Can't Stop the One-Armed Bandits
The Effects of Access to Gambling on Crime*

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Abstract

We estimate the effects on criminal activity due to the approval of state legislation in Illinois that legalized video gambling. The bill gave municipalities discretion over whether to allow video gambling within their local boundaries. Many jurisdictions adjacent to Chicago opted in, while the City of Chicago opted out. These decisions create a natural experiment that allows studying the effects of increasing access to gambling on crime. Using detailed incident-level crime data and a difference-in-differences strategy, we find that (i) access to gambling increases violent and property crimes; (ii) these crimes represent "new" rather than displaced incidents; and (iii) effects are persistent over time. We further study downstream effects on property values, finding that properties adjacent to gambling establishments sell on average at a three percent discount.

Key words: video gambling, crime, amenities, Chicago.
JEL Classification: K42, L83, R38.

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1 Introduction

The relationship between the United States and gambling has been a tumultuous one. After being illegal for most of the twentieth century, commercial and tribal gambling expanded rapidly in the early nineties, becoming legal in forty states.[1] More recently, many state governments have moved towards decentralizing gambling activity, moving it away from casinos to smaller establishments such as bars and restaurants through video gambling.[2] In Illinois, people wagered over $14 billion in 2016, which generated over $277 million in tax revenue (equivalent to around 1 percent of total state tax revenue). Encouraged by the apparent fiscal success of video gambling in Illinois, other states are considering similar legislation. Moving towards decentralized gambling changes the nature of access to gambling: instead of being available at a few designated locations (i.e., casinos), it can become widely available across the state – increasing access drastically.

However, the potential effects on crime from such a large increase in access to gambling are not well understood. Most of the existing evidence focuses on the effect of casino constructions on crime. Nevertheless, we must be cautious when extrapolating these results in the context of decentralized gambling. Casino construction typically entails broader changes other than access to gambling. For example, a new casino may generate a positive local labor market shock that may attenuate the potential adverse effects on crime. At the same time, casinos may attract more people to the area, increasing the likelihood of crimes occurring. Thus, the introduction of casino gambling offers a less-than-ideal case in which to study the effect of gambling on crime because location decisions depend on various factors, including local, social, and economic conditions, which may not always be observed by the econometrician.

[1] With the exception of Nevada that legalized commercial gambling in 1931.

[2] This form of gambling is often referred to as "convenience gambling". Video gambling terminals or video lottery terminals are machines where a player bets on the outcome of a video game (i.e., slots, poker, roulette, etc.). In 2019, this type of gambling was legal in Illinois, Louisiana, Oregon, Pennsylvania, South Dakota, West Virginia, and Georgia.

An ideal setting to study the effects of increasing access to gambling would involve randomly placing gaming terminals in some locations and not in others. In this setting, we could examine the effect of access to gambling by comparing how outcomes change in areas with greater access relative to those with lower access. We take advantage of a setting that comes closer to this ideal experimental situation: the legalization and expansion of video gambling in Illinois. The Video Gaming Act of Illinois was passed in 2009 and implemented in 2012. The law allows local establishments in possession of a liquor license (mainly bars and restaurants) to install up to five video gambling terminals. Local municipalities can decide whether or not to allow video gambling in their territory. The City of Chicago has maintained a ban on gambling since 1993. However, several municipalities directly adjacent to Chicago have adopted video gambling, thus considerably increasing access to gambling in some areas of Chicago.

The empirical evidence presented in this paper shows that increasing the availability of gambling can generate costs beyond those intended by policy-makers. We show that increasing the availability of gambling increases crime, and negatively impact property values. This is critical for local governments considering legalizing gambling as a source of revenue because these adverse effects can offset any gambling tax revenues.

Our empirical analysis uses detailed data on the establishments that adopted video gambling and over ten years of detailed incident-level data on crime from Chicago.[3] We use a difference-in-differences strategy that incorporates the timing of the introduction of video gambling in each establishment and compares crime in census block groups of Chicago that are closer to video gambling establishments with those that are farther away. Our identification strategy relies on the fact that the decision to allow gambling was made independently from the areas of study in Chicago. Therefore, in the absence of the Video Gaming Act, crime in areas relatively closer to establishments that ever adopted video

[3]Incident level crime data is only available for the city of Chicago, and not the surrounding cities

gambling should have evolved similarly to areas further away. We test this assumption and find that, indeed, before the legalization of gambling, crime was evolving similarly in areas with greater access relative to those farther away.

We find that expanding access to video gambling leads to an increase in violent and property crimes in Chicago. On average, being near at least one video gambling establishment is associated with an eight percent increase in violent crime and a six percent increase in property crime. These estimates are similar after accounting for potential confounders, including access to riverboat casinos, demographic controls, and neighborhood-specific trends. Our results suggest that video gambling is creating new crimes rather than displacing existing ones. The effects of access to video gambling are strongest in the block groups closest to video gambling establishments. The effects monotonically decrease, becoming, and remaining at zero after two block groups.

One concern is that video gambling could have increased the availability of bars. There is evidence suggesting that increasing access to bars can increase crime (Rossow and Norstrom, 2012, Anderson et al., 2017). If this were happening, our estimates could merely be capturing the effect of more bars rather than access to gambling. Using data on all liquor licenses granted in Illinois, we show that the effects of access to video gambling remain unchanged after accounting for changes in access to bars over time.

Moreover, we find that the introduction of gambling creates crime, primarily in the form of aggravated battery, robberies, and burglaries. The increase in these types of crimes is consistent with crimes directly associated with gambling, such as emotional cues driven from financial distress from pathological gamblers, and the increased payoff from victim availability. Other crimes, not related to gambling, show no noticeable changes.

Gambling can be socially costly beyond increasing crime. We find that prices of properties near establishments decline considerably following the introduction of video gambling. We estimate that the average price within two block groups drops between 1.5 and 3 per-

centage points. These results not only are consistent with the fact that gambling increased crime but also may be associated with other factors beyond crime. There is not only social stigma related to gambling, but also it attracts and generates particular behaviors that people may be willing to pay a discount to live near gaming terminals (Grinols, 2004).

This paper informs several strands of literature. It relates to research studying gambling externalities. Most of this literature has focused on examining the effect of casino expansions on crime (Gazel et al., 2001, Wilson, 2001, Reece, 2010, Hyclak, 2011, Nichols and Tosun, 2017, Falls and Thompson, 2014, Humphreys and Soebbing, 2014) finding mixed results overall. This is partly because casino constructions entail substantial changes in the affected area. For example, several studies have documented positive effects on the local labor market (Evans and Topoleski, 2002, Humphreys and Marchand, 2013). However, Grinols and Mustard (2006) have the most comprehensive study where they find that casinos increase crime. Moreover, its effects on property values have received considerably less attention with similar mix results (Gazel et al., 2001, Wilson, 2001, Reece, 2010, Hyclak, 2011, Nichols and Tosun, 2017, Falls and Thompson, 2014, Humphreys and Soebbing, 2014). We contribute to this literature in three ways, first, by focusing on a context where factors other than access to gambling remain mostly unchanged. Second, we study localized effects of access to gambling on crime and property values, rather than aggregate effects at the county-year level. Third, we exploit a natural experiment where cities outside of Chicago determined access to gambling.

We also add to the literature examining effects of the expansion of "sin tax" activities on crime. Recent studies focused on the effects of legalized prostitution (Ciacci and Sviatschi, 2016), marijuana dispensaries (Chang and Jacobson, 2017), and bars (Rossow and Norstrom, 2012). Our contribution to this literature is by studying the localized effects of decentralized gambling through the rapid expansion of video gambling terminals – an activity that looks set to grow in several states over the next years.

The paper proceeds as follows. Section 2 provides background on gambling in Illinois, showing how access to gambling increased dramatically as a result of the Video Gaming Act. Section 3 describes our data. Section 4 describes our identification and results, and Section 5 examines the robustness of our main results. Section 6 describe our property values results. Section 7 concludes the paper.

2 Video Gambling in Illinois

Gambling is not new to Illinois. Riverboat casinos were legalized in 1990 through the Riverboat Gambling Act (230 ILCS 10). This made Illinois the second state (after Iowa) to legalize this form of gambling (Grinols, 2004). Gambling activities have been closely regulated in Illinois, which has allowed only ten casinos to open throughout the State. In 2012, riverboat casinos generated about $350 million in tax revenue for the state and $83 million for municipalities (Illinois Gaming Board, 2016).

New spending initiatives have begun to rely on funds from gambling revenue to cover costs. The 2009 *Illinois Jobs Now!* project was conceived to foster economic activity, invest in infrastructure, and create new jobs in the aftermath of the 2008 financial crisis. This project's cost was estimated to be $31 billion, of which the state would account for $13 billion or roughly 40%.[4] Twenty-year bonds financed by fee and tax increases (e.g., increases in vehicle registration fees and alcohol/candy taxes) would mainly cover Illinois' share. The second largest revenue source would be tax income from video gambling.

In 2009, the State passed the Video Gaming Act (230 ILCS 40) that legalized video gambling in any retail location with a valid liquor license and not owned by a horse racing firm or riverboat casino.[5] Qualifying establishments fill out an online application and must

[4]Remaining funds were to be drawn from state debt and federal and local matching grants.
[5]Other establishments also qualified for video gambling: licensed fraternal establishments, licensed veteran organizations, and licensed truck stops.

pay a $100 annual license fee. If their request is approved, state-licensed technicians can install between one and five video gambling terminals in the establishment.[6] Terminals cannot directly dispense coins, cash, or tokens. Players instead receive vouchers that can be exchanged for cash at the register. A player can wager $2 at most and terminals cannot dispense more than $500 per game played. The total revenue generated by video gambling terminals is divided in three parts: 70% goes to establishments and terminal companies, 25% to the state, and 5% to the municipality.

Once the implementation of the Video Gaming Act began in September of 2012, adoption was fast. Figure 1 plots the number of video gambling establishments over time. Many eligible businesses applied for licenses and typically installed the maximum number of terminals allowed by the law. Almost 25,000 video gambling terminals in about 5,000 establishments were operational by 2016 (Illinois Gaming Board, 2017). This places Illinois as the largest video gambling jurisdiction in the world, surpassing Nevada. Video gambling became widespread and convenient to such an extent that revenues and attendance at riverboat casinos in Illinois have been in decline since video gambling was adopted (Commission on Government Forecasting and Accountability, 2015).

While the Video Gaming Act legalized video gambling across Illinois, each municipality could choose whether to allow video gambling within its administrative limits, if it did not already have an ordinance prohibiting gambling.[7] Out of 1,475 municipalities, around 12% either opted-out or already had an ordinance that outlawed gambling. The most notable municipality that does not allow video gambling is Chicago. The City of Chicago has had an ordinance prohibiting gambling that dates back to 1993, passed by City Aldermen in opposition to Mayor Daley's plans to bring casinos to the city (ordinance Title 8, Chapter 8-12). An amendment to this ordinance was proposed in 2012 to allow video gambling

[6]Video gambling activities are extensively regulated by the State. Manufacturers, distributors, suppliers, operators, and handlers must fulfill several requirements, pay fees, and are subject to inspections.
[7]The regulations for the referendum may be found in Section 70 of the Video Gaming Act. They require asking constituents: "Shall video gambling be prohibited in [municipality]?" The choices are Yes or No.

(O2012-2236), it was finally voted down in May 2015.

Even though Chicago has not adopted video gambling, access to gambling has increased dramatically in the city as a result of the Video Gaming Act, notwithstanding that there were a number of riverboat casinos and land-based casinos in neighboring Indiana. This is driven by many bordering municipalities that do allow video gambling. We plot the minimum travel time from the centroid of each census block group to the nearest casino (Figure 2.a) or video gambling establishment (Figure 2.b). On average, travel time to gambling decreased by over 47% across the city (or 9 minutes). Given existing evidence suggesting that the relationship between gambling and travel time approximates an exponential function, such a large expansion in access is set to increase gambling significantly (Grinols, 2004).

To identify the causal effect of increasing access to gambling on crime, we exploit the increase in access to video gambling over time and space. We do so by taking advantage of detailed data on crime in Chicago that is unavailable for the rest of Illinois during periods before and after video gambling was legalized. It is important to note that there are two main potential sources of attenuation bias. First, we are examining a context where gambling was already accessible, though it became dramatically more accessible and widespread with video gambling. Second, the existence of illegal gambling locations within the city of Chicago may also attenuate any potential effects of access to video gambling. For these reasons, our estimates in the following sections should be considered lower bounds on the effects of access to gambling on crime.

3 Data

We combine data from various sources. First, incident-level data on crime from police reports between January 2006 and June 2016 available from the City of Chicago Data

Portal. Similar data is not available for cities neighboring Chicago. This information comes from the Chicago Police Department's Citizen Law Enforcement Analysis and Reporting system. The data set provides the date, time, and location of the crime at the block-level. Each incident is also classified according to the Illinois Uniform Crime Reporting (UCR) code, which in turn follows the Federal Bureau of Investigation's (FBI) Uniform Crime Reporting guidelines.[8] We classify incidents into violent and property crimes. In the case of multiple offenses, the incident is classified using the FBI's UCR Hierarchy Rule.[9] This hierarchical classification implies that reports for lower categories will be downward biased.[10]

We aggregate the data and construct a monthly panel of census block group crime counts. Block groups are small enough to provide sufficient geographic variation in access. Additionally, we obtain demographic characteristics at this level to use as controls from the 2000 Census. Demographic data include total population, percentage of African Americans, percentage of Hispanics, number of housing units, and percentage of vacant housing. We interact these measures with a linear trend and them as controls to account for any differences in demographic characteristics. Table 1 show basic descriptive statistics.

Monthly data on establishments with video gambling comes from the Illinois Gaming board. The data contains the address of the establishment, as well as information on the number of video gambling terminals installed, statistics on volume played, and taxes collected. We geo-coded the location of each establishment and use it to construct our primary measure of access to video gambling. We match establishments at the census

[8]Violent crimes include: homicide, sexual assault, robbery and, aggravated assault and battery; while property crimes: arson, burglary, larceny, and motor vehicle theft. See http://gis.chicagopolice.org/clearmap_crime_sums/crime_types.html for definitions and descriptions (last access August 17, 2017).

[9]This rule assigns the highest hierarchy to violent crimes followed by property crimes. It requires that in a multiple offense scenario the incident must be classified with the highest hierarchy.

[10]The data only contains incidents for which the police responded and completed a case report. The geo-location is approximate and accurate only at the block level. It also contains some missing geo-coordinates. If the address of the incident is present but not the geo-coordinates, we geo-code them to the middle of the block because the last two digits of the address are withheld. We dropped 401 (0.6%) incidents that could not be geo-coded.

block group level and classify block groups each month within Chicago based on proximity to video gambling using geographic adjacency (e.g., within one block is directly adjacent, within two blocks is adjacent-to-adjacent, and so on).

4 Gambling and Crime

There are several potential mechanisms mediating the relationship between access to gambling and crime. Previous research suggests that individuals exposed to gambling, especially to electronic gambling machines, may become a problem or a pathological gambler (Wheeler et al., 2011). Pathological gamblers are more likely to engage in criminal activities as a result of financial and/or emotional distress. In this sense, gamblers have been linked to engaging in property crimes (Blaszczynski and McConaghy, 1994), and domestic violence (Dowling et al., 2016, Lorenz and Shuttlesworth, 1983, Bland et al., 1993). Research has also shown that pathological gamblers display other dysfunctional patterns of behavior such as excessive drinking and drug use which may also contribute to their criminal behavior (Walker, 2013).[11]

The link between access to gambling and crime can be also explained by the standard Becker (1968) model. The increase in the availability of gambling places increases the payoff of crime. These places lower the costs of finding potential victims who would be carrying extra cash to gamble (or from their winnings), increasing the payoffs to crime Grinols and Mustard (2006).

By studying the expansion of video gambling in a decentralized manner, we can largely minimize the role played by other mechanisms. Large scale developments, such as casinos, have been shown to increase employment, wages, and may spur economic development in the area (Evans and Topoleski, 2002, Humphreys and Marchand, 2013). In our context,

[11] See Kindt and Palchak (2002) for a discussion on the financial and social costs of pathological gamblers.

these effects are minimized because the expansion occurs in existing bars and restaurants, rather than in new developments.[12]

4.1 Proximity to Video Gambling and Crime

To identify the effects of increasing access to video gambling on crime in Chicago, we exploit variation over time and space of the adoption of video gambling by establishments. Our identification strategy rests on the assumption that closer block groups have greater access and are more likely to be affected. Figure 3 illustrates our identification. Using this spatial proximity strategy helps account for confounding unobserved neighborhood attributes (Linden and Rockoff, 2008, Diamond and McQuade, 2016). For this reason, we restrict the sample to census block groups that are within six blocks at any point in time.[13]

We employ a difference-in-differences strategy that compares crime in block groups that have greater access to video gambling establishments with blocks groups that have lower access in the same neighborhood, before and after establishments near the Chicago border adopted video gambling. Our baseline specification for a given $Crime_{i,t}$ (i.e., number of crimes in block group i in month-year t) measure is:

$$Crime_{i,t} = \sum_{j} \beta_j BG^j_{i,t} \times Post_{i,t} + \phi X_{i,t} + t\gamma_n + \alpha_i + \delta_t + \varepsilon_{i,t} \tag{1}$$

where $Crime_{i,t}$ are the number of either violent or property crimes. $BG^j_{i,t}$ with $j = 1, ..., 5$ is an indicator for proximity to a gambling establishment, e.g $BG^1_{i,t}$ equals one if the block group is within 1 block group of a video gambling establishment and zero otherwise. Block groups within 6 blocks serve as our baseline. The spatial indicator are interacted with $Post_t$ an indicator that takes one after the establishment adds video gambling. α_i are

[12] We find that the Video Gambling Act did not significantly affect the availability of bars and restaurants. See Appendix B for details.

[13] Appendix Table A.2 shows that this restriction does not play an important role in our results.

block group fixed effects, δ_t are month-year fixed effects, and $\varepsilon_{i,t}$ is the error term. Our parameter of interest, β, estimates the average difference in crime between blocks that are closer to establishments with video gambling relative to those 6 blocks away. Our main identifying assumption is that in the absence of video gambling, crime would have evolved similarly in areas that eventually had high access compared to those with low access. In Section 5 we provide evidence suggesting that this assumption is likely to hold.

This strategy accounts for a number of potential threats to identification. We introduce $X_{i,t}$, that includes flexible controls for proximity to riverboat casinos in the greater-Chicago area and the 2000 census demographic characteristics described above. During our period of analysis, one new riverboat casinos opened near O'Hare, which could potentially bias our results. To account for this potential confounding effect, we include a quadratic function of the linear distance to the nearest riverboat casino. We also add demographic characteristics from the 2000 census interacted with linear time trends to account for the possibility that crime could be driven by underlying changes in the demographic conditions of block groups with higher access to gambling. Finally, we also control for neighborhood specific time trends $t\gamma_n$.[14] These trends account for the possibility that there could have been unobserved public policies during our period of analysis that could affect crime. For example, if shocks in crime at the neighborhood-level were correlated with the adoption of video gambling, our estimates would be biased.

Given the count nature of the crime data, we estimate Equation (1) by maximum likelihood using a Poisson regression. Because errors are expected to be correlated within block groups and access to gambling varies at this level, we cluster our standard errors at the census block level in all our regressions.

Increasing access to gambling increases both violent and property crimes. Figure 4 shows effects by block group distance (i.e., one block away, two, etc.). If our effects were

[14]Our neighborhood definitions is based on the nine Chicago "sides": Far North Side, Northwest Side, North Side, West Side, Central, South Side, Southwest Side, Far Southwest Side, Far Southeast Side.

driven by increased access to gambling, we would expect that blocks that are closer to gambling (i.e., has higher exposure) establishments experience a larger increase in crime. Indeed, both violent and property crimes display a similar pattern: the effects are largest in blocks with highest access to gambling (within 1 block), and the effects decrease as we move further away. At a distance of three or four blocks the effects are zero and remain constant at greater distances. For areas within one block of a video gambling establishment, the average increase in violent and property crime is 9.9% (s.e. 0.048) and 6.8% (s.e. 0.039), respectively.

4.2 Effects of Increase Access to Video Gambling on Crime

Section 4.1 shows that effects are largest within two blocks, and becomes zero and remains zero four and more blocks away. Based on this evidence, and to maximize power, we use a single access indicator that takes one if the block group is within two blocks of a video gambling establishment, and 0 otherwise. This makes blocks that are three to six blocks away from the establishments our comparison group. Our estimating equation then takes the form:

$$Crime_{i,t} = \alpha_i + \beta\, Within\ 2\, Blocks_{i,t} + \phi X_{i,t} + t\gamma_n + \delta_t + \varepsilon_{i,t} \tag{2}$$

where $Within\ 2\ Blocks_{i,t}$ is an indicator that equals one if the block group is within two blocks of a video gambling establishment at time t and zero otherwise. α_i are block group fixed effects, δ_t are month-year fixed effects, and $\varepsilon_{i,t}$ is the error term. Our parameter of interest, β, estimates the average difference in crime between blocks that are within two blocks of establishments with video gambling relative to those that are further away (3-6 blocks). Our main identifying assumption is that in absence of video gambling, crime would have evolved similarly in areas that eventually had high access compared to those

with low access. In Section 5 we provide evidence that this assumption is likely to hold.

It is important to highlight that our results are not driven by this definition of access to gambling. Our estimates are robust to using alternative definitions such as volume played and other access measures typically used in the trade literature (Harris, 1954, Hanson, 2005) that employ a weighted average of the linear distance (or traveling time) from the block group centroid to each establishment.[15][16]

We examine whether greater access to video gambling affects violent and property crime in Chicago. Table 2.a presents these results using number of violent crimes as the dependent variable, while Table 2.b does the same for property crimes. We begin with a basic specification that does not control for access to riverboat casinos, demographic characteristics, or neighborhood specific time trends in column (1). Results show a statistically significant increase in both violent and property crimes. Our estimates indicate that being within two block groups of at least one video gambling establishment increases violent crime by almost 8.8% (s.e. 0.028) and property crime by 5.8% (s.e. 0.023).[17]

These estimates are robust to using alternative specifications. Column (2) accounts for proximity to Riverboat Casinos. Column (3) introduces demographic characteristics and column (4) includes neighborhood-specific time trends.[18] Column (5) is our preferred specification that incorporates all the previous controls. The point estimate slightly decreases to 7.9% (s.e. 0.026) for violent and increases to 6.2% (s.e. 0.025) for property crime, though they are not statistically different from the baseline specification.

Unlike some of the state or region-specific casino studies in the US (Gazel et al., 2001,

[15]For example, if $d_{i,j}$ is the linear distance (or traveling time) between block group centroid i and establishment j, and $\mathbb{1}(VG_{j,t} = 1)$ indicates that establishment j has video gambling in period t, then gambling access (GA) is calculated as $GA_{i,t} = \sum_{j=1}^{J} exp(-\mathbb{1}(VG_{j,t} = 1) \cdot d_{i,j})$.

[16]Results are available in Appendix Table A.4

[17]Given that we estimate non-linear Poisson regressions, estimated coefficients should have a slightly different interpretation than OLS estimates. However, because the coefficient of interest is attached to a dummy variable and the resulting estimates are small, the coefficient can be interpreted as the percentage change in crime $e^{\hat{\beta}} - 1 \approx \hat{\beta}$.

[18]Our results are robust to the definition of neighborhood trends. See Appendix Table A.3

Wilson, 2001, Reece, 2010, Hyclak, 2011, Falls and Thompson, 2014) or the Canadian gambling literature (Arthur et al., 2014, Humphreys and Soebbing, 2014), we do find that greater access to gambling increases crime. Compared to research studying casino openings across the US, our estimates are somewhat lower. Grinols and Mustard (2006) find average rises of 20% in violent crime and 16% in property crime. Evans and Topoleski (2002) find smaller increases when accounting for state-specific time trends, about 10% for both types of crime. However, crime effects due to casino openings are driven by multiple mechanisms, not just gambling itself. For example, part of the increase in crime could be driven mechanically due to an increase in the number of people visiting casino counties. Additionally, these studies mainly identify *extensive* margin effects (i.e., moving from virtually zero gambling to having gambling); whereas our variation is identifying *intensive* margin variation in access. In this sense, our estimates should be considered a lower bound for extensive margin changes to gambling.

4.3 Further Results

We provide additional evidence that the significant increase in access to video gambling is what drives our results and are not spurious. We exploit two different dimensions of our variation in access to gambling: its effects over time, and the availability of video gambling establishments.

We conduct an event study analysis to explore the effects of access to gambling over time. We classify block groups in bins of one year relative when it first had a gambling establishment within two blocks. Point estimates and 90% confidence intervals are presented in Figure 5. Both property and violent crimes show similar patterns: before becoming exposed to video gambling, we do not observe any significant differences in crime between blocks that are within two blocks from gambling establishments compared to those that are further away. Finding similar trends in crime before the adoption of video gambling

provides suggestive evidence validating our main identifying assumption, that crime would have evolved similarly had video gambling not been adopted among closer and further blocks.

The effect of access to video gambling on crime seems to be persistent. On average, the effect after three years or more on violent crime is 8.7% (s.e. 0.041) and 7.0% (s.e. 0.032) for property crime. The pattern of the effects over time is consistent with the timing and expansion of video gambling establishments described in Figure 1. Additionally, it is consistent with evidence that it takes around a year for individuals to become compulsive gamblers (Grinols and Mustard, 2006).

Finally, we find that effects are also increasing in the availability of video gambling establishments. One measure of availability is by volume played at gambling establishments within two blocks. We present results in Figure 6, where we classify block groups within two blocks of gambling establishments by total volume played at those establishments by quartile. Indeed, results suggest that the effects are increasing in volume played as would be expected.

5 Robustness

5.1 Differential trends

Identification of the effect of access to gambling on crime depends on the assumption that in absence of video gambling, crimes in high access areas would have evolved similarly to those further away. Though we cannot test this directly, we provide a number of tests that lend support to it. One approach is to create placebo indicators that equal one for a period of time before the unit becomes "treated" (i.e., a lead of the Within two blocks variable). This variable would capture any differences in trends between groups before being exposed to video gambling. We thus estimate Equation (2) and add the placebo variable.

Results are presented in Table 3, where in each column we change the time-span of the placebo variable. Column (1) presents our preferred specification results from Table 2, column (2) and (3) add a placebo for two years prior, columns (4) and (5) for 3 years prior. The point estimates on all the placebo coefficients are close to zero and we can reject the null hypothesis that the magnitude of effects of access to gambling and the placebo are equal (the largest p-value is 0.039). Additionally, the event study figures presented before (Figure 5) tell the same story: there do not seem to be large systematic differences in trends between groups before video gambling is adopted by an establishment.[19] Taken together, the evidence is reassuring that our findings are not driven by differences predating video gambling adoption.

A second approach is to use randomization testing where we randomly shuffle the adoption dates for each establishment and then estimate for each shuffle Equation (2).[20] This creates a distribution of estimates that can be used to test whether our detected effects are driven solely by the dates that gambling was introduced across block groups. Figure 7 plots the distribution of estimates after 500 shuffles. The blue dotted line marks our preferred estimates from Table 2 column (5). We find that estimates for violent crime, 0.0791 (s.e. 0.0258), are significant at the 7% level, while for property crimes, 0.0620 (s.e. 0.0246), are significant at the 2% level. These results reinforce our previous findings, the increase in crimes are uniquely associated with the precise dates that gambling was adopted across establishments.

[19]The findings are unchanged if we perform the same event study analysis using smaller time aggregations, although the estimates are more imprecise.

[20]Randomization tests introduced by Fisher (1935) are special cases of permutation tests (Welch, 1990). Among the advantages of this approach is that we can construct an exact test for sharp nulls regardless of "sample sizes, regression design, or characteristics about the disturbance term" (Young, 2018). Recent research has also noted that randomization tests may be especially suitable when uncertainty in the estimation arises as a result of unknown counterfactuals (Abadie et al., 2015, Cunningham et al., 2019).

5.2 Proximity to Video Gambling and Crime Displacement

One concern with the interpretation of our results is that access to video gambling is displacing crime: shifting criminal activity towards areas closer to gambling establishments. Although we do not observe crime in the surrounding areas outside Chicago, our results suggest that our estimates capture new crimes in Chicago rather than displacing existing crime. First, if displacement drove our results, we would expect to see crimes increase in the adjacency of gambling establishments and decrease further away. This would suggest that crime is moving from further blocks to closer blocks. However, Figure 4 shows crime decreasing monotonically with distance, point estimates of effects are zero and remain at zero after four or more census block groups away from a video gambling establishment. Second, when including all block groups of Chicago or restricting the sample to block groups ever within 10 blocks of a video gambling establishment we find that our results for violent crime remain the same and for property crime they are slightly smaller but not statistically different from each other.[21] [22]

Moreover, if effects were driven solely by displacement, then there is a form of crime that should not be affected by it: domestic violence.[23] We replicate our baseline analysis using the number of domestic crimes as the dependent variable in Table 4. We find suggestive evidence that access to gambling increased the number of domestic crimes by around 9-10%, though the estimates are not very robust. However, we must take these estimates with a grain of salt: the statistical significance varies greatly depending on the specification used. The potential increase in domestic violence would be consistent with evidence documenting

[21] See Appendix Table A.2 columns (2) and (3)

[22] An alternative way crime could be displaced is from adjacent cities into Chicago. However, if video gambling were "attracting" criminals, it seems unlikely they would shift their activity into Chicago, where video gambling is not available.

[23] Besides classifying a crime by type (e.g., homicide, aggravated battery, etc.), the Chicago Police Department also notes whether the incident was domestic or not based on the relationship between the victim and the offender. Specifically, we focus on violent crimes complemented with simple assault and battery classified as domestic plus offenses against family. We do so to get a domestic violence measure that best fits the definition of the Department of Justice (see https://www.justice.gov/ovw/domestic-violence)

the effect of emotional cues and family violence. For example, Card and Dahl (2011) find that upset losses increase domestic violence by 10% during the hour after a football game.

5.3 Access to Bars

The rise in crime could also be driven by an increase in access to bars rather than gambling. In 2016, video gambling terminals brought establishments over $5,100 a month on average in revenues.[24] This could have had two effects. First, it may encourage new bars to open (or extend the life of existing bars). Given that there is evidence documenting a positive correlation between bars and crime (Rossow and Norstrom, 2012, Anderson et al., 2017), an increase in the number of bars could drive our results. Second, bars located inside Chicago may relocate outside the borders to benefit from video gambling. This could have two opposing effects. On the one hand, the number of local bars can decrease, and this could bias our estimates downwards. On the other hand, it could shift people towards the border, increasing the likelihood of crimes happening in areas near the border.

Our results remain unchanged when accounting for access to bars.[25] We use data on all the liquor licenses granted by the Illinois Liquor Control Committee during the period of July 2009 to March 2016.[26] We geo-coded all establishments in the greater Chicago region and constructed a monthly panel at the census block group level containing the number of active liquor licenses. From these data, we generate two variables: the number of bars in each block group and the number of bars within two blocks.

Results are presented in Table 5, where column (1) replicates our original analysis with neighborhood-trends, and column (2) restricts the sample to the time period for which we have data on liquor licenses. The coefficient for violent crime drops slightly (though

[24] Own calculations based on data from the Illinois Gaming Board.

[25] In the Appendix, we explore if the Video Gaming Act affected the supply of bars in Chicago. Results presented in Appendix Figure A.1 show that there is no evidence that access to gambling affected the number of bars

[26] This was all the data available at the time of our FOIA request.

the difference is not statistically relevant), and property crime remains the same. Column (3) adds the number of bars (in hundreds) in same block as a control, column (4) adds the number of bars (in hundreds) within two blocks as a control, column (5) adds both. Notably, the coefficient of interest remains very stable, suggesting that potential changes in access to bars are not mediating the effect of access to gambling on crime.

5.4 Effects by Crime Type

Table 6 presents results broken down by type of crime. Overall, we find that our main results are driven by robbery, aggravated battery, burglaries and car thefts. Increasing access to gambling adds 14% (s.e. 0.041) more aggravated batteries. Robberies, a violent form of property crime, also goes up by 8.2% (s.e. 0.034). The increase in these types of crime suggests that the most likely explanation for is a combination of higher access to video gambling and alcohol consumption. These two activities are complementary and it is hard to distinguish between them (Welte et al., 2001, Barrett et al., 2015, Sagoe et al., 2017). Crime could be a direct consequence of gambling. For example, financial distress could push individuals to commit crimes or windfalls could make them potential targets (Clark and Walker, 2009, Turner et al., 2009). Additionally, emotional responses such as euphoria or anger to gambling outcomes may drive criminal activity as well (Munyo and Rossi, 2013, Sarmiento-Barbieri et al., 2018). These factors may also induce higher alcohol consumption that in turn could result in more crime (Peirce et al., 1994).

We also find significant increases in burglaries and car thefts consistent with victims becoming more profitable. This could be the result of a combination of the need to carry more cash in order to gamble (video gambling terminals only accept cash) and from their winnings. This potential mechanism has been observed in other contexts. For example, Wright et al. (2014) shows that when Food Stamps (now SNAP) switched payments to Electronic Benefits Transfers (EBT), crime decreased. Moreover, we see no change in

other types of crime that we wouldn't expect to be related to gambling.

5.5 Other Threats to Identification

Our findings are not driven by the estimator choice. Table 7 shows results using OLS. Results are similar to those presented in Table 2. Once more, our preferred specification is shown in column (5). Results using this estimator shows an increase of 9.5% in violent crime and an 8.4% for property crime which are similar to our nonlinear estimates.

The advantage of linear estimators is that we can check for other threats to our identification that are not yet possible with nonlinear estimators. First, we use Oster (2017) test to show that our results are likely not driven by unobservables. Next, we decompose our estimates following Goodman-Bacon (2018) decomposition. The decomposition results reveal that our estimates are driven by the correct comparison groups, treated versus control block groups, and not by earlier/later treated and earlier/later controls. Finally, we show that our results also hold under counterfactual scenarios build using Athey et al. (2018) matrix completion method.

5.5.1 Selection on Unobservables

An advantage of linear models is that we use easily Altonji et al. (2005) and Oster (2017) methods to consider the potential effects of omitted variables. These methods, however, are not available for nonlinear forms like Poisson or Negative Binomial estimators. Table 8 reports Oster's proportionality coefficients. Oster (2017) argues that if observables are related to unobservables, it's inclusion can tell us about the degree of selection on unobservables.

Oster (2017) test depends on an assumption about the maximum achievable R-squared in a model that accounts for the remaining unobservables, R_{max}. Given the potential for measurement error in crime, it is unlikely that $R_{max} = 1$ in our model. Oster suggests a

$R_{max} = 1.3\tilde{R}^2$ rule of thumb, where $\tilde{R}^2$ is the R-squared from the model with a full set of controls.[27] Results reported in Table 8 show that the statistic is always above one, even in the most demanding case. Thus mitigating any concern that our estimates are driven by unobservables.

5.5.2 Difference-in-Difference Decomposition

As pointed out by Goodman-Bacon (2018), the model described in Equation (2) is a weighted average of treatment effects estimated from a series of two by two treatment/control groups. Some of these groups compare blocks that were treated at the same time to blocks that were untreated, and at the same time to blocks that were treated at a different time (earlier or later). In our data there are 25 timing groups, or blocks that become adjacent to a establishment with video gambling. There are thus 625 distinct two by two treatment/control comparison groups for which the difference-in-difference estimate is constructed.

The concern is a design like this is that comparisons between earlier and later treated block groups may introduce bias. Using the method developed by Goodman-Bacon (2018) we can see the extent to which the estimates may be biased by the "wrong" comparisons, i.e., earlier to later treated block groups.

Results for the decomposition are reported in Table 9.[28] Panel (a) shows the decomposition of the estimates presented in Table 7 column (1) where we estimate Equation (2) with no controls. In Panel (b) we decompose the estimates presented in Table 7 column (5) where we add all the controls.

The estimates of the Goodman-Bacon decomposition show that estimates are driven by

[27] The $R_{max} = 1.3\tilde{R}^2$ rule-of-thumb proposed by Oster (2017) emerges form the analysis on 65 results from published papers. At the 1.3 cutoffs, she finds that 90 percent of the experimental results published would 'survive,' implying that unobservable variables would explain less of the variation in the outcome than observables.

[28] We use the `STATA` module `bacondecomp` for the analysis.

comparison between treated and untreated groups. The weights are 94% in the "no controls" case and 82% in the "controls" case for comparisons between treated and untreated block groups. There is some evidence for time varying treatment effects but weights are very small.

5.5.3 Matrix Completion Methods

In the previous subsection, we showed that our results are likely driven by the right comparisons, treated versus control groups. However, there's always the concern that these are the correct controls. In this section, we use modern machine learning techniques to build counterfactuals.

We can think the identification problem as a missing data problem: we don't observe how would crime had evolved in the absence of gambling. To address this missing data issue, Athey et al. (2018) proposes a matrix completion technique. The objective is to estimate counterfactual crime outcomes for block group month combinations using regularization methods. Similar to other regularization methods it depends on a regularization parameter, which we chose using 10-fold cross-validation. Standard errors are calculated using 500 bootstrap draws.

Table 10 shows our baseline linear results side by side with those generated by Athey et al. (2018) method. Estimates for violent crime are 0.083 (s.e. 0.0257) and 0.255 (s.e 0.0734). Although these are smaller than our baseline estimates, they are not statistically different

5.6 Back of the Envelope Cost/Benefit

Taken together, our evidence suggests that access to gambling has increased property and violent crimes in Chicago. In this section we conduct a back of the envelope cost/benefit calculation of the Video Gambling Act for the City of Chicago. For this exercise, we use

our estimates by type from the previous section and cost estimates typically used in the literature to impute the costs of crime. Because Chicago does not directly collect tax revenue from gambling, calculating the benefit is not straight forward. Using alternative measures for benefits, we find that the costs greatly outweigh the benefits.

We can obtain the back of the envelope estimates of the cost associated with the increase in crime in Chicago as a result of video gambling in adjacent municipalities. Following Chalfin and McCrary (2017), we use estimates produced by Cohen and Piquero (2009) on the costs of crime that take into account both direct costs to the victim and indirect costs from reductions in the victim's quality of life. We present the costs for each type of crime in Table 11. We estimate that, on average, the social cost associated to the increase in crime in areas located within two block groups from an establishment with video gambling is around $463 thousand *per month* (in 2016 dollars). This is particularly large considering that the City of Chicago does not receive any direct benefits in terms of tax revenues from video gambling because that activity is banned within city limits.

6 Gambling and Property Values

Expanding access to gambling can be socially costly beyond crime. The externalities generated by gambling (e.g. crime, bankruptcy) can be capitalized into property values. This is particularly important for local government because lower property values translate into a lower property tax base and thus lower tax revenues. Therefore, any tax revenues collected from video gambling could get offset by a fall in property tax revenues.

There are two channels through which access to gambling may be capitalized into property values. First, gaming terminals may attract certain people and generate undesired behavior, like crime, that people may be willing to pay to avoid it. Second, there is social stigma associated with gambling; therefore, individuals may consider living near an

establishment with video gambling terminals as a dis-amenity (Grinols, 2004). However, it could be the case that some individuals do value living close to video gambling (e.g., a gambler). For these individuals, the effect would depend on the extent that they view crime as a dis-amenity relative to the amenity value of living near gambling (Albouy et al., 2018) .

In this section, we explore the consequences of access to gambling on property values.[29] Figure 8 shows the price gradient of distance to establishments pre- and post-adoption of gambling in Cook County. There is a clear drop in property values after the adoption of gambling, which disappears as we move away from these establishments (similar to the pattern we observe with crime).

Based on this graphical evidence, we proceed as before. We first restrict our analysis to transactions within six block groups, which are roughly a mile, and estimate the following equation:

$$\ln Price_{jit} = \alpha_i + \beta\, Within\ 2\, blocks_{i,t} + \theta D_j + \phi X_{i,t} + t\gamma_n + \delta_t + \varepsilon_{j,i,t} \tag{3}$$

where $\ln Price_{jit}$ is log price of house j in block i sold in month t. $Within\ 2\ Blocks_{i,t}$ is an indicator that equals one if the block group is within two blocks of a video gambling establishment at time t and zero otherwise. α_i are block group fixed effects, δ_t are month-year fixed effects, and $\varepsilon_{j,i,t}$ is the error term. The model include dwelling characteristics, D_j, which do not vary over time due to our source.[30]. As before we include demographic and proximity to riverboat controls and time trends for each neighborhood which account

[29]We obtained data of property transaction for Cook County for our study period from Corelogic. The data contains transaction prices for single family residences and structural characteristics. From these data, we create controls for dwelling characteristics. These characteristics come from the Assessor's office and correspond to the most recent property assessment. Table A.1 shows basic descriptive statistics. As before, we match these transactions to block groups and data on demographic characteristics at this level from the 2000 Census to use as controls.

[30]Dwelling characteristics include: age and its square, square footage, number of bedrooms and bathrooms, indicators for brick exterior, fireplace, and garage

the fact that neighborhoods may exhibit different housing price cycles. Our parameter of interest, β, estimates the average difference in prices between properties that are within two blocks of establishments with video gambling relative to properties between 3-6 blocks. Our main identifying assumption is that in absence of video gambling, housing prices would have evolved similarly in areas that eventually had high access compared to those with low access.

6.1 Results

Access to gambling lowers property values. Results are presented in Table 12. Our estimates indicate that the prices of properties sold within two block groups of at least one video gambling establishment decreases by 4.9% (s.e. 0.0055) in the most basic specification (column (1)). After accounting for proximity to Riverboat Casinos (in column (2)) and demographic characteristics (column (3)), the point estimate decreases to around 2.9% and remains highly statistically significant. Column (5) incorporates all the previous controls along with neighborhood trends. Recall that we are including neighborhoods (i.e., municipalities) outside of Chicago as well. This is relevant because in this context, we are severely restricting the variability (and thus, attenuating effects) in access to gambling following this design given that many neighborhoods are geographically small. Despite this, we find that the point estimate shows a negative and highly statistically significant effect on house prices of 1.5% (s.e. 0.0053).

We replicate the event study figure for crime using home sale prices in Figure 9. Similar to the patterns studying crime, property values in high access areas and in low access areas follow similar trends before the introduction of gambling. Again, this provides suggestive evidence validating our main identifying assumption, that property values would have evolved similarly had gambling not been adopted.

Within two years of the introduction we see prices fall about 1% and continue to

decrease. Both property and violent crimes show similar patterns: before becoming exposed to video gambling we do not observe any significant differences in crime between blocks that are within two blocks from gambling establishments compared to those that are further away.

The pattern of the effects over time is not only consistent with the timing and expansion of video gambling establishments described in Figure 1 but also with the effects on crime.

7 Conclusion

This paper studies the effects of increasing access to gambling on crime taking advantage of the legalization and the rapid expansion of video gambling in Illinois. Using crime data for Chicago, which does not allow gambling, we compare areas in the city that have relatively higher access with those that have lower access to gambling. We show that despite there being numerous casinos in the vicinity of Chicago, the Video Gaming Act drastically increased access to gambling in the city. In turn, higher access increased both violent and property crime.

We further show that the effects of gambling are far-reaching beyond with effects on property values. Properties in the blocks adjacent to establishments experience a significant reduction in price after the introduction of gaming terminals. These findings are important for policymakers who consider legalizing gambling as a convenient source of revenue. However, the direct and indirect costs of video gambling may upset any tax revenues generated, especially in the current scheme on how tax revenues are shared between cities and State.

There are numerous avenues for future research. More work is necessary to better understand and disentangle the mechanisms at play. Our results suggest that the mechanisms could be through pathological gambling (i.e. financial distress) and increased payoff

of crime. Learning the extent to which one or the other operates is essential to design policies for mitigating crime. This is particularly relevant considering that video gambling is not only here to stay, but is set to expand in other states. To the extent that the effects are driven by pathological gambling, there are several non-profits and government organizations providing numerous services targeting gambling addiction. For example, the Illinois Alliance on Problem Gambling offers several services such as phone and text-based counseling and a free subscription service to receive motivational messages via text message. Learning about the effectiveness of these programs would be a step forward to stopping the one-armed bandits.

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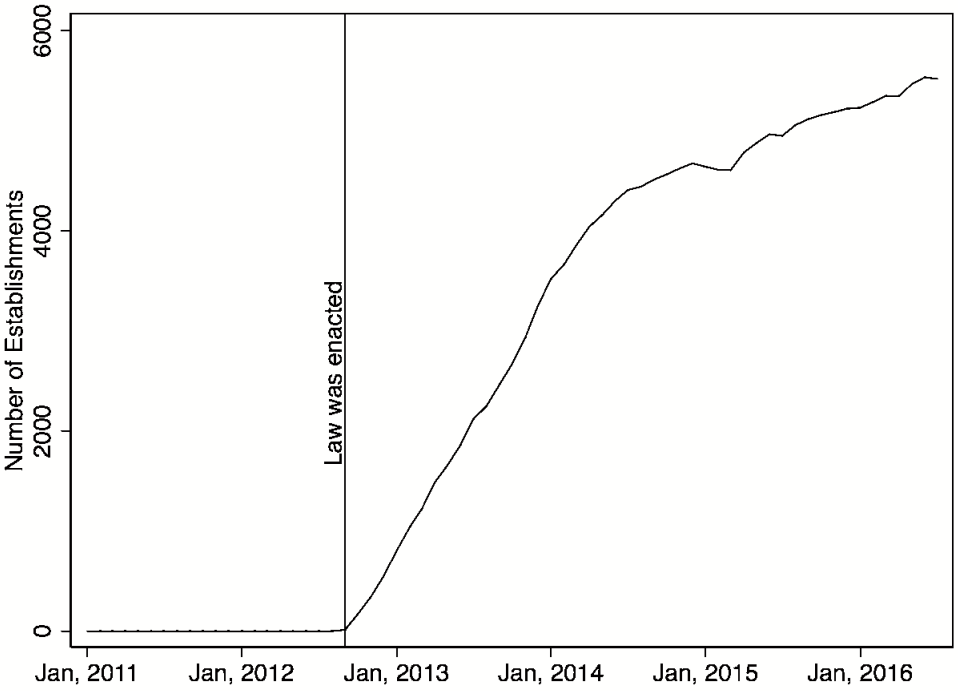
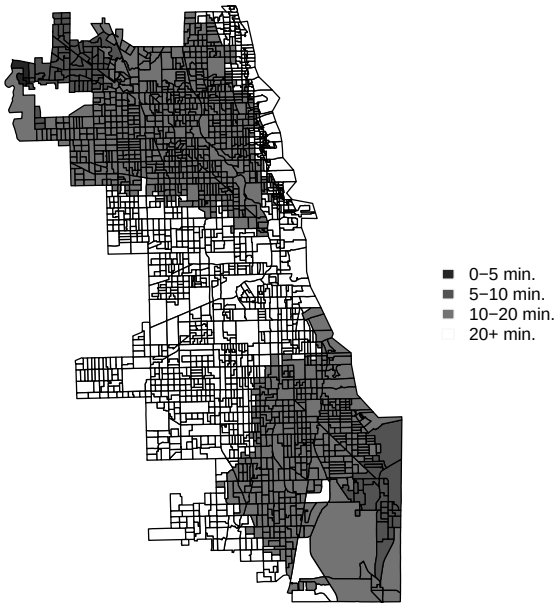
Figure 1. Number of Video Gambling Establishments in Illinois

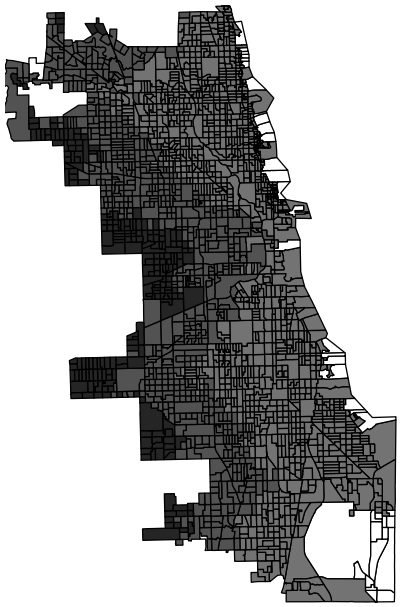


Note: Own calculations based on data from the Illinois Board of Gaming.

Figure 2. Access to Casinos versus Video Gambling Establishments in Chicago



(a) Travel Time to Nearest Casino in April 2012

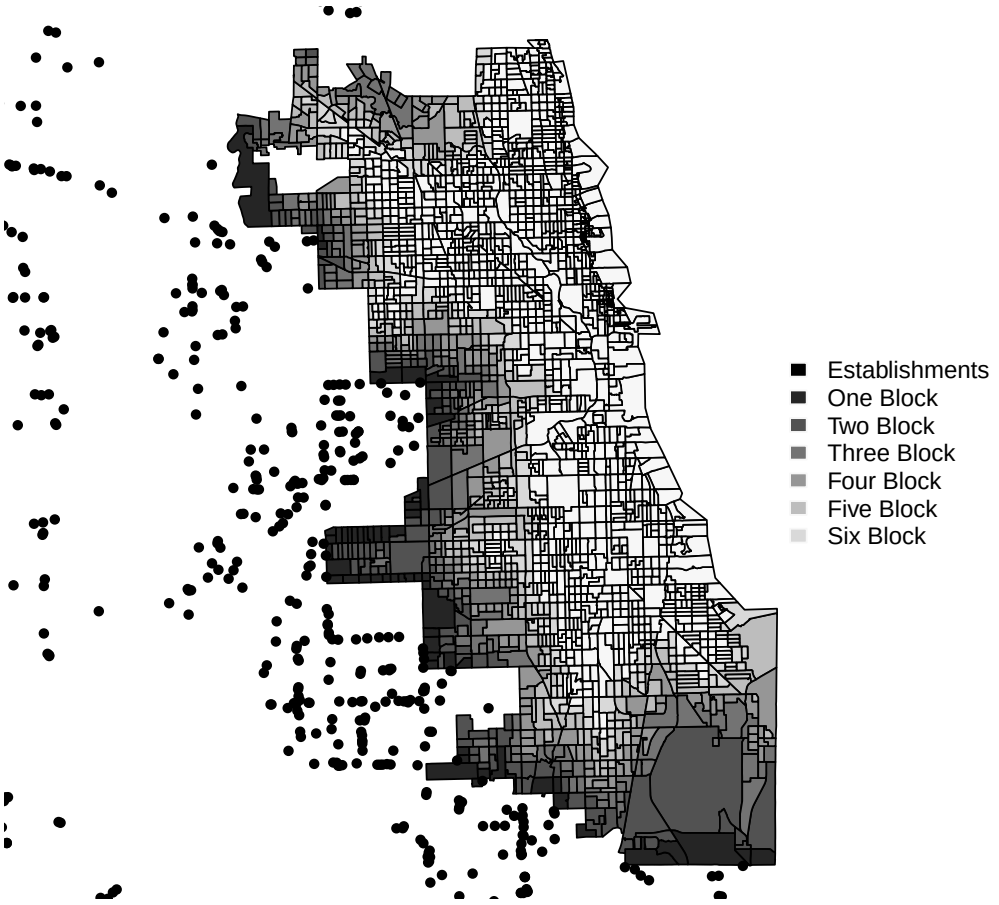


(b) Travel Time to Nearest Video Gambling Establishment in April 2014

Notes: Map of Chicago census block groups. Travel time by car in minutes measured from the census block group centroid to the nearest (a) casino or (b) video gambling establishment.

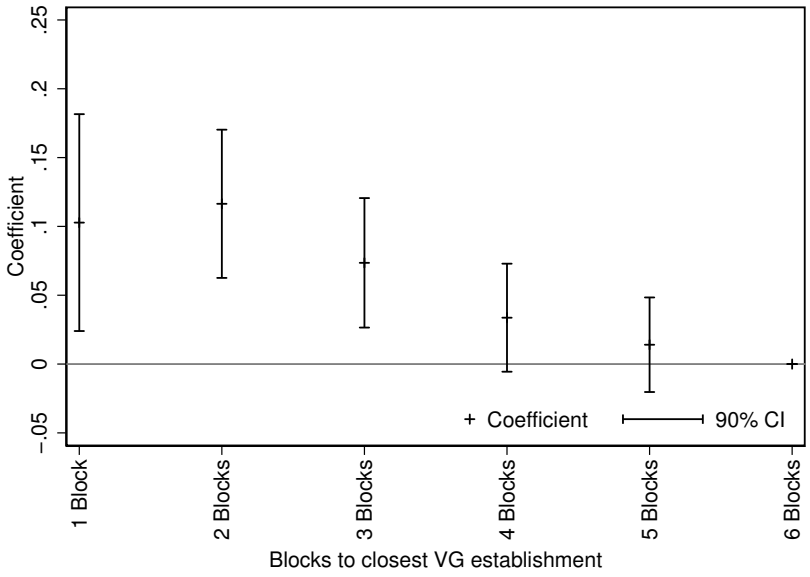
Figure 3. Identification Strategy

April 2014

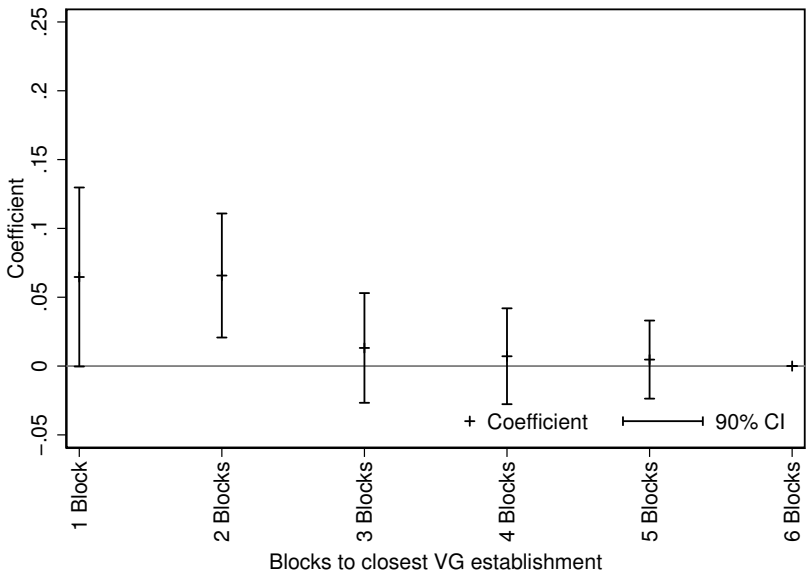


Notes: Dots represent video gambling establishments operating in April 2014. Map of Chicago census block groups. Each block group is classified by geographic proximity to video gambling establishments. For example, one block denotes directly adjacent to a block (outside Chicago) with at least one video gambling establishment, two block denotes two blocks away (i.e., adjacent-of-adjacent), and so on. Six block is six or more block groups away from a video gambling establishment.

Figure 4. The Effect of Access to Video Gambling on Crime, by Blocks



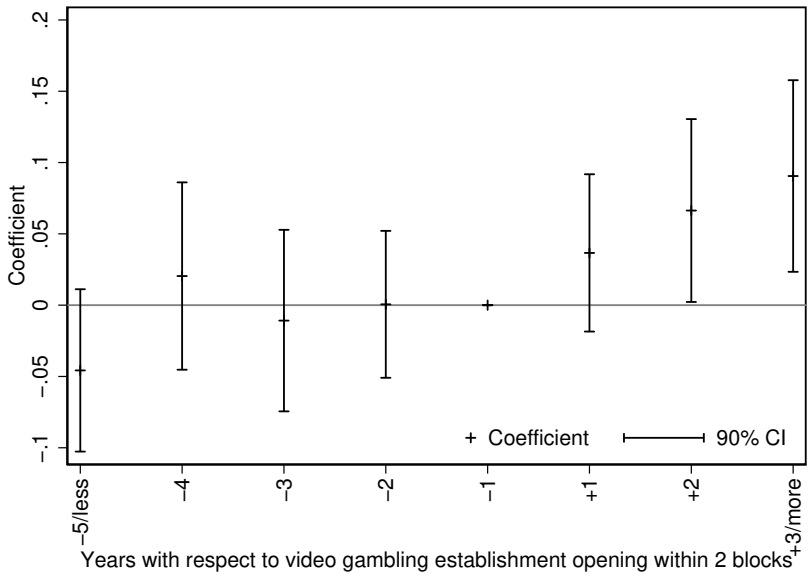
(a) Violent Crimes



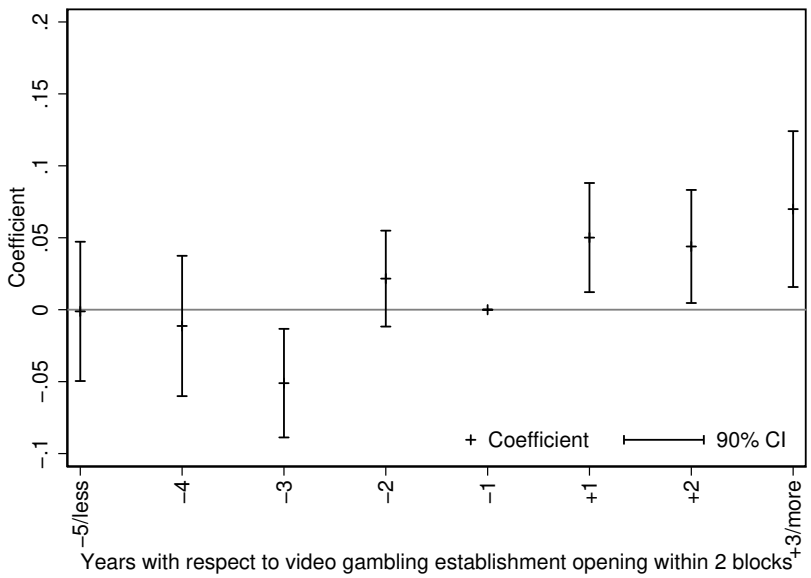
(b) Property Crimes

Notes: Sample of Chicago census block groups by month ever within six block groups from a video gambling establishment. Dependent variables are number of violent or property crimes. Point estimates and 90% confidence intervals for estimating Equation (1) using dummy variables for proximity of closest video gambling establishment (i.e., one block, two, etc.). The omitted category is 6 blocks (that is, has at least one video gambling establishment within six blocks).

Figure 5. The Effect of Access to Video Gambling on Crime, Event Study



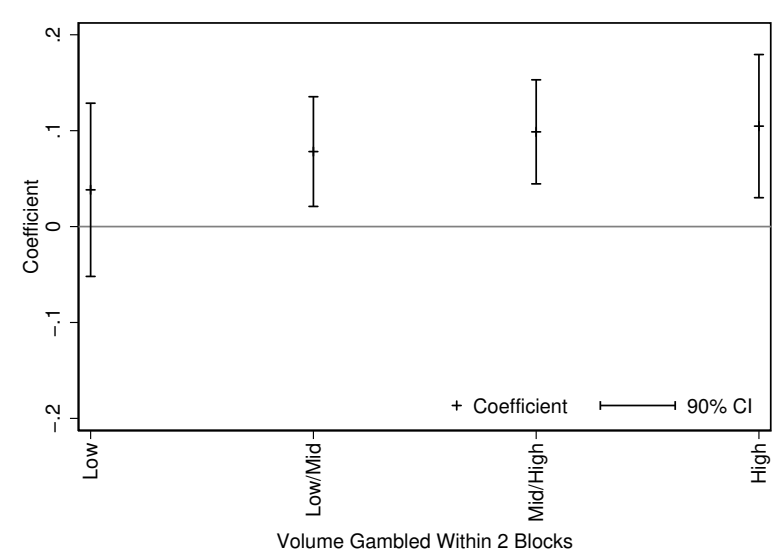
(a) Violent Crimes



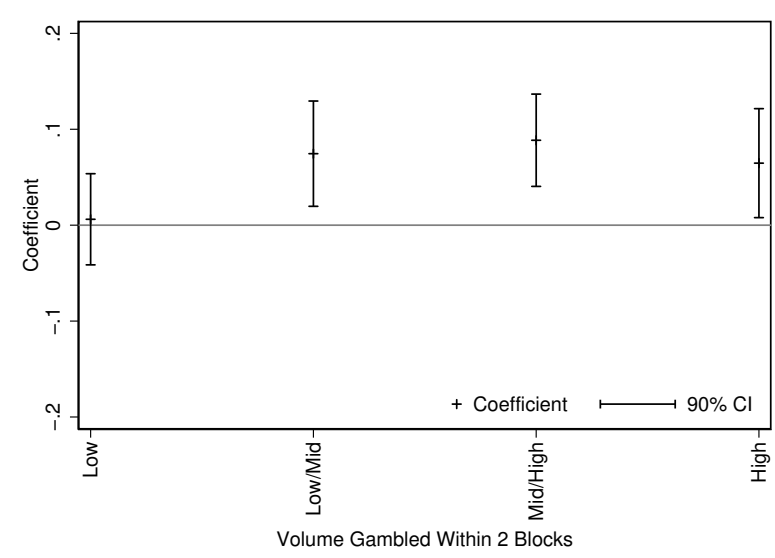
(b) Property Crimes

Notes: Sample of Chicago census block groups by month ever within one, two, four, five and six block groups from a video gambling establishment. Point estimates and 90% confidence intervals for estimating Equation (2) using dummy variables indicating timing with respect to first video gambling establishment operating within two blocks. The omitted category is one year before video gambling establishment operates within two blocks (-1).

Figure 6. The Effect of Access to Video Gambling on Crime, by Volume Gambled



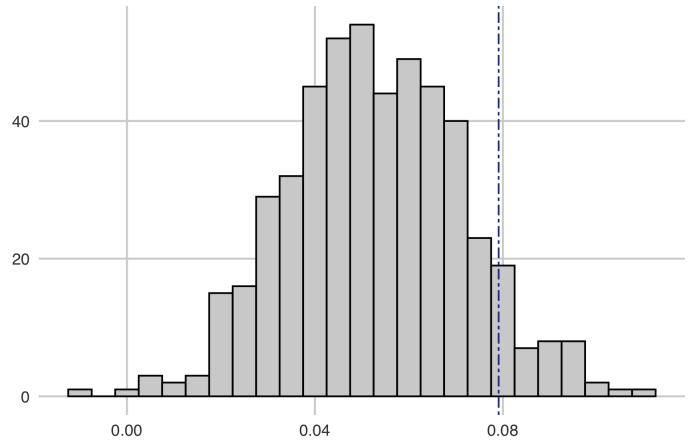
(a) Violent Crimes



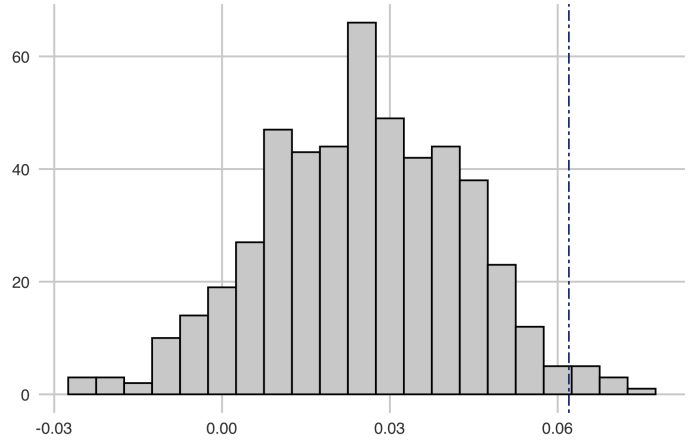
(b) Property Crimes

Note: Sample of Chicago census block groups by month ever within six block groups from a video gambling establishment. Dependent variables are number of violent or property crimes. Point estimates and 90% confidence intervals for estimating Equation (2) using dummy variables by volume played at video gambling establishments within two blocks. Classified into four groups by quartile of monthly volume played: Low ($1 - $383,451), Mid Low ($383,451 - $1,110,453), Mid High ($1,110,453 - $1,865,776), High ($1,865,776, +). The omitted category is zero volume.

Figure 7. The Effect of Access to Video Gambling on Crime, Randomization Tests



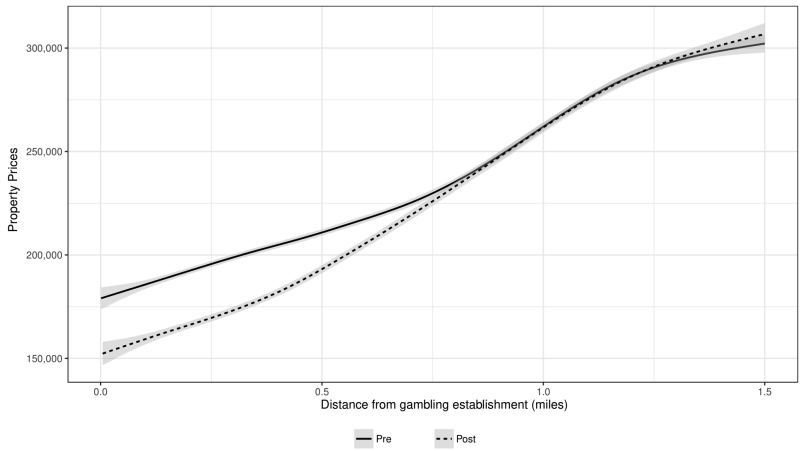
(a) Violent Crimes



(b) Property Crimes

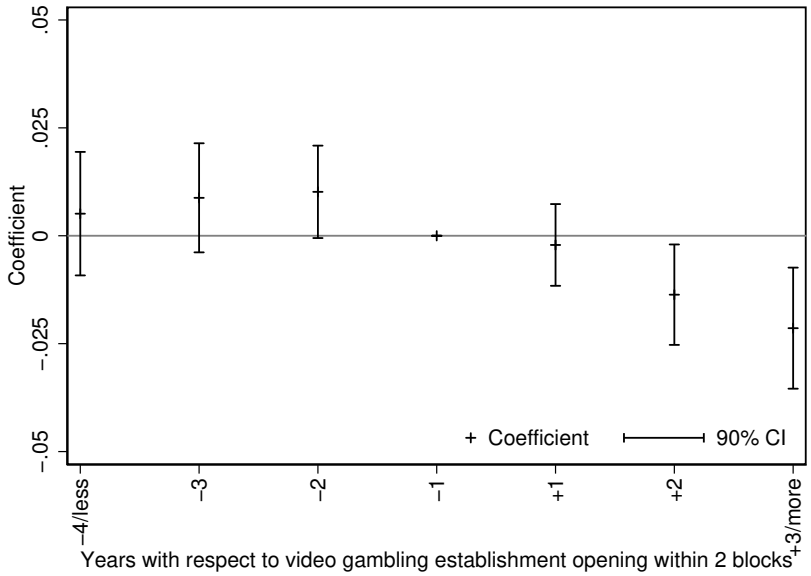
Note: Sample of Chicago census block groups by month ever within six block groups from a video gambling establishment. Dependent variables are number of violent or property crimes from Equation (2). Point estimates resulting from randomizing the dates that each block-group added video gambling. Dashed line denotes the estimated effect in Table 2 column (5).

Figure 8. The Effect of Access to Video Gambling on Property Values, by Distance



Notes: Sample of housing transactions in Cook County by month within 1.5 miles from a gambling establishment. Solid line denotes the price gradient of property price on distance to establishment previous to the adoption of gambling. Dashed line post adoption of gambling. Results are from a local polynomial regression of property transaction price on distance to establishment. Shaded areas denote 90% confidence intervals

Figure 9. The Effect of Access to Video Gambling on Property Values, Event Study



Notes: Sample of of housing transactions in Cook County by census block groups and month ever within one, two, four, five and six block groups from a video gambling establishment. Point estimates and 90% confidence intervals for estimating Equation (3) using dummy variables indicating timing with respect to first video gambling establishment operating within two blocks. The omitted category is one year before video gambling establishment operates within two blocks (-1).

Table 1. Descriptive Statistics

	N	Mean	St. Dev.	Min.	Max.
(a) Crime counts					
Violent	120,777	1.148	1.639	0	17
Property	120,777	3.629	3.747	0	75
Domestic	120,777	1.973	2.313	0	22
Robbery	120,777	0.496	0.921	0	14
Aggravated Battery	120,777	0.355	0.740	0	10
Aggravated Assault	120,777	0.220	0.523	0	7
Sexual Assault	120,777	0.056	0.244	0	4
Homicide	120,777	0.021	0.154	0	6
Larceny	120,777	2.181	2.866	0	71
Burglary	120,777	0.813	1.195	0	17
Motor Vehicle Theft	120,777	0.611	0.962	0	15
Arson	120,777	0.024	0.161	0	5
(b) Access to video gambling					
Within 2 Blocks (=1)	120,777	0.062	0.240	0	1
(c) Amount Played					
Same Block ($/1000)	120,777	12.924	122.368	0	3,333.543
Within 2 Blocks ($/1000)	120,777	83.596	449.045	0	9,611.191
(d) Access to bars					
Same Block (/100)	97,747	0.005	0.010	0	0.130
Within 2 Blocks (/100)	97,747	0.129	0.101	0	1.190
(e) 2000 Census Demographic characteristics					
Population	951	1,374.767	579.424	2	11,341
% African American	951	0.381	0.441	0	0.997
% Hispanics	951	0.249	0.301	0	0.981
Housing Units	951	465.305	166.146	2	1,139
% Vacant Housing	951	0.063	0.053	0	0.554

Notes: Data in panels (a) to (d) at the census block group by month level for the sample of block groups in Chicago ever within six block groups of a video gambling establishment. Panel (e) from the 2000 Census at the block group level for the same sample.

Table 2. The Effect of Access to Video Gambling on Crime

	(1)	(2)	(3)	(4)	(5)
	(a) Violent Crime				
Within 2 Blocks (=1)	0.0881***	0.0958***	0.0934***	0.0833***	0.0791***
	(0.0284)	(0.0269)	(0.0287)	(0.0250)	(0.0258)
	(b) Property Crime				
Within 2 Blocks (=1)	0.0579**	0.0632***	0.0540**	0.0650***	0.0620**
	(0.0234)	(0.0235)	(0.0235)	(0.0239)	(0.0246)
Observations	120,777	120,777	120,777	120,777	120,777
Number of blocks	951	951	951	951	951
f(Distance to Riverboats)	No	Yes	No	No	Yes
Demographic controls	No	No	Yes	No	Yes
Neighborhood trends	No	No	No	Yes	Yes

Notes: Sample of Chicago census block groups by month ever within one, two, four, five and six block groups from a video gambling establishment. Dependent variables are number of property or violent crimes. Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. All estimates include block group fixed effects and month-year effects. f(Distance to Riverboats) is a quadratic function of distance, in miles, from the block group centroid to the closest riverboat casino. Demographic controls include total population, percentage of African Americans, percentage of Hispanics, number of housing units, and percentage of vacant housing from the 2000 Census. We interact these measures with a linear trend and them as controls to account for any differences in demographic characteristics. Neighborhood trends are linear trends for each of the nine Chicago "sides": Far North Side, Northwest Side, North Side, West Side, Central, South Side, Southwest Side, Far Southwest Side, Far Southeast Side.
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3. The Effect of Access to Video Gambling on Crime, with Placebos

	(1)	(2)	(3)	(4)	(5)
	(a) Violent Crime				
Within 2 Blocks (=1)	0.0791***	0.0986***	0.0866***	0.103***	0.0894***
	(0.0258)	(0.0324)	(0.0299)	(0.0346)	(0.0320)
Placebo (2 years prior)		0.0410	0.0254		
		(0.0275)	(0.0267)		
Placebo (3 years prior)				0.0402	0.0241
				(0.0275)	(0.0269)
P-Value (Within 2 = Placebo)		.0257	.0142	.013	.0077
	(b) Property Crime				
Within 2 Blocks (=1)	0.0620**	0.0651**	0.0718**	0.0549*	0.0599*
	(0.0246)	(0.0272)	(0.0295)	(0.0288)	(0.0312)
Placebo (2 years prior)		0.0249	0.0285		
		(0.0206)	(0.0215)		
Placebo (3 years prior)				-0.00737	-0.00446
				(0.0200)	(0.0209)
P-Value (Within 2 = Placebo)		.0394	.0326	.0015	.0018
Observations	120,777	120,777	120,777	120,777	120,777
Number of blocks	951	951	951	951	951
f(Distance to Riverboats)	Yes	No	Yes	No	Yes
Demographic controls	Yes	No	Yes	No	Yes
Neighborhood trends	Yes	No	Yes	No	Yes

Notes: Sample of Chicago census block groups by month ever within one, two, four, five and six block groups from a video gambling establishment. Dependent variables are number of property or violent crimes. Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. Placebo variables equal one for the indicated period of time (1, 2 or 3 years) before an establishment within three block groups first adopts video gambling. All estimates include block group fixed effects, month-year effects. Columns (1), (3), and (5) include also a quadratic function of distance to the closest riverboat casino, demographic controls, and neighborhood time trends as described in Table 2.
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 4. The Effect of Access to Video Gambling on Domestic Violence

	(1)	(2)	(3)	(4)	(5)
	Domestic Violence				
Within 2 Blocks (=1)	0.115**	0.124***	0.140***	0.0760	0.0913*
	(0.0480)	(0.0474)	(0.0484)	(0.0466)	(0.0477)
Observations	120,777	120,777	120,777	120,777	120,777
Number of blocks	951	951	951	951	951
f(Distance to Riverboats)	No	Yes	No	No	Yes
Demographic controls	No	No	Yes	No	Yes
Neighborhood trends	No	No	No	Yes	Yes

Notes: Sample of Chicago census block groups by month ever within one, two, four, five and six block groups from a video gambling establishment. Dependent variables are number of domestic crimes. Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. All estimates include block group fixed effects and month-year effects. Controls for distance to the closest riverboat casino, demographic controls, and neighborhood time trends as described in Table 2.

* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 5. The Effect of Access to Video Gambling on Crime, Controlling for Access to Bars

	(1)	(2)	(3)	(4)	(5)
	(a) Violent Crime				
Within 2 Blocks (=1)	0.0791***	0.0634**	0.0638**	0.0645**	0.0648***
	(0.0258)	(0.0251)	(0.0251)	(0.0251)	(0.0251)
Number of Bars in:					
Same block (/100)			1.210		1.163
			(1.745)		(1.745)
Within 2 Blocks (/100)				-0.220	-0.210
				(0.306)	(0.305)
	(b) Property Crime				
Within 2 Blocks (=1)	0.0620**	0.0625***	0.0655***	0.0663***	0.0691***
	(0.0246)	(0.0226)	(0.0237)	(0.0223)	(0.0235)
Number of Bars in:			2.965		2.853
Same block (/100)			(1.830)		(1.806)
				-0.770***	-0.751***
Within 2 Blocks (/100)				(0.260)	(0.257)
Observations	120,777	97,541	97,541	97,541	97,541
Number of blocks	951	947	947	947	947

Notes: Sample of Chicago census block groups by month ever within one, two, four, five and six block groups from a video gambling establishment. Dependent variables are number of property or violent crimes. Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. Number of bars is the number of active liquor licenses in the same block group or within three block groups. All estimates include block group fixed effects, month-year effects, a quadratic function of distance to the closest riverboat casino, demographic controls, and neighborhood time trends as described in Table 2.

* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 6. The Effect of Access to Video Gambling on Crime, by Type

	(1)	(2)	(3)	(4)
	(a) Violent Crime			
	Robbery	Aggravated Battery	Aggravated Assault	Sexual Assault	Homicide
Within 2 Blocks (=1)	0.0817**	0.144***	0.00964	-0.00833	-0.161
	(0.0338)	(0.0407)	(0.0439)	(0.0858)	(0.129)
Share	0.44	0.31	0.19	0.05	0.02
Observations	118,618	118,110	118,237	109,601	78,232
Number of blocks	934	930	931	863	616

	(5)	(6)	(7)	(8)
	(b) Property Crime			
	Larceny	Burglary	Motor Vehicle Theft	Arson
Within 2 Blocks (=1)	0.0392	0.0810**	0.0922**	0.153
	(0.0338)	(0.0333)	(0.0367)	(0.126)
Share	0.59	0.23	0.17	0.01
Observations	120,777	120,523	120,777	94,488
Number of blocks	951	949	951	744

Notes: Sample of Chicago census block groups by month ever within one, two, four, five and six block groups from a video gambling establishment. Dependent variables are number of property or violent crimes. Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. All estimates include block group fixed effects, month-year effects, a quadratic function of distance to the closest riverboat casino, demographic controls, and neighborhood time trends as described in Table 2.
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 7. The Effect of Access to Video Gambling on Crime
Linear Model

	(1)	(2)	(3)	(4)	(5)
	(a) Violent Crime				
Within 2 Blocks (=1)	0.147***	0.179***	0.0956***	0.192***	0.111***
	(0.0285)	(0.0284)	(0.0261)	(0.0284)	(0.0276)
R^2	0.045	0.049	0.056	0.051	0.058
	(b) Property Crime				
Within 2 Blocks (=1)	0.344***	0.411***	0.214**	0.429***	0.306***
	(0.0919)	(0.0927)	(0.0862)	(0.0922)	(0.0903)
R^2	0.103	0.106	0.115	0.108	0.117
Observations	120,777	120,777	120,777	120,777	120,777
Number of blocks	951	951	951	951	951
f(Distance to Riverboats)	No	Yes	No	No	Yes
Socio-economic controls	No	No	Yes	No	Yes
Neighborhood trends	No	No	No	Yes	Yes

Notes: Sample of Chicago census block groups by month ever within one, two, four, five and six block groups from a video gambling establishment. Dependent variables are number of property or violent crimes. Each coefficient is an estimate of Equation (2) using Linear regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. All estimates include block group fixed effects and month-year effects. f(Distance to Riverboats) is a quadratic function of distance, in miles, from the block group centroid to the closest riverboat casino. Demographic controls include total population, percentage of African Americans, percentage of Hispanics, number of housing units, and percentage of vacant housing from the 2000 Census. We interact these measures with a linear trend and them as controls to account for any differences in demographic characteristics. Neighborhood trends are linear trends for each of the nine Chicago "sides": Far North Side, Northwest Side, North Side, West Side, Central, South Side, Southwest Side, Far Southwest Side, Far Southeast Side.
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 8. Robustness to Omitted Variable Bias

R_{max}	$1.1\tilde{R}^2$	$1.2\tilde{R}^2$	$1.3\tilde{R}^2$
Violent	4.0965	2.0714	1.3861
Property	3.9288	1.9781	1.3218

Notes: This Table reports the Oster (2017) proportionality coefficient. Coefficients from Table 7 column (5) are compared with the specification with no controls in column (1). $\tilde{R}^2$ corresponds to the R^2 from Table 7 Column (5).

Table 9. The Effect of Access to Video Gambling on Crime
Difference-in-Difference Decomposition

	Weight (1)	Violent Crime (2)	Property Crime (3)
	(a) Average "No Controls" Estimates		
Av. Treatment Effect		0.147	0.344
Treated vs Control	0.937	0.161	0.369
Earlier Treated vs Later Control	0.051	-0.069	-0.021
Later Treated vs Earlier Control	0.011	0.011	-0.119
	(b) Average "Controled" Estimates		
Av. Treatment Effect		0.111	0.306
Never vs Timing	0.8244	0.1596	.03688
Timing Groups	0.0692	-0.0604	-0.1384
Within	0.1064	-0.1526	.01058

Notes: This Table reports Goodman-Bacon (2018) difference-in-difference decomposition. Panel (a) reports results of the decomposition of Table 7 column (1) where there are no controls . Panel (b) results for the estimates shown in Table 7 column (5) with all the controls.
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 10. The Effect of Access to Video Gambling on Crime
Matrix Completion Estimation

	(1) Linear	(2) Athey et al. (2018)
	(a) Violent Crime	
Within 2 Blocks (=1)	0.111***	0.083***
	(0.0276)	(0.0257)
	(b) Property Crime	
Within 2 Blocks (=1)	0.306***	0.255***
	(0.0903)	(0.0734)
Observations	120,777	120,777
Number of blocks	951	951

Notes: This Table reports in column (1) our baseline results from Table 7 column (5) side by side to results fro Athey et al. (2018) matrix completion estimation method in column (2). We use 10 folds for cross validation and 500 draws for bootstrapped standard errors in column (2).
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 11. Back of the Envelope Monthly Cost Estimates for Chicago

Crime	Estimated New Incidents per month	Cost Per Incident	Total Cost	90% Conf. Int.
Violent	15.88		419.68	[-89.97; 897.45]
Robbery	8.92	13.80	123.06	[38.96; 207.15]
Aggravated Battery and Assault	6.97	42.56	296.62	[158.14; 435.11]
Sexual Assault	-	155.28	-	[-287.07; 255.2]
Property	33.30		43.06	[33.42; 209.5]
Burglary	14.49	2.30	33.33	[10.7; 55.96]
Larceny	18.81	0.52	9.73	[-4.13; 23.58]
Motor Vehicle Theft	12.39	6.33	78.41	[26.85; 129.96]
Total			**462.74**	**[-0.06; 1.11]**

Notes: All dollar amounts in 2016 dollars. Estimated number of new incidents per month is based on coefficients obtained in Table 6. The social cost per incident obtained from Cohen and Piquero (2009).

Table 12. The Effect of Access to Video Gambling on House Prices

	(1)	(2)	(3)	(4)
	ln Property Transaction Price			
Within 2 Blocks (=1)	-0.0491***	-0.0288***	-0.0294***	-0.0147***
	(0.0055)	(0.0054)	(0.0054)	(0.0053)
Observations	150,228	150,228	150,228	150,228
Number of blocks	1,418	1,418	1,418	1,418
Dwelling Characteristics	Yes	Yes	Yes	Yes
Distance to Riverboats	No	Yes	Yes	Yes
Demographic Controls	No	No	Yes	Yes
Neighborhood trends	No	No	No	Yes

Notes: Sample of of housing transactions for single family residences in Cook County by census block groups and month ever within one, two, four, five and six block groups from a video gambling establishment. Dependent variables are ln of property transaction price. Each coefficient is an estimate of Equation (3) using linear regression. Standard errors clustered at the block group level are in parentheses. $Within\ 2\ blocks$ equals one if the transaction corresponds to a property in a census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. All estimates include block group fixed effects and month-year effects. Dwelling Characteristics include age and its square, square footage, number of bedrooms and bathrooms, indicators for brick exterior, fireplace, and garage. f(Distance to Riverboats) is a quadratic function of distance, in miles, from the block group centroid to the closest riverboat casino. Demographic controls include total population, percentage of African Americans, percentage of Hispanics, number of housing units, and percentage of vacant housing from the 2000 Census. We interact these measures with a linear trend and them as controls to account for any differences in demographic characteristics. Neighborhood trends are linear trends for each of the nine Chicago "sides", for properties sold in Chicago, and for each municipality for those sold outside Chicago.
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

APPENDIX:
Can't Stop the One-Armed Bandits
The Effects of Access to Gambling on Crime

A Additional Robustness

This section details a number of additional robustness checks. We explore the sensitivity of our estimates to sample definitions, the use of alternative estimators, alternative geographic time trends and using alternative definitions for access to video gambling. Overall, results are similar across the different checks.

A.1 Robustness to Sample Definitions

We explore the sensitivity of our results to alternative definitions of the sample. In our main analysis we restrict our sample to census block groups that are ever within six block groups from a video gambling establishment. In Table A.2, column (1) we present the estimate for our preferred specification in the paper (column (5) of Table 2). In column (2) we do not apply any restrictions in the sample and include all block groups in Chicago while column (3) restricts to blocks within ten block groups of a gambling establishment. In columns (4) and (5) we return to our original sample, but drop blocks on the lake shore or those that are industrial (i.e., have no residences). Regardless of how we specify the sample, our point estimates are very stable.

A.2 Robustness to Trends

We also account for potential unobserved shocks such as community area policies or changes in policing by accounting for different geographic trends. In our preferred specification, we account for neighborhood trends time trends. An alternative concern is that policing strategies could have changed differently in different areas. To account for this potential, instead of including neighborhood area trends, we include community areas and police district in columns (2) and (3) of Table A.3. Nevertheless, results are still robust to accounting for time trends at this level.[31]

A.3 Robustness to Access Definition

Our results do not depend on how access to video gambling is defined. We present estimates using our preferred specification for a number of alternative definitions of access to gambling in Table A.4. *Number of VG within 2 Blocks* is the count of number of gambling establishments within two block groups at time t, *log(Volume Played+1)* is the logarithm

[31]Our neighborhood definitions is based on the nine Chicago "sides": Far North Side, Northwest Side, North Side, West Side, Central, South Side, Southwest Side, Far Southwest Side, Far Southeast Side. These neighborhoods are comprised by 77 community areas and 23 police districts.

of total volume played plus one at time t in all video gambling establishments within two blocks. *Access to VG* is an access measure typically used in the trade literature that weights each video gambling establishment by its distance (or travel time) at time t. For example, if $d_{i,j}$ is the linear distance (or traveling time) between block centroid i and establishment j, and $\mathbb{1}(VG_{j,t} = 1)$ indicates that establishment j has video gambling in period t, then gambling access (GA) is calculated as $GA_{i,t} = \sum_{j=1}^{J} exp(-\mathbb{1}(VG_{j,t} = 1) \cdot d_{i,j})$. We standardize all the measures to have mean zero and standard deviation one for ease of comparison. Regardless of the definition used, results are very similar. For example, increasing the number of video gambling establishments within two blocks by one standard deviation is associated with an increase of 2.4% (s.e. 0.006) and 1.6% (s.e. 0.0097) in property and violent crimes.

When defining intensity of access to video gambling, in the paper we use volume played at establishments within two blocks to show that effects were increasing in volume played. Results are similar when using number of establishments within two blocks instead.

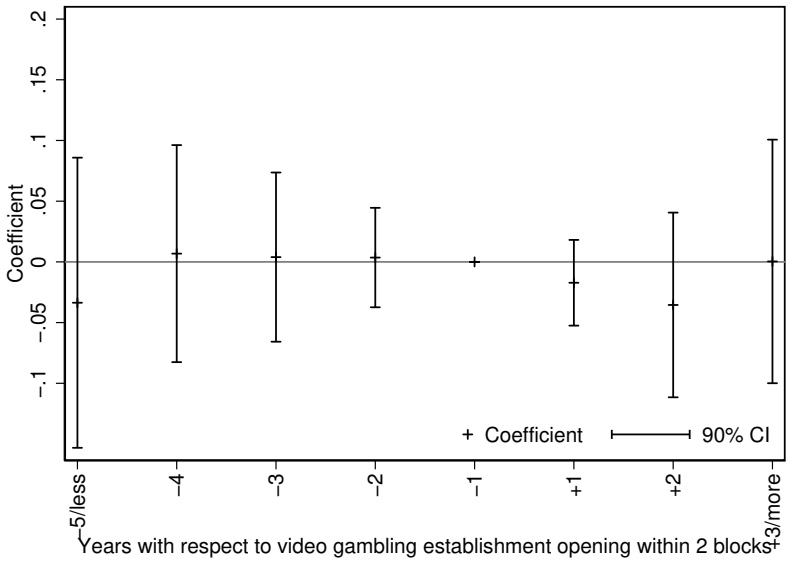
B Effect on Supply of Bars

In the paper we show that accounting for the availability of bars either in the same block or in neighboring blocks does not affect our estimates. Nevertheless, it is still valuable to examine whether the Video Gaming Act affected the supply of bars in the area.

To examine whether the access to video gambling affected the number of bars within Chicago, we replicate our analysis on crime but using number of bars as dependent variable instead. We are interested in comparing areas inside Chicago that experienced higher access to gambling with those that had relatively lower access to evaluate whether the number of bars changed differentially. We show the evidence as an event-study figure in Figure A.1 Overall, we do not find evidence that access to gambling inside Chicago affected the number of bars. Even though point estimates are positive after video gambling becomes accessible, the magnitude is small and in the other direction. Using our baseline specification instead of the event study, the estimated coefficient is 0.038 (s.e. 0.041).[32] This is a small magnitude considering that the average number of bars in the sample of block groups inside Chicago used for the analysis is 1.42. Even if the effect were orders of magnitude larger, economically it seems unlikely to be driving the effects on crime.

[32] Available in Table A.5.

Figure A.1. Effect of Video Gambling on Number of Bars



Notes: Sample of census block groups by year ever within six block groups from a video gambling establishment. Dependent variables are number of bars. Point estimates and 90% confidence intervals for estimating Equation (2) using dummy variables indicating timing with respect to first video gambling establishment operating within two blocks. The omitted category is one year before video gambling establishment operates within two blocks (-1).

Table A.1. Descriptive Statistics: Property Transactions and Characteristics

	N	Mean	St. Dev.	Min.	Max.
Transaction Price	150,228	254,756	161,341	35,100	859,000
Age of structure	150,228	52.53	25.59	0	200
Square footage	150,228	1,611	737	400	14,461
Number of bathrooms	150,228	1.77	0.71	1	9
Number of bedrooms	150,228	3.32	0.80	1	12
Has brick exterior (=1)	150,228	0.63	0.48	0	1
Has basement (=1)	150,228	0.79	0.41	0	1
Has fireplace (=1)	150,228	0.40	0.49	0	1
Has garage (=1)	150,228	0.90	0.30	0	1

Notes: Sample of transactions in Cook County ever within six block groups of a video gambling establishment. Data include transaction for single family residences and comes from Corelogic.

Table A.2. Sample Sensitivity

	(1)	(2)	(3)	(4)	(5)	(6)
	(a) Violent Crime					
Within 2 Blocks (=1)	0.0791***	0.0737***	0.0742***	0.0856***	0.0817***	0.0731***
	(0.0258)	(0.0250)	(0.0245)	(0.0268)	(0.0270)	(0.0263)
	(b)Property Crime					
Within 2 Blocks (=1)	0.0620**	0.0290	0.0255	0.0695***	0.0677***	0.0709***
	(0.0246)	(0.0248)	(0.0254)	(0.0246)	(0.0250)	(0.0254)
Observations	120,777	277,495	210,693	102,108	112,268	110,363
Number of blocks	951	2,185	1,659	804	884	869
Block Restrictions	1 to 6	All	1 to 10	1 to 6	1 to 6	1 to 6
Other Restrictions	None	None	None	Drops 3rd block	No Industrial	Not near Riverboat

Notes: Sample of Chicago census block groups by month. Dependent variables are number of property or violent crimes. Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. Column (1) uses baseline sample definition used throughout the paper, column (2) includes all block groups in Chicago, column (3) excludes blocks that are more than 10 block groups away from a video gambling establishment. Column (4) is similar to the specification in column (1) but drops blocks that are three blocks away, leaving a buffer area. The last two columns use baseline sample but drop industrial blocks in column (4) and blocks near River Boat casinos in column (5). All estimates include block group fixed effects, month-year effects, a quadratic function of distance to the closest riverboat casino, neighborhood time trends, and demographic controls as described in Table 2.

* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table A.3. Robustness to Alternative Trends

	(1)	(2)	(3)
	(a) Violent Crime		
Within 2 Blocks (=1)	0.0791***	0.0735***	0.0765***
	(0.0258)	(0.0248)	(0.0254)
	(b) Property Crime		
Within 2 Blocks (=1)	0.0620**	0.0590***	0.0612**
	(0.0246)	(0.0207)	(0.0254)
Observations	120,777	120,777	120,777
Number of blocks	951	951	951
Linear Time Trends	Neighborhood	Community Area	Police District

Notes: Sample of Chicago census block groups by month ever within six block groups from a video gambling establishment. Dependent variables are number of property or violent crimes. Coefficients for estimating model 2 using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. All estimates include block group fixed effects, month-year effects, a quadratic function of distance to the closest riverboat casino, and demographic controls as described in Table 2. Each column uses different level-specific linear time trend: (1) Neighborhood, (2) Community Area, and (3) Police District.
* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table A.4. Alternative Video Gambling Access Definitions

	(1)	(2)	(3)	(4)
	(a) Violent Crime			
Within 2 Blocks (=1)	0.0791***			
	(0.0258)			
Log(Volume Played +1)		0.00620***		
		(0.00182)		
Access to VG (distance)			0.0246***	
			(0.00641)	
Access to VG (travel time)				0.0145***
				(0.00480)
	(b) Property Crime			
Within 2 Blocks (=1)	0.0620**			
	(0.0246)			
Log(Volume Played +1)		0.00499***		
		(0.00181)		
Access to VG (distance)			0.0156**	
			(0.00715)	
Access to VG (travel time)				0.0216***
				(0.00523)
Observations	120,777	120,777	120,777	120,777
Number of blocks	951	951	951	951

Notes: Sample of Chicago census block groups by month ever within six block groups from a video gambling establishment. Dependent variables are number of property or violent crimes. Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. All measures of access are standardized with mean zero and standard deviation of one (see Section A for variable definitions). All estimates include block group fixed effects, month-year effects, a quadratic function of distance to the closest riverboat casino, neighborhood time trends, and demographic controls as described in Table 2. * Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table A.5. Effect of Video Gambling Act on Number of Bars

	(1)	(2)	(3)
	Number of Bars		
Within 2 Blocks (=1)	0.0379		0.0485
	(0.0407)		(0.0388)
Block has VG (=1)		0.105***	0.110***
		(0.0386)	(0.0387)
Observations	26,001	44,874	44,874
Number of blocks	312	554	554
Original Sample	Yes	No	No
Expanded Sample	No	Yes	Yes

Notes: Each coefficient is an estimate of Equation (2) using Poisson regression. Standard errors clustered at the block group level are in parentheses. *Within 2 blocks* equals one if the census block group is within two block groups of a video gambling establishment after the establishment adopted video gambling. Column (1) restricts the sample to block groups in Chicago. Columns (2) and (3) include Chicago and block groups outside of Chicago that are within three block groups from the Chicago border. *Block has VG* equals one if the block group has at least one establishment with video gambling at time t. All measures of access are standardized with mean zero and standard deviation of one (see Section A for variable definitions). All estimates include block group fixed effects, month-year effects, a quadratic function of distance to the closest riverboat casino, neighborhood time trends, and demographic controls as described in Table 2.

* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.