Crime and the Depenalization of Cannabis Possession: Evidence from a Policing Experiment*

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Abstract

We 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. Theory suggests such a policy will: (i) impact the size of the market for cannabis in Lambeth as well as neighboring boroughs as drug users move to Lambeth to purchase cannabis; (ii) allow the police to reallocate effort towards other types of crime. We investigate whether such changing crime patterns are observed during and after the depenalization policy is introduced in Lambeth using administrative records on criminal offences by drug type, by specific drug offences that proxy demand and supply side criminal activities, and for seven types of non-drug crime. We find that depenalization in Lambeth led to an increase in cannabis possession offences that persisted well after the policy experiment ended. Half of the increase is attributable to drugs tourism into Lambeth from neighboring boroughs after depenalization. We find little evidence that the policy caused the police to reallocate effort towards Class-A drug crime, rather the evidence suggests the police in Lambeth reallocate their effort towards non-drug crime: there are significant reductions in five non-drug crime types, and significant improvements in police effectiveness against such crimes as measured by arrest and clear-up rates. These nuanced results provide new insights for the current policy debate on the regulation of illicit drugs markets.

Keywords: depenalization, drugs crime; non-drugs crime; police behavior.
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1 Introduction

In nearly every country the market for illicit drugs remains pervasive, despite long running attempts to restrict such activities. Around the globe a variety of policy approaches have been tried, ranging from punitive approaches as manifested in the US 'war on drugs', to more liberal law enforcement strategies, such as those in Holland or Portugal, that lead to the decriminalization or depenalization of the possession of some forms of illicit drug, most notably cannabis.[1]

Both approaches have been much criticized – the tough US policy stance is estimated to cost tens of billions of dollars annually, and there remain an estimated 3.7 million individuals regular consumers of illicit drugs, the majority of whom consume cannabis [DHHS 2008]. At the same time, concerns over more liberal policy strategies relate to the inherent characteristics of the illicit drugs market: consumption might damage user's health [Arseneault *et al.* 2004, van Ours and Williams 2009]; the use of some drugs providing a gateway to more addictive drugs [van Ours 2003]; and the potentially large spillover effects on crime and other forms of anti-social behavior.

We contribute to this policy debate by evaluating an increasingly common policy intervention in the illicit drugs market: the depenalization of cannabis possession, so that the possession of small quantities of cannabis is no longer a criminally prosecutable offence. We present evidence from a localized UK policing experiment that introduced such a policy and focus attention on measuring its impact on crime, considered to be a major social cost of the illicit drug market.

Criminal activity and drugs markets might be linked because: (i) the substance itself leads to more violent or criminal behavior by users; (ii) users commit property crimes to obtain money to buy drugs; (iii) violence occurs between drug suppliers to control selling areas. We present evidence over a broad range of crime types to assess the impact of depenalization both on the size of illicit drugs markets for cannabis and harder drugs, as well as the policy impact on non-drug crime such as property and violent crime.[2]

The depenalization policy we evaluate was unilaterally introduced by the local police force in one London borough, Lambeth, in July 2001, a policy known as the Lambeth Cannabis Warning Scheme (LCWS). We describe the motivation behind the policy and its implementation in more

[1] Donohue *et al.* [2011] categorize illicit drug policies into three types: (i) legalization – a system in which possession and sale are lawful but subject to regulation and taxation; (ii) criminalization – a system of proscriptions on possession and sale backed by criminal punishment, potentially including incarceration; (iii) depenalization – a hybrid system, in which sale and possession are proscribed, but the prohibition on possession is backed only by such sanctions as fines or mandatory substance abuse treatment, not incarceration. Following Donohue *et al.* [2011] we prefer the use of depenalization over decriminalization as best describing the policy experiment we evaluate, and closely mapping into the definition of depenalization used by criminologists.

[2] The size of drugs markets has previously been linked to crime rates [Grogger and Willis 2000, Pacula and Kilmer 2003], especially for property crime [Corman and Mocan 2000]. On users, Fergusson and Horwood [1997] report evidence of a link between the early onset of cannabis use and subsequent crime using longitudinal data for a birth cohort of New Zealand children. Early onset users had significantly higher rates of later substance use, juvenile offending, mental health problems, unemployment and school dropout. On cannabis and violence, there is no clear evidence between the two as cannabis is usually thought to inhibit aggressive behavior [Resignato 2000]. On crimes by drug suppliers, Kuziemko and Levitt [2004] find that incarcerating drug offenders is almost as effective in reducing violent and property crime as locking up other types of offenders. Levitt and Venkatesh [2000] show that workers in the illicit drugs market are not particularly well remunerated and so pursuing property crime might provide additional income and the flexibility to continue working in the drugs trade.

detail later. It is however worth noting that many aspects of the policy reflect how other depenalization policies have been implemented around the world: (i) the possession of small quantities of cannabis for personal consumption was no longer an arrestable offence; (ii) the primary motivation was to free up police time and other resources to focus on crimes related to other drugs or other types of crimes; (iii) the policy did not alter penalties for cannabis supply.

The LCWS was first announced as a temporary policing experiment to run for six months from July 2001. At the end of this trial period the policy was adjudged to have been a success with the support of local residents. The policy was then announced to have been extended for a further six months. Following this announcement, media reports of the deleterious effects of the policy on crime, drug tourism, and drug use by children began to steadily increase. As local support for the LCWS waned, the policy came to and end by July 2002, having run for 13 months. We exploit the fact the policy was initially announced to be temporary, then announced to have been extended, and then switched off altogether, to assess the short and long run effects of the depenalization policy on drugs crime and non-drug crime.

To guide the empirics and interpret the evidence, we develop a Hotelling-style model of two borough locations. This emphasizes that the link between depenalization and crime is driven by the behavioral responses of police officers, suppliers of drugs, and consumers of drugs. The framework makes precise the *multiple* channels through which the depenalization of cannabis possession unilaterally implemented in one borough, affects the equilibrium market size for cannabis and other drugs, police effort towards cannabis and non-cannabis drugs crimes, and the numbers of each type of drug crime. The framework makes precise that such a policy will: (i) impact the size of the market for cannabis in Lambeth as well as neighboring boroughs as drug users move to Lambeth to purchase cannabis; (ii) allow the police to reallocate effort towards other types of crime. We empirically investigate whether such changing patterns of crime and police behavior are observed during and after the depenalization policy is introduced in Lambeth.

To do so, we use detailed administrative records obtained directly from the London Metropolitan Police Authority to construct a panel data set on crime for 32 London boroughs, for each month between April 1998 and January 2006. This contains information on the number of recorded drug offences at two fine levels of detail: (i) the number of criminal offences related to any given *drug type*, e.g. cannabis, heroin, cocaine etc.; (ii) for each drug type, the *specific offence* committed: possession, trafficking, intent to supply etc. Such detailed measurement of drug crime allows us to assess the impact of the policy on the size of cannabis market (as proxied by the total number of cannabis offences), and whether the change in market size is predominantly driven by changes in demand related offences such as cannabis possession, or by supply related offences such as cannabis trafficking and intent to supply etc. Two further points are of note in terms of how the detailed administrative data maps to the conceptual framework.

First, the model makes precise that a depenalization policy can free up police resources to tackle non-cannabis drugs crime. The disaggregated drug crime data we exploit allows us to specifically measure such effects on other illicit drugs markets, not just the direct effects on the market for cannabis. The model also suggests depenalization also allows the police to reallocate

effort toward non-drug crime. We are able to explore such effects on seven types of non-drug crime: violence against the person, sexual offences, robbery, burglary, theft and handling, fraud and forgery, and criminal damage.

Second, the model emphasizes that one mechanism by which the size of the cannabis market can increase in Lambeth is because of drugs tourism as drug users change behavior to purchase cannabis in Lambeth where the penalties for being caught engaging in the market for cannabis are lower under the policy. We infer drugs tourism from changes in cannabis crime in neighboring boroughs to Lambeth. Understanding whether drugs tourism exists is of direct relevance to the current policy debate on how best to regulate illicit drugs markets.[3]

The administrative records from which we construct the borough-month level panel dataset on criminal offences described above, also contain information on two measures more closely correlated to police behavior for each disaggregated crime type: the number of individuals arrested, and the number of crimes cleared-up. These margins help provide evidence on how the allocation of police effort across crime types changes in response to the depenalization policy.[4]

Our main results are as follows. First, the depenalization of cannabis in Lambeth leads to a significant increase of 18% in rates of cannabis possession offences. This effect is quantitatively large and persists well after the policy experiment ends. Closer examination of the data reveals that during the policy period, cannabis crime only rises in Lambeth six months into the policy – precisely the time when the policy is announced to have been extended, that might have been taken as a signal of the policy's permanence. In contrast, over the same policy and post-policy periods, we find no evidence of London-wide increases in cannabis crime rates.

Second, on drugs tourism, the evidence suggests cannabis users relocate to Lambeth from neighboring boroughs after depenalization. However this spatial reallocation of cannabis users across boroughs only accounts for around 46% of the increase in cannabis offences documented in Lambeth. This suggests some element of the increase in cannabis crime might stem from changes in behavior along other margins: (i) the same number of cannabis users might purchase larger *quantities* of cannabis; (ii) the policy might induce some individuals to *start* using cannabis; (iii) the police might start formally recording cannabis possession offences whereas previously offenders would have only been informally warned. These channels are discussed in greater detail later.

Third, we find little evidence the policy causes the police to reallocate their effort towards other crimes relating to harder Class-A drugs, such as heroin, crack and cocaine. However, the primary benefit of the policy is that it allows the Lambeth police to reallocate their effort towards *non-drug* crime: we observe significant reductions in five out of seven other crime types in the long run, and significant improvements in police effectiveness against such crimes, as measured by

[3]Other studies examining the effects of policing on spatial crime patterns include Di Tella and Schargrodsky [2004] and Draca *et al.* [2010]. Both exploit police redeployments caused by terrorism.

[4]Criminal offences might be reported by the public or the police. There can be more than one individual arrested for any recorded offence, and a clear-up is an offence for which a suspect's details are passed onto the Criminal Prosecution Service (CPS), the Government Department responsible for prosecuting criminal cases investigated by the police in England and Wales. Each arrest and clear-up is associated with a recorded offence. The offence location refers to where the offence occurred, irrespective of the place of residence of the arrestee.

arrest and clear-up rates.

We build on existing evidence on the effects of depenalization or decriminalization policies on crime. MacCoun and Reuter [2001] review these studies and find positive but modest impacts. One reason for the difference with our findings stems from our research design exploiting within *and* across borough variation in crime, rather than being based on nationwide policy changes. US studies have exploited the fact that in the 1970s some states depenalized cannabis and found weak impacts on crime [NRC 2001]. However, Pacula *et al.* [2004] have questioned such studies because, to quote, "[so called] decriminalized states are not uniquely identifiable based on statutory law as has been presumed by researchers over the past twenty years".

We contribute to this literature by exploiting a localized policy change and using detailed administrative records on crime and police behavior. Our evidence provides a nuanced picture of the impacts of an increasingly observed policy, the depenalization of cannabis: (i) across crimes related to cannabis, Class-A drugs, and seven non-drug crime types; (ii) on measures of police behavior, by assessing its impact on arrest and clear-up rates; (iii) across time, by assessing the short and long run impacts of the LCWS, and across space, by assessing the policy impact on Lambeth's geographic neighbors. Taken together these results provide new evidence relevant to the policy debate on whether and how to intervene in illicit drug markets.[5]

The paper is organized as follows. Section 2 develops a Hotelling-style model of the market for cannabis and other illicit drugs that highlights multiple channels through which a depenalization policy changes behavior of users and suppliers of drugs, as well as the police. Section 3 describes the motivation behind the LCWS, its implementation, and reasons for its abandonment. Section 4 describes our administrative data and empirical method. Section 5 presents the results on the impact of depenalization on cannabis crime and drugs tourism, and how through changes in police behavior the policy impacted other drug crime, and seven types of non-drug crime. Section 6 concludes by using house price information to provide a hedonic evaluation of the depenalization policy. This sheds light on how Lambeth residents value the total social effects of depenalization in the long run, not just those operating through changes in crime.

2 Conceptual Framework

We develop a Hotelling-style model of the market for cannabis, accounting for utility maximizing cannabis users, profit maximizing cannabis suppliers, and crime minimizing police. The model highlights multiple channels through which the depenalization of cannabis possession affects cannabis crime, other drugs crime, and causes spillover effects on crime in neighboring boroughs through changes in behavior of users and suppliers of drugs as well as the police.

[5] We also contribute to the literature examining the impact of drug policies on drug usage. The earlier evidence is mixed: some studies find little evidence of increased drug usage either in the UK [Warburton *et al.* 2005, May *et al.* 2007a, Pudney 2010] or other countries [Single 1989, DiNardo and Lemieux 2001, MacCoun and Reuter 2001, Hughes and Stevens 2010], and others finding slight increases [Williams 2004, Domrongplasit *et al.* 2010]. Our research design based on a localized policy suggests there might have been a considerable increase in the equilibrium market size for cannabis in Lambeth.

2.1 Users

Cannabis users are uniformly located on a segment of unit length between two boroughs, and face transport costs t per unit. Denoting the distance from A as x, users therefore face transport costs of tx to travel to borough A. There are two suppliers of cannabis, each located at an end of the line, taken to be the center of each borough. Each borough has its own police force. In borough b, the price of cannabis is π_b and the police devote effort P_b^d towards cannabis crime. Policing imposes a cost on cannabis users, $\alpha_b P_b^d$, where α_b reflects the punishment conditional on being apprehended by the police, and P_b^d reflects the probability of being detected engaging in the cannabis market. Hence, the utility of a cannabis consumer located in each market is,

$$\begin{aligned} u_A &= -\pi_A - tx - \alpha_A P_A^d, \\ u_B &= -\pi_B - t(1-x) - \alpha_B P_B^d. \end{aligned} \tag{1}$$

The marginal consumer is indifferent between traveling to A or B, and so is located at,

$$x^* = \frac{1}{2} + \frac{\pi_B - \pi_A}{2t} + \frac{1}{2t}(\alpha_B P_B^d - \alpha_A P_A^d). \tag{2}$$

All consumers closer to borough A than this marginal consumer purchase cannabis from the supplier in A and so the size of the cannabis market in borough A is $D_A = x^*$.

2.2 Suppliers

Cannabis suppliers simultaneously set prices to maximize profits. The profit for the supplier in borough b is $\Pi_b = \pi_b D_b$, so the Nash equilibrium prices in each borough are,

$$\begin{aligned} \pi_A &= t + \frac{1}{3}(\alpha_B P_B^d - \alpha_A P_A^d), \\ \pi_B &= t - \frac{1}{3}(\alpha_B P_B^d - \alpha_A P_A^d). \end{aligned} \tag{3}$$

The equilibrium market size for cannabis in each borough is therefore a function of the punishment for cannabis related criminal activities and the intensity of cannabis policing in *both* boroughs,

$$\begin{aligned} D_A(t, \alpha_A, \alpha_B, P_A^d, P_B^d) &= \frac{1}{2} + \frac{1}{6t}(\alpha_B P_B^d - \alpha_A P_A^d), \\ D_B(t, \alpha_A, \alpha_B, P_A^d, P_B^d) &= \frac{1}{2} - \frac{1}{6t}(\alpha_B P_B^d - \alpha_A P_A^d). \end{aligned} \tag{4}$$

As cannabis markets across boroughs are interlinked, depenalization policies in one borough will change the behavior of cannabis users and suppliers in all boroughs. Such concerns over drug tourism have been central to the policy debate, and our empirical analysis addresses this issue.[6]

[6] We have no data on cannabis prices by borough and so we do not emphasize the price predictions. It is unclear how reliable such price information would be given that it is often based on selective samples of drug busts, and the considerable dispersion in the price-quality ratio for illicit drugs [Galenianos *et al.* 2010].

2.3 Drug Crime and Policing

To map this framework to the data at hand, we assume there are two crime types: cannabis crime (d) and other drug crime (o). For expositional ease we refer to other drugs as 'Class-A' drugs. In the UK this category covers cocaine, crack, heroin, LSD, MDMA and methadone. The police in borough b choose the intensity with which to police cannabis and Class-A drug crime, denoted P_b^d and P_b^o respectively. The number of cannabis crimes (C_b^d) and Class-A drug crimes (C_b^o), are both affected by the intensity of policing towards both drug crimes, and on the size of the cannabis market within the borough, such that,

$$\begin{aligned} C_b^d &= \delta_{d(b)} D_b(t, \alpha_A, \alpha_B, P_A^d, P_B^d) - e(P_b^d), \\ C_b^o &= \delta_o D_b(t, \alpha_A, \alpha_B, P_A^d, P_B^d) - e(P_b^o). \end{aligned} \tag{5}$$

The size of the cannabis market, $D_b(.)$, generates cannabis crime as well as Class-A drugs crime because of common users or suppliers of both drug types for example. Of course, this formulation in no way implies that individuals who *solely* use cannabis are responsible for other crimes. Rather it highlights that markets for different drugs might be linked through either demand or supply side channels, and this leads to the cannabis market potentially affecting other crime. The second term in each equation above captures that police effort towards a crime type reduces the number of those types of crime. We assume that for each crime type, $e(0) < 0$ and $e(.)$ is concave so police intensity reduces crime at a diminishing rate.[7] The police minimize a weighted sum of all drug crime in the borough, subject to a resource constraint,

$$\min_{P_b^d, P_b^o} \lambda_b C_b^d + (1 - \lambda_b) C_b^o \ s.t. \ P_b^d + P_b^o = P, \tag{6}$$

where λ_b reflects the relative weight of cannabis crime in the police objective function, and P is the total police resources that can be allocated to drug crime. The optimal effort the police devote towards cannabis crime is implicitly defined through the first order condition,

$$\begin{aligned} (1 - \lambda_b) e'(P - P_b^d) - \lambda_b e'(P_b^d) &= \frac{\alpha_b}{6t} [\lambda_b \delta_{d(b)} + (1 - \lambda_b) \delta_o], \\ P_b^d &= P_b^d(\delta_{d(b)}, \delta_o, \alpha_b, \lambda_b, t, P). \end{aligned} \tag{7}$$

Equilibrium police effort towards cannabis crime depends on the relationship between the size of the cannabis market and cannabis crime ($\delta_{d(b)}$), the impact of the cannabis market on Class-A drugs crime (δ_o), the punishment for engaging in cannabis related activities (α_b), the weight the police place on cannabis crime (λ_b), transportation costs (t) and aggregate police resources (P).

[7] We have ruled out dynamic effects of policing on crime so that, for example, the effect of police intensity on cannabis crime in (5) in period t is $e(P_b^{d,t}, P_b^{d,t-1})$. This would capture in reduced form, any learning-by-doing effects in policing, or the fact that it takes time for police to act on intelligence gathered in the previous period. As a consequence, the short run enforcement of the LCWS might have longer run effects on policing and hence the market for illicit drugs. We leave this theoretical extension for future work, but estimate both short and long run effects in our empirical analysis.

Substituting (7) into (5), total cannabis crime in borough A is then,

$$C_A^d = \delta_{d(A)} D_A(t, \alpha_A, \alpha_B, P_A^d(\delta_{d(A)}, \delta_o, \alpha_A, \lambda_A, t, P), P_B^d((\delta_{d(B)}, \delta_o, \alpha_B, \lambda_B, t, P))) - e(P_A^d(\delta_{d(A)}, \delta_o, \alpha_A, \lambda_A, t, P)). \tag{8}$$

2.4 Depenalization

Suppose borough A unilaterally depenalizes the possession of cannabis. There are multiple channels through which this policy might affect both drug markets. The first channel is labelled a 'mechanical effect' in that some behaviors – the possession of small quantities of cannabis – are no longer recorded as criminal offences. Hence the size of the market for cannabis has a *weaker* impact on cannabis crime, namely $\delta_{d(A)}$ falls. All else equal, depenalization should then reduce recorded cannabis offences, C_A^d. However, the model makes precise that there will also be an endogenous response in police behavior, $P_A^d(.)$, due to the fall in $\delta_{d(A)}$. This causes the police to optimally devote less effort to cannabis related policing and so countervails the direct effect of a reduction in $\delta_{d(A)}$ on cannabis crime in (8). On the other hand, the police optimally reallocate effort towards Class-A drugs crimes and this might reduce crime rates for Class-A drugs crime. More precisely, note that the larger is the spillover effect δ_o, the more any reallocation of police effort towards Class-A drugs is partially offset by an increased size in the cannabis market. In the limiting case of $\delta_o = 0$ Class-A drugs crimes must necessarily fall because only the beneficial effect of the police reallocating effort towards Class-A drugs crimes is relevant.

Result 1a (Mechanical Effect): *Suppose depenalization reduces $\delta_{d(A)}$. This reduces cannabis related police intensity, and has ambiguous effects on the size of the market for cannabis, cannabis crime and Class-A drugs crime. Class-A drugs crimes are more likely to decrease the smaller is the spillover effect of the cannabis market on Class-A drugs crimes (δ_o).*

The second channel through which depenalization in borough A affects drug crime is that it reduces the costs to cannabis users of being apprehended by the police, α_A. As (4) shows, this weakened 'incarceration effect' has a direct effect on the equilibrium size of the cannabis market in borough A as more users decide to purchase cannabis there.[8] Moreover, as (7) shows, this is *reinforced* by the endogenous police response, $P_A^d(.)$, which is that the police optimally devote less effort towards cannabis offences as the returns to such effort is diminished. Hence cannabis crime in borough A unambiguously increases. As with the mechanical effect, as the police reallocate effort from cannabis crime towards Class-A drug crimes, Class-A drugs crimes might fall.

Result 1b (Incarceration Effect): *Suppose depenalization reduces α_A. This reduces police effort towards cannabis crime, and unambiguously increases cannabis crime. Class-A drug crimes are more likely to decrease the smaller is the spillover effect of the cannabis market on Class-A drug crimes (δ_o).*

The third channel through which the depenalization of cannabis possession in borough A

[8] As (3) shows this effect causes an increase in cannabis prices in borough A all else equal. Pacula *et al.* [2010] also develop a model in which equilibrium prices rise following depenalization because of an increase in demand.

manifests itself is through a change in police preferences, namely a reduction in λ_b, the relative weight of cannabis crimes in (6). This weakened 'deterrence effect' directly affects the optimal effort the police devote to both cannabis and Class-A drugs crimes, and through this on the equilibrium size of the cannabis market and crime rates as seen in (8). Given the multiplicative interaction between α_A and P_A^d in consumer preferences (1), these effects are observationally equivalent to those operating through the incarceration effect.[9]

Result 1c (Deterrence Effect): *Suppose depenalization reduces λ_A. This reduces police effort towards cannabis crime, and unambiguously increases cannabis crime. Class-A drug crimes are more likely to decrease the smaller is the spillover effect of the cannabis market on Class-A drug crimes (δ_o).*

Taking all three channels into account the overall effect of depenalization on cannabis crime is *a priori* ambiguous. While our data does not allow us to separately identify each effect, finding an overall *decrease* in cannabis crime would suggest the direct mechanical effect dominates overall. On the other hand, if depenalization causes an overall *increase* in cannabis crime, this suggests the other effects dominate and that it is important to take into account the behavioral response of consumers, suppliers, and the police, when thinking through the impact of illicit drug policies.

The framework also makes precise the inter-linkages between the cannabis markets in the two boroughs so that a depenalization policy in borough A impacts drug crime patterns in borough B. Such spillover effects occur because policy parameters in borough A, such as α_A and $P_A^d(.)$, change the size of the cannabis market in borough B, $D_B(.)$ as relatively more drugs users prefer to purchase from suppliers in borough A. To summarize,

Result 2 (Spillovers): *Depenalization in borough A unambiguously reduces cannabis crime in the neighboring borough B because of drugs tourism.*

We later provide evidence on the existence of such drug tourism by measuring the impact of the depenalization policy in Lambeth on patterns of crime in its neighboring boroughs.

2.5 Non-Drug Crime

We have so far emphasized the distinction between cannabis and Class-A drugs crime. However, it is also plausible that the depenalization of cannabis allows police to reallocate their effort towards other non-drugs crime, not just Class-A drugs crime. This is indeed often a motivation behind such policies. The model can then be simply extended to cover three crime types: cannabis, Class-A drug, and other crimes, where each crime type might be affected the size of the market for cannabis, and the police in each borough seek to minimize a weighted average of all three crime types. Again the interlinkage between markets for different drug types might then create this correlation between the size of the cannabis market, the size of the market for Class-A drugs, and the amount of non-drug crime such as property and violent crime [Grogger and Willis 2000, Pacula and Kilmer 2003].

[9] Durlauf and Nagin [2010] provide a comprehensive overview of the literature on the evidence in favor of deterrence effects from a range of crime policies.

The impact of depenalization on other crime types is then very similar to the effects documented above for Class-A drugs crime: the mechanical effect of depenalization implies that the effect on non-drug crimes is ambiguous. However, the incarceration and deterrence effects of depenalization imply non-drug crimes should fall with depenalization because of the reallocation of police effort away from cannabis crime to such non-drug crimes. The extent to which they do so depends on how correlated non-drug crime is to the size of the cannabis market. We later estimate the impact of the depenalization of cannabis on seven other non-drug crime types that, *a priori*, vary in how correlated they might be to the size of the market for cannabis.

2.6 Other Margins

It is important to emphasize that this conceptual framework is developed only as a guide to structure and interpret the empirical analysis. This highlights the multiple channels through which depenalization affects crime patterns through changes in behavior of the police, users and suppliers of drugs. Of course, there are other channels through which the policy impacts illicit drugs markets that are not captured, but we recognize to be empirically relevant and that are discussed in light of the evidence presented.

A first additional channel to consider is that of 'net-widening' as emphasized in the criminology literature [Christie and Ali 2000, Warburton *et al.* 2005, May 2007a]. This states that in practice, depenalization policies allow the police to formally deal with cannabis offences where previously they might have issued informal warnings. Hence some part of the increase in cannabis possession offences is due to changes in police reporting behavior rather than real changes in the size of the market for cannabis. In the context of our framework, the net-widening effect operates like the opposite of the mechanical effect so the size of the cannabis market has a *stronger* impact on cannabis crime ($\Delta\delta_{d(A)} > 0$). As depenalization implies cannabis is no longer an arrestable offence, the incarceration effect still operates as before.

A second additional channel relates to user's choice of the *quantity* of cannabis to consume. If the policy causes users to purchase quantities above what is permissible to be counted as a 'small' quantity under the depenalization policy, cannabis possession offences will rise. Such effects occur if users mis-perceive the policy as effectively signalling the police turning a blind-eye to the possession of even large quantities of cannabis, so that user's behave as if λ_b has fallen as in the deterrence effect, even if the police retain the same objective.

Third, depenalization might induce some individuals to *start* using cannabis as new users. This extensive margin is not captured in our model, that assumes everyone uses cannabis and so emphasizes the decision of where to purchase cannabis from, rather than whether to consume.

Although we recognize the importance of these channels to the interpretation of the evidence, we note that these last two additional channels are not emphasized in the conceptual framework simply due to data constraints: data on the quantity of drugs possessed (conditional on being apprehended) is unavailable, nor is representative data on cannabis usage available at the borough-month level.

3 The Lambeth Cannabis Warning Scheme (LCWS)

3.1 Background

To understand the UK policy debate on illicit drugs that led to the LCWS, we need to go back to the publication of the Runciman Report in 2000. This was a high profile inquiry commissioned by the Police Foundation, whose remit was to review and suggest amendments to the primary piece of legislation in the UK governing the policing of illicit drugs, the Misuse of Drugs Act 1971. The UK has a three tiered drug classification system, with assignment from Class-C to Class-A intended to indicate increasing potential harm to users.[10] The Runciman Report called for the classification system to more closely follow the scientific evidence of relative harms, and consequently that cannabis be reclassified from Class-B to a Class-C drug. The report emphasized three benefits of doing so: (i) reduce the number of individuals being criminalized; (ii) remove a source of friction between the police and local communities; (iii) freeing up police time.

Subsequent to the Runciman Report, the Metropolitan Police Authority (MPA) produced their own report on drugs policing, 'Clearing the Decks.' This suggested the idea of a workable depenalization policy in May 2000. This report again emphasized that such a policy might enable the police to divert resources towards areas of high priority if they were willing to explore alternatives to arrest for a number of minor crimes, including possession of cannabis. The notion that such a depenalization policy might actually be implemented within London began to take hold a year later in early 2001, when the police commander for the London borough of Lambeth, Brian Paddick, conducted a staff consultation exercise on drugs policing strategy. During the consultation, officers complained they spent a considerable amount of time dealing with arrests for cannabis possession and this detracted from their ability to deal with high priority crime such as street crime, to tackle Class-A drugs, and to respond to emergency calls.[11]

With the sanctioning of the Metropolitan Police Commissioner, Sir John Stevens, the LCWS was introduced in Lambeth on 4th July 2001 as a pilot project that was intended to run for six months. Under the scheme, those found in possession of small quantities of cannabis for their personal use: (i) had the drugs confiscated; (ii) were given a warning – prior to the policy such individuals would have been arrested [Dark and Fuller 2002]. This relates to the pure mechanical effect of the LCWS described earlier, that causes a reduction in cannabis offences, as $\Delta\delta_{d(b)} < 0$, assuming no behavioral responses of users, suppliers or the police. The net-widening channel is that police recording behavior is altered so that $\Delta\delta_{d(b)} > 0$ because the policy allows them to formally deal with cannabis offences where previously they might have issued informal warnings and no offence would have been recorded. Under the policy, the police continued to prosecute cannabis suppliers.

[10] Class-A drugs are cocaine, crack, crystal-meth, Heroin, LSD, MDMA and methadone; Class-B drugs are amphetamines and cannabis; Class-C drugs are anabolic steroids, GHB and ketamine.

[11] Police officers also reported concerns, following a recent disciplinary case, that they might face disciplinary action if they continued to follow a long-standing unofficial practice of dealing with people found in possession of cannabis by informally warning them and destroying the drugs on the streets. Pre-policy, such actions did not have official sanction [May *et al.* 2002, Warburton *et al.* 2005, May *et al.* 2007a].

To gauge public opinion of the LCWS, an IPSOS-MORI poll was commissioned during the six month policy experiment. This found broad local support for the scheme. 36% of surveyed residents approved outright of the policy. A further 47% approved provided the police actually reduced serious crime in Lambeth. Following the groundswell of support for the policy, at the end of the trial period, the policy was then announced to have been extended for a further six months. Given the support for policy at that time, it is plausible this extension might have been interpreted by users, suppliers and police officers as representing a permanent change in drug policing strategy.

3.2 Why Was the Policy Ended?

Anecdotal evidence suggests local support for the scheme began to decline once the policy was announced to have been extended beyond the initial pilot. Media reports cited that local opposition arose due to concerns that children were at risk from the scheme, and that the LCWS had led to an increase in drug tourism in Lambeth. The LCWS formally ended on 31st July 2002. In part because of disagreements between the police and local politicians over the policy's true impacts, post-policy Lambeth's cannabis policing strategy did not return identically to what it had been pre-policy. Rather, it adjusted to be a firmer version of what had occurred during the pilot. More precisely, the MPA announced that in Lambeth officers would continue to issue warnings but would now also have the discretion to arrest where the offence was aggravated. Aggravating factors included: (i) if the officer feared disorder; (ii) if the person was openly smoking cannabis in a public place; (iii) those aged 17 or under were found in possession of cannabis; (iv) individuals found in possession of cannabis were in or near schools, youth clubs or children's play areas.

4 Data, Descriptives and Empirical Method

4.1 Data Sources

4.1.1 Crime Data

We exploit detailed administrative records obtained directly from the London Metropolitan Police Authority to construct a panel data set on crime for 32 London boroughs, for each month between April 1998 and January 2006. This contains information on the number of recorded drug offences at two fine levels of detail. First, the number of criminal offences related to any given *drug type*, e.g. cannabis, heroin, cocaine etc. Following the conceptual framework outlined, we focus attention on cannabis and Class-A drugs crime. Second, for each drug type, the data records the *specific offence* committed: possession, trafficking, intent to supply etc. To shed light on whether the observed changes in the size of the market for cannabis, as proxied by the number of cannabis offences, are driven predominantly by demand or supply side factors, we split cannabis offence types into two categories: we proxy changes in demand with the number of offences related to cannabis

possession, and we proxy changes in supply with the number of offences related to trafficking, intent to supply etc.[12]

Table 1 provides descriptive evidence on drug crime in Lambeth and other London boroughs pre-policy, at various levels of detail. We exclude Lambeth's geographic neighbors when referring to other London boroughs because, as highlighted in Section 2, we expect there to be spillover effects into such boroughs of the policy and so a more valid comparison group is based on Lambeth's non-neighboring boroughs in London.

Panel A of Table 1 shows that in the pre-policy period, Lambeth has historically higher rates of cannabis offences than other London boroughs. Out of 32 boroughs, Lambeth is ranked 6th highest in terms of drug related offences per 1000 of the adult population pre-policy. Panel B shows that in Lambeth, 34% of drug offences relate to Class-A drugs and 60% relate to cannabis. Compared to other boroughs, Lambeth has relatively more Class-A drug offences. Panel C shows how cannabis offences break down by specific crime types, that can be roughly classified as demand and supply side offences. In Lambeth 91% of cannabis offences are for the cannabis possession, with the remainder mostly related to intent to supply offences. This breakdown by cannabis offence type is not significantly different between Lambeth and other London boroughs.

As suggested by the conceptual framework, *police effort* towards cannabis related and Class-A drugs crime ($P^d_{Lambeth}(.), P^o_{Lambeth}(.)$) might be impacted by the depenalization policy through multiple channels. To try and capture such effects we exploit panel data for each drug type, on the number of arrests and clear-ups by borough-month between April 1998 and January 2006. To be clear, the policy itself makes cannabis possession a non-arrestable offence. As emphasized in the criminology literature, the direct policy impact ought to be a reduction in arrest and clear-up rates for cannabis possession. In our framework this effect occurs through the weakened deterrence effect ($\Delta\lambda_A < 0$) as the police place less weight on cannabis crime. One advantage of interpreting the evidence after having developed a conceptual framework is that we make precise that this literal effect of the policy on police behavior in turn will impact the behavior of users, that ultimately causes the size of cannabis market to then change.

Finally, to explore the policy impact on non-drugs related crime as suggested by the model, we exploit the administrative records to construct panel data by borough-month on the number of offences, arrests and clear-ups for seven non-drug crime types: violence against the person, sexual offences, robbery, burglary, theft and handling, fraud and forgery, and criminal damage.

This data therefore allows us to provide a rich and nuanced analysis of the impact of the depenalization of cannabis possession in Lambeth on crime. We document the policy impact: (i) across crime types: cannabis, Class-A drugs, and seven non-drug crime types; (ii) on measures of police behavior, by assessing its impact on arrest and clear-up rates; (iii) across time, by assessing the short and long run impacts of the LCWS, and across space, by assessing the policy impact on Lambeth's geographic neighbors.

[12]These supply side offences include: possession with intent, possession on a ship, production, supply, unlawful export, unlawful import, carrying on a ship, inciting others to supply, manufacture, and money laundering. There are a very small number of other offences that cannot be classified as either demand or supply related.

4.1.2 Police Operations and Other Data

To credibly measure the impact of the LCWS on crime, we need to control for all other police activities. To do so we construct a novel panel dataset of police operations by London borough-month for our sample period. As Panel A of Table A1 shows, for each borough specific police operation, we derive the type of criminal offence targeted and dates of operation. Some operations occur like the LCWS, within one borough; others are coordinated across boroughs. The length of police operations varies between a few months and two years. There is no evidence of a spike in police operations immediately after the LCWS is introduced, to perhaps reinforce or compensate for its effects. Panel B shows borough specific police operations for which we have incomplete information on their dates of operation. Panel C shows police operations that are London wide, and so are controlled for in our empirical analysis using year fixed effects. Panel D records police operations that are referred to in MPA reports, but that we have insufficient detail on to code in any of the previous panels. To control for borough characteristics, we use the *Quarterly Labor Force Local Area Data*. This provides quarterly data by borough on demographic and labor market characteristics. We interpolate this data to obtain a series at the borough-month level.

4.2 Descriptive Evidence

Figure 1A shows time series evidence for Lambeth and the average for all other London boroughs excluding Lambeth's neighbors, on the total number of cannabis drug offences per 1000 of the adult population. We refer to this as the rate of cannabis offences in aggregate. The period during which the LCWS is in place is indicated by the dashed vertical lines. Four points are of note. First, prior to the introduction of the LCWS, there is a *downward* trend in cannabis offence rates in Lambeth and London more generally. Second, there is a large *increase* in cannabis offence rates in Lambeth during the policy. Averaging within the pre and policy periods, cannabis offences in Lambeth rose by 61% in the policy period relative to pre-policy. For the rest of London, there was no significant change in cannabis offences between these time periods.

Third, the dramatic upturn in offences occurs six months after the policy starts – precisely the time when the policy extension is announced – rather then immediately after the policy experiment is first introduced. This suggests that impact of the announcement of the policy's extension, rather than its mere introduction, appears to be key for understanding changes in cannabis crime. At face value this casts doubt on whether all the change in cannabis offences can be understood through merely a net-widening effect of changes in police reporting behavior.

Fourth, the rise in cannabis offences is quantitatively large and appears permanent. There is little evidence from Figure 1A that the time series for Lambeth begins to converge back to its pre-policy level or those of the other boroughs in the post-policy period. Indeed, post-policy, drug offences continue to rise by a further 46% in Lambeth.

Figure 1B then focuses exclusively on cannabis possession offences. This time series mimics the pattern for cannabis offences as a whole so that possession related offences, that constitute the bulk of cannabis related crime as shown in Table 1, do indeed drive the increase in cannabis

offences in aggregate. We again note the dramatic increase in cannabis possession offences occurs *not* when the policy is first introduced, but six months later when it is announced to have been extended. Finally, to begin exploring the policy impact on *non-drug* crimes, Figure 1C shows the corresponding time series for all non-drug offences. Prior to the LCWS's introduction, we observe upward trends in such crime rates in Lambeth and across London as a whole. However, a few months into the policy period, rates of criminal offence begin declining in Lambeth and this downward trend continues in the long run. In contrast for the rest of London, non-drug offences remain relatively constant for the second half of the sample period.

4.3 Empirical Method

To establish whether this descriptive evidence reflects a causal impact of the LCWS policy on crime, we estimate the following panel data specification for borough b in month m in year y,

$$\begin{aligned} \ln C^d_{bmy} &= \beta_0 P_{my} + \beta_1 \left[L_b \times P_{my}\right] + \beta_2 PP_{my} + \beta_3 \left[L_b \times PP_{my}\right] \\ &\quad + \gamma X_{bmy} + \lambda_b + \lambda_m + \lambda_y + u_{bmy}, \end{aligned} \tag{9}$$

where C^d_{bmy} is the number of criminal offences, in any given category, per thousand of the adult population (aged 16 and over). P_{my}, PP_{my} are dummies for the policy and post-policy periods respectively. L_b is a dummy for the borough of Lambeth. The parameters of interest are estimated from within a standard difference-in-difference research design: β_1 and β_3 capture differential changes in crime rates in Lambeth during and after the LCWS policy period, relative to other London boroughs. Given the potential for geographic spillovers through drugs tourism, we exclude geographic neighbors to Lambeth throughout. β_0 and β_2 capture London-wide trends, among non-neighbors to Lambeth, in drug crime during and post-policy.

In X_{bmy} we control for the following borough-specific time varying variables: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged 25 to 34, aged 35 to 49, aged above 50, and the male unemployment rate. We also control for the borough-month specific policing initiatives described in Panel A of Table A1. The fixed effects capture remaining permanent differences across boroughs (λ_b), monthly variation in crime (λ_m), and aggregate annual shocks to crime such as London-wide policing strategies and nationwide drug policies (λ_y). We weight observations by the borough population and control for a dummy for the change in crime recording rules that occurred nationwide from April 2002.[13] Finally, defining time t as the number of months since January 1990: $t = [12 \times (y - 1990)] + m$, we assume a Prais-Winsten borough specific AR(1) error structure, $u_{bmy} = u_{bt} = \rho_b u_{bt-1} + e_{bt}$,where e_{bt} is a classical error term. u_{bmy} is borough specific heteroskedastic, and contemporaneously correlated across boroughs.

[13]Importantly, this change in recording impacts all boroughs in the same way (see http://rds.homeoffice.gov.uk/rds/countrules.html for further details). Similarly the nationwide depenalization of cannabis possession that occurred in England from January 2004 onwards, that our sample covers, ought to have impacted all boroughs equally.

5 Results

5.1 Cannabis Crime in Aggregate

Table 2 presents estimates of (9) where we focus on how the policy affects the rate of cannabis offences in aggregate, so C^d_{bmy} in (9) exactly matches C^d_b in the conceptual framework. Column 1 only controls for borough, month and year fixed effects. In line with the descriptive evidence in Figure 1A, Lambeth experiences a significant increase of 13.5% in cannabis offences when the LCWS is in place relative to the pre-policy period ($\widehat{\beta}_1$). This increase is sustained in the post-policy period where cannabis crime is 24.2% higher than in the pre-policy period ($\widehat{\beta}_3$). The coefficients on the policy and post-policy period dummies ($\widehat{\beta}_0$, $\widehat{\beta}_2$) are close to zero, suggesting that in other London boroughs there is no significant time trend in cannabis crimes during either period once borough, month and year fixed effects are controlled for.

Column 2 shows the results to be robust to including the full set of covariates in (9). These baseline results suggest the depenalization of cannabis in Lambeth led to a significant *increase* in cannabis offences both during the policy period, and well after the policy officially ended. The direction of these changes imply the direct mechanical effect of depenalization ($\Delta\delta_{d(Lambeth)} < 0$), that would reduce cannabis offences other things equal, is more than offset by the other channels through which depenalization impacts cannabis crime, namely the weakened incarceration and deterrence effects of the policy ($\Delta\alpha_A < 0$, $\Delta\lambda_A < 0$) that lead to an increase in cannabis offences.

The next specification additionally controls for a *within-borough* linear time trend in (9). As expected, the policy effects are less precisely estimated and of smaller magnitude, although both remain significantly different from zero. As Column 4 shows, once we also control for a within-borough quadratic time trend it is no longer possible to identify an effect of the policy during its period of operation. This is hardly surprising given the policy is only in operation for 13 months. However the post-policy effect remains highly significant even in this specification.[14]

In summary, the evidence suggests the policy led to a significant increase in cannabis offences. The model highlights that such a rise can be caused by an increase size of the market for cannabis in Lambeth as a whole, as cannabis users prefer to purchase drugs in Lambeth relative to other locations ($\Delta D_{Lambeth}(.) > 0$). We later provide evidence on this channel by investigating how patterns of cannabis related crime in neighboring boroughs change in response to the policy in Lambeth. Of course, some element of the increase in cannabis related crime might stem from channels not captured in the model. For example, the same number of cannabis users might change behavior so as to purchase larger *quantities* of cannabis, all else equal. Hence although the number of users remains unchanged, more cannabis will be consumed. The possession of such larger quantities of cannabis would still be recorded as an offence under the LCWS. Alternatively, the policy

[14] As a further check on the robustness of the results to time effects, we also estimated (9) restricting the sample to a 12 month window around the policy, that is from July 2000 until July 2003. Hence the policy and post-policy effects are not identified assuming any particular underlying long run time trends. The previous results are robust to using this narrower time frame. Indeed, this specification shows that over this shorter time frame when drug offences are still found to have risen in Lambeth, drug offences are declining elsewhere in London as suggested by Figure 1A.

might induce some individuals to *start* using cannabis. Our data does not allow us to discriminate between such explanations: data on the quantity of drugs in possession is unavailable, nor is representative data on cannabis usage available at the borough-month level. Finally, some element of the increase in cannabis possession might also be due a net-widening effects through changes in police reporting behavior. We return to discuss these channels and alternative hypotheses after having presented evidence on cannabis crime in boroughs neighboring Lambeth.

The last specification in Column 5 also explores the dynamic effects of the policy. Following the time series evidence in Figure 1A, this checks for differential policy responses during the first six months of the policy, when the LCWS was announced to be a temporary policing experiment, and the last seven months, after it was announced to have been extended. In line with the evidence in Figure 1A, *all* of the within policy effect on cannabis offences occurs after the second policy announcement. We can only speculate on why this second announcement is the trigger for cannabis offences to rise. If, for example, it is interpreted as a signal to users and suppliers of the policy's permanence, then as there are fixed costs to re-structuring criminal networks, drug suppliers have incentives to delay any changes in their operation until the policy is presumed to be permanently in place. Clearly understanding such dynamic and announcement effects of policy needs more research.

The result does help however to immediately address two concerns. First, it suggests the LCWS was not introduced in response to rising cannabis crime rates: as Figure 1A shows, cannabis offences were generally trending *downwards* in Lambeth in the years prior to the introduction of the LCWS. Second, this casts doubt on whether all the change in cannabis offences can be understood through merely a net-widening effect of changes in police reporting behavior, that has typically been documented by criminologists to occur as soon as a depenalization policy is introduced.[15]

5.2 Cannabis Crime in Detail

We next exploit data on specific *types* of cannabis crime to further investigate what lies behind the main result from Table 2. We do so along three margins as suggested by the conceptual framework: (i) breaking down cannabis offences into offences for cannabis possession, that might be more attributable to changes in behavior of cannabis users; (ii) breaking down cannabis offences into offences for cannabis trafficking and supply, that might be more attributable to changes in behavior of cannabis suppliers; (iii) exploring more direct measures of police behavior such as arrest rates and clear-up rates for each type of cannabis offence, as proxies for $P^d_{Lambeth}(.)$.[16]

Table 3 presents the results. In each column, specifications analogous to (9) are estimated, where the crime rate now specifically refers to sub-categories of cannabis crime. Furthermore,

[15] We also estimated a specification breaking down the post-policy response for each year. This confirmed the post-policy effects on cannabis crime to be long-lasting: we cannot reject the null that the effect in Lambeth is the same in the first and fourth year post-policy. These helps address concerns that cannabis crime rates in Lambeth were naturally diverging away from the rest of London.

[16] We again reiterate that this classification of offences into demand and supply related is only approximate. For example, it might be substantially more difficult to prove an offence of intent to supply, so that in practice the police use their discretion so some drug suppliers are charged with a lesser offence of possession.

given the earlier findings, we divide the policy period into two halves to more precisely understand the effects of the LCWS on the market for cannabis when it is announced as a temporary policy experiment vis-à-vis a more permanent change in policing strategy.

Column 1 shows that cannabis possession crimes only rise after the policy is announced to have been extended. This increase of 18.7% in cannabis possession offences in the second half of the policy period closely matches the descriptive evidence in Figure 1B. We find no evidence that rates of cannabis possession in other London boroughs were changing significantly over time. Column 2 repeats the analysis for offences more closely related to the *supply* of cannabis. We find: (i) no evidence the LCWS significantly increased offences related to cannabis supply during its official period of operation; (ii) in the long run, cannabis supply offences rose by 2.7% relative to the pre-policy period. For other London boroughs the evidence suggests that such supply related cannabis offences were actually falling over time. Taken together the results suggest that any change in the underlying size of the market for cannabis in Lambeth as a result of the policy was driven by both demand and supply factors, although the demand side response to depenalization is proportionately larger.[17]

The conceptual framework developed emphasizes it is important to understand the behavior of the police, as well as that of users and suppliers of cannabis, when investigating the impact of drug policing strategies. Any increase in the market size for cannabis following depenalization is partly due to reduced police intensity towards cannabis related crime, $P_b^d(.)$. As (7) shows, this occurs through the mechanical, incarceration and deterrence channels. To explore the policy effects on measures correlated to police behavior we estimate (9) but where the dependent variable refers to either arrest rates or clear-up rates, for specific cannabis offences. As individuals are not necessarily immediately arrested for offences they commit, we define the arrest rate as the number of arrests in the borough in period t divided by the number of offences committed between month t and the previous quarter within the borough. The clear-up rate is analogously defined.[18]

The results are presented in Columns 3 to 6 of Table 3. Column 3 shows that relative to the pre-policy period, arrest rates for cannabis possession significantly *drop* by 20.2% in the first half of the policy period, and by 36.5% in the second half of the period. Column 4 shows a similar fall in clear-up rates for cannabis possession as soon as the policy is introduced. These measures of police behavior indicate that once depenalization is in place, the police immediately devote less effort towards targeting cannabis users, as proxied by arrest and clear-up rates for cannabis possession crimes.

On the one hand this is reassuring because it is precisely what the depenalization policy prescribes: cannabis possession is no longer an arrestable offence and so we expect to observe immediate falls in arrest and clear-up rates as soon as the policy is introduced. However, as the framework makes clear, such a weakened deterrence effect of depenalization does in turn impact

[17]For brevity, we have not shown the dynamic policy response along these margins when we split the post-policy period year by year. Doing so we find the significant increase in cannabis possession offences remains in each of the four years post policy, as does the increase in cannabis supply related offences.

[18]Ideally, the clear-up rate in time period t would be defined as the number of clear-ups in time t divided by the stock of unsolved offences at the time, but such data is unavailable.

the behavior of cannabis users, as shown in (1). Ultimately this feeds through into changes in the size of the cannabis market. Hence the immediate behavioral response of the police in terms of arrest and clear up rates for cannabis possession shown in Columns 3 and 4 might in turn drive the slightly delayed response among cannabis users that shows up in the significant rise in cannabis possession offences six months into the policy, as shown in Column 1.

We also estimated a dynamic policy response along these margins when we split the post-policy period year by year. These results show that in the long run, the significant decline in arrest and clear-up rates related to cannabis possession only persist for the first year of the post-policy period. This adds credibility to these outcomes as closely measuring causal changes in police behavior in response to the policy, as they quickly revert to their pre-policy levels once the LCWS is stopped.[19]

Columns 5 and 6 present analogous specifications on arrest and clear-up rates for crimes related to cannabis *supply*. In line with the policy description in Section 3 that penalties for cannabis supply were unchanged, we observe no change in police intensity with regards to crimes related to the supply of cannabis. Trends in Lambeth are no different for those in other parts of London during the policy and post-policy periods.[20]

5.3 Cannabis Crime in Neighboring Boroughs

The model developed highlights that a localized depenalization policy should alter the behavior of cannabis users in *other* locations, who become more likely to travel to Lambeth to purchase cannabis. This mechanism causes the equilibrium size of the market for cannabis to expand as a result of depenalization. To provide evidence on such spillover effects, we estimate a specification analogous to (9) but additionally control for interactions between the policy and post policy-periods and whether the borough is a geographic neighbor of Lambeth ($N_b = 1$) or not ($N_b = 0$),[21]

$$\begin{aligned} \ln C^d_{bmy} &= \beta_0 P_{my} + \beta_1 \left[L_b \times P_{my}\right] + \beta_2 PP_{my} + \beta_3 \left[L_b \times PP_{my}\right] \\ &\quad + \beta_4 \left[N_b \times P_{my}\right] + \beta_5 \left[N_b \times PP_{my}\right] + \gamma X_{bmy} + \lambda_b + \lambda_m + \lambda_y + u_{bmy}. \end{aligned} \tag{10}$$

Table 4 shows the results for cannabis crime, breaking the results by demand and supply offence types. Column 1 confirms that post-policy there is a significant *reduction* of 3% in rates of cannabis possession offences in geographic neighbors to Lambeth. A negative effect on neighbors is also found during the policy period, although this is not significant. The post-policy effect is in line with the existence of drugs tourism, as drug users move from neighboring boroughs to

[19] This castes further doubt on the interpretation that changes in how police record cannabis crime can explain the data: if so then how the police record cannabis possession offences would have to permanently change even if the policy is reversed, while other margins of police behavior on arrests and clear-ups would have to revert back to their original levels a year after the policy is reversed.

[20] We note all the results presented in Columns 3 to 6 are robust to defining arrest and clear-up rates as being per 1000 of the adult population, rather than per the number of offences in the previous quarter. The results are not therefore driven by the increase in offences previously noted. For example, during the policy in per capita terms arrests rates for cannabis possession drop by 30% and clear-ups drop by 56%.

[21] We define the geographic neighbors of Lambeth to be the boroughs that have contiguous land borders with Lambeth: Croydon, Merton, Southwark and Wandsworth.

Lambeth to purchase drugs. However, the 3% reduction in cannabis possession averaged across all four neighbors to Lambeth does not fully account for the long run rise in cannabis possessions in Lambeth of 20.8%. Indeed, the magnitude of the estimated effects imply that at most, the declines in drugs crime neighbors to Lambeth might explain up to 46% of the increases in Lambeth.

Although the evidence in Column 1 suggests the existence of drugs tourism of cannabis users, in Column 2 we find no evidence of reductions in cannabis supply offence rates, as might be indicative of suppliers changing location in response to the policy.

We also estimate a specification analogous to (10) for arrest and clear-up rates. In neighbors to Lambeth, we find no significant evidence that either during or after the LCWS policy period, the police changed behavior so as to significantly alter arrest or clear-up rates. This is the case for both demand and supply related cannabis offences. This suggests the documented fall in cannabis possession among Lambeth's neighbors is not driven by changes in police behavior in these locations. Indeed as assumed in the model, it is as if borough police forces operate in isolation without accounting for cross-borough effects of policing policies.

In short, drugs tourism from geographic neighbors to Lambeth can explain around half the documented increase in cannabis possession offences, that directly implies an increase in the size of the cannabis market in Lambeth. Hence a combination of other channels not captured in our framework likely explain the remaining increase. There are three additional channels of note.

First, depenalization might induce some individuals to *start* using cannabis as new users as penalties for being caught engaging in the market for cannabis are reduced. Again this implies an increase in the cannabis market in Lambeth. Second, if the policy causes users to purchase quantities above what is permissible to be counted as a 'small' quantity under the depenalization policy, cannabis possession offences will rise. Such effects occur if users mis-perceive the policy as effectively signalling the police turning a blind-eye to the possession of even large quantities of cannabis. This would also imply an increase in the cannabis market size as measured by quantities supplied and demanded, if not in the number of users.[22] Finally, there is likely to be some element of 'net-widening' as emphasized in the criminology literature [Christie and Ali 2000, Warburton *et al.* 2005, May 2007a] where depenalization allows the police to formally deal with cannabis offences where previously they might have issued informal warnings. Indeed given the documented heterogeneity in behavior of individual police officers in relation to drugs policing [May 2007a], we would certainly expect some element of net-widening to occur under the LCWS. New data would be required to further probe the relative importance of these three channels.

A final alternative hypothesis that might explain some of the results related to changes in the reporting behavior of the *public*, rather than changes in the size of the market for cannabis in Lambeth. Under this hypothesis the policy might signal to the public that the police are taking cannabis crime more seriously and this causes them to be more likely or vigilant in reporting

[22]Indeed, in an MPS review of the LCWS policy, Dark and Fuller [2002] note the ambiguity officers themselves faced in regards to establishing a clear threshold for what constituted a small quantity of cannabis possessed. Christie and Ali [2000] report that in the context of depenalization in South Australia, small quantities corresponded to less than $100g$ of cannabis or $20g$ of cannabis resin.

such offences. This interpretation explains the rise in recorded cannabis crime in Table 2 if: (i) the public only respond to the announcement that the policy is being extended, not merely introduced; (ii) the reporting behavior of the public is unaffected by the policy officially ending; (iii) changes in reporting behavior occur only to crimes of cannabis possession, not cannabis supply; (iv) members of the public in neighboring boroughs become less likely to report cannabis offences post-policy. Furthermore, in the context of the framework developed, this hypothesis suggests the public believe the police place *greater* weight on drugs related crime in their objective function ($\Delta\lambda_A > 0$). If so, the clear implication is that police in Lambeth find it optimal to reallocate their effort away from other crimes towards cannabis related crime. This is contradicted by the results that follow.

5.4 The Reallocation of Police Effort Towards Other Crimes

5.4.1 Class-A Drug Crime

We next exploit crime data by *drug-type* to investigate whether the depenalization of cannabis possession in Lambeth allows the police to reallocate their effort away towards other types of drug crime. We focus on Class-A drug crime because this constitutes the bulk on non-cannabis drug crime, as Table 1 shows. That the police might be able to reallocate effort towards Class-A drugs was a key motivation leading to the introduction of Lambeth's depenalization policy. We estimate specifications analogous to (9) breaking the results down along three margins: offences for the possession of Class-A drugs, offences related to the supply of Class-A drugs, and direct measures of police behavior such as arrest rates and clear-up rates related to each type of Class-A drug offence, as proxies for $P^o_{Lambeth}(.)$. To map these results more closely to those established for cannabis crime in Lambeth in Table 3, we divide the policy period into two halves to understand the effects of depenalization on the market for Class-A drugs when it is announced as a temporary policy experiment vis-à-vis a more permanent change in policing strategy.[23]

Table 5 presents the results. Columns 1 and 2 show that during the policy period there is little discernible impact of cannabis depenalization on Class-A drug possession offences, nor on the Class-A drug supply offences. In terms of proxies of police effort towards Class-A drug crime, Columns 3 and 4 show there is no significant change in either arrest rates nor clear-up rates for Class-A drug possession offences. On the supply side, Columns 5 and 6 show that arrest and

[23]It is worth considering whether a sufficiently large number of police man-hours could have been freed up by the LCWS policy. We note that 1390 cautions were given in Lambeth for possession of cannabis during the policy period. The PRS consultancy group, which evaluated the pilot scheme at the 6 month point, estimated that for every warning given, 3 police hours were saved by avoiding custody procedures and interviewing time. This amounts to 4170 police hours saved per annum, the equivalent of 2.75 officers. The MPA stated that during the policy period, the size of the Lambeth police force was 860 officers, so the policy changed the effective police force by .3%. However, there are two reasons for this to be an underestimate of the total time that could have been reallocated. First, the MPA noted that the 3 hours per warning figure was conservative, as it "was based on the premise of an officer working alone. It took no account of the time spent transporting the arrested person to a police station and the time waiting to book them in on arrival". A later MPA report following the nationwide declassification stated the time saving was five hours dealing with cannabis arrest and two more hours operational time at police stations [Wood 2004]. Second, the figures refer to the time saved *conditional* on apprehending an individual for cannabis possession. The first order effect on police man-hours would presumably be not to search for such individuals in the first place.

clear-up rates for Class-A drug supply offence actually fall significantly for the first six months of the policy, but are not significantly different to their pre-policy levels thereafter, all else equal.

Taken together, the results shows that patterns of Class-A drugs crime in Lambeth along all three margins of offences, arrests and clear-ups, do not differ much from London-wide trends more generally. This is in sharp contrast to the previously documented effects on cannabis offences, arrests and clear-ups. There are two ways to interpret this finding. First, the police do not reallocate effort towards Class-A drug crime. Alternatively, if they do reallocate effort this way, the strength of complementarity between the two drugs markets is sufficiently high (δ_o is large) so that any increased effort towards Class-A drug crimes is completely offset by the increased number of such crimes, which is interlinked to the underlying growth in the cannabis market. However if this were truly the case then we might expect to see increases in arrest or clear-ups *per offence* for Class-A drugs, but the evidence in Table 5 suggests this does not occur.

5.4.2 Non-Drug Crime

To follow-up on this assertion and the earlier descriptive motivation given in Figure 1C, our final set of results in Table 6 explore the impact of the depenalization of cannabis possession on *non-drug* crime. Column 1 shows the short and long run policy impacts on total non-drug crime. During the policy period, total non-drug crime was not significantly different in Lambeth than other London boroughs. Remarkably, in the post-policy period, the total non-drug crime rate in Lambeth significantly fell by 11.8% more than the London-wide average. Quantitatively this translates into a large reduction in total crime in Lambeth: pre-policy, 97% of all offences in Lambeth are non-drug related.

The remaining Columns of Table 6 estimate specification (9) for each non-drug related offence type. We observe robust evidence of falls post-policy in recorded offences for *nearly all* crime types. As theory suggests, even absent spillovers between the cannabis market and other crime types ($\delta_o = 0$), depenalization reduces such crimes by freeing up police resources. Moreover, during the policy period there are rises in robbery and theft and handling. These short run rises might reflect the technology of cannabis crime – the market for cannabis might have larger spillover effects onto these crime types ($\delta_o > 0$), consistent with other evidence [Corman and Mocan 2000].[24]

To pin down whether these long run declines in non-drug crimes is due to a reallocation of police effort, Table 7 estimates the short and long run policy effects on our measures of police effort: arrests (Panel A) and clear-ups (Panel B). Column 1 in Panel A shows that arrest rates for non-drug crime *rose* significantly: the difference-in-difference estimate is 2.8% for Lambeth relative to the rest of London and the pre-policy period. Considering specific crime types, the remaining Columns highlight how in the long run there are significant increases in arrest rates for nearly all non-drug crime types. Panel B shows these higher arrest rates actually feed into higher clear-up rates, again for a broad range of crime types.

[24]This potential reallocation of police effort across crime types has been hinted at in previous studies. For example Single [1989] notes that following depenalization in California, there is some evidence that the police targeted non-cannabis crime to a greater extent.

The evidence therefore suggests a significant re-allocation of policing intensity after the introduction of the LCWS, away from cannabis crimes and towards other non-drug crimes, but not Class-A drugs crime. This reallocation appears to persist long after the LCWS officially ends, and is reflected in marked increases in arrest rates for a broad range of crime types (Table 7, Panel A) – that might itself feedback into lowering offence rates (Table 6). Finally, we note that the results presented are robust to defining arrest and clear-up rates as being per 1000 of the adult population, rather than per offences in the previous quarter. Hence these patterns in arrest and clear-up rates likely reflect real changes in police behavior rather than being driven solely by declines in the number of offences in each crime type.

5.4.3 Police Resources

An obvious concern is that these long run reductions in non-drug crime types might reflect other changes that were occurring in Lambeth rather than the longer term impacts of the depenalization policy. A leading alternative hypothesis would be that the number of police officers in Lambeth relative to the rest of London might have been rising over time. While detailed borough-month level information on police manpower or task allocations does not exist for our study period, there is evidence from MPA reports that police officer numbers in Lambeth rose in the post-policy period.[25] These suggest that in the summer of 2001 the Lambeth police were running at 11% below their budgeted workforce target, equivalent to 102 officers below strength. By January 2002 the situation had improved with an additional 43 officers in Lambeth, reducing the deficit to 6.3%.

To investigate whether this change in Lambeth can explain the differential patterns of crime documented in Table 6, we have collated the available data on annual police numbers for all 32 London boroughs from 1997 to 2010. This shows that police numbers certainly rose in Lambeth rose during and after the policy – between 2001 and 2006, police numbers increased by 20.5% in Lambeth. However, this pattern is by no means exceptional to Lambeth. Over the same period, the police numbers for London as a whole rose by 22.7%, slightly more than in Lambeth. This suggests changing police strength in Lambeth vis-à-vis other London boroughs is unlikely to explain the large reductions in non-drug crime documented.[26]

A second way to understand whether changing police numbers might plausibly explain the documented impact on non-drugs crime is to use estimates from the literature on the elasticity of crime with respect to police strength. In this setting, the estimates provided by Draca *et al.* [2010] are perhaps most informative. They use the exogenous shift in police deployment following the July 2005 terror attacks in London to estimate an elasticity of crime with respect to police numbers to be around -0.3. For the LCWS, over the post-policy period from January 2002 to March 2006, police numbers in Lambeth increased by 13.2%. Hence using the elasticity estimate from Draca *et al.* [2010] and our regression coefficient, this should have led to a 4% drop in non-drugs crime. This is less than half the actual long run fall in non-drug crime we find of 11.8%.

[25] Source: http://www.mpa.gov.uk/committees/mpa/2002/020926/17/

[26] We have probed this time series on police numbers by borough-year to understand what drives changes in police strength. This suggests that police numbers track the borough population with some lag.

6 Discussion

We 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. Theory suggests such a policy will: (i) impact the size of the market for cannabis in Lambeth as well as neighboring boroughs as drug users move to Lambeth to purchase cannabis; (ii) allow the police to reallocate effort towards other types of crime. We investigate whether such changing crime patterns are observed during and after the depenalization policy is introduced in Lambeth using administrative records on criminal offences by drug type, by specific drug offences that proxy demand and supply side criminal activities, and for seven types of non-drug crime. We find that depenalization in Lambeth led to an increase in cannabis possession offences that persisted well after the policy experiment ended. Half of the increase is attributable to drugs tourism into Lambeth from neighboring boroughs. We find little evidence that the policy causes the police to reallocate effort towards Class-A drug crime, but we do find evidence that the police in Lambeth reallocate their effort towards non-drug crime: there are significant long run reductions in five non-drug crime types, and significant improvements in police effectiveness against such crimes as measured by arrest and clear-up rates.

Our analysis has been guided by a conceptual framework that emphasizes how the behavioral response of police, users and suppliers all need to be accounted for, to properly interpret the evidence. While the model highlights multiple channels through which a depenalization of cannabis affects crime patterns, it still leaves open many areas for future research on how illicit drug policy affects the behavior of users, suppliers and the police. On drug users, outstanding issues relate to whether drug policies influence some individuals to start consuming illicit drugs or change the quantities consumed among existing users; on drug suppliers, research on how drug policies change the organization of criminal activity remains scarce; and on police behavior, much remains to be understood regarding the specifics of how police reallocate time and tasks in response to drug policies, and the extent to which police across jurisdictions coordinate strategies.

The detailed and nuanced results we provide give important insights for the policy debate on the regulation of illicit drugs markets, especially by providing a comprehensive review of the impact of depenalization on crime along three margins: drug and non-drug crimes, the location of crimes, and the short and long run policy responses. Our findings are relevant for other settings given the depenalization policy we study reflects how liberal drugs policies have been implemented by many other countries [Donohue *et al.* 2011].

Understanding the *welfare* consequences of drug policy is important given the large numbers of illicit drug users around the world, the majority of whom consume cannabis. Theoretical arguments exist for and against liberalized regulation of illicit drugs [Glaeser and Shleifer 2001, Becker *et al.* 2006], and Miron [2010] provides estimates of the budgetary consequences of liberalizing drug policy in the US. To provide a final contribution to this strand of literature, we conclude our analysis by presenting suggestive evidence on the welfare effects of the depenalization policy we have studied. These welfare effects are *a priori* ambiguous because on the one hand depenalization

led to an increase in cannabis offences, but on the other hand many other types of crime were reduced, and indeed total crime overall fell. We therefore estimate the impact of the depenalization of cannabis possession on house prices following the intuition that the total social cost of depenalization (not just those arising from crime) should be reflected in house prices [Rosen 1974].

To do so we exploit information at the zip code level on house prices to estimate a specification analogous to (9). The unit of observation is zip code sector s in quarter q in year y, where we note that zip code sectors are *within* borough. This allows us to later explore whether and how the effects of depenalization affect house prices *within* Lambeth. To begin with we estimate a panel data specification of the form,

$$\begin{aligned} \ln h_{sqy} &= \beta_0 P_{qy} + \beta_1 \left[L_b \times P_{qy}\right] + \beta_2 PP_{qy} + \beta_3 \left[L_b \times PP_{qy}\right] \\ &\quad + \gamma X_{bqy} + \lambda_s + \lambda_q + \lambda_y + u_{sqy}, \end{aligned} \tag{11}$$

where h_{sqy} is the mean house price sale for terraced houses in zip code sector s in quarter q in year y, deflated to 1995 Q1 prices;[27] P_{qy}, PP_{qy} are dummies for the policy and post-policy periods respectively; L_b is a dummy for whether the zip code sector is in Lambeth. To reflect the lag between house buying decisions and recorded house sales, all time-vary explanatory variables are lagged by one quarter. In X_{bqy} we continue to control for socio-demographic and police operation controls, as in (9). We also allow for borough specific time trends ($\lambda_b \times qy$) to capture common house price movements, and control for fixed effects for zip code, quarter, and year. The sample runs from January 1995 until December 2005, standard errors are clustered at the zip code-sector level, and observations are weighted by the numbers of terraced house sales in the zip code-sector during the quarter.

Table 8 reports the results. Column 1 shows that in the long run after the LCWS is introduced, house prices fall by 6.1% more in Lambeth relative the London wide average. Column 2 shows the effect to be robust to controlling for borough specific linear time trends. The negative effects on house prices in the long run exist despite the overall *falls in total crime* experienced in Lambeth post-policy. Lambeth residents might either place disproportionate weight on cannabis related crime relative to all other crimes, or there might exist other social costs beyond crime, that make the neighborhood less desirable once the market for cannabis expands.

As house price data is available by zip-code, the remaining specifications examine whether there are heterogeneous effects of depenalization on house prices *within* Lambeth, depending on the location of drugs crime. To do so we identify which zip-code sectors within each borough have higher than median drugs crime rates and define these to be drugs crime 'hot-spots'. We then

[27] The house price data cover 25 of the 32 boroughs used for the crime analysis. The boroughs not covered are Barking and Dagenham, Bexley, Harrow, Havering, Hillingdon, Kingston-upon-Thames and Sutton. There are 509 distinct zip codes in the final sample, with an average of 25.3 zip codes per borough, and 33 zip codes in Lambeth. House prices are deflated to the first quarter of 1995 prices, using the Land Registry house price index for Greater London, which is based on repeat sales (see http://www1.landregistry.gov.uk/houseprices/housepriceindex/.) House price information is available for terraced houses, detached, semi-detached, and flats/maisonettes. We drop zip code sectors that have the lowest 10% of house sales, as these are unlikely to correspond to residential neighborhoods. The reported results are robust to dropping zip codes that straddle borough boundaries.

explore whether house prices vary differentially within borough between hot-spots and non-hot-spots, and whether this difference in Lambeth differs from other boroughs over time.[28]

Column 3 shows that all of the long run negative effect of depenalization on house prices within Lambeth occurs in these drug crime hot-spot zip codes, and the magnitude of the fall, at -13.9%, is significantly larger than in previous all-Lambeth estimates. Indeed, there is *no* significant effect of depenalization on house prices on non hot-spot zip codes in Lambeth.[29] Hot-spot areas in other boroughs appear to have positive and significant house price rises, consistent with there being convergence in house prices across neighborhoods. In high crime neighborhoods, a greater proportion of property sales might relate to flats and maisonettes, rather than terraced houses. Hence it is reassuring to find the triple-difference estimates to be very similar for such properties, as Column 4 shows. Finally, in Column 5 we explore how house prices for terraced houses change in neighboring boroughs. In contrast to Lambeth, we find that house prices in hot-spot zip codes in neighbors to Lambeth do not decline relatively more than other areas in neighboring boroughs. This might reflect that the drugs tourism documented earlier originates from drugs crime hot-spots in neighboring boroughs.

These results suggest that for local residents, the total social effects of depenalization, comprising the documented impact on crime and potentially other effects such as alcohol use and visible anti-social behaviors, reduce the willingness to pay to reside in these neighborhoods and increase within borough inequality in house prices between high and low crime zip codes. These are important channels through which the effects of depenalization might operate in the long run [Miron and Zweibel 1995], and that we are investigating in ongoing research.[30]

A Appendix

A.1 Proofs

Proof of Result 1a: The indirect mechanical effect operating through changes in cannabis related police intensity in borough A is determined by totally differentiating (7),

$$\frac{dP_A^d}{d\delta_{d(A)}} = -\frac{\alpha_A \lambda_A}{6t(1-\lambda_A)e''(P-P_A^d) + \lambda_A e''(P_A^d)} > 0. \tag{12}$$

[28] A caveat to the definition of hot-spot that we use is that it is based on data published in 2008/9. Only for these most recent years does the MPA publish detailed crime statistics by ward, which are areas within a borough and can be readily matched to zip code sectors. Hence in using this *ex post* definition of hot-spots we are implicitly assuming the location of crime within a borough does not vary over time. Over the time period for which such ward level crime data is available, we do not find much evidence that hot-spots change over time.

[29] May *et al.* [2007b] provide detailed descriptive evidence on drug dealing in Brixton: a hot spot area in our definition covering more than one zip code, and the most important commercial centre in Lambeth. They describe the geography of drugs crime in Brixton, how it affects other crimes.

[30] On hospital admissions, Model [1993] explores the effect decriminalizing cannabis in 12 US states between 1973 and 1978 had on hospital emergency room drug episodes. He finds evidence that decriminalization was accompanied by a significant reduction in episodes involving drugs other than marijuana and an increase in marijuana episodes suggesting consumers substitute towards the less severely penalized drug. There is mixed evidence on whether alcohol and cannabis are substitutes for young individuals: DiNardo and Lemieux [2001] and Conlin *et al.* [2005] present evidence they are substitutes, while Pacula [1998] finds them to be complements.

As total resources P are unchanged, police intensity related to other crime types, $P_A^o = P - P_A^d$, necessarily increases. The mechanical effect of depenalization on drugs crime in borough A is,

$$\frac{dC_A^d}{d\delta_{d(A)}} = D_A(.) + \delta_d \frac{\partial D_A}{\partial P_A^d}\frac{\partial P_A^d}{\partial \delta_{d(A)}} - e'(P_A^d)\frac{\partial P_A^d}{\partial \delta_{d(A)}} = D_A(.) - \left[\delta_{d(A)}\frac{\alpha_A}{6t} + e'(P_A^d)\right]\frac{\partial P_A^d}{\partial \delta_d}. \tag{13}$$

The first term captures the positive direct effect, the second term captures the offsetting indirect effect, and the overall effect cannot be signed. To see the effect on Class-A drugs crimes,

$$\frac{dC_A^o}{d\delta_{d(A)}} = \delta_o\left[\frac{\partial D_A}{\partial P_A^d}\frac{\partial P_A^d}{\partial \delta_{d(A)}}\right] + e'(P - P_A^d)\frac{\partial P_A^d}{\partial \delta_{d(A)}} = \left[-\delta_o\frac{\alpha_A}{6t} + e'(P - P_A^d)\right]\frac{\partial P_A^d}{\partial \delta_{d(A)}}, \tag{14}$$

which is also of ambiguous sign. If $\delta_o = 0$ so there are no spillover effects of the cannabis market to Class-A drug crime, then $\frac{dC_A^o}{d\delta_{d(A)}} > 0$ and the mechanical effect of depenalization causes Class-A drug crime to necessary fall.■

Proof of Result 1b: Totally differentiating (7) we see that a weakened incarceration effect in borough A due to depenalization, changes cannabis related policing intensity as follows,

$$\frac{dP_A^d}{d\alpha_A} = -\frac{\lambda_b\delta_{d(A)} + (1-\lambda_b)\delta_o}{6t(1-\lambda_A)e''(P - P_A^d) + \lambda_A e''(P_A^d)} > 0. \tag{15}$$

To calculate the overall incarceration effect of depenalization, note that α_A has a direct effect on the equilibrium cannabis market size in borough A and an effect through police intensity,

$$\frac{dC_A^d}{d\alpha_A} = \delta_{d(A)}\left[\frac{\partial D_A}{\partial \alpha_A} + \frac{\partial D_A}{\partial P_A^d}\frac{\partial P_A^d}{\partial \alpha_A}\right] - e'(P_A^d)\frac{\partial P_A^d}{\partial \alpha_A} = -\delta_{d(A)}\left[\frac{P_A^d}{6t} + \frac{\alpha_A}{6t}\frac{\partial P_A^d}{\partial \alpha_A}\right] - e'(P_A^d)\frac{\partial P_A^d}{\partial \alpha_A} < 0. \tag{16}$$

Hence the incarceration effect leads to an unambiguous increase in cannabis crime in borough A. To see the effect on Class-A drug crime,

$$\frac{dC_A^o}{d\alpha_A} = -\delta_o\left[\frac{P_A^d}{6t} + \frac{\alpha_A}{6t}\frac{\partial P_A^d}{\partial \alpha_A}\right] + e'(P - P_A^d)\frac{\partial P_A^d}{\partial \alpha_A}, \tag{17}$$

which is of ambiguous sign because the first term is negative and the second term is positive. In the extreme case of $\delta_o = 0$, $\frac{dC_A^o}{d\alpha_A} > 0$ and the incarceration effect, like the mechanical effect, cause Class-A drugs crimes to fall.■

Proof of Result 1c: Totally differentiating (7), a weakened deterrence effect in borough A changes cannabis related policing intensity in the same direction as the incarceration effect,

$$\frac{dP_A^d}{d\lambda_A} = -\frac{\alpha_A\left(\delta_{d(A)} - \delta_o\right) + [e'(P - P_A^d) + e'(P_A^d)]}{6t(1-\lambda_A)e''(P - P_A^d) + \lambda_A e''(P_A^d)} > 0. \tag{18}$$

This channel only affects cannabis related crimes through the change in police intensity so,

$$\frac{dC_A^d}{d\lambda_A} = \delta_{d(A)}\frac{\partial D_A}{\partial P_A^d}\frac{\partial P_A^d}{\partial \lambda_A} - e'(P_A^d)\frac{\partial P_A^d}{\partial \lambda_A} = \left[-\delta_{d(A)}\frac{\alpha_A}{6t} - e'(P_A^d)\right]\frac{\partial P_A^d}{\partial \lambda_A} < 0. \tag{19}$$

Hence the deterrence effect leads to an unambiguous increase in cannabis rime in borough A. To see the effect on Class-A drug crime,

$$\frac{dC_A^o}{d\lambda_A} = \delta_o \left[\frac{\partial D_A}{\partial P_A^d}\frac{\partial P_A^d}{\partial \lambda_A}\right] + e'(P - P_A^d)\frac{\partial P_A^d}{\partial \lambda_A} = \left[-\delta_o \frac{\alpha_A}{6t} + e'(P - P_A^d)\right]\frac{\partial P_A^d}{\partial \lambda_A}, \tag{20}$$

which is of ambiguous sign. In the extreme case where $\delta_o = 0$, $\frac{dC_A^o}{d\lambda_A} > 0$ and like the other effects, the deterrence effect causes Class-A drug crime to fall.■

Proof of Result 2: To see the effects of a local depenalization in borough A on crime in borough B, we note first that from the first order condition (7), drug related police intensity in B is independent of the key parameters in borough A: α_A, λ_A. Hence we see that (7) for borough B also does not depend on $\delta_{d(A)}$. Hence considering first the mechanical effect, the spillover effect on cannabis crime in borough B is,

$$\frac{dC_B^d}{d\delta_{d(A)}} = \delta_{d(B)}\frac{\partial D_B}{\partial P_B^d}\frac{\partial P_B^d}{\partial \delta_{d(A)}} = 0, \tag{21}$$

because the final term is zero. In contrast, the incarceration and deterrence effects in borough A do cause drugs tourism and have spillover effects on cannabis crime in neighboring borough B,

$$\begin{aligned}
\frac{dC_B^d}{d\alpha_A} &= \delta_{d(B)}\left[\frac{\partial D_B}{\partial \alpha_A} + \frac{\partial D_B}{\partial P_A^d}\frac{\partial P_A^d}{\partial \alpha_A}\right] = \delta_{d(B)}\frac{P_A^d}{6t} > 0, \\
\frac{dC_B^d}{d\lambda_A} &= \delta_{d(B)}\left[\frac{\partial D_B}{\partial P_A^d}\frac{\partial P_A^d}{\partial \lambda_A}\right] = \delta_{d(B)}\left[\frac{\alpha_A}{6t}\frac{\partial P_A^d}{\partial \lambda_A}\right] > 0.
\end{aligned} \tag{22}$$

Hence cannabis crimes are reduced in the neighboring borough, through changes in the equilibrium market sizes for cannabis across boroughs.■

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Table 1: Detailed Drug Offences, Pre-policy Period

Means and standard deviations in parentheses

	(1) Lambeth	(2) Other London Boroughs (excluding neighbors to Lambeth)
A. Total		
Total drugs offences per 1000 of adult population	.608	.403
	(.124)	(.296)
B. Drug Type		
Share of drugs offences related to Class-A drugs	.344	.209
	(.054)	(.110)
Share of drug offences relating to any cannabis offences	.600	.730
	(.052)	(.111)
Share of drugs offences related to Class-B drugs (including cannabis)	.628	.765
	(.057)	(.113)
Share of drugs offences related to Class-C drugs	.002	.004
	(.005)	(.010)
C. Cannabis Offences Breakdown		
Share of cannabis offences relating to having possession of cannabis	.907	.917
	(.044)	(.056)
Share of cannabis offences relating to having possession of cannabis with intent to supply	.055	.050
	(.031)	(.043)
Share of cannabis offences relating to production/being concerned in production of cannabis	.015	.013
	(.016)	(.022)
Share of cannabis offences relating to supply or offer to supply cannabis	.022	.019
	(.023)	(.027)

Notes: The pre-policy period runs from April 1998 until June 2001. Other London boroughs are all London boroughs excluding Lambeth and its neighboring boroughs (Croydon, Merton, Southwark and Wandsworth). Standard deviations are in parentheses. Class-A drugs are cocaine, crack, crystal-meth, Heroin, LSD, MDMA and methadone; Class-B drugs are amphetamines and cannabis (in the pre-policy period); Class-C drugs are anabolic steroids, GHB and ketamine.

Table 2: The Effect of the Depenalization on Cannabis Offences in Aggregate

Dependent Variable: Log (total recorded cannabis offences, per 1000 of adult population)

	(1) Fixed Effects	(2) Baseline	(3) Borough Specific Linear Time Trend	(4) Borough Specific Quadratic Time Trend	(5) Within Policy Dynamics
Lambeth x Policy Period	.135***	.107***	.086*	.077	
	(.037)	(.037)	(.045)	(.047)	
Policy Period	-.005	-.010	-.009	.003	-.006
	(.016)	(.014)	(.014)	(.012)	(.014)
Lambeth x Post-Policy Period	.242***	.210***	.185***	.183***	.221***
	(.028)	(.029)	(.061)	(.060)	(.025)
Post-Policy Period	.001	-.018	-.015	-.007	-.011
	(.023)	(.022)	(.022)	(.019)	(.022)
Lambeth x Policy Period [1-6 months]					.026
					(.042)
Lambeth x Policy Period [7-13 months]					.187***
					(.041)
Borough, Month, Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Socio-demographic Controls	No	Yes	Yes	Yes	Yes
Police Operation Controls	No	Yes	Yes	Yes	Yes
Observations	2632	2632	2632	2632	2632

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the borough-month-year level. The sample period runs from April 1998 until January 2006. Control boroughs are all other London boroughs, excluding Lambeth's neighbours (Croydon, Merton, Southwark and Wandsworth). Panel corrected standard errors are calculated using a Prais-Winsten regression, where a borough specific AR(1) process is assumed. This also allows the error terms to be borough specific heteroskedastic, and contemporaneously correlated across boroughs. Observations are weighted by the share of the total (excluding neighbouring boroughs) London population that month-year in the borough. The policy period dummy variable is equal to one from July 2001 until July 2002, and zero otherwise. The post-policy period dummy variable is equal to one from July 2002 onwards, and zero otherwise. Column 1 only additionally controls for borough, month and year fixed effects. In Column 2 onwards, the following socio-demographic control variables, measured in logs, are controlled for at the borough-month-year level: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged between 25 to 34, aged between 35 to 49, aged above 50, and the male unemployment rate, and a dummy for the change in crime recording rules from April 2002 onwards. In Column 2 onwards, the police operation controls variables are indicators for whether the borough was part of a recent Police Operation. Operations that targeted a group of specific boroughs include the Safer Streets Initiative Phase 1 (04/02/2002 – 31/03/2002) and Phase 2 (15/04/2002 – 31/03/2003), Operation Recover (10/2005-17/12/2007), Operation Blunt 1 (11/2004-11/2005),Operation Safer Homes (28/10/2002-06/2004) and Operation Solstice (01/12/2003-08/12/2003). Lambeth was part of Safer Streets Phase 1 and 2, and Blunt 1. Further operations (past of a larger operation named Strongbox) that targeted single boroughs include Operation Windmill (Lambeth: 08/05/1999-02/07/1999), Operation Empire (Hackney: 17/07/1999-10/09/1999), Operation Regis (Camden, Islington: 02/10/1999-03/12/1999), Operation Victory (Westminster: 22/01/2001-18/03/2001), Operation Castille (Haringey: 17/04/2001-10/06/2001), Operation Claymoor (Brent: 16/07/2001-09/09/2001) and Operation Sabre (Tower Hamlets: 17/09/2001-09/12/2001). Column 3 (4) additionally controls for a borough specific linear (quadratic) time trend.

Table 3: The Effect of the Depenalization on Cannabis Related Crime in Detail

Crime Series:	Offences		Arrests	Clear-ups	Arrests	Clear-ups
Offence Type:	**(1) Cannabis Possession**	**(2) Cannabis Supply**	**(3) Cannabis Possession**	**(4) Cannabis Possession**	**(5) Cannabis Supply**	**(6) Cannabis Supply**
Lambeth x Policy Period [1-6 months]	.021	.007	-.202**	-.527***	-.091	-.093
	(.040)	(.012)	(.079)	(.119)	(.085)	(.092)
Lambeth x Policy Period [7-13 months]	.187***	.012	-.365***	-.502***	-.068	-.054
	(.040)	(.011)	(.075)	(.118)	(.080)	(.086)
Policy Period	-.003	-.002	.042	.027	.017	-.004
	(.014)	(.002)	(.065)	(.066)	(.035)	(.029)
Lambeth x Post-Policy Period	.213***	.027***	-.040	-.207***	.017	.067
	(.024)	(.007)	(.044)	(.078)	(.047)	(.050)
Post-Policy Period	-.002	-.006**	.091	.071	.019	-.026
	(.021)	(.003)	(.102)	(.103)	(.055)	(.046)
Borough, Month, Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Socio-demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Police Operation Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2632	2632	2632	2632	2631	2631

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the borough-month-year level. The sample period runs from April 1998 until January 2006. Control boroughs are all other London boroughs, excluding Lambeth's neighbours (Croydon, Merton, Southwark and Wandsworth). The dependent variable in Columns 1 and 2 is the log of the number of offences for each offence type, per 1000 of the adult population. The dependent variable in Columns 3 and 5 is the arrest rate for each offence type, defined as the log of the number of arrests divided by the number of offences in the borough in the same month and previous quarter. The dependent variable in Columns 4 and 6 is the clear-up rate for each offence type, defined as the log of the number of clear-ups divided by the number of offences in the borough in the same month and previous quarter. In Columns 1, 3 and 4 the offence type relates to cannabis possession. In Columns 2, 5 and 6 the offence type is the sum of all offences related to cannabis supply including: possession with intent, possession on a ship, production, supply, unlawful export, unlawful import, carrying on a ship, inciting others to supply, manufacture, and money laundering. Panel corrected standard errors are calculated using a Prais-Winsten regression, where a borough specific AR(1) process is assumed. This also allows the error terms to be borough specific heteroskedastic, and contemporaneously correlated across boroughs. Observations are weighted by the share of the total (excluding neighbouring boroughs) London population that month-year in the borough. The policy period dummy variable is equal to one from July 2001 until July 2002, and zero otherwise. The post-policy period dummy variable is equal to one from July 2002 onwards, and zero otherwise. The following socio-demographic control variables, measured in logs, are controlled for at the borough-month-year level: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged between 25 to 34, aged between 35 to 49, aged above 50, and the male unemployment rate, and a dummy for the change in crime recording rules from April 2002 onwards. The police operation controls variables are indicators for whether the borough was part of a recent Police Operation. Operations that targeted a group of specific boroughs include the Safer Streets Initiative Phase 1 (04/02/2002 – 31/03/2002) and Phase 2 (15/04/2002 – 31/03/2003), Operation Recover (10/2005-17/12/2007), Operation Blunt 1 (11/2004-11/2005),Operation Safer Homes (28/10/2002-06/2004) and Operation Solstice (01/12/2003-08/12/2003). Lambeth was part of Safer Streets Phase 1 and 2, and Blunt 1. Further operations (past of a larger operation named Strongbox) that targeted single boroughs include Operation Windmill (Lambeth: 08/05/1999-02/07/1999), Operation Empire (Hackney: 17/07/1999-10/09/1999), Operation Regis (Camden, Islington: 02/10/1999-03/12/1999), Operation Victory (Westminster: 22/01/2001-18/03/2001), Operation Castille (Haringey: 17/04/2001-10/06/2001), Operation Claymoor (Brent: 16/07/2001-09/09/2001) and Operation Sabre (Tower Hamlets: 17/09/2001-09/12/2001).

Table 4: The Effect of the Depenalization of Cannabis on Boroughs Neighboring Lambeth

Crime Series:	Offences		Arrests	Clear-ups	Arrests	Clear-ups
Offence Type:	**(1) Cannabis Possession**	**(2) Cannabis Supply**	**(3) Cannabis Possession**	**(4) Cannabis Possession**	**(5) Cannabis Supply**	**(6) Cannabis Supply**
Lambeth x Policy Period	.107***	.010	-.288***	-.089	-.514***	-.081
	(.036)	(.009)	(.062)	(.064)	(.099)	(.069)
Policy Period	-.008	-.002	.045	.012	.027	-.015
	(.013)	(.002)	(.065)	(.033)	(.065)	(.027)
Lambeth x Post-Policy Period	.208***	.028***	-.040	.012	-.211***	.060
	(.028)	(.006)	(.046)	(.047)	(.080)	(.050)
Post-Policy Period	-.011	-.006**	.092	.019	.066	-.028
	(.020)	(.003)	(.102)	(.051)	(.103)	(.042)
Neighboring Borough x Policy Period	-.009	-.003	-.007	.001	.007	-.016
	(.016)	(.002)	(.021)	(.069)	(.021)	(.057)
Neighboring Borough x Post-Policy Period	-.030**	.000	.000	.025	.002	.020
	(.013)	(.002)	(.015)	(.048)	(.015)	(.040)
Borough, Month, Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Socio-demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Police Operation Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3008	3008	3008	3007	3008	3007

Notes*** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the borough-month-year level. The sample period runs from April 1998 until January 2006. The sample is larger than in the previous tables because it includes Lambeth's neighbours (Croydon, Merton, Southwark and Wandsworth). The dependent variable in Columns 1 and 2 is the log of the number of offences for each offence type, per 1000 of the adult population. The dependent variable in Columns 3 and 5 is the arrest rate for each offence type, defined as the log of the number of arrests divided by the number of offences in the borough in the same month and previous quarter. The dependent variable in Columns 4 and 6 is the clear-up rate for each offence type, defined as the log of the number of clear-ups divided by the number of offences in the borough in the same month and previous quarter. In Columns 1, 3 and 4 the offence type relates to cannabis possession. In Columns 2, 5 and 6 the offence type is the sum of all offences related to cannabis supply including: possession with intent, possession on a ship, production, supply, unlawful export, unlawful import, carrying on a ship, inciting others to supply, manufacture, and money laundering. Panel corrected standard errors are calculated using a Prais-Winsten regression, where a borough specific AR(1) process is assumed. This also allows the error terms to be borough specific heteroskedastic, and contemporaneously correlated across boroughs. Observations are weighted by the share of the total (excluding neighbouring boroughs) London population that month-year in the borough. The policy period dummy variable is equal to one from July 2001 until July 2002, and zero otherwise. The post-policy period dummy variable is equal to one from July 2002 onwards, and zero otherwise. The following socio-demographic control variables, measured in logs, are controlled for at the borough-month-year level: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged between 25 to 34, aged between 35 to 49, aged above 50, and the male unemployment rate, and a dummy for the change in crime recording rules from April 2002 onwards. The police operation controls variables are indicators for whether the borough was part of a recent Police Operation. Operations that targeted a group of specific boroughs include the Safer Streets Initiative Phase 1 (04/02/2002 – 31/03/2002) and Phase 2 (15/04/2002 – 31/03/2003), Operation Recover (10/2005-17/12/2007), Operation Blunt 1 (11/2004-11/2005),Operation Safer Homes (28/10/2002-06/2004) and Operation Solstice (01/12/2003-08/12/2003). Lambeth was part of Safer Streets Phase 1 and 2, and Blunt 1. Further operations (past of a larger operation named Strongbox) that targeted single boroughs include Operation Windmill (Lambeth: 08/05/1999-02/07/1999), Operation Empire (Hackney: 17/07/1999-10/09/1999), Operation Regis (Camden, Islington: 02/10/1999-03/12/1999), Operation Victory (Westminster: 22/01/2001-18/03/2001), Operation Castille (Haringey: 17/04/2001-10/06/2001), Operation Claymoor (Brent: 16/07/2001-09/09/2001) and Operation Sabre (Tower Hamlets: 17/09/2001-09/12/2001).

Table 5: The Effect of the Depenalization on Class-A Drugs Related Crime in Detail

Crime Series:	Offences		Arrests	Clear-ups	Arrests	Clear-ups
Offence Type:	**(1) Class-A Drugs Possession**	**(2) Class-A Drugs Supply**	**(3) Class-A Drugs Possession**	**(4) Class-A Drugs Possession**	**(5) Class-A Drugs Supply**	**(6) Class-A Drugs Supply**
Lambeth x Policy Period [1-6 months]	-.013	-.014	-.009	.002	-.199**	-.165*
	(.014)	(.019)	(.053)	(.052)	(.095)	(.090)
Lambeth x Policy Period [7-13 months]	-.001	-.007	-.047	-.053	.068	.055
	(.013)	(.018)	(.053)	(.053)	(.089)	(.084)
Policy Period	-.009***	.007	.027	.026	-.009	-.003
	(.003)	(.005)	(.064)	(.062)	(.059)	(.054)
Lambeth x Post-Policy Period	.020***	-.015	-.015	-.014	-.078	-.018
	(.007)	(.010)	(.030)	(.029)	(.053)	(.049)
Post-Policy Period	-.007	.006	.102	.103	.005	-.028
	(.005)	(.008)	(.102)	(.098)	(.092)	(.084)
Borough, Month, Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Socio-demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Police Operation Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2632	2632	2632	2632	2630	2630

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the borough-month-year level. The sample period runs from April 1998 until January 2006. Control boroughs are all other London boroughs, excluding Lambeth's neighbours (Croydon, Merton, Southwark and Wandsworth). Class-A drugs are cocaine, crack, crystal-meth, Heroin, LSD, MDMA and methadone. The dependent variable in Columns 1 and 2 is the log of the number of offences for each offence type, per 1000 of the adult population. The dependent variable in Columns 3 and 5 is the arrest rate for each offence type, defined as the log of the number of arrests divided by the number of offences in the borough in the same month and previous quarter. The dependent variable in Columns 4 and 6 is the clear-up rate for each offence type, defined as the log of the number of clear-ups divided by the number of offences in the borough in the same month and previous quarter. In Columns 1, 3 and 4 the offence type relates to possession of Class-A drugs. In Columns 2, 5 and 6 the offence type is the sum of all offences related to Class-A drugs supply including: possession with intent, possession on a ship, production, supply, unlawful export, unlawful import, carrying on a ship, inciting others to supply, manufacture, and money laundering. Panel corrected standard errors are calculated using a Prais-Winsten regression, where a borough specific AR(1) process is assumed. This also allows the error terms to be borough specific heteroskedastic, and contemporaneously correlated across boroughs. Observations are weighted by the share of the total (excluding neighbouring boroughs) London population that month-year in the borough. The policy period dummy variable is equal to one from July 2001 until July 2002, and zero otherwise. The post-policy period dummy variable is equal to one from July 2002 onwards, and zero otherwise. The following socio-demographic control variables, measured in logs, are controlled for at the borough-month-year level: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged between 25 to 34, aged between 35 to 49, aged above 50, and the male unemployment rate, and a dummy for the change in crime recording rules from April 2002 onwards. The police operation controls variables are indicators for whether the borough was part of a recent Police Operation. Operations that targeted a group of specific boroughs include the Safer Streets Initiative Phase 1 (04/02/2002 – 31/03/2002) and Phase 2 (15/04/2002 – 31/03/2003), Operation Recover (10/2005-17/12/2007), Operation Blunt 1 (11/2004-11/2005),Operation Safer Homes (28/10/2002-06/2004) and Operation Solstice (01/12/2003-08/12/2003). Lambeth was part of Safer Streets Phase 1 and 2, and Blunt 1. Further operations (past of a larger operation named Strongbox) that targeted single boroughs include Operation Windmill (Lambeth: 08/05/1999-02/07/1999), Operation Empire (Hackney: 17/07/1999-10/09/1999), Operation Regis (Camden, Islington: 02/10/1999-03/12/1999), Operation Victory (Westminster: 22/01/2001-18/03/2001), Operation Castille (Haringey: 17/04/2001-10/06/2001), Operation Claymoor (Brent: 16/07/2001-09/09/2001) and Operation Sabre (Tower Hamlets: 17/09/2001-09/12/2001).

Table 6: The Effect of the Depenalization on Non-Drug Related Crime

Dependent Variable: Log (recorded offences of a given type, per 1000 of adult population)

Crime Type:	(1) Total (without drugs)	(2) Violence Against the Person	(3) Sexual	(4) Robbery	(5) Burglary	(6) Theft and Handling	(7) Fraud or Forgery	(8) Criminal Damage
Lambeth x Policy Period	.017	.001	-.012	.101**	.004	.057**	-.077*	-.022
	(.028)	(.026)	(.014)	(.051)	(.042)	(.028)	(.043)	(.029)
Policy Period	.015	.000	.006	.018	.016	.035*	-.015	-.004
	(.022)	(.018)	(.004)	(.015)	(.015)	(.021)	(.031)	(.017)
Lambeth x Post-Policy Period	-.118***	-.025	-.007	-.107**	-.180***	-.082***	-.185***	-.064***
	(.025)	(.022)	(.010)	(.044)	(.033)	(.024)	(.032)	(.022)
Post-Policy Period	-.003	-.000	.004	.007	-.023	.030	-.029	-.024
	(.032)	(.027)	(.007)	(.023)	(.022)	(.031)	(.048)	(.026)
Share of All Offences Pre-policy	.969	.157	.010	.075	.133	.379	.083	.131
Borough, Month, Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Socio-demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Police Operation Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2632	2632	2632	2632	2632	2632	2632	2632

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the borough-month-year level. The sample period runs from April 1998 until January 2006. Control boroughs are all other London boroughs, excluding Lambeth's neighbours (Croydon, Merton, Southwark and Wandsworth). In Column 1 the dependent variable is the log of the number of all non-drugs related crime per 1000 of the adult population. Panel corrected standard errors are calculated using a Prais-Winsten regression, where a borough specific AR(1) process is assumed. This also allows the error terms to be borough specific heteroskedastic, and contemporaneously correlated across boroughs. Observations are weighted by the share of the total (excluding neighbouring boroughs) London population that month-year in the borough. The policy period dummy variable is equal to one from July 2001 until July 2002, and zero otherwise. The post-policy period dummy variable is equal to one from July 2002 onwards, and zero otherwise. The following socio-demographic control variables, measured in logs, are controlled for at the borough-month-year level: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged between 25 to 34, aged between 35 to 49, aged above 50, and the male unemployment rate, and a dummy for the change in crime recording rules from April 2002 onwards. The police operation controls variables are indicators for whether the borough was part of a recent Police Operation. Operations that targeted a group of specific boroughs include the Safer Streets Initiative Phase 1 (04/02/2002 – 31/03/2002) and Phase 2 (15/04/2002 – 31/03/2003), Operation Recover (10/2005-17/12/2007), Operation Blunt 1 (11/2004-11/2005),Operation Safer Homes (28/10/2002-06/2004) and Operation Solstice (01/12/2003-08/12/2003). Lambeth was part of Safer Streets Phase 1 and 2, and Blunt 1. Further operations (past of a larger operation named Strongbox) that targeted single boroughs include Operation Windmill (Lambeth: 08/05/1999-02/07/1999), Operation Empire (Hackney: 17/07/1999-10/09/1999), Operation Regis (Camden, Islington: 02/10/1999-03/12/1999), Operation Victory (Westminster: 22/01/2001-18/03/2001), Operation Castille (Haringey: 17/04/2001-10/06/2001), Operation Claymoor (Brent: 16/07/2001-09/09/2001) and Operation Sabre (Tower Hamlets: 17/09/2001-09/12/2001). At the foot of the table we show the proportion of all criminal offences (drug and non-drug related) that each category makes up in the pre-policy period in Lambeth from April 1998 until June 2001.

Table 7: The Effect of the Depenalization on Police Effort on Non-Drug Crime

A. Dependent Variable: Log (arrest rate for a given crime category)

Crime Type:	(1) Total (without drugs)	(2) Violence Against the Person	(3) Sexual	(4) Robbery	(5) Burglary	(6) Theft and Handling	(7) Fraud or Forgery	(8) Criminal Damage
Lambeth x Policy Period	-.002	.028	.029	.040**	-.024	-.008	.003	-.008
	(.007)	(.017)	(.041)	(.018)	(.020)	(.005)	(.016)	(.010)
Policy Period	-.003	.001	.020	-.004	.011	-.003	.009	-.007
	(.008)	(.028)	(.018)	(.011)	(.009)	(.005)	(.011)	(.006)
Lambeth x Post-Policy Period	.028***	.084***	.093***	.044***	.032**	-.007	.049***	.025***
	(.006)	(.014)	(.030)	(.013)	(.015)	(.004)	(.012)	(.007)
Post-Policy Period	.000	.022	.054*	.014	.015	-.001	.019	-.007
	(.012)	(.043)	(.028)	(.016)	(.014)	(.008)	(.018)	(.009)
Share of All Arrests Pre-policy	.806	.255	.023	.051	.086	.254	.044	.093
B-M-Y Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2632	2632	2632	2632	2632	2632	2632	2632

B. Dependent Variable: Log (clear-up rate for a given crime category)

Crime Type:	(1) Total (without drugs)	(2) Violence Against the Person	(3) Sexual	(4) Robbery	(5) Burglary	(6) Theft and Handling	(7) Fraud or Forgery	(8) Criminal Damage
Lambeth x Policy Period	-.002	.027	.033	.023*	-.023	-.007	-.000	-.002
	(.007)	(.017)	(.040)	(.013)	(.019)	(.005)	(.007)	(.009)
Policy Period	-.007	-.002	.011	-.007	.008	-.004	-.000	-.007
	(.007)	(.027)	(.018)	(.009)	(.008)	(.005)	(.002)	(.005)
Lambeth x Post-Policy Period	.023***	.081***	.097***	.030***	.030**	-.010**	.014***	.026***
	(.006)	(.014)	(.029)	(.010)	(.014)	(.004)	(.005)	(.007)
Post-Policy Period	-.004	.014	.047*	.010	.013	-.002	.004	-.008
	(.011)	(.041)	(.028)	(.014)	(.013)	(.007)	(.003)	(.009)
Share of All Clear-ups Pre-policy	.788	.277	.025	.043	.084	.256	.008	.095
B-M-Y Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2632	2632	2632	2632	2632	2632	2632	2632

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the borough-month-year level. The sample period runs from April 1998 until January 2006. Control boroughs are all other London boroughs, excluding Lambeth's neighbours (Croydon, Merton, Southwark and Wandsworth). In Panel A the dependent variable is the log of the number of arrests divided by the number of offences in the borough in the same month and previous quarter, for each crime type. In Panel B the dependent variable is the log of the number of clear-ups divided by the number of offences in the borough in the same month and previous quarter, for each crime type. Panel corrected standard errors are calculated using a Prais-Winsten regression, where a borough specific AR(1) process is assumed. This also allows the error terms to be borough specific heteroskedastic, and contemporaneously correlated across boroughs. Observations are weighted by the share of the total (excluding neighbouring boroughs) London population that month-year in the borough. The policy period dummy variable is equal to one from July 2001 until July 2002, and zero otherwise. The post-policy period dummy variable is equal to one from July 2002 onwards, and zero otherwise. The following socio-demographic control variables, measured in logs, are controlled for at the borough-month-year level: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged between 25 to 34, aged between 35 to 49, aged above 50, and the male unemployment rate, and a dummy for the change in crime recording rules from April 2002 onwards. The police operation controls variables are indicators for whether the borough was part of a recent Police Operation. Operations that targeted a group of specific boroughs include the Safer Streets Initiative Phase 1 (04/02/2002 – 31/03/2002) and Phase 2 (15/04/2002 – 31/03/2003), Operation Recover (10/2005-17/12/2007), Operation Blunt 1 (11/2004-11/2005),Operation Safer Homes (28/10/2002-06/2004) and Operation Solstice (01/12/2003-08/12/2003). Lambeth was part of Safer Streets Phase 1 and 2, and Blunt 1. Further operations (past of a larger operation named Strongbox) that targeted single boroughs include Operation Windmill (Lambeth: 08/05/1999-02/07/1999), Operation Empire (Hackney: 17/07/1999-10/09/1999), Operation Regis (Camden, Islington: 02/10/1999-03/12/1999), Operation Victory (Westminster: 22/01/2001-18/03/2001), Operation Castille (Haringey: 17/04/2001-10/06/2001), Operation Claymoor (Brent: 16/07/2001-09/09/2001) and Operation Sabre (Tower Hamlets: 17/09/2001-09/12/2001). At the foot of each panel we show the proportion of all arrests and clear-ups (drug and non-drug related) that each category makes up in the pre-policy period in Lambeth from April 1998 until June 2001.

Table 8: Depenalization of Cannabis Possession and House Prices

Dependent Variable: Log (zip code-quarter mean house price, deflated to 1995 Q1 prices)

	(1) Baseline	(2) Borough Specific Linear Time Trend	(3) Drug Crime Hotspot	(4) Flats and Maisonettes	(5) Drug Crime Hotspot, with Neighbors
Lambeth x Policy Period	.015	-.038*	.014	.031	.008
	(.014)	(.021)	(.039)	(.029)	(.038)
Policy Period	-.015*	-.014*	-.043***	-.048***	-.038***
	(.008)	(.008)	(.013)	(.017)	(.013)
Lambeth x Post-Policy Period	-.061***	-.138***	-.021	.070**	-.035
	(.018)	(.037)	(.033)	(.030)	(.032)
Post-Policy Period	-.011	-.009	-.077***	-.111***	-.064***
	(.013)	(.013)	(.018)	(.019)	(.018)
Lambeth x Hotspot			.141***	.308***	.647***
			(.035)	(.046)	(.055)
Hotspot			-.590***	.084***	-.671***
			(.027)	(.021)	(.048)
Lambeth x Policy Period x Hotspot			-.062*	-.056*	-.062*
			(.036)	(.033)	(.036)
Policy Period x Hotspot			.033***	.037**	.034***
			(.012)	(.016)	(.012)
Lambeth x Post-Policy Period x Hotspot			-.139***	-.180***	-.137***
			(.023)	(.030)	(.023)
Post-Policy Period x Hotspot			.076***	.078***	.076***
			(.016)	(.017)	(.016)
Neighbor x Policy Period					-.064***
					(.023)
Neighbor x Post-Policy Period					-.164***
					(.032)
Neighbor x Hotspot					.692***
					(.036)
Neighbor x Policy Period x Hotspot					-.009
					(.024)
Neighbor x Post-Policy Period x Hotspot					-.009
					(.029)
Zip code, Quarter, Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Observations	14018	14018	14018	16431	17336

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. All observations are at the zip code-sector-quarter-year level. House prices are deflated to the first quarter of 1995 prices, using the Land Registry house price index for Greater London, which is based on repeat sales. More information on the index can be found at http://www1.landregistry.gov.uk/houseprices/housepriceindex/. For all specifications, the sample runs from January 1995 until December 2005, standard errors are clustered by zip code, and observations are weighted by the numbers of sales for the housing type in that quarter-year in the specific zip code-sector. Lambeth's neighbouring boroughs were excluded from the analysis in Columns 1 to 4. Hotspots were created based on the total drug offences, namely if the ward was equal to or above the median within the borough. To reflect the lag between the house buying decision and the recorded sale of the house, all time-vary explanatory variables are lagged by one quarter. The (one quarter lagged) policy period dummy variable is equal to one from the fourth quarter (starts October 1) of 2001 until the third quarter of 2002 (ends September 30), and zero otherwise. The (one quarter lagged) post-policy period dummy variable is equal to one from the fourth quarter of 2002 onwards, and zero otherwise. The following socio-demographic control variables, measured in logs, are controlled for at the borough-month-year level: the share of the adult population that is ethnic minority, that is aged between 20 to 26, aged between 25 to 34, aged between 35 to 49, aged above 50, and the male unemployment rate, and a dummy for the change in crime recording rules from April 2002 onwards. The police operation controls variables are indicators for whether the borough was part of a recent Police Operation. Operations that targeted a group of specific boroughs include the Safer Streets Initiative Phase 1 (04/02/2002 – 31/03/2002) and Phase 2 (15/04/2002 – 31/03/2003), Operation Recover (10/2005-17/12/2007), Operation Blunt 1 (11/2004-11/2005),Operation Safer Homes (28/10/2002-06/2004) and Operation Solstice (01/12/2003-08/12/2003). Lambeth was part of Safer Streets Phase 1 and 2, and Blunt 1. Further operations (past of a larger operation named Strongbox) that targeted single boroughs include Operation Windmill (Lambeth: 08/05/1999-02/07/1999), Operation Empire (Hackney: 17/07/1999-10/09/1999), Operation Regis (Camden, Islington: 02/10/1999-03/12/1999), Operation Victory (Westminster: 22/01/2001-18/03/2001), Operation Castille (Haringey: 17/04/2001-10/06/2001), Operation Claymoor (Brent: 16/07/2001-09/09/2001) and Operation Sabre (Tower Hamlets: 17/09/2001-09/12/2001). All of these socio-economic and police operation control variables are lagged one quarter.

Table A1: Coding Police Operations

Information Source	Operation Name	Borough	Start	End	Focus	URL	Other Links
A. Borough Specific Police Operations, Complete Information on Start and End Dates							
MPA	Recover	Greenwich, Lewisham, Southwark, Bromley, Croydon	10/2005	17/12/2007	Recovery of Abandoned Stolen	http://www.mpa.gov.uk/committees/mpa/2007/071220/10/	http://www.mpa.gov.uk/committees/x-f/2008/080221/11/
MPA http://www.mpa.gov.uk/committees/mpa/reports/	Blunt	Lambeth, Southwark, Hackney, Newham, Haringey, Tower Hamlets, Brent, Croydon, Waltham Forest, Lewisham, Enfield, Hammersmith and Fulham	11/2004	11/2005	Knife Crime	http://www.mpa.gov.uk/committees/mpa/2005/050526/10/	http://cms.met.police.uk/news/major_operational_announcements/we_launch_the_next_phase_of_operation_blunt
MPA http://www.mpa.gov.uk/committees/mpa/reports/	Safer Streets	Lambeth, Westminster, Southwark, Hackney, Haringey, Camden, Tower Hamlets, Brent, Islington	04/02/2002	31/03/2002	Street Crime	http://www.mpa.gov.uk/committees/mpa/2002/020523/11/	
MPA http://www.mpa.gov.uk/committees/mpa/reports/	Safer Streets Phase 2	Lambeth, Westminster, Southwark, Hackney, Haringey, Camden, Tower Hamlets, Brent, Islington, Newham, Ealing, Waltham Forest, Lewisham, Wandsworth, Croydon	15/04/2002	31/03/2003	Street Crime	http://www.mpa.gov.uk/committees/mpa/2002/020523/11/	
MPA	Strongbox-Windmill	Lambeth	08/05/1999	02/07/1999		http://www.mpa.gov.uk/committees/mpa/2002/020523/10/	http://www.mpa.gov.uk/committees/mpa/2001/010208/07/
MPA	Strongbox-Empire	Hackney	17/07/1999	10/09/1999		http://www.mpa.gov.uk/committees/mpa/2002/020523/10/	http://www.mpa.gov.uk/committees/mpa/2001/010208/07/
MPA	Strongbox-Regis	Camden, Islington	02/10/1999	03/12/1999		http://www.mpa.gov.uk/committees/mpa/2002/020523/10/	http://www.mpa.gov.uk/committees/mpa/2001/010208/07/
MPA	Strongbox-Victory	Westminster	22/01/2001	18/03/2001	Volume Crime: Burglary, Robbery, Vehicle Crime, Drugs	http://www.mpa.gov.uk/committees/mpa/2002/020523/10/	http://www.mpa.gov.uk/committees/mpa/2001/010208/07/
MPA http://www.mpa.gov.uk/committees/mpa/reports/	Strongbox-Castille	Haringey	17/04/2001	10/06/2001		http://www.mpa.gov.uk/committees/mpa/2002/020523/10/	http://www.mpa.gov.uk/committees/mpa/2001/010208/07/ http://www.mpa.gov.uk/committees/mpa/2001/010726/08/
MPA	Strongbox-Claymoor	Brent	16/07/2001	09/09/2001		http://www.mpa.gov.uk/committees/mpa/2002/020523/10/	http://www.mpa.gov.uk/committees/mpa/2001/010208/07/
MPA	Strongbox-Sabre	Tower Hamlets	17/09/2001	09/12/2001		http://www.mpa.gov.uk/committees/mpa/2002/020523/10/	http://www.mpa.gov.uk/committees/mpa/2001/010208/07/
Planning, Performance & Review Committee reports archive http://www.mpa.gov.uk/committees/x-ppr/reports/	Safer Homes	Barnet, Bromley, Croydon, Enfield, Greenwich, Harrow, Hilling don, Hounslow, Lewisham, Redbridge, Southwark, Waltham Forest, Wandsworth	28/10/2002	6/2004	Burglary	http://www.mpa.gov.uk/committees/x-ppr/2003/030313/10/	http://www.mpa.gov.uk/committees/x-ppr/2003/030109/06/
MPA - Annual Reports	Solstice	Brent, Hackney, Westminster, Hammersmith & Fulham, Lewisham, Camden	01/12/2003	08/12/2003	Transport Crime	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Alnwick	Haringey	16/09/2002	13/10/2002	Street Crime	http://www.mpa.gov.uk/downloads/publications/annualrep2002-03.pdf	www.haringeycpcg.org.uk/documents/Police_Report_Nov_2002.doc
Draca et al (2008)	Theseus	Westminster, Camden, Islington, Tower Hamlets, Kensington & Chelsea	7/7/2005	17/08/2005	7/7 Bombings	Draca et al 2008: http://cep.lse.ac.uk/pubs/download/dp0852.pdf	http://www.mpa.gov.uk/committees/x-f/2005/050915/07/
B. Borough Specific Police Operations, Incomplete Information on Start and End Dates							
MPA - Annual Reports	Bantam	Hackney	11/2001	Unknown	Trident-related	http://www.mpa.gov.uk/downloads/publications/annualrep2002-03.pdf	
MPA - Annual Reports	Footbrake	Redbridge	04/2003	03/2004	Vehicle Crime	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Anuric	Kennington			Drug Trafficking	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Dobbi	Enfield			Unlicensed Minicabs	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Michaelmas	Enfield			Street Crime, Burglary	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Garm	Tower Hamlets			Robbery	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Lewark	Lewisham, Southwark			Robbery	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Challenger	Lambeth, Southwark, Hackney, Brent, Lewisham, Tower Hamlets			Robbery	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Orion	Hackney			Drugs	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Foist	Hackney, Haringey, Newham			Uninsured Cars	http://www.mpa.gov.uk/downloads/publications/annualrep2006-07.pdf	
Other Sources - ref URL	Alliance	5 boroughs South London	11/2007	Unknown	Gang Crime	http://www.mpa.gov.uk/committees/mpa/2008/080529-agm/06/#h2002	http://ken.3cdn.net/d23b2ee136d273b37d_xrm6bhcgf.pdf
Other Sources - ref URL	Kartel	11 Boroughs		25/02/2008		http://www.mpa.gov.uk/committees/mpa/2008/080529-agm/06/#h2004	
Other Sources - ref URL	Coalmont	Southward, Lambeth, Lewisham			Gun Crime	http://www.mpa.gov.uk/committees/x-eodb/2008/080207/07/	
C. London Wide Police Operations							
MPA http://www.mpa.gov.uk/committees/mpa/reports/	Blunt 2	All London	14/05/2008	Present	Youth Knife Crime	http://www.mpa.gov.uk/committees/mpa/2008/080529-agm/06/	http://police.homeoffice.gov.uk/news-and-events/news/operation-blunt-2?version=1
MPA	Blunt	All London	12/2005	Unknown	Knife Crime	http://www.mpa.gov.uk/committees/mpa/2005/050526/10/	
Planning, Performance & Review Committee reports archive	Maxim	All London	24/03/2003	Unknown	Immigration, People Trafficking	http://www.mpa.gov.uk/committees/x-ppr/2006/061109/08/	http://www.mpa.gov.uk/committees/x-ppr/2003/030508/09/, http://www.mpa.gov.uk/committees/x-ppr/2004/040212/11/
Planning, Performance & Review Committee reports archive	Safer Homes	All London	25/10/2002	27/10/2002	Burglary	http://www.mpa.gov.uk/committees/x-ppr/2003/030313/10/	
MPA - Annual Reports	Payback	All London	09/2003			http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports		All London			Hate Crime	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Rainbow	All London			Terrorism	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Copernicos	All London			High-valued Property Theft	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Halifax IV	All London	17/01/2005	28/02/2005	Fail to Appear Warrants	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Bluesky	All London			Immigration	http://www.mpa.gov.uk/downloads/publications/annualrep2005-06.pdf	
MPA - Annual Reports	Jigsaw	All London			Sex Offenders	http://www.mpa.gov.uk/downloads/publications/annualrep2005-06.pdf	
MPA - Annual Reports	Anchorage 2	All London			Violent Crime	http://www.mpa.gov.uk/downloads/publications/annualrep2005-06.pdf	
MPA - Annual Reports	Erica	All London			Anti Social Behaviour	http://www.mpa.gov.uk/downloads/publications/annualrep2007-08.pdf	
MPA - Annual Reports	Argon	All London	09/2007	01/2008	Gun Crime in Nightclubs		
Other Sources - ref URL	Curb	All London	06/2007	03/2008	Youth Violence	http://www.mpa.gov.uk/committees/mpa/2008/080529-agm/06/#h2003	
Other Sources - ref URL	Kontiki	All London			Human Trafficking	http://www.mpa.gov.uk/committees/x-ppr/2006/061109/08/	
Other Sources - ref URL	Sterling	All London			Fraud	http://www2.le.ac.uk/ebulletin/news/press-releases/2000-2009/2009/02/nparticle.2009-02-13.8756898007	
Other Sources - ref URL	Evader	All London				http://www.mpa.gov.uk/committees/x-ppr/2003/030109/06/	
D. Police Operations, Incomplete Information							
MPA - Annual Reports	Enver			19/12/2003	Tamil Criminals	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Tullibardine					http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Grafton		04/2003		Crime Around Heathrow	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Bright Star				Anti-terror	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Amethyst				Child Sex Abuse	http://www.mpa.gov.uk/downloads/publications/annualrep2003-04.pdf	
MPA - Annual Reports	Nemo				Drugs	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Vanadium				Drugs	http://www.mpa.gov.uk/downloads/publications/annualrep2004-05.pdf	
MPA - Annual Reports	Chicago				Bus Crime	http://www.mpa.gov.uk/downloads/publications/annualrep2006-07.pdf	
MPA - Annual Reports	BusTag				Bus Vandalism	http://www.mpa.gov.uk/downloads/publications/annualrep2006-07.pdf	
MPA - Annual Reports	Overt				Anti-terror	http://www.mpa.gov.uk/downloads/publications/annualrep2006-07.pdf	
MPA - Annual Reports	Overamp				Anti-terror	http://www.mpa.gov.uk/downloads/publications/annualrep2006-07.pdf	
Other Sources - ref URL	Suki						
Other Sources - ref URL	Lateen				Violent Crime	http://www.haringeycpcg.org.uk/documents/CPCG%20police%20report%20April%2008.pdf	

Notes: All websites were accessed in September and October 2009.

Figure 1A: Aggregate Cannabis Offences

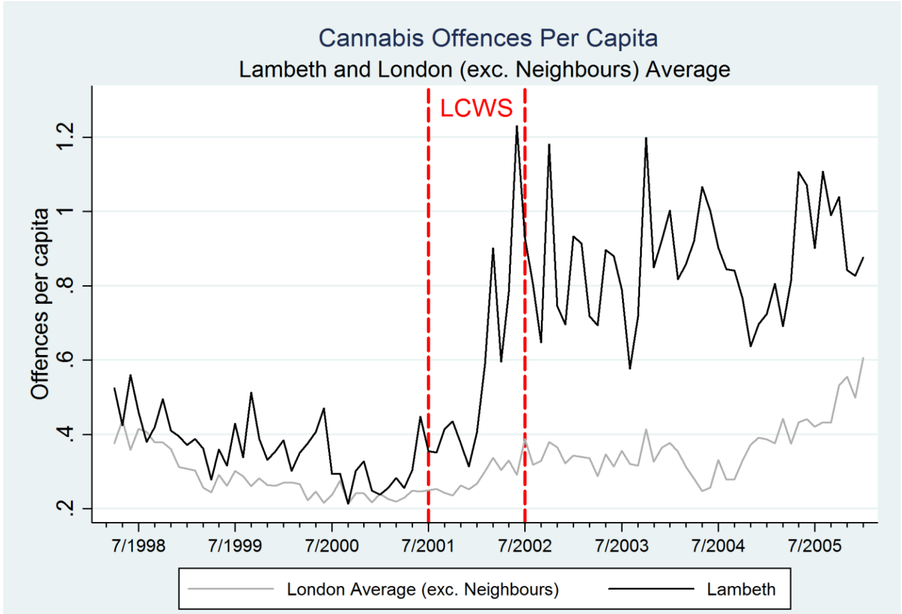


Figure 1B: Cannabis Possession Offences

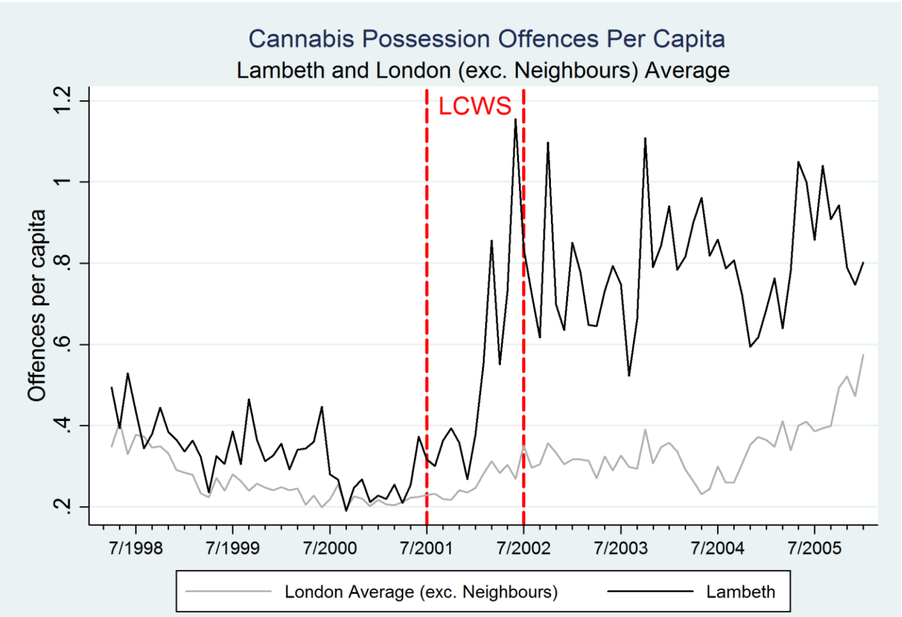
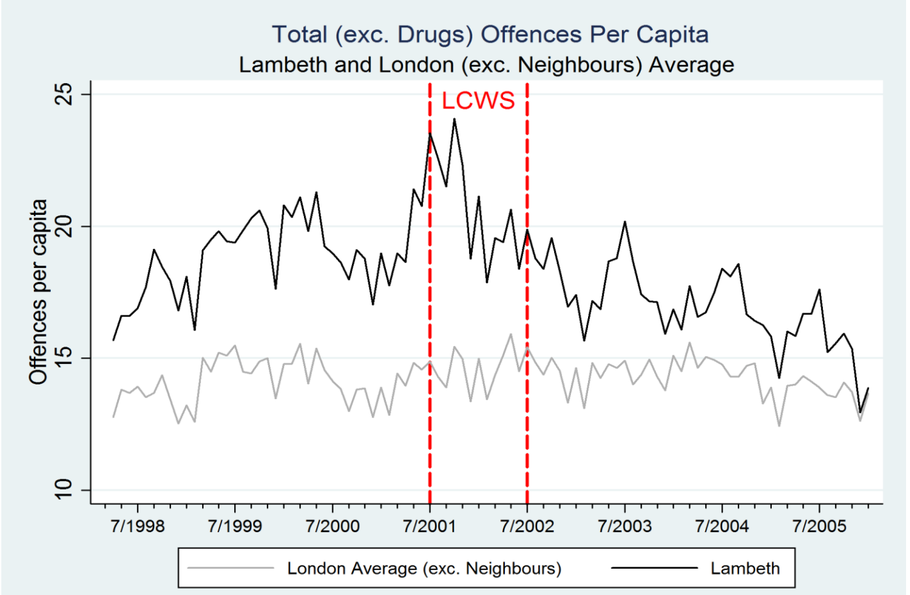


Figure 1C: Aggregate Non-Drug Offences



Notes : The sample period runs from April 1998 until January 2006. The two red vertical lines represent the start and end of the Lambeth policy (July 2001 and July 2002 respectively). In each Figure, the black time series represents the relevant time series for Lambeth. The grey series represents the mean offences per capita for the rest of London, excluding Lambeth and Lambeth's neighbouring boroughs (Croydon, Merton, Southwark and Wandsworth). Figure 1A shows the time series for the number of cannabis related offences in aggregate, per 1000 of the adult population. Figure 1B shows the time series for the number of cannabis possession offences, per 1000 of the adult population. Figure 1C shows the time series of the number of non-drug offences, per 1000 of the adult population. Non-drug offences include those for violence against the person, sexual offences, robbery, burglary, theft and handling, fraud or forgery, and criminal damage.