

The impact on urban crime of regulating cannabis social clubs: evidence from a natural experiment

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Abstract. In this paper we explore a highly controversial issue nowadays in many cities around the world, that is, the role (and impact) that marijuana must have in societies where is still, in general, an illegal substance but that can be consumed under certain circumstances (for medical or recreational purposes). More precisely, and by means of a natural experiment, we explore the impact that the (random) closure, by local police forces, of the 10% cannabis social clubs (CSC, hereafter) in 2014 in the City of Barcelona had on various types of urban crime. Using very detailed geocoded crime data we are able to perform both daily and weekly estimations in a Differences-in-Differences set up. Moreover, we make use of a unique daily ticket dataset for public museums in the City of Barcelona to estimate for each CSC (our unit of analysis) a measure of daily tourism pressure on the area surrounding the club; measure that depends on the distance to the main touristic places around the city. Therefore, we are able to control for an important variable in this set-up, tourism, which is intimately related with both crime and recreational marijuana in Barcelona. Finally, we also collect listings from Airbnb to analyze the impact of the closures on both valuation of touristic accommodations and touristic prices in those areas that had a CSC sealed compared with those areas that had not.

Key words: Cannabis Social Clubs; Marijuana; Urban Crime; Tourism.

JEL CODE: K42; L83; O18.

1. Introduction

As the medical value of cannabis gains traction with medical professionals and policy makers, medical cannabis reforms are taking hold in many countries around the world. To date, medical cannabis is legally available to some degree for patients in at least 20 countries.¹ This has captured the attention of academia, from various fields, and has led to an important

¹ With varying regulatory frameworks and specificities we find the use of medical cannabis in Argentina (since 2017); Australia (since 2016); Austria (since 2008; medical cannabis available to patients since Jan. 2017); Canada (since 2001); Chile (since 2005 and growing medical cannabis in the country since 2014); Colombia (since 2016); Croatia (since 2015); Czech Republic (since 2013); Finland (since 2008); Germany (since 2016); Israel (since 2016); Italy (since 2013); Jamaica (since 2015); Macedonia (since 2016); Netherlands (since 2000); Portugal (since 2001 decriminalized the possession of all drugs for personal use); Romania (since 2013); South Africa (since 2017); US (California legalize medical cannabis back in 1996, since then 28 states have legalized the drug for medical use); Uruguay (since 2013).

number of studies dealing with the various impacts of such legalization, even if only for medical reasons.

As a result of the medical and political discussion regarding medical marijuana many countries have also opened the discussion regarding the regulation of recreational marijuana and the potential problematic social outcomes of marijuana legalization. If Netherlands is the paradigm of regulating such use of cannabis, countries like Uruguay in 2013 passed legislation allowing residents to sign up to grown cannabis for personal use at home, and soon, pharmacies will begin selling small amounts of cannabis to registered users across the country.² Uruguay has actually legalized medical and recreational use of marijuana, and has many cannabis clubs around the country that grow cannabis and distribute it to registered, paying members. In 2016 new Canadian government announced its intention to (fully) legalize cannabis as well. In the US, where much of the regulation action regarding drugs policy has taken place,³ it is now immerse in a decisive period due to the recent developments in some States (Colorado and Washington) to legalize the sale of cannabis for recreational use.⁴

The Spanish case, lay in between. In Spain, possession of marijuana is legal in private areas only, illegal in public areas (decriminalized) and offenders receive an administrative fine. Possession of more than 70/100gr. (depending on the region) is considered as possession with the intention of trafficking. Selling marijuana it is punished by prison in all the ways, even for first offenders; however, cannabis can be acquired in private smoker/cannabis clubs. Cultivation is legal only for own consumption (determines the quantity allowed to be grown); if the plants are located somewhere visible from the street/public place, it's an administrative offense. Therefore there is a legal loophole that allows marijuana to be grown for personal use, cannabis social clubs (CSC, hereafter) have sprung up across Spain in recent years are particularly prevalent in cities such as Barcelona, Bilbao and Valencia.

In this paper we explore by means of a natural experiment the impact that the (random) closure, by local police forces, of the 10% CSCs in 2014 in the City of Barcelona had on various types of urban crime. Using very detailed geocoded crime data we are able to perform both

² <http://www.elpais.com.uy/informacion/se-vendera-marihuana-farmacias.html> (last accessed 22 May 2017).

³ For instance the wave of decriminalization that was implemented in many US states in the 1970s as well as state efforts to make cannabis available for medicinal purposes in the 1990s and 2000s; this combined with a strong support to the prohibitionist interpretation of the UN drug conventions, and as one its strictest domestic enforcers.

⁴ From 1996 to 2016, there have been 25 states that have passed medical marijuana laws, in varying forms. Currently Alaska, Colorado, Washington, and Washington D.C. have legalized recreational use of marijuana for citizens over the age of 21. This movement has progressed even as marijuana still remains federally illegal. The implications of legalization are an area of much debate and conflicting views, as the industry has been illegal for many years with data difficult to access.

daily and weekly estimations in a Differences-in-Differences set up. Moreover, we make use of a unique daily ticket dataset for public museums in the City of Barcelona to estimate for each CSC (our unit of analysis) a measure of tourism pressure on the area surrounding the club; measure that depends on the distance to the main touristic places around the city. Therefore, we are able to control for an important variable in this set-up, tourism, which is intimately related with both crime and recreational marijuana in Barcelona. Finally, we also collect listings from Airbnb to analyze the impact of the closures on both valuation of touristic accommodations and touristic prices in those areas that had a CSC sealed compared with those areas that had not.

Generally speaking, in Spain and in many countries around the world, the discussion revolves around both the use of medical marijuana and regarding the existence of a *de facto* use of marijuana for recreational purposes. Therefore, there is a clear interest for understanding the potential impact that marijuana laws can have on marijuana use, and this issue is receiving plenty of academic and legislative attention. More precisely, the connection between drugs and crime is one of the main reasons used to block more permissive marijuana laws. In this set up, the production and dissemination of sound evidence is a vital part of policy reform regarding the legalization of marijuana. When Stevens and Pacula (2017) reflect on how to improve the use of evidence in drug policy state: *“Evidence is rarely imported directly into policy in a linear fashion. The ‘enlightenment’ function of evidence may be blocked by the barriers that prevent policy makers from accessing evidence (Ritter, 2009), or by systematic distortion in the political uses of the research base (Stevens, 2011). Nevertheless, we believe that high quality research is the best way to inform public debate about the process, outcome and impacts of different drug policies.”*

For this purpose, the structure of this paper is as follows. Section 2 briefly reviews the broad existing literature regarding the impact of cannabis consumption and illegal behavior. Section 3 presents the legal background that has given rise to the “recreational use” of marijuana in Spain. Section 4 describes the empirical model and the data used. Section 5 presents the empirical results. Finally, section 6 concludes.

2. Cannabis and illegal behavior: an overview of the existing literature

The link between crime and the legality of marijuana can take various forms. Following Pacula and Kilmer (2003) we can broadly identify four basic mechanisms. First, a psychopharmacological mechanism argues that the person who smokes marijuana becomes an

offender because of the acute psychoactive effects of marijuana.⁵ However, as pointed out by Niveau and Dang (2003) they could also be more likely to get caught. In this sense, research in controlled environments (driving simulators and closed course tests) finds marijuana impairment, that is, the consumption of marijuana increases deviations in lateral position (Hartman, 2015; Crowthorne, 2000), negatively affects tracking ability and decision time (Sexton et al. 2000). In this sense, cannabis consumers could be seen also as “an easy” target for motivated offenders.

Second, crime becomes the mean to finance addiction (economic-compulsive behavior), in this sense, regardless of any effect of the drug, the need for financing the use of drugs could spur criminal activity. In this sense, as pointed out by Morris et al. (2014) marijuana can be seen as ‘gateway’ to harder drugs such as cocaine and heroin, and this could lead to long-term increases in crime as an ever-growing number of illicit drug users engage in serious predatory crimes to support their habits.

Third, systemic violence emerge due to the implicit existence of a black market behind (illegal) marijuana. Cartels, dealers and gangs generate crime to resolve turf conflicts in a market fueled by unregulated profits and competition (see Sherman, 1995). Fourth, the so-called by Pacula and Kilmer (2003) “common factor” hypothesis suggests that there are exogenous characteristics that affect both the individual probability of committing a crime and, at the same time, the probability to use (or abuse) drugs.⁶

In this set up, trying to disentangle which are the (various) effects and through which mechanisms, there is a growing literature, especially in the United States, that bring evidence on the impact of (medical) marijuana on traffic fatalities and alcohol consumption (Anderson et al., 2013); on suicides (Anderson et al., 2014) and on the abuse of the substance (Cerdá et al. 2012). Regarding the impact on crime, see among others, Benson et al. (1992), Niveau and Dang (2003) for the case of violent crime, Pacula and Kilmer (2003), Swartout and White (2010) for the specific case of sexual aggressions, Keppler and Freisthler (2012) for the impact of marijuana dispensaries in the US city of Sacramento, or Shepard and Blackley (2016). However the renewed interest that the economics of crime literature has experienced in recent years, together with the possibility of using new econometric techniques and new empirical approaches, that allow researchers to properly address the causality issue regarding

⁵ See Moore and Sturat (2005) for a review of the (mainly health) literature on the relation between marihuana use/abuse and interpersonal violence.

⁶ In econometric terms, this point relates to the endogeneity caused by the existence of omitted factors correlated with both the endogenous and the explanatory variables. If not taken into account properly, any attempt to unveil the relation between drugs and crime may suffer the problem of spurious correlation: factors associated with drug use are at the same time intrinsically associated with criminal activity.

marijuana and crime, has brought recent contributions for the US case such as Morris et al. (2014) or Dragone et al. (2016) or Adda et al., (2014) for the UK.

Note that an important number of previous findings regarding the relation between marijuana and crime basically report divergent results: while results from laboratory-based studies seem to be inconclusive, results of cross-sectional and longitudinal research mainly undertaken in the health discipline provide support for an 'association' between marijuana use/withdrawal and various types of violence, however, causality has not been a central issue in those studies. It is evident from the inconsistent findings in the literature that the exact nature of the relation remains unclear and, as pointed out by Ostrowsky (2001), potentially confounding variables in this complex issue is, among others, at the core of the contradictory findings found in the literature.

Addressing this crucial issue, and framed in the recent economics of crime literature that has taken identification as one of the crucial questions to deal with when analyzing the determinants and consequences of crime, Dragone et al. (2016) combine difference-in-differences and spatial regression discontinuity designs at the county level for the neighboring US States of Washington (legalized recreational marijuana in 2012) and Oregon (legalized recreational marijuana in 2014) to identify the causal impact of the legalization of cannabis for recreational use on crime rates. The authors find that the legalization reduced rapes by about 4 per 100,000 inhabitants (a 30% drop), and thefts by about 100 per 100,000 inhabitants (a 20% drop). Morris et al. (2014), using panel data estimates 1990-2006, find that states adopting medical marijuana laws saw a reduction in the murder rate and aggravated assault rate by -2.4% with no change in the rate of rape, burglary, larceny, vehicle theft or arson.

Using individual-level panel data for the UK case and exploiting as a natural experiment the 2004 declassification of cannabis (changed expected punishments differently in various age groups due to thresholds in British criminal law) Braakmann and Jones (2014) find no increases in either cannabis consumption, consumption of other drugs, crime and other forms of risky behavior.

Related to our proposed empirical set up, Freisthler et al. (2016) study the effect of the closure of 90% of the marijuana dispensaries in violent property crimes in the city Long Beach, CA. They analyze during a period of two years how density of dispensaries affects crimes. Their study shows that there were no changes in crime rates in census block in which dispensaries were allocated, although the effect of the closures show up in neighbor's census blocks (3.49% violent crimes per year and 1.71% violent property crimes). They explain this effect by the fact that surveillance measures (cameras) are mandatory in marijuana dispensaries and that may push crime to surrounding areas. Other added explanations are that when people is

going to acquire marihuana they familiarize with neighborhoods that they go through, facilitating posterior crimes. Finally it is important to highlight the differences between dispensaries of medical marihuana and CSC (recreational marihuana): dispensaries are used to deliver marihuana to entitled consumers (consumption does not happen in the dispensary itself) and, moreover, dispensaries can also be deliver marijuana to patients' homes; therefore again, an important part of the consumption do not need to be physically in the area surrounding the dispensary.

3. Legal background: Cannabis Social Clubs in Barcelona

The so called "Spanish Cannabis Social Club model" generated a great deal of interest in drug policy circles (see for instance Marks, 2015 and Belackova et al., 2016 for the Spanish case; Decorte, 2015 for the Belgian case; Bewley-Taylor et al., 2014 for the Uruguayan case and other Latin-American experiences). The model implemented in Spain consists of a not for-profit association, democratically operated by its members, officially registered as a legal entity, which collects and distributes cannabis to its members, on private premises licensed for the sole access of members. The cannabis social club model was initially perceived as a safe and feasible option for policymakers to move a meaningful distance along the spectrum towards legally regulated cannabis markets without crossing over to full commercial availability; avoiding the black market and its risks, assuring the flow of proper information about the negative effects of cannabis use to consumers and also somehow control consumption (the amount allowed to consume in social clubs was rather small, with a monthly limit being pre-set for each member and production was set according to the forecast of the shared consumption of the members).

The first cannabis association in Spain was formed in 1991 and the first club appears to have been opened in 2001. There was a dramatic proliferation of cannabis associations and clubs between 2007 and 2011. In this set up, and maybe spurred by the fact that the City of Barcelona is a highly touristic city, CSCs started to target tourists as potential clients, and regional and local authorities started to fear that Barcelona was becoming "The New Amsterdam".⁷

At first, CSCs are private only open to new members via referrals through existing members. There is a preliminary application process; in principle not all who apply qualify for membership based on Spanish law and club policy. This membership process is not meant to be promotional in any way; application for membership is general and is not necessarily

⁷ <http://www.lavanguardia.com/vida/20140119/54399239955/boom-clubs-cannabis-turismo-porro-barcelona.html>

applied to any particular club unless the applicant fully qualifies. However, the clubs found successful ways to overcome these rules to attract tourists.⁸

In this set up, in 2014 the Barcelona City Council engaged in the endeavor to regulate the activity of CSCs. Despite the existent regulation the center-right party governing, at the time, the City Council decided to start the process to issue new regulations with the aim to drastically reduce the number of CSCs in the city under the motto *“we cannot allow, under the appearance of associations, those who threaten the coexistence, well-being and health of people”* (Mr. Joaquim Forn, First Deputy Mayor of the Barcelona City Council).⁹ The idea of the reform was to constraint the location of CSCs to be away from potential conflicting locations such as educational, medical or recreational areas.¹⁰ The City Council proposal had both political and associational opposition. In the middle of this “regulatory battle”, and used also as a propagandistic tool, in 2014 the City Council launched the so called “Operation Sativa”, conducted by local police forces. The legal protection afforded to registered associations by the Spanish Constitution, national and regional legislation means that they can only be dissolved by a court order.¹¹ However, the licensing of private premises for the use of the association (social clubs) entails the adequate satisfaction of various municipal regulations and regional laws concerned with matters such as health and safety, and the abatement of noise and noxious emissions. Therefore, between the 11th and the 13th of August 2014 the City Council ordered the cessation of activity of 49 CSCs, out of the total of 155 clubs that existed in the city at the time.

The City Council identified deficiencies in its operation and coexistence problems with the neighborhood, among others. The local police sealed those days 15 of these premises (11 in the District of Ciutat Vella, 3 in the District of Horta Guinardó and 1 in the District of Sant Martí), since, according to the municipal government had ignored the order of dismissal

⁸ On the internet, it is easy to find instructions and promo videos of CSCs for tourist (<https://www.youtube.com/watch?v=FbmDzoVrU50> or <http://cannabisbarcelona.com/>). From these sites it is easy to learn that in order to join a cannabis club in Barcelona, an existing member must endorse potential clients. However, tourists can send the club a private message to their Facebook page and request an invitation: cannabis clubs in Barcelona are proud to announce that they normally reply immediately. In principle no guests or visitors are allowed. Members have to pay an annual membership fee that can range from €20 to €50 depending on the exclusivity and quality of the club. Tourists are advised to carry an ID even before becoming a member.

⁹ <http://www.lavanguardia.com/politica/20140613/54408973568/barcelona-prohibe-por-un-ano-abrir-nuevos-clubes-de-cannabis-para-regularlos.html>

¹⁰ Indeed, the City Council proposal published in May 2015 (for public consultation before approval) reduced the number of CSC from 155 down to only 11; that is, those that fulfilled the strict restriction of the local government.

¹¹ The Constitutional Law 1/2002 of 22 March regulating the right of association, develops the fundamental right to association contained in the article 22 of the Spanish Constitution. Concerning the Catalan region, associations are regulated in Law 4/2008 of 24 April, of the third book of the Catalan Civil Code on legal persons.

activity and the deficiencies were substantial. The other associations were given a maximum of 48 hours to identify and remedy deficiencies before the seal of premises was imposed. Among the irregularities giving rise to closure orders range from the presence of minors or the use of the club premises as a supply for dealers who sell on the streets, the lack of ventilation in the premises, to the operation of bars without license. Also selling cannabis to tourists with the only pre-requisite to make them fill out a form. Some of the sealed clubs were accused of drug trafficking and faced trial (later on). We are going to use both those sealed CSCs and the timing of such closures to identify a causal impact on criminal activity around the premises of the CSCs.

4. Methodology and data

4.1. Empirical set up

The empirical specification aims to unveil the causal relationship between the use of recreational marijuana and urban crime; using, in a differences-in-differences specification, the shut downs as an exogenous shock to CSCs activity and, hence, to crime. The estimated equation is:

$$Crime_{it}^k = \alpha + \beta_1 CLOSURE_{it} + \beta_2 X_{it} + \gamma_i + \varphi_t + \varepsilon_{it} \quad (1)$$

where i indicates the CSC, k the type of crime and t the periodicity (days or weeks) that our data takes. $CLOSURE_{it}$ is a variable resulting from the interaction between two dummy variables; one indicating those CSCs that were sealed by the Barcelona City Council and the other indicating the day of closure. X_{it} indicates other potential determinants of criminal activity around CSC (that vary by CSC and time unit: days or weeks). More precisely, we compute data on the “touristic pressure” around each CSC. We also include the interaction between CLOSURE and the touristic pressure.

Note that Eq. (1) is estimated both on a daily basis (365 days corresponding to 1st January 2014 to 31st December 2014) and on a weekly basis (52 weeks). All regressions include CSC fixed effects; day or week fixed effects; and errors are either clustered at the neighborhood level (73 neighborhoods in Barcelona) or the district level (10 districts in Barcelona).

Identifying the parameter of interest, β_1 , requires both that those CSCs sealed and the timing of the closures to be uncorrelated with time-varying unobserved factors that themselves generate outcomes of interest. In this sense various characteristics of the closures

themselves play an important role. First, timing of events was totally unrelated to crime and was determined by when the City Council wanted an impact (media impact) to pose themselves in the debate regarding regulating CSCs and second, as previously explained, the need for a court order to seal a CSC implies an administrative procedure that follows a rather different time path than police actions aimed to tackle criminality in the streets of Barcelona. Moreover, the fact that only 15 CSCs were formally sealed, and the rest only warned, implies that those sealed CSCs had serious problems, especially regarding safety regulations that could put in danger members of cannabis associations. Therefore, and although one of the formal reasons to regulate CSCs by the City Council was the negative externalities they, in principle, could generate to the surroundings of where they are located, the closures followed the local regulation in force; that is, basically centered in the health and safety conditions of the premises.

4.2. Potential threats to the identification strategy

The potential threats to our identification are mainly two. First, the possibility of new clubs openings; however, and importantly for us, in June 2014 the Barcelona City Council, due precisely to the regulation of CSCs process started, forbid the opening of new CSCs or the enlargement of the existing ones.¹² In this regard, we have a piece of evidence that comes from the City Council report on CSCs that presents data for May 2015, and show the same number of registered associations than in 2014 during “Operation Sativa”. In fact, as a result of the impossibility to open new CSCs there was a waiting list to obtain the permits to open new ones.

Second, how long those sealed CSCs remained closed. The same report in May 2015 shows that nearly 40% of sealed CSCs in August 2014 remain inactive in May 2015. The rest were again open. As a robustness check we restrict our estimates to those CSC that were reported closed in May 2015. Nevertheless, we believe that the reasons for the closure were important enough to need some renewal of the premises and need also some sort of latter approval by the C authorities that could certify that all the requirements were fulfilled. We believe this process was not immediate for sealed CSC and need some time. In any case, and to properly deal with this issue we present, as a further robustness exercises, the main estimations limiting the time span after the closures.

¹² <http://www.lavanguardia.com/politica/20140613/54408973568/barcelona-prohibe-por-un-ano-abrir-nuevos-clubes-de-cannabis-para-regularlos.html>

4.3. Data issues

In this paper we merge three different and unique dataset. First, we make use of a non-public dataset containing all crimes recorded by the *Mossos d'Esquadra* (the autonomous police agency in Catalonia) and *Guardia Urbana* (Barcelona local police), which both are responsible for preventing and solving crimes in the City of Barcelona.¹³ The dataset records at what time the crime takes place (if known), where it takes place, and the type of crime committed. The dataset extends from January 1, 2014 to December 31, 2014. Illegal activities are classified in accordance with the roughly 190 articles of the Spanish penal code. However, to reduce the number of categories without causing an aggregation bias that might undermine my estimates (Cherry and List, 2002). We combined some of these articles, taking care not to aggregate crimes with different offender motivations. We ended up with three main categories: property crimes (with a clear economic return), crimes against persons, and other types of crimes. For property crimes (84 percent of all recorded crimes in Catalonia during the 2007–09 period) we calculated the number of “Thefts”, “Robberies”, and “Damages”. Thefts, the misappropriation of others’ belongings without resorting to any type of violence, are by and large the most common type of recorded crime, with approximately 43.7 percent of all recorded felonies. Robberies (14.3 percent of the total) entail some sort of violent behavior by offenders, hence they would be classified as a mix between property crimes and crimes against persons, although the original definition of a robbery is to take property unlawfully. We also report, as a robustness test, the results for “Fraud” a property crime that in principle we do expect to be influenced by the CSC closure.

The main crimes involving interpersonal violence, which we have called crimes against persons (11 percent of all recorded crimes in Catalonia in the 2007–09 period) include “Injuries” and “Intimate Partner Violence”.¹⁴ We also include in this group of crime variables “Drug” consumption or trafficking and crimes against the “Law and order”.¹⁵

Thanks to the fact that we have all crime data geocoded, we can compute, for every CSC, an area of influence and calculate the number of crimes occurred in the vicinity of each CSC. In this sense, every crime is associated to a unique CSC depending in which CSCs area of influence the crime happens. The CSCs areas of influence divide Barcelona in cells in a way that when an event occurs in a CSCs area of influence the CSC of that area of influence is the nearest one. To

¹³ This dataset holds reports filed by both citizens and the police forces. Note that local police forces are primarily responsible for urban traffic and upholding municipal laws and ordinances

¹⁴ Another type of crime against the person is “Threats”, that showed no significant results in the estimates reported.

¹⁵ Normally these two types of crime are usually aggregated in the category of “other crimes” that together with crimes against the “road safety” account for approximately 5 percent of all recorded crime in Catalonia in the 2007–09 period.

calculate CSCs areas of influence we apply Dirichlet tessellation method, also called Theissen (Voronoi) polygons. This method, based on the distance between neighboring steams has widely used to represent areas of influence.¹⁶ As a consequence of using this methodology every CSC has different surface of influence (depending on how many CSCs are around and how close they are each other). With the aim to limit the area of influence we apply two different maximum distance of influence criteria: 100 and 300 meters of influence. According to these distances we obtain two models of areas of influence, see Figure 1. We present, in section 5, the main results for the 100 meters area of influence. In Appendix A we report the main results using the 300 meters area of influence.

Figure 1. Influence area for each CSC for 100 meters (panel a) & 300 meters (panel b) and city center zoom –100 meters– (panel c).



Second, we made a great effort to obtain detailed tourist data for the City of Barcelona and to geographically match this data with CSCs locations. Briefly, to measure the touristic

¹⁶ See Stoyan et al. (1992) and Moller (1994) for a comprehensive review of the proprieties and applications of this method.

pressure around CSCs we use a very detailed data of daily visitors of the six public museums in Barcelona. We combine this data with public information related with the annual amount of visitors of the 12 most visited points of interest in Barcelona which requires ticket. In all, we have 18 touristic points of interest, among which there are the 14 most visited in the city.¹⁷

Moreover, museum visitor data include survey answers that allows us to compute the daily proportion of tourists among the visitors to each museum. Combining these data sets we compute a measure of touristic pressure for each CSC depending on the distance to a touristic point given a linear function decay that assumes that the touristic pressure is maximum when the CSC is at 0 meters of the point of interest and become 0 at 1,000 meters. Formally, we can define our Touristic Pressure Daily Index (*TPDI*) for each CSC (*i*) as:

$$TPDI_i = \sum_{j=1}^m (Vd_j \cdot Td_j \cdot D_j^i) \quad (2)$$

where for each touristic point of interest *j* we have the amount of people that visit it each day (*Vd_j*); the proportion of tourists among those visitors that day (*Td_j*) and the proportion of visitors (*D_jⁱ*) that can be assigned to each CSC according to the distance between the CSC and the touristic point of interest (see Figure 2). Note that this measure of touristic pressure is calculated on a daily basis but can be easily computed on a weekly basis, matching the time variation of our variable of interest, crime.

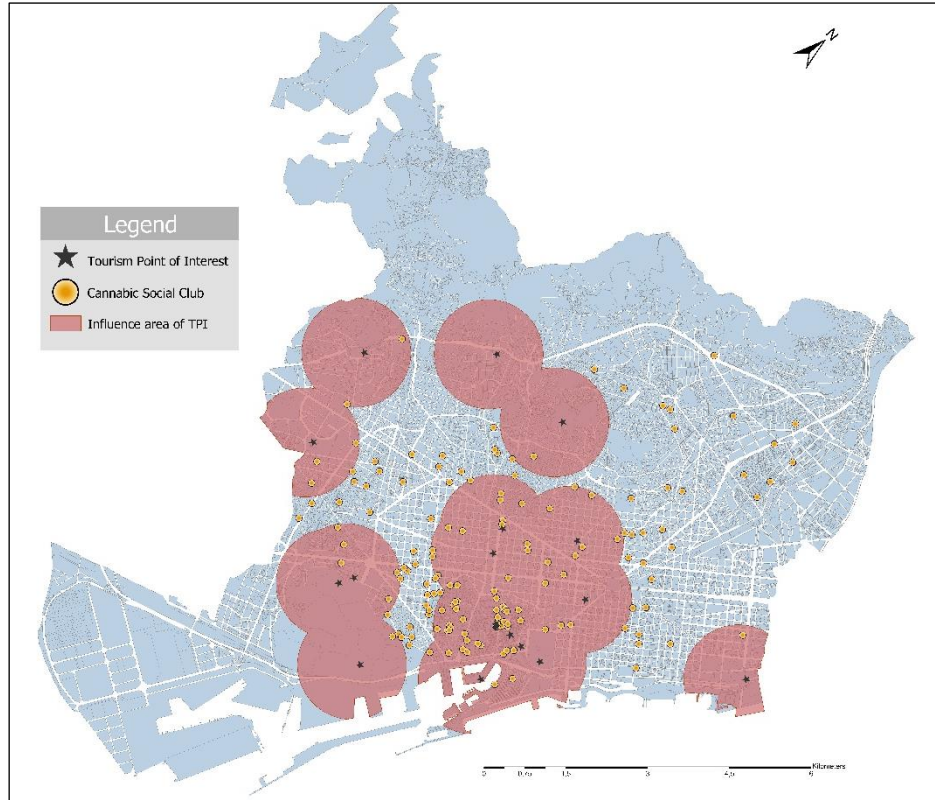
Using Eq. (2) it is straight forward to build up a placebo experiment regarding the impact of tourism on crime around the area where CSC are located. In this sense, we randomly allocate, from a geographical point of view, the 18 touristic points of interest around the city of Barcelona, obtaining a non-real distribution of tourists (see Figure B1 in Appendix B). We expect not to find any significant effect when using the touristic pressure measure corresponding to this alternative distribution of touristic places and, similarly, the interaction of this variable with the closures should, in principle, also not to be significant.

Third, we make use of Airbnb data listings for two points in time in 2014. One is May 2014 (before closures) and the other is September 2014 (after closures). In both cases we have for each accommodation information on room type, neighborhood, number of reviews received, overall satisfaction, number of accommodates, number of bedrooms, number of bathrooms, price, minimum stay, and importantly for us latitude and longitude of the accommodation.

¹⁷ The six public museums are: Picasso, Blau, Music, Marès, Museum of the History of Barcelona and Pedralbes. The twelve points of touristic interests are: Sagrada Familia, Park Güell, FC Barcelona Stadium and Museum, Aquarium, El Born, El Poble Espanyol, The Zoo, Gaudi's Casa Batlló, Gaudi's La Pedrera, CaixaForum, CosmoCaixa and Montjuïc Castel.

With this information we can match each listed accommodation in Airbnb with our CSCs to understand the impact that the closures had on prices and on the valuation of accommodation facilities in Barcelona.

Figure 2. Touristic points of interest, its area of influence and CSC in the City of Barcelona.



5. Main results: the impact of the CSC closures on crime.

Table 1 present the panel estimates for the daily results using an area of influence for each CSC of 100 meters. We introduce in these daily estimation CSC fixed effects; week or daily fixed effects and errors are clustered at the neighborhood level.¹⁸ Note that these estimations are restrictive in the sense that there is not a high count of crimes that happen within a 100 meters radius away from each CSC on a daily basis. Moreover, the use of both cross-sectional and temporal fixed effects make the estimation very data hungry although we have around 56.000 observations. We also present the main results when using a 300 meters radius from each CSC (Table A1 in Appendix A) and estimating the models but on a weekly basis (Table A2 in Appendix A).

¹⁸ We finally report the linear estimates using panel data techniques. The results using negative binomials with the panel structure are consistent with respect to sign and significativity; however, convergence of the negative binomial estimation, given the high number of fixed effects used, it is not always obtained. Results are also very consistent to cluster errors at the district level (higher level of aggregation with respect to neighborhoods).

The overall picture that emerge is that CSCs closure reduced crimes, especially robberies, damages and crimes against the law and order. Note that thefts, the most common type of crime in the City of Barcelona, although not statistically significant in a radius of 100 meters becomes significant (with the negative sign) for a greater area of influence of each CSC (up to 300 meters, Table A1). We do find a positive and significant impact in the case of injuries (interpersonal violence). In this sense offender strategies regarding pickpocketing can entail a “larger area” to be performed differently than injuries, mainly caused by brawls that are more difficult to plan where they occur (interpersonal violence).

Interestingly we do not find any significant impact of closures on drugs (consumption and trafficking), these results could indicate that the closures did not externalize the consumption of cannabis close to those areas where there was a CSC open. Maybe more expected is the non-significance for the impact on fraud or on intimate partner violence, both types of crime more unrelated, intuitively, with the use of CSC. In sum, the initial results seem to indicate that the (random) closure of some CSCs in the City of Barcelona in August 2014 reduced, generally speaking, crime in those areas close to them (up to 300 meters).

The next step is introduce an important variable that must be accounted for to really capture the potential mechanisms behind the observed results, that is, tourism. The results regarding our measure of touristic pressure are, as expected, an important determinant of observed crime rates across the city of Barcelona. Tourism increases significantly thefts, robberies, crimes against the law and order and injuries (both for the 100 meters and 300 meters estimates); increase drug trafficking and consumption for the 300 meters estimates; while significantly reduce damages and intimate partner violence.

The interaction term between the closure indicator and the touristic pressure informs us about the impact that the closure is having on crime rates mainly via the presence of tourists in the area surrounding the CSC. Note that in Table 1 the interaction term has the opposite sign (and similar magnitude) for thefts and crime; this could indicate that the closure transforms thefts into robberies. This could be consistent with tourists, clients of CSC, being easy targets for offenders and suffer pickpocketing after consuming cannabis in the areas surrounding the CSC; however, in those places where CSC where unexpectedly closed (for both the tourists and the offenders) the criminal action becomes a robbery (involving some sort of violence) due to the fact that victims are not influenced by cannabis use.

Table 1. Panel estimation daily results. 100 meters.

PROPERTY CRIMES	Theft			Robbery			Damages			Fraud		
<i>Closure</i>	-0.619 (0.547)	-0.0563 (0.608)	-0.147 (0.614)	-0.0842 (0.100)	-0.545*** (0.149)	-0.554*** (0.159)	-0.386** (0.150)	-0.614* (0.288)	-0.613* (0.278)	-0.408 (0.303)	-0.414 (0.245)	-0.427 (0.271)
<i>Touristic_pressure (TPDI)</i>	25.01*** (1.616)	26.33*** (1.552)	25.38*** (1.709)	0.543* (0.249)	0.417** (0.130)	0.176 (0.287)	-0.685** (0.277)	-0.832*** (0.147)	-0.862*** (0.240)	0.134 (0.305)	0.129 (0.250)	-0.266 (0.184)
<i>Closure*Touristic_press</i>		-5.803*** (1.223)	-4.630*** (1.292)		5.113*** (0.324)	4.616*** (0.329)		2.496*** (0.642)	2.230*** (0.575)		0.0520 (0.583)	0.154 (0.626)
<i>Constant</i>	19.13** (7.260)	7.205*** (2.018)	19.13** (7.561)	3.834** (1.379)	1.637*** (0.230)	3.834** (1.375)	1.227*** (0.288)	0.888*** (0.172)	1.227*** (0.287)	0.514 (0.358)	0.514* (0.229)	0.583*** (0.166)
CRIM. AGAINST PERSONS	Drugs			Law order			Injuries			IPV		
<i>Closure</i>	-0.0188 (0.0527)	-0.0703 (0.0880)	-0.0681 (0.0907)	-0.249*** (0.0228)	-0.256*** (0.0297)	-0.248*** (0.0223)	0.222*** (0.0418)	0.340*** (0.0830)	0.333*** (0.110)	-0.217* (0.114)	-0.149 (0.111)	-0.176 (0.121)
<i>Touristic_pressure (TPDI)</i>	0.0224 (0.0465)	-0.00551 (0.0542)	-0.0161 (0.0566)	0.477*** (0.0938)	0.515*** (0.0824)	0.478*** (0.0955)	0.419** (0.146)	0.483** (0.164)	0.505*** (0.179)	-0.342*** (0.0839)	-0.228*** (0.0696)	-0.310*** (0.0797)
<i>Closure*Touristic_press</i>		0.443** (0.194)	0.484* (0.216)		0.0237 (0.0647)	-0.0141 (0.0603)		-1.109*** (0.188)	-1.085*** (0.227)		-0.469** (0.181)	-0.403* (0.217)
<i>Constant</i>	0.443** (0.194)	0.160*** (0.0281)	0.443** (0.194)	-2.11e-05 (0.0930)	0.237*** (0.0644)	-2.12e-05 (0.0930)	0.802 (0.505)	0.308*** (0.0583)	0.802* (0.455)	1.374 (0.772)	0.154** (0.0524)	1.374 (0.773)
Observations	56,572	55,792	56,572	56,572	55,792	56,572	56,572	55,792	56,575	56,572	55,792	56,572
Number of id_club	155	155	155	155	155	155	155	155	155	155	155	155
Day FE	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES
Week FE	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO
Club Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster (Neighbourhood)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Distance	100m	100m	100m	100m	100m	100m	100m	100m	100m	100m	100m	100m

Note that the interaction also show very interesting results as, for instance, and increase in drugs crimes and damages due to the closure but in places with more tourism. Somehow the interaction term together with the detailed crime data by type is giving some interesting intuitions behind the mechanisms that could be at work regarding marijuana consumption in private recreational places that have become very popular for tourists.

We believe that these results are really capturing the impact of tourism on crime by observing the placebo estimation we constructed with a random distribution of touristic places around the City (Table 3). The touristic pressure variable in Table 3 is not statistically significant in any of the estimations performed, and also the interaction term of the placebo touristic pressure is showing no effects at all.

5.1. Potential threats to the identification: robustness exercises

As mentioned in section 4 the above explained results could be subject to criticism from various points of view. In Table 2 we tackle some of the most important shortcomings that our empirical set up could face. First, we restrict the time period and we re-estimate the models but until the end of November, the reason is having in mind that the closure took place in mid-August (holyday month in Spain) and some important works surely needed for sealed CSC to re-open (2-3 months), this combined with the empirical need to lose too many observations after the closure. Second, we re-estimate the models but having as closed all those CSC that in May 2015 where reported by the Barcelona City Council to be still closed and with no activity. Third, and given the high concentration of CSC in the city center (District of Ciutat Vella) we restrict the estimations only to that part of the City (of course the number of observations drops significantly).

Although the estimates have less power because we are restricting in various ways our sample, it is quite reassuring for us that the main results previously explained hold and seem to be robust to these potential threats.

Table 2. Dealing with potential threats to identification. Daily results. 100 meters.

	<i>Time restriction</i>	<i>May 2015</i>	<i>Ciutat Vella</i>	<i>Time restriction</i>	<i>May 2015</i>	<i>Ciutat Vella</i>	<i>Time restriction</i>	<i>May 2015</i>	<i>Ciutat Vella</i>	<i>Time restriction</i>	<i>May 2015</i>	<i>Ciutat Vella</i>
PROPERTY CRIMES	<i>Theft</i>			<i>Robbery</i>			<i>Damages</i>			<i>Fraud</i>		
<i>Closure</i>	-0.618 (0.685)	-1.642 (1.343)	0.789 (2.396)	-0.567*** (0.0894)	-0.891* (0.413)	-0.681 (0.382)	-0.326 (0.183)	0.224 (0.197)	-0.693 (0.565)	-0.486 (0.303)	-0.105 (0.270)	-0.587 (0.404)
<i>Touristic_pressure (TPDI)</i>	23.59*** (1.704)	27.91*** (2.556)	22.88** (7.020)	0.385 (0.249)	-0.0114 (0.330)	-0.572* (0.183)	-1.311*** (0.223)	-1.525*** (0.210)	-0.394*** (0.0601)	0.264 (0.348)	0.126 (0.281)	0.510 (0.767)
<i>Closure*Touristic_press</i>	-3.166* (1.492)	-3.770 (6.204)	-4.671 (3.063)	4.693*** (0.0828)	10.21*** (1.814)	4.910*** (0.785)	2.022*** (0.365)	0.252 (0.759)	2.564* (0.942)	0.0230 (0.685)	1.333 (1.333)	0.742 (1.197)
<i>Constant</i>	19.13** (7.404)	18.60** (7.474)	48.86 (28.27)	3.834** (1.381)	3.848** (1.457)	8.863** (2.537)	1.227*** (0.292)	1.061*** (0.322)	1.673** (0.441)	0.514* (0.230)	0.550* (0.250)	0.976 (1.001)
CRIM. AGAINST PERSONS	<i>Drugs</i>			<i>Law order</i>			<i>Injuries</i>			<i>IPV</i>		
<i>Closure</i>	-0.0812 (0.119)	-0.0215 (0.172)	-0.170 (0.325)	-0.298*** (0.0434)	-0.681** (0.270)	-0.222 (0.124)	0.330*** (0.0538)	0.00483 (0.157)	-0.298 (0.261)	-0.0818 (0.0922)	-0.000646 (0.134)	0.427 (0.196)
<i>Touristic_pressure (TPDI)</i>	-0.0869 (0.0667)	0.0236 (0.0554)	-0.134* (0.0502)	0.374*** (0.113)	0.569*** (0.101)	0.565*** (0.0762)	0.687** (0.215)	0.199 (0.130)	-0.265 (0.135)	-0.386*** (0.0777)	-0.196 (0.110)	0.644 (0.517)
<i>Closure*Touristic_press</i>	0.615** (0.268)	-2.325** (0.794)	0.760 (0.603)	0.117 (0.0717)	1.270 (1.195)	-0.122 (0.412)	-1.151*** (0.143)	1.606* (0.737)	-0.284 (0.540)	-0.694*** (0.141)	-0.645 (0.579)	-1.256*** (0.196)
<i>Constant</i>	0.443** (0.194)	0.474* (0.211)	0.751 (0.639)	-2.64e-05 (0.101)	-1.20e-05 (0.0909)	-0.000125 (0.188)	0.802 (0.512)	0.858 (0.572)	3.689** (0.838)	1.374 (0.767)	1.469 (0.902)	2.538 (1.261)
Observations	51,615	52,920	17,885	51,615	52,920	17,885	51,615	52,920	17,885	51,615	52,920	17,885
Number of id_club	155	145	49	155	145	49	155	145	49	155	145	49
Day FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Club Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster (Neighbourhood)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Distance	100m	100m	100m	100m	100m	100m	100m	100m	100m	100m	100m	100m

Table 3. Placebo estimation for daily results. 100 meters.

PROPERTY CRIMES	Theft		Robbery		Damages		Fraud	
<i>Closure</i>	-0.724 (0.575)	-0.738 (0.597)	-0.0864 (0.100)	-0.0503 (0.466)	-0.383** (0.150)	-0.380* (0.173)	-0.408 (0.304)	-0.428 (0.314)
<i>Touristic_pressure (TPDI)</i>	-8.463 (10.56)	-8.465 (10.56)	-0.447 (1.055)	-0.440 (0.909)	0.131 (0.399)	0.132 (0.396)	-1.280 (0.962)	-1.284 (0.960)
<i>Closure*Touristic_press</i>		4.165 (10.32)		-10.55 (8.005)		-0.739 (6.642)		5.616 (6.318)
<i>Constant</i>	19.13** (6.861)	19.13** (6.861)	3.834** (1.367)	3.834*** (0.926)	1.227*** (0.287)	1.227*** (0.287)	0.514 (0.356)	0.514 (0.356)
CRIM. AGAINST PERSONS	Drugs		Law & order		Injuries		IPV	
<i>Closure</i>	-0.0187 (0.206)	-0.0177 (0.218)	-0.251* (0.134)	-0.261* (0.144)	0.220*** (0.0414)	0.240*** (0.0333)	-0.216* (0.116)	-0.269** (0.110)
<i>Touristic_pressure (TPDI)</i>	-0.251 (0.289)	-0.251 (0.288)	-0.331 (0.240)	-0.333 (0.240)	0.175 (0.544)	0.179 (0.540)	1.258 (1.009)	1.247 (1.008)
<i>Closure*Touristic_press</i>		-0.308 (3.466)		3.108 (3.159)		-5.783*** (1.539)		15.36*** (3.286)
<i>Constant</i>	0.443 (0.266)	0.443 (0.266)	1.70e-06 (0.0694)	1.71e-06 (0.0695)	0.802 (0.491)	0.802 (0.492)	1.374** (0.602)	1.374** (0.601)
Observations	56,575	56,575	56,575	56,575	56,575	56,575	56,575	56,575
Number of id_club	155	155	155	155	155	155	155	155
Day FE	YES	YES	YES	YES	YES	YES	YES	YES
Week FE	NO	NO	NO	NO	NO	NO	NO	NO
Club Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Cluster (Neighbourhood)	YES	YES	YES	YES	YES	YES	YES	YES
Distance	100m	100m	100m	100m	100m	100m	100m	100m

5.2. Broader welfare impacts: Airbnb evidence

The last piece of information comes from the estimations performed using Airbnb data (prices and valuation of accommodations). Note that, indeed, the public discussion about the presence of CSC around the city and about the recreational use of cannabis is largely motivated by the neighborhood claims that this activity worsens the welfare of residents on those areas close to the CSC because the insecurity it brings to the neighborhood. In fact, one of the main reasons for the Barcelona City Council to endeavor in a regulation period of this activity was based on the neighborhood claims against these activities. Despite the negative externality argument, it could be the case that CSC are perceived as an amenity that attracts tourists and, hence, economic activity, hence, being positively valued by neighbors. In this sense, Airbnb data is very informative from various points of view. First, it mainly collects the accommodation valuation of tourists, which in turn we know that are an important share of CSC users. Second, it also collects prices and, hence, how the supply of accommodation (owners) perceive the CSC, if as a positive or a negative amenity for their activity.

We have listings of Airbnb rooms and apartments offered in Barcelona in two points in time during 2014. In May 2014 (before the closures) we have 10,441 listings; and in September 2014 (after the closures) we have 10,413 listings. Given that we have the address of each room/apartment in the list we assign them to the closest of the 155 CSCs. Therefore, after the assignation process all Airbnb observation are allocated with a maximum distance of 933 meters and an average of 250 meters from a CSC (see Table 4).

We collapse the dataset to have the CSC as a measure of observation for the two points in time. In the regressions, presented in Table 5, we perform 3 sets of estimations. The two first columns refer to the global satisfaction made by users of the offered accommodation; columns 3 and 4 present the overall price of the accommodation while columns 5 and 6 present the price per person. We include our variable of interest *Closure*, that indicates those CSC sealed and closed in September 2014, the period of the year (May or September), and the averages for the distance of apartments to each CSC; for the number of bedrooms, for the number of persons that can stay at the apartment, for the number of bathrooms and for the minimum stay required. All regressions include CSC fixed effects and errors are clustered at the neighborhood level.¹⁹

¹⁹ Note that we omit the number of persons in the regressions for prices per person.

Table 4. Average distances of each Airbnb observation to a CSC.

<i>Percentiles</i>	<i>Both periods</i>		<i>May 2014</i>		<i>Sept. 2014</i>	
	<i>Distance</i>	<i>Smallest</i>	<i>Distance</i>	<i>Smallest</i>	<i>Distance</i>	<i>Smallest</i>
1%	52.0	42.4	49.2	47.3	52.0	42.4
5%	81.2	47.3	81.9	49.2	79.2	52.0
10%	92.2	49.2	93.0	60.9	91.7	56.5
25%	127.3	52.0	127.3	72.6	123.1	67.6
50%	190.7		183.8		193.8	
		Largest		Largest		Largest
75%	288.1	750.2	288.5	650.3	288.1	706.7
90%	439.1	751.5	445.1	656.8	433.1	740.1
95%	555.2	894.8	558.3	750.2	555.2	751.5
99%	750.2	933.8	750.2	933.8	751.5	894.8
<i>Mean</i>	235.2		234.2		236.1	
<i>Std. Dev.</i>	151.7		150.3		153.4	
Observations	310		155		155	

The results reported in Table 5 seem to indicate that CSCs are perceived by both, the demand and supply of tourism, as a positive amenity of the influence area where the CSC because both the global satisfaction reported of the accommodation and the price of the rooms (overall and per person) are negatively affected by the closure of some CSCs (note that the results for prices are close to be statistically significant). For tourist being, on average, further away from a CSC is valued negatively while we find the opposite for prices but with a rather small impact. That is the reduction in crime rates observed due to the CSCs closure do not seem to capitalize into the productive sector of the City (citizens offering accommodation through Airbnb). Of course these “welfare results” are partial because it analyze only a specific sector of the housing sector: basically accommodation for tourist and not local residents (those that permanently live in the area of influence of a CSC and do not offer their accommodation for rent). Having this in mind, our results are in line with those found by Adda et al., (2014) who evaluate the impact on crime of a localized policing experiment that depenalized the possession of small quantities of cannabis in the London borough of Lambeth. The authors analyze welfare issues of local residents of the depenalization policy by looking at housing prices, finding that despite the overall fall in crime attributable to the policy (via police reallocation to nondrug crimes), they find that the total welfare of local residents likely fell.

Table 5. Airbnb results: the impact of CSC closures on Airbnb accommodations satisfaction and prices.

VARIABLES	(1) <i>global satisfaction</i>	(2) <i>global satisfaction</i>	(5) <i>price</i>	(6) <i>price</i>	(3) <i>Price per person</i>	(4) <i>Price per person</i>
<i>Closure</i>	-0.316** (0.158)	-0.326** (0.162)	-10.74 (6.527)	-10.30 (6.506)	-2.513 (1.986)	-2.427 (2.007)
<i>Distance to the CSC</i>		-0.00351** (0.00160)		0.147*** (0.0507)		0.0533*** (0.0157)
<i>Period of the year</i>	0.613*** (0.0502)	0.618*** (0.0500)	1.073 (1.836)	0.846 (1.803)	-0.239 (0.522)	-0.316 (0.516)
<i>Number of bedrooms</i>	0.924 (0.830)	0.932 (0.810)	52.33** (24.01)	51.98** (23.49)	-2.293 (4.278)	-1.405 (4.052)
<i>Number of persons</i>	0.137 (0.244)	0.102 (0.241)	1.618 (8.443)	3.100 (8.308)		
<i>Bathrooms</i>	0.0338 (0.657)	0.0276 (0.623)	-16.33 (26.20)	-16.07 (25.56)	-15.76 (9.663)	-15.36 (9.473)
<i>Minimum stay</i>	-0.0613 (0.133)	-0.0476 (0.137)	38.41*** (14.26)	37.84*** (13.92)	10.12*** (3.234)	9.909*** (3.128)
<i>Constant</i>	0.828 (0.728)	1.709* (0.886)	-21.47 (42.70)	-58.37 (47.34)	35.61*** (12.21)	22.41* (12.72)
Observations	310	310	310	310	310	310
R-squared	0.725	0.734	0.745	0.752	0.604	0.622
Number of id_club	155	155	155	155	155	155
Club Fixed Effects	YES	YES	YES	YES	YES	YES
Cluster (Neighborhood)	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

6. Conclusions

In many developed countries, individuals and governments are nowadays shaping their opinions and laws regarding the safety and potential benefits of marijuana as a legal source of medication and recreational activity as more rigorous evidence is provided on the broad impact of the use of such substance. The aim of this paper has been, hence, to provide rigorous and sound evidence regarding the impact of the existence in Spain of a “sort of model” (due to imprecise regulation) regarding the recreational use of marijuana, that is, the existence of private Cannabis Social Clubs that are allowed to provide certain quantities of marijuana for registered affiliates for consumption within the Club premises. The due to the fact that this model has mainly evolved towards attracting tourist as clients, the stakeholders involved (City Council, cannabis associations, neighbors, local businesses) have raised the need to address this important urban issue and to open a wide debate on how this activity should peacefully coexist with the surroundings where it is located.

By means of a natural experiment, the unexpected closure in August 2014 in the City of Barcelona of around 10% of the existing CSC, we believe we provide causal evidence on the (short-run) impact of such activity. Importantly, we undertake a great effort to control for a key variable in this set up: tourism in Barcelona. Indeed, our estimates show how our measure of touristic pressure has a positive impact in thefts (also important quantitatively), robberies, crimes against law and order or injuries.

Our results regarding, our main variable of interest, point out that the closure of such activity reduced, in general, criminal activity in the areas surrounding CSC. However, it highlighted the crucial role played by tourism. There seems to be a substitution effect between thefts (no violence) and robberies (with violence) in those areas with closures and with higher touristic pressure, indicating that quite likely tourists are in those areas target for offenders that can take advantage of a sort of incapacitation effect of cannabis (among maybe other substances) of CSC users to perpetrate their actions. The results for injuries (mainly due to brawls and fights) can be also framed into this mechanism, the closure of CSC in places with high touristic pressure results in less reported injuries maybe due to a more capable and vigilant tourists in those areas. Drug related crimes are increased in those areas with closures and more touristic pressure (consumption is possibly brought down the street) and damages are also increased (maybe as a sort of frustration reaction). All these results seem to point out as CSC as crime attractors more than crime generators, using Bra

Our results can be useful in many ways to orientate the debate regarding the regulation of marijuana use for recreational purposes. It seems clear that the interaction of this activity with

tourism is creating most of the negative externalities that are perceived by residents in those areas where CSC are located. Indeed, the initial model was understood to internalize consumption (mainly by locals) into private premises, however, tourism seems to have distort the original model and claims for a rethinking on how to deal with CSC in the presence of tourism.

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A. Appendix: Robustness results for main specification

Table A1. Daily results for 300 meters.

PROPERTY CRIMES	Theft			Robbery			Damages			Fraud		
Closure	-0.927** (0.349)	-0.628 (0.355)	-0.723* (0.359)	0.0843 (0.0537)	-0.0844** (0.0363)	-0.0521 (0.0308)	-0.147** (0.0563)	-0.0977* (0.0519)	-0.0914 (0.0510)	0.0117 (0.0857)	0.0145 (0.0807)	
Touristic_pressure (TPDI)	19.35*** (3.972)	22.82*** (3.042)	19.67*** (4.095)	3.474*** (0.0766)	3.896*** (0.112)	3.257*** (0.0776)	-0.0702 (0.128)	-0.128** (0.0519)	0.0186 (0.125)	-0.0670 (0.351)	-0.491 (0.334)	
Closure*Touristic_press		-5.612** (2.200)	-4.407** (1.930)		3.379*** (0.145)	2.951*** (0.124)		-1.151*** (0.217)	-1.208*** (0.200)	-0.394 (0.387)	-0.543 (0.332)	
Constant	17.99*** (4.505)	7.076*** (1.615)	17.99*** (4.507)	4.963** (1.772)	1.651*** (0.111)	4.963** (1.770)	1.028*** (0.174)	0.869*** (0.0484)	1.028*** (0.174)	0.657** (0.273)	0.604*** (0.0950)	
CRIM. AGAINST PERSONS	Drugs			Law order			Injuries			IPV		
Closure	0.0131 (0.0128)	-0.00233 (0.0124)	0.00329 (0.0110)	-0.0374* (0.0184)	-0.00384 (0.0121)	0.0117 (0.0128)	0.0639** (0.0273)	0.111** (0.0442)	0.0973** (0.0408)	-0.0923 (0.0555)	-0.00845 (0.0352)	-0.0194 (0.0380)
Touristic_pressure (TPDI)	0.267** (0.0962)	0.334*** (0.0482)	0.252** (0.0973)	1.295*** (0.120)	1.316*** (0.0570)	1.373*** (0.126)	1.309*** (0.106)	1.335*** (0.0450)	1.362*** (0.110)	-0.552*** (0.0360)	-0.305*** (0.0222)	-0.436*** (0.0411)
Closure*Touristic_press		0.191*** (0.0286)	0.212*** (0.0293)		-1.009*** (0.0395)	-1.063*** (0.0945)		-0.811*** (0.110)	-0.723*** (0.0916)	-1.664*** (0.117)	-1.577*** (0.139)	
Constant	0.302** (0.106)	0.160*** (0.0229)	0.302** (0.106)	0.454*** (0.0736)	0.261*** (0.0428)	0.454*** (0.0741)	1.354* (0.726)	0.234*** (0.0492)	1.354* (0.727)	1.104** (0.370)	0.183*** (0.0236)	1.104** (0.371)
Observations	56,574	55,800	56,574	56,574	55,800	56,574	56,574	55,800	56,574	56,574	55,800	56,574
Number of id_club	155	155	155	155	155	155	155	155	155	155	155	155
Day FE	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES	NO	YES
Week FE	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO
Club Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster (Neighbourhood)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Distance	300m	300m	300m	300m	300m	300m	300m	300m	300m	300m	300m	300m

TableA2. Weekly results for 100 & 300 meters.

PROPERTY CRIMES	Theft		Robbery		Damages		Fraud	
<i>Closure</i>	10.69*	5.526	-3.778***	-0.527**	-4.126*	-0.440	-3.375	-0.0447
	(5.288)	(3.969)	(1.078)	(0.222)	(2.250)	(0.351)	(3.723)	(1.051)
<i>Touristic_pressure (TPDI)</i>	59.23***	44.72***	1.275*	6.857***	-1.191**	0.375**	-1.018**	-1.188**
	(3.667)	(8.161)	(0.584)	(0.547)	(0.415)	(0.131)	(0.393)	(0.555)
<i>Closure*Touristic_press</i>	-13.50***	-17.98***	4.977***	4.883***	1.389	-2.176***	0.127	-0.860
	(1.096)	(0.566)	(0.457)	(0.143)	(0.898)	(0.240)	(1.673)	(0.770)
<i>Constant</i>	42.12***	47.29***	11.32***	11.10***	6.345***	5.830***	4.289***	4.323***
	(12.00)	(10.06)	(1.451)	(0.749)	(1.223)	(0.347)	(0.982)	(0.655)
CRIM. AGAINST PERSONS	Drugs		Law & order		Injuries		IPV	
<i>Closure</i>	-0.413	0.0615	-0.159	0.352*	2.825***	1.298**	-0.615	0.198
	(0.669)	(0.0785)	(0.633)	(0.179)	(0.860)	(0.511)	(0.951)	(0.232)
<i>Touristic_pressure (TPDI)</i>	1.396***	1.645***	1.582***	2.582***	-0.379	0.648**	-0.0539	0.0193
	(0.229)	(0.0287)	(0.375)	(0.273)	(0.317)	(0.287)	(0.165)	(0.283)
<i>Closure*Touristic_press</i>	0.238	0.147***	-0.566**	-1.320***	-1.578***	-1.125***	-0.904**	-1.862***
	(0.238)	(0.0261)	(0.235)	(0.137)	(0.322)	(0.357)	(0.382)	(0.133)
<i>Constant</i>	0.784***	1.003***	1.411**	1.720***	2.381***	1.715***	1.044*	1.257***
	(0.212)	(0.122)	(0.541)	(0.350)	(0.392)	(0.254)	(0.611)	(0.266)
Observations	7,854	7,854	7,854	7,854	7,854	7,854	7,854	7,854
Number of id_club	154	154	154	154	154	154	154	154
Week FE	YES	YES	YES	YES	YES	YES	YES	YES
Club Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Cluster (Neighbourhood)	YES	YES	YES	YES	YES	YES	YES	YES
Distance	100m	300m	100m	300m	100m	300m	100m	300m

Appendix B. Placebo.

Figure B1. Random assignation of touristic points around the city.

