betas estimated using the three- and four-factor models.

36 months. Finally, ex ante portfolio volatility is constructed for each investor in each month as the standard deviation of the monthly returns of that particular portfolio over the preceding 36 months. Ex ante portfolio volatility takes into account both the variances and covariances of the stocks in the portfolios of each investor.

We estimate a difference-in-differences regression of the following form using the brokerage investors in the 50-mile subsample:

$$Y_{it} = \gamma_i + \delta_t + \lambda X_{it} + \eta AfterTrmt_{it} + \theta(TrmtGroup_i \times AfterTrmt_{it}) + \epsilon_{it}. \qquad (2)$$

Y_{it} is a measure of portfolio risk for investor i in month t. $TrmtGroup_i$ is a variable indicating the propensity to gamble for each investor i. In cases where quintile or tercile analysis is used, $TrmtGroup_i$ is an indicator variable that equals one for investors who are in the top quintile or tercile of propensity to gamble scores (the treatment group) and zero for those in the bottom quintile or tercile (the control group). $AfterTrmt_t$ is an indicator that equals one if the casino near investor i has opened by month t and zero otherwise. X_{it} is a set of investor specific time-varying controls including portfolio size and the number of stocks in the portfolio to control for changes in wealth and diversification. γ_i and δ_t are household and month fixed effects, respectively. Household fixed effects control for the effects of unobservable household characteristics that may affect risk taking. Month fixed effects control for any macroeconomic trends affecting households such as stock market conditions and unemployment rates.

The coefficient η captures the effect of the casino opening on unlikely gamblers or the effect as the propensity to gamble score goes to zero. The coefficient of interest, θ, captures the differential effect of a casino opening on the treatment sample relative to the control sample or in other words, how the effect varies with investors' propensity to gamble score. A positive estimate of θ would suggest that consistent with the hypothesis, after the casino opening, there is an increase in the portfolio risk exposure of likely gamblers relative to unlikely gamblers.

In all regressions, standard errors are clustered by household. This accounts for correlation of the error terms within household over time. For robustness, all regressions are repeated with standard errors clustered by either zip code or state to account for cross-sectional correlation in errors between households over time and within a given zip code or state, respectively. Results remain the same and often become stronger, but the reduced number of clusters may introduce bias in the standard error estimates (Petersen, 2009).

3.3.3 Measurement Error

The predicted propensity to gamble score is an imperfect proxy of each investor's true propensity to gamble. Other demographic, social, and economic characteristics also predict gambling propensity, however, the set of characteristics we use to predict gambling behavior are limited to the set available in the brokerage data. Given this constraint, investors' predicted propensity to gamble will be measured with error. However, as long as the resulting error due to omitted variables is not systematically correlated with the opening of casinos, which is a reasonable assumption to make, the implication for the coefficient of interest, θ, is a downward bias making it more difficult for us to find significant results (Levi, 1973). The direction of the bias on the coefficient estimates of the other variables in equation (2) may, however, be in either direction. To further mitigate the effect of measurement error, the analysis is also performed using a regressor that groups investors into either quintiles or terciles based on their propensity to gamble score, in addition to the continuous measure of gambling propensity. Sorting investors into bins helps to alleviate some of the measurement error concern; if the errors in the first stage predictive regression are not perfectly correlated across individuals, then the errors would tend to offset each other when individuals are grouped into bins.[24]

4 Results

4.1 Baseline Regression Estimates

The first set of regression results from estimating equation (2) support the hypothesis that likely gamblers take on more portfolio risk after being stimulated by risk taking through gambling. Table 6 shows results from regressing each of three measures of portfolio risk on investors' propensity to gamble interacted with an indicator that equals one after a casino opening near that investor and zero otherwise. In Panel A, the dependent variable is the ex ante weighted stock beta. The positive coefficient on the interaction term between the $AfterTrmt$ dummy and the propensity to gamble score in column (1) indicates that investors who have a higher predicted propensity to gamble increase the ex ante weighted stock beta exposure in their portfolios after a casino opens nearby.

Columns (2) and (3) show results from regressions that use a quintile and tercile version of the propensity to gamble score whereby the variable equals one for investors in the top quintile or tercile of investors in the sample and equals zero for investors in the lowest quintile or tercile, respectively.

[24]Portfolio sorts are often used to this effect in asset pricing. For example, see Fama and MacBeth (1973).

As previously discussed, we group investors into bins based on their propensity to gamble score in order to minimize within-bin variation of this score since it is a noisy proxy of investors' true propensity to gamble. The positive coefficients on the interaction terms are both positive and significant in column (2), but not in column (3). In economic terms, the coefficient estimate of 0.0772 in column (2) indicates that investors in the top quintile of likely gamblers increase the weighted stock beta risk exposure in their portfolios by 0.0772 after a casino opens, relative to unlikely gamblers. This represents an increase of 6.92% after a casino opening for investors in the top quintile of likely gamblers relative to their pre-casino opening mean ex ante weighted stock beta of 1.116.

Columns (4) to (6) show regressions similar to those in columns (1) to (3), but use a propensity to gamble score estimated for individuals who currently gamble in some form outside of lotteries. Not surprisingly, results using the measure of non-lottery gambling propensity are slightly stronger both economically and statistically since this refined measure more precisely identifies those individuals who are most likely to visit casinos and engage in casino-type gambling. In economic terms, the coefficient estimate of 0.0936 in column (5) indicates that investors in the top quintile of likely gamblers increase the weighted stock beta risk exposure in their portfolios by 8.39% after a casino opens relative to unlikely gamblers. The results in columns (3) and (6) indicate that the effect persists when comparing the top third of those most likely to gamble relative to the bottom third; while the effect is unsurprisingly smaller than when considering the top and bottom quintiles, it suggests that the result is not confined to a small subset of investors who are especially prone to gambling. In all columns, the coefficient on the $AfterTrmt$ dummy variable is negative, but insignificant indicating that unlikely gamblers decrease their level of risk taking after a casino opens, but not significantly so. A negative coefficient is consistent with the hypothesis that investors who are unlikely to gamble are potentially more likely to derive anxiety or moral disgust, two emotions that studies have shown lead to increased risk aversion, from a casino opening, thus resulting in less risky portfolio choices.

Panel B of Table 6 shows regression estimates similar to those in Table 6, but use ex ante weighted stock volatility as the dependent variable. Results are consistent with those in Panel A and again are generally stronger in columns (4) to (6) using the non-lottery gambling propensity score. The coefficient estimate of 0.0136 in column (5) suggests that the quintile of investors most likely to gamble increase the weighted stock volatility exposure in their portfolios by 9.51% after a casino opening relative to their pre-treatment average. The percentage increase in weighted stock volatility for likely investors after a casino opening is comparable to the percentage increase seen using ex ante weighted stock beta as the dependent variable. In columns (1) and (4), the coefficient estimate on the $AfterTrmt$ dummy variable is negative and significant with a magnitude of slightly less than half of that of the coefficient estimate on the interaction term. In the other columns, the coefficient on the $AfterTrmt$ dummy is negative, but insignificant and approximately one tenth of the size of the coefficient on the interaction term.

Panel C shows results using ex ante portfolio volatility as the dependent variable. Results are again consistent with those in Panels A and B and show that likely gamblers increase the ex ante portfolio volatility of their portfolios after a casino opening relative to unlikely gamblers. Those investors with a non-lottery predicted propensity to gamble score in the highest quintile increase the ex ante portfolio volatility of their portfolios by 8.53% after the casino opening, relative to their pre-treatment average. For brevity, we only show results using the non-lottery gambling propensity score in the remainder of the paper and refer to it simply as the "propensity to gamble score". Results are similar using the broader measure as well.

4.2 Distribution of Treatment Effect

The results in the previous section establish the mean effect of casino openings on likely gamblers relative to unlikely gamblers, but does not shed light on the distribution of the effect across different demographics. Table 7 sheds light on this issue by interacting the $TrmtGroup_i \times AfterTrmt_{it}$ term with the demographic characteristics of investors. The treatment group is represented by an indicator variable that equals one for the quintile of investors most likely to gamble and zero for the quintile of investors least likely to gamble. Controls for the effect of each of the demographic characteristics of interest interacted with $After\ Casino_{it}$ are included to determine the role of demographic of likely gamblers that most contribute to the change in risk taking.[25] These regressions show that likely gamblers who are older, male, married, and have higher incomes experience the most significant increases in portfolio risk taking relative to unlikely gamblers. For brevity, results are shown only for ex ante weighted stock beta as the dependent variable, but results with ex ante weighted stock volatility and ex ante portfolio volatility are similar. The coefficient on the $AfterTrmt$ dummy is insignificant.

[25] The interaction between the $AfterTrmt$ dummy and the *HighNonLottPropGambleQuintile* is not included in the model because of the high correlation between this interaction term and the triple interaction terms, however results remain qualitatively similar when this interaction term is included.

4.3 Robustness Tests

4.3.1 Does Proximity to a Casino Matter?

In the above analysis, we focus on the 50-mile subsample of investors located within approximately a one-hour drive of a casino, a reasonable distance for inclusion of investors likely to visit the casino repeatedly. We should expect to see the effect of casinos on likely gamblers relative to unlikely gamblers diminish as we include investors who live farther away. Examining investors within a 100-mile radius of each casino will include those who are approximately a two-hour drive away and are thus less likely to visit the casino frequently relative to those within a 50-mile radius.

Table 8 shows results using a 100-mile subsample. As expected, results are generally less significant both economically and statistically relative to results using the 50-mile subsample in Table 6. Columns (1) to (3) show that results using ex ante weighted stock beta as the dependent variable are much less significant both relative to results in Panel A of Table 6. In columns (4) to (6), we see that results are still significant when examining ex ante weighted stock volatility, although slightly less so, both statistically and economically, than analogous results using the 50-mile subsample in Panel B of Table 6. Results using ex ante portfolio volatility as the dependent variable in columns (7) to (9) are similar. These results suggest that the documented effect is specific to the location of the casino, but persists significantly for two of the three measures of portfolio risk even when considering investors within 100 miles of a casino.

4.3.2 Treatment Dynamics

To further ensure that the casino opening is in fact the driving force of the change in behavior between likely and unlikely gamblers, we consider the dynamics of the change in risk taking in more detail surrounding the casino opening. We estimate a dynamic form of the difference-in-differences regression in equation (2):

$$\begin{aligned} Y_{it} = \gamma_i + \delta_t + \lambda X_{it} + \eta_{-2} AfterTrmt_{it}^{-2} + \theta_{-2}(TrmtGroup_i \times AfterTrmt_{it}^{-2}) \\ + \eta_{-1} AfterTrmt_{it}^{-1} + \theta_{-1}(TrmtGroup_i \times AfterTrmt_{it}^{-1}) \\ + \sum_{j=1}^{s} \left[\eta_j AfterTrmt_{it}^{j} + \theta_j (TrmtGroup_i \times AfterTrmt_{it}^{j}) \right] \\ + \eta_{>s} AfterTrmt_{it}^{>s} + \theta_{>s}(TrmtGroup_i \times AfterTrmt_{it}^{>s}) + \epsilon_{it}. \end{aligned} \quad (3)$$

This model includes additional terms to capture leads relative to equation (2). $AfterTrmt_{it}^{-1}$ is an indicator that equals one in the 12 months prior to the casino opening and zero otherwise; that is, it equals 1 for months -1 to -12 relative to the casino opening and zero otherwise. Similarly, $AfterTrmt_{it}^{-2}$ equals one for months -13 to -24 relative to the casino opening and zero otherwise. Additionally, period indicators are substituted for the $AfterTrmt_{it}$ indicator. For $s = 0, 1, 2$, $AfterTrmt_{it}^{j}$ is an indicator variable that equals one for the j^{th} year after the casino opening where $j < s$ and $AfterTrmt_{it}^{>s}$ is an indicator that equals one if the casino opened strictly more than s years ago. When $s = 0$, the after casino opening period indicators collapse to the $AfterTrmt_{it}$ indicator that equals zero before and one after the casino opening, as used in equation (2). Each η_i captures the effect of the casino opening on unlikely gamblers. The coefficients of interest, each θ_i, capture the difference in portfolio risk taking between likely and unlikely gamblers in each year i surrounding the casino openings where $i = -2, -1, ..., s$. The pattern in θ_i can inform whether the casino opening is the driver of the observed change in portfolio risk taking.

Table 9 shows regression results from the above model using each of the three measures of portfolio risk taking as the dependent variable. The treatment group is represented by an indicator variable that equals one for the quintile of investors most likely to gamble and zero for the quintile of investors least likely to gamble.[26] The first three columns report results from the above regression using ex ante weighted stock beta as the dependent variable and shows that the increase in ex ante weighted stock beta starts after a casino opening. In columns (2) and (3), we see that the effect starts in the 12 months immediately following the casino opening and continues well past the second year of operation; thus, it does not seem that this effect is temporary since there is no decline when the novelty of the new casino wears off. Columns (4) to (6) show analogous results using ex ante weighted stock volatility as the dependent variable. Again the increase in weighted stock volatility increases after the casino opening and does not appear to dissipate even two years after the casino opening. In this case, the coefficient estimates, η_j, on the period indicators, $AfterTrmt_{it}^{j}$, for year j before or after the casino opening are significantly negative before and after the casino opening indicating that unlikely gamblers appear to take less risk, but in a manner apparently unrelated to the date of the casino opening. As previously mentioned, we know that the predicted propensity score is measured with error biasing the coefficient estimates on the interaction terms downwards; however, we do not know the direction of the bias on the other coefficient estimates in the model and should interpret the coefficients on the period indicators with caution. Results are similar in columns (7) to (9) using the ex ante portfolio volatility as the dependent variable. These results serve as a useful consistency check to ensure that the effect happens as a result of the casino opening

[26] We repeat the analysis using period lengths of six months, as well as using investors' propensity to gamble score and tercile sorts with no difference in qualitative findings.

and not before.

5 Increased Risk Taking and Performance

A natural question to ask is how the portfolios of likely gamblers perform relative to unlikely gamblers in light of the increased level of portfolio risk. To shed light on this question, we estimate the following difference-in-differences regression:

$$P_{it} = \gamma_i + \delta_t + \lambda X_{it} + \eta AfterTrmt_{it} + \theta(TrmtGroup_i \times AfterTrmt_{it}) + \epsilon_{it}. \quad (4)$$

This equation is identical to equation (2), except the dependent variable, P_{it}, is a measure of portfolio performance. The two dependent variables we consider are monthly realized portfolio returns net of transaction costs and ex ante Sharpe ratio.[27] The ex ante Sharpe ratio, $(E[r_j]-r_f)/\sigma_j$, is constructed for each household in each month using the monthly performance of the stocks in each household's portfolio over the preceding 36 months (Mitton and Vorkink, 2007). Similar to the ex ante measures of portfolio risk, the Sharpe ratio is an ex ante measure, which reflects the performance investors would expect at the time of portfolio formation based on past information.

Table 10 reports the results from estimating the above regression using the 50-mile subsample. Columns (1) to (3) show that in addition to increasing their ex ante portfolio risk, likely gamblers generally realize higher returns relative to unlikely gamblers subsequent to the opening of the casino. The coefficient estimate on the $AfterTrmt$ dummy variable indicates that unlikely gamblers net returns decreased after a casino opening. The results in columns (4) to (6) show that investors' overall performance ex ante, as measured by the ex ante Sharpe ratio, does not change significantly between likely and unlikely gamblers. The coefficient estimate on the $AfterTrmt$ dummy variable is significantly negative suggesting that unlikely gamblers decreased their portfolio mean-variance efficiency after a casino opening, however, the coefficient should be interpreted with some caution since the propensity to gamble score may introduce bias in the other coefficient estimates.

6 Discussion

Two issues warrant further discussion. First, this study explores changes in risk taking within a particular asset class. The data does not allow conclusions about overall asset allocation to be drawn since we do not know investors' holdings outside of their brokerage accounts. However,

[27] Note that since we include month fixed effects in the specification, the results from regressions estimated using either net returns or market-adjusted net returns will be identical.

household portfolio allocations tend to be sticky over time due to inertia and change very slowly over time (Brunnermeier and Nagel, 2008). In untabulated results, we find that the portfolio sizes in the brokerage accounts of likely gamblers do not significantly change relative to unlikely gamblers after casino openings. Thus, it is possible, but potentially unlikely that gamblers greatly increase their holdings of safe assets after casino openings to significantly tilt their overall portfolio allocation towards safer assets. Second, a possible shortcoming of the data is that the subsample of investors who reside near casinos may not be representative of the entire population of investors because casinos tend to open along state borders, which may have populations unrepresentative of the entire U.S. population. However, the analysis is done on a relative basis by sorting investors into quintiles or terciles based on their propensity to gamble; thus, any conclusions drawn are done so on a relative basis. In other words, our results apply to the extent that the behavior of the most likely gamblers *relative* to the least likely gamblers is the same in our subsample as it is in the larger population and does not require that the populations themselves be identical.

7 Conclusions

In this paper, we show that individuals' non-investment risk-taking behavior can affect their willingness to take investment risks in their portfolios. In particular, we use the initial legalization and opening of commercial casinos in the U.S. as a natural experiment to show that the opening of a casino results in increased risk taking in the portfolios of those investors who are likely to visit the casino to gamble relative to those investors who are not. This study offers initial non-experimental evidence that exposure to increased non-investment financial risk taking through casino-type gambling results in increased portfolio risk taking, potentially induced by excitement from going to a casino and gambling. This leaves many interesting questions to be explored. For example, is it beneficial for someone at a bank or buy-side firm be allowed to engage in trading, which can produce the same emotional responses as gambling, as well as giving portfolio advice to a client or managing portfolios? Particularly at smaller firms without a clear delineation between these activities, it may be important to consider the carry-over effects that trading activities may have on portfolio risk choices. Other questions raised include whether non-monetary risk taking induce greater risk taking in financial decisions. Does the same effect hold when managers take on more risk when making investment decisions at the firm level as a result of excitement from past risks taken? We leave these questions to future research.

References

Amir, O., Rand, D. G., and Kobi Gal, Y. (2012). Economic games on the internet: The effect of $1 stakes. *PloS one*, 7(2).

Anderson, G. and Brown, R. I. F. (1984). Real and laboratory gambling, sensation-seeking and arousal. *British Journal of Psychology*, 75(3):401–410.

Appendino, M. (2013). Lifetime experience of volatility: A new determinant of household demand for stocks. *Yale University Working Paper*.

Barber, B. M., Lee, Y.-T., Liu, Y.-J., and Odean, T. (2009). Just how much do individual investors lose by trading? *Review of Financial Studies*, 22(2):609–632.

Barber, B. M. and Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The Journal of Finance*, 55(2):773–806.

Barber, B. M. and Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics*, 116(1):261–292.

Bassi, A., Colacito, R., and Fulghieri, P. (2013). 'o sole mio: An experimental analysis of weather and risk attitudes in financial decisions. *Review of Financial Studies*, 26(7):1824–1852.

Berinsky, A. J., Huber, G. A., and Lenz, G. S. (2012). Evaluating online labor markets for experimental research: Amazon.com's mechanical turk. *Political Analysis*, 20(3):351–368.

Bjork, J. M., Knutson, B., Fong, G. W., Caggiano, D. M., Bennett, S. M., and Hommer, D. W. (2004). Incentive-elicited brain activation in adolescents: similarities and differences from young adults. *The Journal of Neuroscience*, 24(8):1793–1802.

Bonaparte, Y., Kumar, A., and Page, J. (2012). Political climate, optimism, and investment decisions. *Working Paper*.

Brenner, R. (1990). *Gambling and speculation: A theory, a history, and a future of some human decisions*. Cambridge University Press.

Brunnermeier, M. K. and Nagel, S. (2008). Do wealth fluctuations generate time-varying risk aversion? Micro-evidence on individuals' asset allocation. *The American Economic Review*, 98(3):713–736.

Buhrmester, M., Kwang, T., and Gosling, S. D. (2011). Amazon's mechanical turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, 6(1):3–5.

Camerer, C. F. and Hogarth, R. M. (1999). The effects of financial incentives in experiments: A review and capital-labor-production framework. *Journal of Risk and Uncertainty*, 19(1-3):7–42.

Card, D., Mas, A., Moretti, E., and Saez, E. (2012). Inequality at work: The effect of peer salaries on job satisfaction. *The American Economic Review*, 102(6):2981–3003.

Central Intelligence Agency (2012). The World Factbook. `https://www.cia.gov/library/publications/the-world-factbook/index.html`, accessed June 2013.

Chang, T., Solomon, D., and Westerfield, M. (2013). Looking for someone to blame: Delegation, cognitive dissonance, and the disposition effect. *Working Paper*.

Chua, P., Krams, M., Toni, I., Passingham, R., and Dolan, R. (1999). A functional anatomy of anticipatory anxiety. *Neuroimage*, 9(6):563–571.

Coval, J. D. and Shumway, T. (2005). Do behavioral biases affect prices? *The Journal of Finance*, 60(1):1–34.

Dorn, A., Dorn, D., and Sengmueller, P. (2012). Trading as gambling. *Working Paper*.

Dorn, D. and Sengmueller, P. (2009). Trading as entertainment? *Management Science*, 55(4):591–603.

Duarte, J., Siegel, S., and Young, L. (2012). Trust and credit: The role of appearance in peer-to-peer lending. *Review of Financial Studies*, 25(8):2455–2484.

Dutton, D. G. and Aron, A. P. (1974). Some evidence for heightened sexual attraction under conditions of high anxiety. *Journal of Personality and Social Psychology*, 30(4):510.

Eadington, W. R. (1999). The economics of casino gambling. *The Journal of Economic Perspectives*, 13(3):173–192.

Fama, E. F. and MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *The Journal of Political Economy*, pages 607–636.

Fessler, D. M., Pillsworth, E. G., and Flamson, T. J. (2004). Angry men and disgusted women: An evolutionary approach to the influence of emotions on risk taking. *Organizational Behavior and Human Decision Processes*, 95(1):107–123.

Gallup (2011). Doctor-assisted suicide is moral issue dividing americans most. `http://www.gallup.com/poll/147842/Doctor-Assisted-Suicide-Moral-Issue-Dividing-Americans.aspx`, accessed Dec 2013.

Gao, X. and Lin, T. C. (2011). Do individual investors trade stocks as gambling? Evidence from repeated natural experiments. *Working Paper*.

Grinblatt, M. and Keloharju, M. (2009). Sensation seeking, overconfidence, and trading activity. *The Journal of Finance*, 64(2):549–578.

Guiso, L., Sapienza, P., and Zingales, L. (2013). Time-varying risk aversion. *Working Paper*.

Hirshleifer, D. and Shumway, T. (2003). Good day sunshine: Stock returns and the weather. *The Journal of Finance*, 58(3):1009–1032.

Horton, J. J., Rand, D. G., and Zeckhauser, R. J. (2011). The online laboratory: Conducting experiments in a real labor market. *Experimental Economics*, 14(3):399–425.

Imbens, G. W. and Wooldridge, J. M. (2009). Recent developments in the econometrics of program evaluation. *Journal of Economic Literature*, 47(1):5–86.

Ipeirotis, P. (2010a). Demographics of mechanical turk. *NYU Working Paper*.

Ipeirotis, P. G. (2010b). Analyzing the Amazon Mechanical Turk marketplace. *XRDS: Crossroads, The ACM Magazine for Students*, 17(2):16–21.

Kallick, M., Suits, D., Dielman, T., and Hybels, J. (1979). *A survey of American gambling attitudes and behavior*. Survey Research Center, Institute for Social Research, University of Michigan Ann Arbor.

Kamstra, M. J., Kramer, L. A., and Levi, M. D. (2003). Winter blues: A SAD stock market cycle. *The American Economic Review*, 93(1):324–343.

Kaustia, M. and Knüpfer, S. (2008). Do investors overweight personal experience? Evidence from IPO subscriptions. *The Journal of Finance*, 63(6):2679–2702.

Knutson, B., Adams, C., Fong, G., and Hommer, D. (2001). Anticipation of increasing monetary reward selectively recruits nucleus accumbens. *The Journal of Neuroscience*.

Knutson, B., Wimmer, G. E., Kuhnen, C. M., and Winkielman, P. (2008). Nucleus accumbens activation mediates the influence of reward cues on financial risk taking. *NeuroReport*, 19(5):509–513.

Koleva, S. P., Graham, J., Iyer, R., Ditto, P. H., and Haidt, J. (2012). Tracing the threads: How five moral concerns (especially purity) help explain culture war attitudes. *Journal of Research in Personality*, 46(2):184–194.

Kuhnen, C. M. and Knutson, B. (2005). The neural basis of financial risk taking. *Neuron*, 47(5):763–770.

Kuhnen, C. M. and Knutson, B. (2011). The influence of affect on beliefs, preferences, and financial decisions. *Journal of Financial and Quantitative Analysis*, 46(3):605.

Kumar, A. (2009). Who gambles in the stock market? *The Journal of Finance*, 64(4):1889–1933.

Kumar, A., Page, J. K., and Spalt, O. G. (2011). Religious beliefs, gambling attitudes, and financial market outcomes. *Journal of Financial Economics*, 102(3):671–708.

Kuziemko, I., Norton, M. I., Saez, E., and Stantcheva, S. (2013). How elastic are preferences for redistribution? Evidence from randomized survey experiments. *National Bureau of Economic Research Working Paper*.

Ladouceur, R., Mayrand, M., and Tourigny, Y. (1987). Risk-taking behavior in gamblers and non-gamblers during prolonged exposure. *Journal of Gambling Behavior*, 3(2):115–122.

Ladouceur, R., Tourigny, M., and Mayrand, M. (1986). Familiarity, group exposure, and risk-taking behavior in gambling. *The Journal of Psychology*, 120(1):45–49. PMID: 3735143.

Leary, K. and Dickerson, M. (1985). Levels of arousal in high-and low-frequency gamblers. *Behaviour Research and Therapy*, 23(6):635–640.

Lerner, J. S., Small, D. A., and Loewenstein, G. (2004). Heart strings and purse strings: Carryover effects of emotions on economic decisions. *Psychological Science*, 15(5):337–341.

Levi, M. D. (1973). Errors in the variables bias in the presence of correctly measured variables. *Econometrica*, 41(5):985–86.

Li, G. (2012). Gamblers as personal finance activists. *Working Paper*.

Lo, A. W. and Repin, D. V. (2002). The psychophysiology of real-time financial risk processing. *Journal of Cognitive Neuroscience*, 14(3):323–339.

Lo, A. W., Repin, D. V., and Steenbarger, B. N. (2005). Fear and greed in financial markets: A clinical study of day-traders. *National Bureau of Economic Research Working Paper*.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., and Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127(2):267.

Malmendier, U. and Nagel, S. (2011). Depression babies: Do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics*, 126(1):373–416.

Marge, M., Banerjee, S., and Rudnicky, A. I. (2010). Using the Amazon Mechanical Turk for transcription of spoken language. In *Acoustics Speech and Signal Processing (ICASSP), 2010 IEEE International Conference on*, pages 5270–5273. IEEE.

Mason, W. and Suri, S. (2012). Conducting behavioral research on Amazon's Mechanical Turk. *Behavior Research Methods*, 44(1):1–23.

Mason, W. and Watts, D. J. (2010). Financial incentives and the performance of crowds. *ACM SigKDD Explorations Newsletter*, 11(2):100–108.

Mitton, T. and Vorkink, K. (2007). Equilibrium underdiversification and the preference for skewness. *Review of Financial Studies*, 20(4):1255–1288.

Oppenheimer, D. M., Meyvis, T., and Davidenko, N. (2009). Instructional manipulation checks: Detecting satisficing to increase statistical power. *Journal of Experimental Social Psychology*, 45(4):867–872.

Paolacci, G., Chandler, J., and Ipeirotis, P. (2010). Running experiments on Amazon Mechanical Turk. *Judgment and Decision Making*, 5(5):411–419.

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies*, 22(1):435–480.

Rand, D. G. (2012). The promise of Mechanical Turk: How online labor markets can help theorists run behavioral experiments. *Journal of Theoretical Biology*, 299:172–179.

Rand, D. G. and Nowak, M. A. (2011). The evolution of antisocial punishment in optional public goods games. *Nature Communications*, 2:434.

Saunders, E. M. (1993). Stock prices and wall street weather. *The American Economic Review*, 83(5):1337–1345.

Schwarz, N. and Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, 45(3):513.

Shiv, B., Loewenstein, G., Bechara, A., Damasio, H., and Damasio, A. R. (2005). Investment behavior and the negative side of emotion. *Psychological Science*, 16(6):435–439.

Simmons, A., Matthews, S. C., Stein, M. B., and Paulus, M. P. (2004). Anticipation of emotionally aversive visual stimuli activates right insula. *Neuroreport*, 15(14):2261–2265.

Smith, G., Levere, M., and Kurtzman, R. (2009). Poker player behavior after big wins and big losses. *Management Science*, 55(9):1547–1555.

Suri, S. and Watts, D. (2010). Cooperation and contagion in networked public goods experiments. *PLoS ONE*, 6(3).

Thaler, R. H. and Johnson, E. J. (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management Science*, 36(6):643–660.

U.S. Census Bureau (2012). Household Income for States: 2010 and 2011. `http://www.census.gov/prod/2012pubs/acsbr11-02.pdf`, accessed June 2013.

Walker, M. B. (1992). *The psychology of gambling.* Pergamon Press.

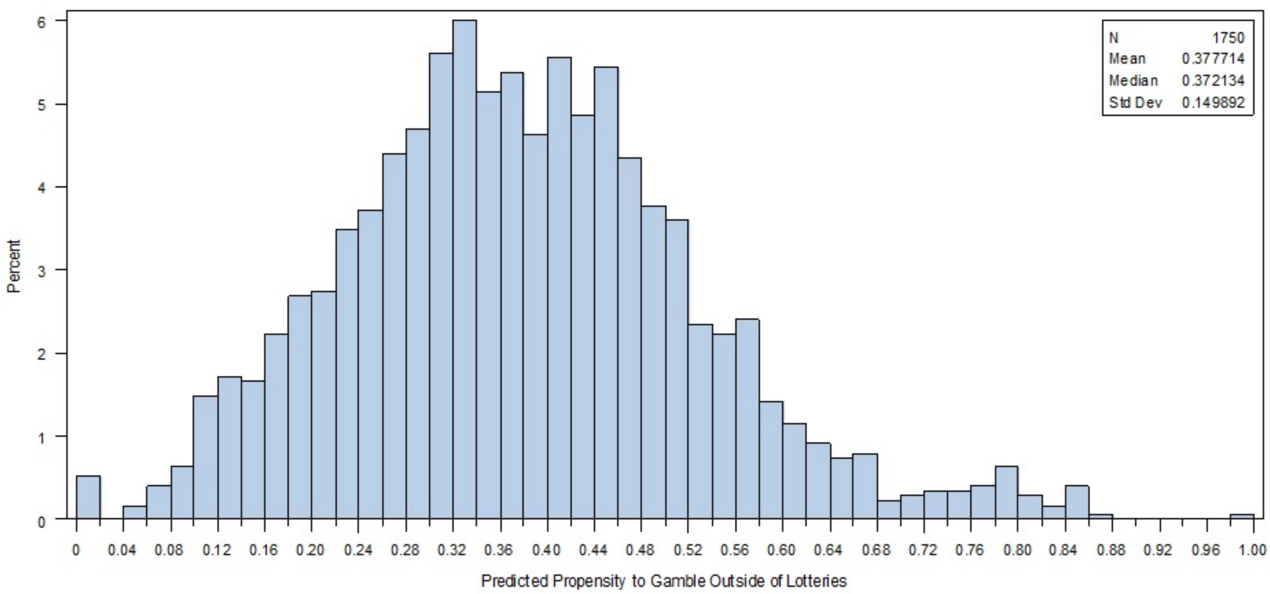
Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking.* Cambridge University Press.

Figure 1: Map of U.S. Casino Openings

This map shows the locations of the 61 casinos that opened between 1991 and 1996 used in the sample. Each color indicates a different state.

Figure 2: Distribution of Predicted Propensity to Gamble Outside of Lotteries

Panel A: Predicted Propensity to Gamble Outside of Lotteries for Respondents in the Survey Data
This figure shows the distribution of the predicted propensity to gamble outside of lotteries for respondents in the survey data computed from the parameter estimates resulting from the predictive regression shown in Table 4 and each respondent's demographic and geographic characteristics.



Panel B: Predicted Propensity to Gamble Outside of Lotteries for Investors in the Brokerage Data
This figure shows the distribution of the predicted propensity to gamble outside of lotteries for investors in the brokerage data set computed from the parameter estimates resulting from the predictive regression shown in Table 4 and each investor's demographic and geographic characteristics. The vertical lines indicate the 20^{th}, 33^{rd}, 67^{th}, and 80^{th} percentiles of the distribution.

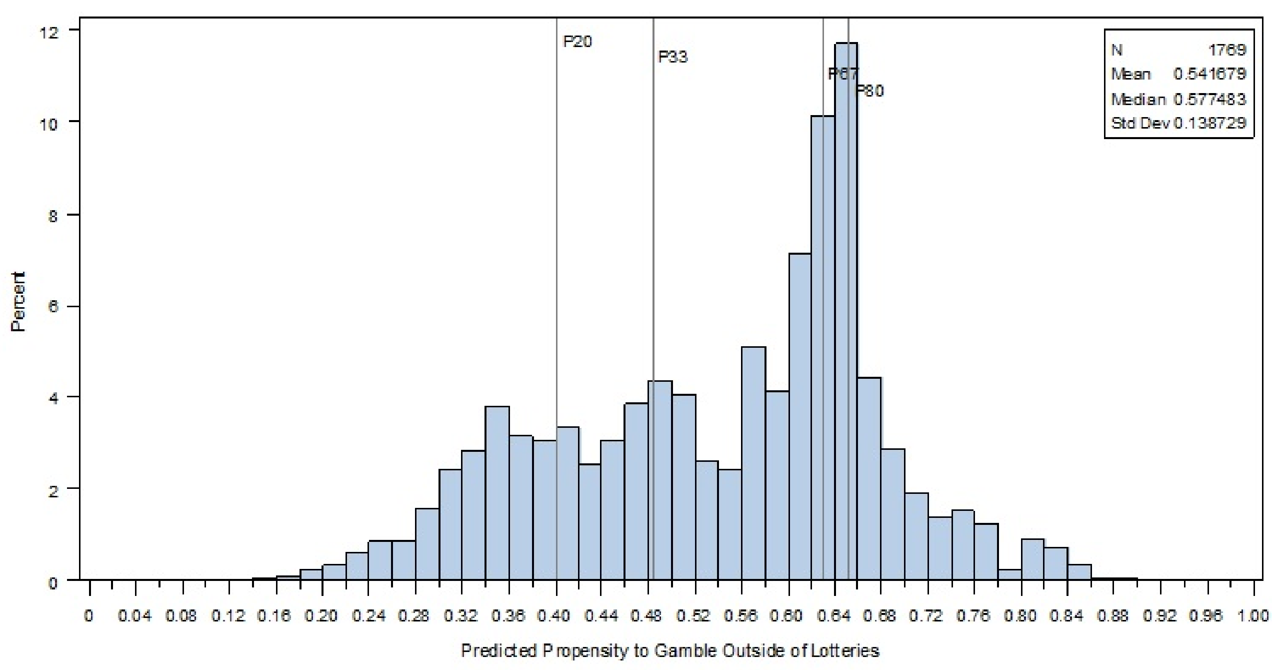


Table 1: Casino Openings

This table lists the 61 casinos that opened in the U.S. from January 1991 through to November 1996, during the discount brokerage data sample period. The table shows the month and year the casino first opened its doors, along with the state and zip code where it was located. The two right-most columns show the number of investors in the discount brokerage data that are within a 50- and 100-mile radius of the casino. Investors are included only once, meaning that once a casino opens within 50 miles of an investor, that investor is linked with that casino and opening date and no others even if another casino opens within 50 miles of that same investor. Thus, the investors linked with each casino below are all unique.

	Date of Opening	Casino	State	Zip Code	# Incremental Investors within 50 Miles	# Incremental Investors within 100 Miles
1.	Apr-91	The Dubuque Casino Belle	IA	52004	8	69
2.	Apr-91	The Diamond Lady	IA	52722	13	22
3.	Apr-91	The President	IA	52801	3	
4.	May-91	The Emerald Lady	IA	52627	4	4
5.	Jun-91	The Mississippi Belle II	IA	52732	1	43
6.	Sep-91	Alton Belle	IL	62002	143	165
7.	Oct-91	Bronco Billy's Sports Bar & Casino	CO	80814	124	264
8.	Oct-91	Johnny Nolon's	CO	80818	1	3
9.	Oct-91	Dostal Alley Saloon & Gambling Emporium	CO	80427	132	12
10.	Nov-91	Par-A-Dice	IL	61611	20	23
11.	Jan-92	The Famous Bonanza	CO	80428	1	2
12.	Mar-92	Casino Rock Island	IL	61201		
13.	May-92	Red Dolly Casino, Inc.	CO	80422		
14.	Jun-92	Empress I	IL	60435	824	870
15.	Jun-92	The Silver Eagle	IL	61025		1
16.	Jun-92	Century Casinos	CO	80816		
17.	Aug-92	Isle of Capri Casino - Biloxi	MS	39530	20	134
18.	Aug-92	President Casino	MS	39531	4	
19.	Aug-92	Midnight Rose Hotel & Casino	CO	80819		
20.	Oct-92	Tunica Casino d/b/a Splash Casino	MS	38664	87	105
21.	Jan-93	The Sioux City Sue	IA	51102	8	62
22.	Feb-93	Players Riverboat Casino	IL	62960	6	24
23.	May-93	Northern Star	IL	60432	4	5
24.	May-93	Grand Casino - Gulfport	MS	39501	2	2
25.	Jun-93	City of Lights I and City of Lights II	IL	60606	48	49
26.	Jun-93	Casino Queen	IL	62201	4	1
27.	Aug-93	Isle of Capri Casino-Vicksburg	MS	39180	7	15
28.	Oct-93	Star	LA	70601	15	32
29.	Feb-94	Hilton - Flamingo	LA	70130	59	16
30.	Mar-94	Las Vegas Casino	MS	38701	1	1
31.	Apr-94	Harrahs	LA	71101	8	14
32.	Apr-94	Treasure Bay Casino	MS	36535	15	15
33.	May-94	The Dubuque Diamond Jo	IA	52001		
34.	May-94	Isle of Capri (Boss.)/Diamond Jacks	LA	71111		
35.	May-94	President Riverboat Casino on the Admiral	MO	63102		
36.	May-94	Casino St. Charles	MO	63302	2	9
37.	Jun-94	Argosy Riverside Casino	MO	64150	89	99
38.	Jun-94	St. Jo Frontier Casino	MO	64501		2
39.	Aug-94	Boomtown	LA	70058		
40.	Sep-94	Treasure Chest	LA	70065	1	
41.	Sep-94	North Star	MO	64116		
42.	Sep-94	Belle of B.R.	LA	70802	12	
43.	Oct-94	Grand Victoria	IL	60120	14	3
44.	Nov-94	The Catfish Bend Casinos	IA	52601		
45.	Dec-94	The Belle of Sioux City	IA	51101		
46.	Dec-94	The Miss Marquette	IA	52158		11
47.	Apr-95	Casino Aztar	MO	63830	5	1
48.	Jun-95	Brass Ass Casino	CO	80813	2	
49.	Jul-95	Bally's	LA	70126		
50.	Jul-95	Isle of Capri (L.C.)	LA	70669	1	
51.	Sep-95	Sam's Town Casino	MO	64118		
52.	Dec-95	Casino Aztar	IN	47708	5	6
53.	Jan-96	Harrahs Council Bluffs Casino & Hotel	IA	51501	16	2
54.	Jun-96	Majestic Star Casino	IN	46402		7
55.	Jun-96	Trump Casino	IN	46406		
56.	Jun-96	Empress Casino Hammond	IN	46320		
57.	Jul-96	Century Casino Cripple Creek	CO	80815		
58.	Aug-96	Double Eagle Hotel & Casino	CO	80817		
59.	Oct-96	Grand Victoria Casino & Resort	IN	47040	57	138
60.	Oct-96	Flamingo Casino	MO	64120		
61.	Dec-96	Argosy Casino	IN	47025	3	1
	Total				1,769	2,232

Table 2: Summary Statistics: Investor Demographic and Portfolio Characteristics

This table contains summary statistics for the main data samples used. Panel A shows the demographic, gambling, and an abridged set of portfolio characteristics of the respondents in the MTurk survey sample. All respondents are in the U.S., at least 18 years of age, and have financial investments. Panel B shows summary investor demographic and portfolio characteristics for the full sample of investors from a large U.S. discount brokerage (see Barber and Odean (2000) for details). Panel C shows the same information for the 50-mile subsample of investors. The survey sample was collected in October and November 2012. The sample period for the brokerage account data is from January 1991 to November 1996. Male, Married, Retired, and Children are indicator variables equal to one if the investor is male, married, retired, or has at least one child, respectively. Income is the investor's annual income. Portfolio characteristics in Panels B and C are defined as follows. Portfolio size is the average monthly value of stocks in all of an investor's brokerage accounts. Ex ante weighted stock beta is the monthly value-weighted average of CAPM betas of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months. Ex ante weighted stock volatility is the monthly value-weighted average of the volatility of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months. Ex ante portfolio volatility is the standard deviation of the portfolio returns over the preceding 36 months. Sharpe ratio, $(E[r_j]-r_f)/\sigma_j$, is constructed for each household using ex ante portfolio volatility as the denominator and an ex ante measure of portfolio performance also constructed from the monthly performance of stocks in each investor's portfolio over the preceding 36 months. Monthly turnover is the average monthly portfolio turnover for each investor, calculated as the average of an investor's monthly sales turnover and purchase turnover. Gross return is the average monthly portfolio return realized by each investor. Net return is the gross portfolio return net of transaction costs Barber and Odean (2000). Market-adjusted gross return is the gross return minus the monthly value-weighted market return. Market-adjusted net return is the net return minus the monthly value-weighted market return. All portfolio characteristic measures are mean monthly averages for each investor.

			Percentile					
	Mean	Std Dev	10th	25th	50th	75th	90th	N
Panel A: Survey Sample								
Investor Demographics								
Age	33.44	10.84	22	25	31	39	50	1,750
Male	0.526	0.499	0	0	1	1	1	1,750
Married	0.417	0.493	0	0	0	1	1	1,750
Retired	0.018	0.132	0	0	0	0	0	1,750
Children	0.391	0.488	0	0	0	1	1	1,750
Income	$61,929	$40,936	$10,000	$30,000	$50,000	$80,000	$125,000	1,750
Gambling Characteristics								
Currently gambles	0.435	0.496	0	0	0	1	1	1,750
Currently gambles outside of lotteries	0.378	0.485	0	0	0	1	1	1,750
Panel B: Full Brokerage Sample								
Investor Demographics								
Age	52.352	13.009	39.5	39.5	49.5	59.5	69.5	32,556
Male	0.881	0.324	0	1	1	1	1	34,872
Married	0.734	0.442	0	0	1	1	1	30,871
Retired	0.168	0.374	0	0	0	0	1	19,143
Children	0.248	0.432	0	0	0	0	1	40,097
Income	$77,340	$38,352	$25,000	$45,000	$62,500	$112,500	$150,000	34,992
Portfolio Characteristics								
Portfolio size	$33,559	$177,934	$2,538	$5,562	$11,975	$27,312	$64,921	62,531
Ex ante weighted stock beta (CAPM)	1.107	0.818	0.593	0.854	1.106	1.374	1.673	62,496
Ex ante weighted stock volatility	0.133	0.076	0.072	0.090	0.119	0.158	0.210	62,531
Ex ante portfolio volatility	0.100	0.086	0.048	0.062	0.083	0.118	0.163	62,519
Ex ante Sharpe ratio	0.150	0.268	-0.034	0.052	0.147	0.239	0.328	62,519
Monthly turnover	6.78%	19.49%	0.00%	0.87%	2.94%	7.22%	16.04%	62,531
Gross returns	1.62%	5.37%	-0.57%	0.62%	1.39%	2.36%	3.88%	62,531
Net returns	1.27%	5.85%	-0.95%	0.40%	1.23%	2.14%	3.53%	62,531
Market-adjusted gross returns	0.27%	5.30%	-1.86%	-0.67%	0.09%	1.03%	2.49%	62,531
Market-adjusted net returns	-0.08%	5.80%	-2.28%	-0.89%	-0.07%	0.81%	2.15%	62,531
Panel C: Brokerage Sample Near Casinos								
Investor Demographics								
Age	52.52	12.57	39.5	39.5	49.5	59.5	69.5	1,769
Male	0.930	0.255	1	1	1	1	1	1,769
Married	0.804	0.397	0	1	1	1	1	1,769
Retired	0.129	0.335	0	0	0	0	1	1,769
Children	0.401	0.490	0	0	0	1	1	1,769
Income	$77,627	$37,654	$35,000	$45,000	$62,500	$112,500	$150,000	1,769
Portfolio Characteristics								
Portfolio size	$28,232	$57,565	$2,968	$5,951	$12,450	$26,701	$61,057	1,769
Ex ante weighted stock beta (CAPM)	1.069	0.382	0.633	0.849	1.059	1.284	1.528	1,769
Ex ante weighted stock volatility	0.127	0.056	0.073	0.089	0.115	0.153	0.197	1,769
Ex ante portfolio volatility	0.091	0.055	0.048	0.058	0.074	0.106	0.150	1,769
Ex ante Sharpe ratio	0.161	0.188	-0.017	0.064	0.158	0.246	0.330	1,769
Monthly turnover	4.54%	10.19%	0.00%	0.61%	2.08%	4.82%	11.00%	1,769
Gross returns	1.32%	2.21%	-0.16%	0.70%	1.31%	1.96%	2.97%	1,769
Net returns	1.12%	2.33%	-0.46%	0.55%	1.18%	1.81%	2.79%	1,769
Market-adjusted gross returns	0.01%	2.19%	-1.47%	-0.63%	0.01%	0.65%	1.62%	1,769
Market-adjusted net returns	-0.19%	2.31%	-1.76%	-0.76%	-0.13%	0.49%	1.39%	1,769

Table 3: Survey Sample Summary Statistics: Comparing Gamblers to Non-Gamblers

This table compares the mean demographic characteristics of gamblers versus non-gamblers in the survey sample. Panel A shows mean characteristics for survey respondents who currently gamble versus those who do not. Panel B shows mean characteristics for survey respondents who currently gamble outside of lotteries versus those who do not. The right-most column shows *t*-tests of the difference between the characteristics of gamblers versus non-gamblers. Variables are as defined in Table 2.

Panel A: Gambling Behavior

	Does Not Currently Gamble	Currently Gamble	Difference
Age	32.074	35.206	-3.132***
			(-6.05)
Male	0.509	0.548	-0.039
			(-1.64)
Married	0.393	0.447	-0.053**
			(-2.25)
Retired	0.011	0.026	-0.015**
			(-2.26)
Children	0.373	0.414	-0.041*
			(-1.74)
Income	$58,327	$66,610	-8,283***
			(-4.22)
Number of Observations	989	761	

Panel B: Gambling Behavior Outside of Lotteries

	Does Not Currently Gamble Outside of Lotteries	Currently Gamble Outside of Lotteries	Difference
Age	32.563	34.874	-2.312***
			(-4.35)
Male	0.511	0.549	-0.038
			(-1.53)
Married	0.406	0.434	-0.028
			(-1.16)
Retired	0.014	0.024	-0.010
			(-1.50)
Children	0.379	0.410	-0.031
			(-1.28)
Income	$58,407	$67,731	-$9,324***
			(-4.65)
Number of Observations	1,089	661	

Table 4: Cross-Sectional Logit Regression Using Survey Data: Predicting the Likelihood of Gambling Participation

This table contains the coefficient estimates of individual-level cross-sectional logit regressions using survey data collected from Amazon Mechanical Turk. The dependent variable in column (1) equals one if the respondent indicated that they currently participates in some form of gambling, and equals zero otherwise. In column (2), the dependent variable equals one if the respondent currently gambles, excluding participation in lotteries. Male, Married, Child, and Retired are indicator variables that equal one if the respondent is male, married, has at least one child, or is currently retired, respectively. Age is the respondent's age expressed in 10 year increments (Age/10) and income is the respondent's household income in tens of thousands ($10,000s) for ease of readability. The squared and cubed values of age and income are also included as explanatory variables. State fixed effects are also included in the specification, but estimates are not shown for brevity.

Independent Variable	Currently Gambles (1)	Currently Gambles Outside of Lotteries (2)
Intercept	6.4904***	5.1206***
	(3.66)	(2.81)
Male	0.2442**	0.2071*
	(2.27)	(1.88)
Married	-0.0861	-0.2348*
	(-0.63)	(-1.68)
Child	-0.1505	-0.0714
	(-1.11)	(-0.51)
Retired	0.5573	0.3910
	(1.28)	(0.86)
Age	2.1662*	3.4499***
	(1.87)	(2.85)
Age^2	-0.3791	-0.7192**
	(-1.30)	(-2.36)
Age^3	0.0219	0.0484**
	(0.94)	(1.98)
Income	0.3687***	0.3747***
	(4.09)	(4.06)
$Income^2$	-0.0300***	-0.0288***
	(-3.14)	(-2.94)
$Income^3$	0.0007**	0.0006**
	(2.56)	(2.36)
State Fixed Effects	Yes	Yes
Adjusted R^2	0.0965	0.0963
Number of Respondents	1,750	1,750

Table 5: Brokerage Sample Summary Statistics: Comparing Gamblers to Non-Gamblers

This table contains mean summary statistics for the 50-mile subsample of investors in the brokerage data set, sorted into quintiles based on their estimated propensity to gamble outside of lotteries. Panel A contains investor demographics and Panel B contains the pre-treatment portfolio characteristics to compare the investor portfolios of likely versus unlikely gamblers before the opening of the casino. The right-most column shows t-tests of the difference between the characteristics of unlikely gamblers in the lowest quintile of gambling propensity and of likely gamblers in the highest quintile of gambling propensity Variables are as defined in Table 2.

	Gambling Propensity Ouside of Lotteries Quintiles					
	Low	2	3	4	High	Low–High
Panel A: Investor Demographics						
Propensity to gamble outside of lotteries	0.315	0.441	0.548	0.628	0.701	-0.386***
						(-112.8)
Age	51.227	50.677	53.246	52.194	55.509	-4.282***
						(-5.03)
Male	0.928	0.914	0.919	0.936	0.961	-0.033**
						(-2.24)
Married	0.831	0.800	0.794	0.878	0.740	0.090***
						(3.38)
Retired	0.104	0.097	0.145	0.079	0.247	-0.143***
						(-5.85)
Children	0.428	0.416	0.406	0.476	0.285	0.143***
						(4.60)
Income	$65,853	$76,730	$74,580	$85,556	$86,781	-20,928***
						(-8.62)
Number of Observations	472	464	470	468	466	
Panel B: Pre-Treatment Portfolio Characteristics						
Portfolio size	$18,920	$22,459	$23,091	$20,655	$24,343	-$5,422
						(-1.44)
Monthly turnover	7.72%	5.49%	7.78%	5.95%	6.77%	0.956%
						(0.86)
Ex ante weighted stock beta (CAPM)	1.119	1.099	1.127	1.070	1.116	0.003
						(0.09)
Ex ante weighted stock volatility	0.148	0.147	0.151	0.146	0.143	0.005
						(0.82)
Ex ante portfolio volatility	0.094	0.092	0.093	0.092	0.095	-0.001
						(-0.23)
Ex ante Sharpe ratio	0.172	0.151	0.152	0.174	0.146	0.026**
						(2.04)
Gross returns	2.370%	2.091%	2.126%	1.603%	1.900%	0.470%
						(1.38)
Net returns	2.023%	1.839%	1.761%	1.375%	1.583%	0.441%
						(1.32)
Market-adjusted gross returns	0.921%	0.513%	0.588%	0.179%	0.452%	0.469%
						(1.45)
Market-adjusted net returns	0.574%	0.262%	0.223%	-0.049%	0.135%	0.439%
						(1.36)
Number of Observations	472	464	470	468	466	

Table 6: Panel Difference-in-Differences Regression: Effect of Casino Openings on Portfolio Risk Taking

This table contains estimates from fixed effect panel regressions using the 50-mile subsample. In each panel, a measure of portfolio risk is regressed on the interaction between a measure of gambling propensity and an indicator that equals one for all months after the casino near each investor has opened. In Panel A, the dependent variable is ex ante weighted stock beta, which is the monthly value-weighted average of CAPM betas of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months. The dependent variable in Panel B is the ex ante weighted stock volatility, a monthly value-weighted average of the volatility of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months. Panel C shows regressions using ex ante portfolio volatility, the standard deviation of the monthly returns on the portfolio in month t over the preceding 36 months, as the dependent variable. $AfterCasino$ is an indicator that equals one if the casino near investor i has opened by month t. In column (1), $PropGambleScore$ is a variable indicating the propensity to gamble for each investor i. In columns (2) and (3), $HighPropGambleQuintile$ and $HighPropGambleTercile$ are indicator variables that equals one for investors who are in the top quintile and tercile, respectively, sorted based on the propensity to gamble score used in column (1). The samples used in columns (2) and (3) include only those investors in the top and bottom quintiles and terciles, respectively, for ease of interpretation. The measures of gambling propensity used in columns (4) to (6) are analogous to those in columns (1) to (3), but use a measure indicating an investor's propensity to gamble excluding lotteries. All regressions include household and month fixed effects, as well as controls for portfolio size and the number of stocks in each investor's portfolio. Portfolio size is expressed in millions for ease of readability. Standard errors are clustered by household. t-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% significance levels, respectively.

Panel A: Effect of Casino Openings on Ex ante Weighted Portfolio Beta (CAPM)

	Dependent Variable: Ex ante Weighted Portfolio Beta (CAPM)					
	(1)	(2)	(3)	(4)	(5)	(6)
PropGamble Score × After Casino	0.1655*					
	(1.87)					
High PropGamble Quintile × After Casino		0.0772**				
		(1.98)				
High PropGamble Tercile × After Casino			0.0514			
			(1.63)			
NonLottPropGamble Score × After Casino				0.1757**		
				(2.02)		
High NonLottPropGamble Quintile × After Casino					0.0936**	
					(2.25)	
High NonLottPropGamble Tercile × After Casino						0.0603*
						(1.89)
After Casino	-0.0876	-0.0422	-0.0005	-0.0793	-0.0229	-0.0126
	(-1.55)	(-1.26)	(-0.02)	(-1.62)	(-0.69)	(-0.49)
Portfolio Size	0.1280	0.2156	0.2580	0.1294	0.2538	0.1558
	(0.40)	(0.42)	(0.58)	(0.41)	(0.44)	(0.35)
Number of Stocks	0.0019	-0.0065	-0.0004	0.0019	-0.0029	-0.0004
	(0.44)	(-0.72)	(-0.06)	(0.43)	(-0.29)	(-0.06)
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.246	0.256	0.237	0.246	0.204	0.231
Number of Households	1,769	698	1,194	1,769	701	1,180
Number of Observations	85,924	33,707	57,400	85,924	33,793	57,247

Continued on next page

Table 6 Panel Difference-in-Differences Regression: Effect of Casino Openings on Portfolio Risk Taking

– *Continued from previous page*

Panel B: Effect of Casino Openings on Ex ante Weighted Stock Volatility

	Dependent Variable: Ex ante Weighted Stock Volatility					
	(1)	(2)	(3)	(4)	(5)	(6)
PropGamble Score × After Casino	0.0283**					
	(2.26)					
High PropGamble Quintile × After Casino		0.0118**				
		(2.16)				
High PropGamble Tercile × After Casino			0.0087*			
			(1.90)			
NonLottPropGamble Score × After Casino				0.0297**		
				(2.37)		
High NonLottPropGamble Quintile × After Casino					0.0136**	
					(2.39)	
High NonLottPropGamble Tercile × After Casino						0.0122***
						(2.82)
After Casino	-0.0135*	-0.0057	-0.0019	-0.0120*	-0.0014	-0.0015
	(-1.75)	(-1.37)	(-0.59)	(-1.78)	(-0.31)	(-0.44)
Portfolio Size	-0.0214	-0.0358	-0.0276	-0.0211	-0.0506	-0.0440
	(-0.66)	(-0.72)	(-0.63)	(-0.66)	(-0.91)	(-1.02)
Number of Stocks	-0.0004	-0.0007	-0.0005	-0.0004	0.0003	-0.0004
	(-0.91)	(-0.81)	(-0.66)	(-0.93)	(0.29)	(-0.58)
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.530	0.555	0.517	0.530	0.474	0.512
Number of Households	1,769	698	1,194	1,769	701	1,180
Number of Observations	86,043	33,762	57,492	86,043	33,841	57,342

Panel C: Effect of Casino Openings on Ex ante Portfolio Volatility

	Dependent Variable: Ex ante Portfolio Volatility					
	(1)	(2)	(3)	(4)	(5)	(6)
PropGamble Score × After Casino	0.0182**					
	(2.26)					
High PropGamble Quintile × After Casino		0.0071**				
		(2.08)				
High PropGamble Tercile × After Casino			0.0048*			
			(1.79)			
NonLottPropGamble Score × After Casino				0.0174**		
				(2.23)		
High NonLottPropGamble Quintile × After Casino					0.0081**	
					(2.30)	
High NonLottPropGamble Tercile × After Casino						0.0032
						(1.22)
After Casino	-0.0101**	-0.0016	0.0003	-0.0081*	-0.0004	0.0001
	(-2.01)	(-0.56)	(0.15)	(-1.91)	(-0.12)	(0.05)
Portfolio Size	-0.0749	-0.0819	-0.0892	-0.0746	-0.1269	-0.1036
	(-1.56)	(-1.08)	(-1.37)	(-1.55)	(-1.49)	(-1.57)
Number of Stocks	-0.0023***	-0.0034**	-0.0026**	-0.0023***	-0.0023	-0.0026**
	(-2.68)	(-2.54)	(-2.11)	(-2.68)	(-1.10)	(-2.10)
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.313	0.336	0.272	0.313	0.204	0.259
Number of Households	1,769	698	1,194	1,769	701	1,180
Number of Observations	85,964	33,726	57,428	85,964	33,810	57,279

Table 7: Panel Difference-in-Differences Regression: Effect of Demographic Characteristics on Portfolio Risk Taking

This table contains estimates from fixed effect panel regressions using the 50-mile subsample. The dependent variable is ex ante weighted stock beta, the monthly value-weighted average of CAPM betas of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months. $HighNonLottPropGambleQuintile$ is an indicator that equals one for investors in the highest quintile sorted on their propensity to gamble outside of lotteries score and equals zero for investors in the lowest quintile. $AfterCasino$ is an indicator that equals one if the casino near investor i has opened by month t. Each demographic characteristics is interacted with either $AfterCasino$ or both $HighNonLottPropGambleQuintile$ and $AfterCasino$. All regressions include household and month fixed effects, as well as controls for portfolio size and the number of stocks in each investor's portfolio. Portfolio size is expressed in millions for ease of readability. Standard errors are clustered by household. t-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% significance levels, respectively.

	Dependent Variable: Ex ante Weighted Portfolio Beta (CAPM)					
	(1)	(2)	(3)	(4)	(5)	(6)
Age × After Casino	-0.0028					
	(-1.64)					
Children × After Casino		-0.0339				
		(-0.71)				
Income × After Casino			-0.0004			
			(-0.80)			
Male × After Casino				0.0549		
				(0.63)		
Married × After Casino					0.0658	
					(1.30)	
Retired × After Casino						0.0611
						(1.05)
Age × High NonLottPropGamble Quintile × After Casino	0.0018**					
	(2.47)					
Children × High NonLottPropGamble Quintile × After Casino		0.0332				
		(0.61)				
Income × High NonLottPropGamble Quintile × After Casino			0.0013**			
			(2.57)			
Male × High NonLottPropGamble Quintile × After Casino				0.0886**		
				(2.08)		
Married × High NonLottPropGamble Quintile × After Casino					0.0807*	
					(1.77)	
Retired × High NonLottPropGamble Quintile × After Casino						0.0144
						(0.20)
After Casino	0.1214	0.0289	0.0042	-0.0719	-0.0592	0.0081
	(1.27)	(0.86)	(0.09)	(-0.85)	(-1.26)	(0.27)
Portfolio Size	0.2565	0.2673	0.2609	0.2525	0.2507	0.2565
	(0.44)	(0.46)	(0.45)	(0.44)	(0.42)	(0.44)
Number of Stocks	-0.0027	-0.0028	-0.0030	-0.0029	-0.0030	-0.0032
	(-0.26)	(-0.27)	(-0.30)	(-0.28)	(-0.29)	(-0.31)
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.205	0.204	0.205	0.204	0.205	0.204
Number of Households	701	701	701	701	701	701
Number of Observations	33,793	33,793	33,793	33,793	33,793	33,793

Table 8: Panel Difference-in-Differences Regression: 100-Mile Radius Subsample

This table contains estimates from fixed effect panel regressions using the 100-mile subsample. The dependent variable is ex ante weighted stock beta in columns (1) to (3), ex ante weighted stock volatility in columns (4) to (6), and ex ante portfolio volatility in columns (7) to (9). Ex ante weighted stock beta is the monthly value-weighted average of CAPM betas of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months, ex ante weighted stock volatility is defined as the monthly value-weighted average of the volatility of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months, and ex ante portfolio volatility is the standard deviation of the monthly returns on the portfolio in month t over the preceding 36 months, as the dependent variable. The explanatory variables of interest are an interaction between a measure of gambling propensity and $AfterCasino$, an indicator that equals one for all months after the casino near each investor has opened. In column (1), $NonLottPropGambleScore$ is a variable indicating the propensity to gamble outside of lotteries for each investor i. In columns (2) and (3), $HighNonLottPropGambleQuintile$ and $HighNonLottPropGambleTercile$ are indicator variables that equals one for investors who are in the top quintile and tercile, respectively, sorted based on the propensity to gamble score used in column (1). The samples used in columns (2) and (3) include only those investors in the top and bottom quintiles and terciles, respectively, for ease of interpretation. All regressions include household and month fixed effects, as well as controls for portfolio size and the number of stocks in each investor's portfolio. Portfolio size is expressed in millions for ease of readability. Standard errors are clustered by household. t-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% significance levels, respectively.

Dependent Variable:	Ex ante Weighted Portfolio Beta (CAPM)			Ex ante Weighted Stock Volatility			Ex ante Portfolio Volatility		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NonLottPropGamble Score × After Casino	0.0774			0.0193*			0.0133*		
	(0.99)			(1.70)			(1.88)		
High NonLottPropGamble Quintile × After Casino		0.0484			0.0100*			0.0056*	
		(1.29)			(1.93)			(1.70)	
High NonLottPropGamble Tercile × After Casino			0.0374			0.0094**			0.0040*
			(1.29)			(2.32)			(1.67)
After Casino	-0.0338	0.0050	-0.0085	-0.0065	0.0011	0.0016	-0.0064*	0.0011	-0.0009
	(-0.78)	(0.16)	(-0.35)	(-1.04)	(0.25)	(0.50)	(-1.66)	(0.41)	(-0.48)
Portfolio Size	-0.0282	0.3299	-0.0548	-0.0026	-0.0035	-0.0059	-0.0268	-0.0910	-0.0269
	(-0.19)	(0.69)	(-0.33)	(-0.18)	(-0.06)	(-0.38)	(-1.19)	(-1.33)	(-1.02)
Number of Stocks	0.0007	-0.0045	0.0019	-0.0011**	-0.0011	-0.0011**	-0.0026***	-0.0022	-0.0033***
	(0.25)	(-0.55)	(0.46)	(-2.49)	(-1.13)	(-2.06)	(-4.27)	(-1.46)	(-4.13)
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.248	0.217	0.242	0.381	0.497	0.523	0.280	0.241	0.290
Number of Households	2,232	951	1,536	2,232	951	1,536	2,232	951	1,536
Number of Observations	108,098	44,957	73,370	108,238	45,034	73,489	108,143	44,985	73,408

Table 9: Panel Difference-in-Differences Regression: Dynamic Treatment Effects

This table contains estimates from fixed effect panel regressions to examine the dynamics of risk taking surrounding the casino opening using the 50-mile subsample. The dependent variable is ex ante weighted stock beta in columns (1) to (3), ex ante weighted stock volatility in columns (4) to (6), and ex ante portfolio volatility in columns (7) to (9). Ex ante weighted stock beta is the monthly value-weighted average of CAPM betas of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months, ex ante weighted stock volatility is defined as the monthly value-weighted average of the volatility of each stock in the investor's portfolio estimated using monthly data over the preceding 36 months, and ex ante portfolio volatility is the standard deviation of the monthly returns on the portfolio in month t over the preceding 36 months, as the dependent variable. The explanatory variables of interest are an interaction between a dummy indicating investors most likely to gamble relative to those least likely to gamble and an dummy indicating the year(s) surrounding the casino opening. $HighNonLottPropGambleQuintile$ is an indicator that equals one for investors in the highest quintile sorted on their propensity to gamble outside of lotteries score and equals zero for investors in the lowest quintile. $AfterTrmt^{s}_{it}$ is an indicator variable that equals one for the s^{th} year after the casino opening and $AfterTrmt^{>s}_{it}$ is an indicator that equals one if the casino opened strictly more than s years ago. For years prior to the casino opening, $AfterTrmt^{-1}_{it}$ is an indicator that equals one for the year before the casino opened and $AfterTrmt^{-2}_{it}$ is an indicator the equals one for the year two years prior to the casino opened. All regressions include household and month fixed effects, as well as controls for portfolio size and the number of stocks in each investor's portfolio. Portfolio size is expressed in millions for ease of readability. Standard errors are clustered by household. t-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% significance levels, respectively.

Dependent Variable:	Ex ante Weighted Portfolio Beta (CAPM)			Ex ante Weighted Stock Volatility			Ex ante Portfolio Volatility		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
High NonLottPropGamble Quintile × After Casino^{-2}	0.1214	0.1195	0.1204	0.0127	0.0129	0.0128	0.0099	0.0096	0.0095
	(1.34)	(1.32)	(1.33)	(1.13)	(1.14)	(1.13)	(1.36)	(1.31)	(1.31)
High NonLottPropGamble Quintile × After Casino^{-1}	0.1368	0.1334	0.1351	0.0203	0.0210	0.0207	0.0093	0.0094	0.0092
	(1.40)	(1.36)	(1.38)	(1.47)	(1.53)	(1.51)	(1.01)	(1.03)	(1.01)
High NonLottPropGamble Quintile × After Casino$^{>0}$	0.2194**			0.0280**			0.0156*		
	(2.27)			(1.98)			(1.77)		
High NonLottPropGamble Quintile × After Casino^{1}		0.2414**	0.2421**		0.0253*	0.0249*		0.0180*	0.0176*
		(2.40)	(2.41)		(1.78)	(1.76)		(1.87)	(1.83)
High NonLottPropGamble Quintile × After Casino$^{>1}$		0.2018**			0.0303**			0.0139	
		(2.03)			(2.07)			(1.53)	
High NonLottPropGamble Quintile × After Casino^{2}			0.1797*			0.0341**			0.0158*
			(1.77)			(2.31)			(1.70)
High NonLottPropGamble Quintile × After Casino$^{>2}$			0.2210**			0.0268*			0.0118
			(2.12)			(1.80)			(1.25)
After Casino^{-2}	-0.0392	-0.0343	-0.0306	-0.0098	-0.0112*	-0.0111*	-0.0072	-0.0081*	-0.0075*
	(-0.85)	(-0.73)	(-0.65)	(-1.48)	(-1.82)	(-1.90)	(-1.62)	(-1.83)	(-1.75)
After Casino^{-1}	-0.0234	-0.0157	-0.0111	-0.0168**	-0.0193**	-0.0187**	-0.0077	-0.0097*	-0.0085*
	(-0.46)	(-0.30)	(-0.20)	(-2.03)	(-2.52)	(-2.44)	(-1.43)	(-1.89)	(-1.73)
After Casino$^{>0}$	-0.0459			-0.0169**			-0.0083		
	(-0.76)			(-1.97)			(-1.38)		
After Casino^{1}		-0.0508	-0.0431		-0.0177**	-0.0171*		-0.0113*	-0.0097*
		(-0.79)	(-0.64)		(-2.08)	(-1.85)		(-1.93)	(-1.73)
After Casino$^{>1}$		-0.0199			-0.0238**			-0.0120*	
		(-0.26)			(-2.43)			(-1.68)	
After Casino^{2}			-0.0012			-0.0252**			-0.0115*
			(-0.02)			(-2.25)			(-1.70)
After Casino$^{>2}$			-0.0142			-0.0208			-0.0077
			(-0.15)			(-1.52)			(-0.96)
Portfolio Size	0.2559	0.2635	0.2591	-0.0496	-0.0508	-0.0501	-0.1262	-0.1258	-0.1255
	(0.44)	(0.45)	(0.45)	(-0.92)	(-0.95)	(-0.93)	(-1.48)	(-1.48)	(-1.48)
Number of Stocks	-0.0032	-0.0033	-0.0033	0.0003	0.0003	0.0003	-0.0023	-0.0023	-0.0023
	(-0.31)	(-0.32)	(-0.33)	(0.27)	(0.31)	(0.30)	(-1.10)	(-1.10)	(-1.10)
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.205	0.205	0.205	0.475	0.475	0.476	0.205	0.205	0.205
Number of Households	701	701	701	701	701	701	701	701	701
Number of Observations	33,793	33,793	33,793	33,841	33,841	33,841	33,810	33,810	33,810

Table 10: Panel Difference-in-Differences Regression: Effect of Casino Openings on Portfolio Performance

This table contains estimates from fixed effect panel regressions using the 50-mile subsample. The dependent variable in columns (1) to (3) is the portfolio returns net of transaction costs and the dependent variable used in columns (4) to (6) is the ex ante Sharpe ratio. Sharpe ratio, $(E[r_j] - r_f)/\sigma_j$, is constructed from the monthly performance of stocks in each investor's portfolio over the preceding 36 months. The explanatory variables of interest are an interaction between a measure of gambling propensity and $AfterCasino$, an indicator that equals one for all months after the casino near each investor has opened. In column (1), $NonLottPropGambleScore$ is a variable indicating the propensity to gamble outside of lotteries for each investor i. In columns (2) and (3), $HighNonLottPropGambleQuintile$ and $HighNonLottPropGambleTercile$ are indicator variables that equals one for investors who are in the top quintile and tercile, respectively, sorted based on the propensity to gamble score used in column (1). The samples used in columns (2) and (3) include only those investors in the top and bottom quintiles and terciles, respectively, for ease of interpretation. All regressions include household and month fixed effects, as well as controls for portfolio size and the number of stocks in each investor's portfolio. Portfolio size is expressed in millions for ease of readability. Standard errors are clustered by household. t-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% significance levels, respectively.

Dependent Variable:	Realized Net Returns			Ex Ante Sharpe Ratio		
	(1)	(2)	(3)	(4)	(5)	(6)
NonLottPropGamble Score × After Casino	0.0224***			0.0448		
	(3.34)			(1.38)		
High NonLottPropGamble Quintile × After Casino		0.0093***			0.0225	
		(2.92)			(1.57)	
High NonLottPropGamble Tercile × After Casino			0.0078***			0.0100
			(3.49)			(0.88)
After Casino	-0.0121***	-0.0051**	-0.0046**	-0.0315*	-0.0256**	-0.0173*
	(-3.29)	(-2.05)	(-2.45)	(-1.71)	(-2.20)	(-1.86)
Portfolio Size	-0.0149	0.0063	-0.0062	0.4766***	0.3699***	0.4812***
	(-1.01)	(0.26)	(-0.32)	(5.18)	(3.41)	(4.33)
Number of Stocks	-0.0003	-0.0013	-0.0006	0.0078***	0.0114***	0.0093***
	(-0.70)	(-1.04)	(-0.91)	(4.62)	(5.30)	(4.86)
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.106	0.099	0.102	0.409	0.473	0.474
Number of Households	1,769	701	1,180	1,769	701	1,180
Number of Observations	86,044	33,841	57,343	85,963	33,810	57,279