

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

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## Extended abstract.

**Overview.** 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).<sup>1</sup> 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 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

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<sup>1</sup> There is a growing literature in the United States as individuals and governments are shifting their opinions and laws regarding the safety and potential benefit of marijuana as a legal source of medication. 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. There is evidence on the impact of medical marijuana on traffic fatalities and alcohol consumption (Anderson et al., 2013); on suicides (Anderson et al., 2014). regarding the abuse of the substance (Cerdá et al. 2012) and also regarding the impact on crime, see among others, Benson et al. (1992), Niveu and Dang (2003) or Pacula and Kilmer (2003). 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 marijuana and crime, has brought recent contributions for the US case such as Morris et al. (2014) or Dragone et al. (2016) or for the UK case (Adda et al., 2014)

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.

**Legal background.** 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”.<sup>2</sup> 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 applied to any particular club unless the applicant fully qualifies. However, the clubs found successful ways to overcome these rules to attract tourist.<sup>3</sup>

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<sup>2</sup> <http://www.lavanguardia.com/vida/20140119/54399239955/boom-clubs-cannabis-turismo-porro-barcelona.html>

<sup>3</sup> 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.

**The public intervention.** 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 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).<sup>4</sup> 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.<sup>5</sup> 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.<sup>6</sup> 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 11<sup>th</sup> and the 13<sup>th</sup> of August 2014 the City Council ordered the cessation of activity of 49 CSCs, out of the total of 156 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 activity and the deficiencies were substantial. The other associations where 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.

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<sup>4</sup> <http://www.lavanguardia.com/politica/20140613/54408973568/barcelona-prohibe-por-un-ano-abrir-nuevos-clubes-de-cannabis-para-regularlos.html>

<sup>5</sup> Indeed, the City Council proposal published in May 2015 (for public consultation before approval) reduced the number of CSC from 156 down to only 11; that is, those that fulfilled the strict restriction of the local government.

<sup>6</sup> 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.

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

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

where  $i$  indicates the CSC,  $k$  the type of crime and  $t$  the periodicity (days or weeks) that our data takes. CLOSURE 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. Note that Eq. (1) is estimated both on a daily basis (365 days corresponding to 1<sup>st</sup> January 2014 to 31<sup>st</sup> 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,  $\beta_1$ , 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.

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.<sup>7</sup> In this regard, we have a piece of evidence that comes from

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<sup>7</sup> <http://www.lavanguardia.com/politica/20140613/54408973568/barcelona-prohibe-por-un-ano-abrir-nuevos-clubes-de-cannabis-para-regularlos.html>

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 show that nearly 40% of sealed CSCs in August 2014 remain inactive in May 2015. The rest were again open. However, the reasons for the closure, where important enough to need some renewal of the premises and show the authorities that all the requirements were fulfilled; process that was not immediate and took some time. In any case, and to properly deal with this issue we present, as a robustness exercises, the main estimations limiting the time span after the closures.

**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.<sup>8</sup> 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”, “Car thefts”, 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. 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”; “Intimate Partner Violence” and “Threats”. A final aggregate category of other crimes (5 percent of all recorded crime in Catalonia in the 2007–09 period) include “Drug” consumption or trafficking, crimes against “Law and order” and “Scams”. Thanks to the fact that we have all crime data geocoded,

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<sup>8</sup> 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

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 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.<sup>9</sup>

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



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). With the aim to limit the area of influence we apply two different maximum distance of influence criteria: 100 and 300

<sup>9</sup> See Stoyan et al. (1992) and Moller (1994) for a comprehensive review of the proprieties and applications of this method.

meters of influence. According to these distances we obtain two models of areas of influence, see Figure 1.

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 tourism pressure around CSCs we use a very detailed data of daily visitors of the 6 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 tourism point of interest, among which there are the 14 most visited. Moreover, museum visitor data include survey answers that allows us to compute the daily proportion of tourists among the visitors to each museum. With these data sets we compute a measure of tourism pressure for each CSC depending on the distance to a touristic point given a linear function decay that assumes that the tourist 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 Tourism Pressure Daily Index (*TPDI*) for each CSC (*i*) as:

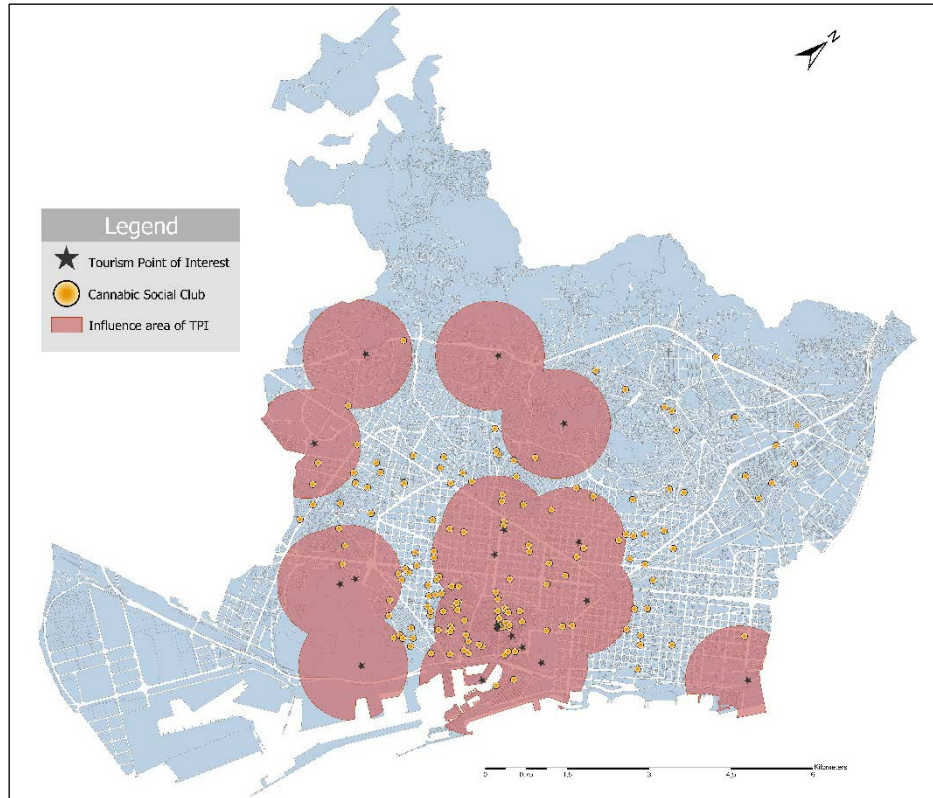
$$TPDI_i = \sum_{j=1}^m (Vd_j \cdot Td_j \cdot D_j^i) \quad (2)$$

where for each touristic point of interest *j* we have the amount of people that visit it each day (*Vd<sub>j</sub>*); the proportion of tourists among those visitors that day (*Td<sub>j</sub>*) and the proportion of visitors (*D<sub>j</sub><sup>i</sup>*) 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.

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. 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.



**Overview of preliminary results.** The initial results presented (see Table 1 for daily results and Table 2 for weekly results) are very restrictive in the sense that we report, for the time being, only results for the counts of crimes that happen 100 meters away from each CSC and, hence, with less counts of crimes. Therefore, these initials results must be seen as very data hungry. The overall picture that emerge is that CSCs closure, reduced crimes, especially damages, crimes against the law and order and, less significantly, crimes related with intimate partner violence (IPV). 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 for a greater area of influence of each CSC (up to 300 meters, results not reported). In sum, the initial results seem to indicate that the (random) closure of some CSCs in the City of Barcelona in August 2014 reduced 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, tourism. The initial results, not reported, point out how touristic pressure turns to be a significant variable to take into account. Finally, the last piece of information comes from the estimations performed using Airbnb data (prices and valuation of accommodations). Initial results seem to point 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 value of the accommodation and the price of the rooms are negatively affected by the closure



of some CSCs). 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). In any case, the role of tourism and the impact on the valuation and prices of accommodation due to CSC closures need some deep thought and further analysis.

Table 1. OLS estimations. Daily results.

VARIABLES	damages	damages	drugs	drugs
CLOSURE	<b>-0.383**</b> (0.150)	<b>-0.383**</b> (0.172)	-0.0188 (0.0527)	-0.0189 (0.206)
	theft	theft	law_order	law_order
CLOSURE	-0.726 (0.576)	-0.727 (0.740)	<b>-0.251***</b> (0.0234)	<b>-0.251*</b> (0.134)
	car_theft	car_theft	ipv	ipv
CLOSURE	0.00317 (0.00325)	0.00317 (0.00299)	<b>-0.215*</b> (0.114)	<b>-0.215*</b> (0.116)
	scams	scams	threats	threats
CLOSURE	<b>-0.409*</b> (0.186)	-0.409 (0.303)	-0.0738 (0.144)	-0.0739 (0.102)
			injuries	injuries
CLOSURE			<b>0.220***</b> (0.0414)	0.220 (0.150)
Observations	56,569	56,575	56,569	56,575
Number of clubs	155	155	155	155
Day FE	YES	YES	YES	YES
CSCclub Fixed Effects	YES	YES	YES	YES
Cluster errors	District	Neigh	District	Neigh
Distance	100m	100m	100m	100m

Note: Robust standard errors are shown in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 2. OLS estimations. Weekly results.

VARIABLES	damages	damages	drugs	drugs
CLOSURE	<b>-3.042**</b> (1.215)	<b>-3.042***</b> (0.964)	-0.267 (0.442)	-0.267 (1.574)
	theft	theft	law_order	law_order
CLOSURE	-1.011 (3.647)	-1.011 (2.867)	<b>-0.628*</b> (0.300)	-0.628 (1.070)
	car_theft	car_theft	ipv	ipv
CLOSURE	0.0197 (0.0255)	0.0197 (0.0231)	-1.301 (0.754)	<b>-1.301**</b> (0.612)
	scams	scams	threats	threats
CLOSURE	<b>-3.253*</b> (1.665)	-3.253 (2.611)	-0.470 (1.035)	-0.470 (0.733)
			injuries	injuries
CLOSURE			<b>1.636***</b> (0.340)	1.636 (1.329)
Observations	7,854	7,854	7,854	7,854
Number of clubs	154	154	154	154

Week FE	YES	YES	YES	YES
CSClub Fixed Effects	YES	YES	YES	YES
Cluster errors	District	Neigh	District	Neigh
Distance	100m	100m	100m	100m

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