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Braakmann, Nils

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Nils Braakmann*

Newcastle University

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Abstract:

Using street level crime data for London from December 2010 to March 2012 merged with detailed information on crimes committed during the 2011 London riots, I show that crime in areas affected by the riots fell considerably in the months following the riots. I also investigate two potentials channels through which the riots might have influenced future crime rates, specifically unemployment and changes in police deployment. The results suggest increases in unemployment in the affected areas and no change in police deployment in the months after the riots, suggesting that crime fell for other reasons.

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* Nils Braakmann, Newcastle University, Business School – Economics, 5 Barrack Road, Newcastle upon Tyne, Tyne and Wear, NE1 4SE, United Kingdom, e-mail: nils.braakmann@ncl.ac.uk.

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1. Introduction

Riots are a recurring phenomenon in many societies. With the exception of one study on the consequences of riots in the US in the 1960 for property values (Collins and Margo, 2007) and one study on the economic impact of the Rodney King riots (Matheson and Baade, 2004), the (sparse) economic literature has primarily focused on their determinants (see, e.g., DiPasquale and Glaeser, 1998). In contrast, this paper focuses on the consequences of the 2011 London riots for subsequent criminal behaviour. These riots (and their extension to other cities) were some of the worst riots in (younger) British history. Following the shooting of a local man by the police on August 4, riots broke out in Tottenham, a part of London. The riots lasted from August 6 to August 10 and led to frequent looting, arson and rioting in several boroughs in London as well as in Birmingham, Bristol, Manchester, Liverpool and several smaller towns.

There is a range of reasons why we might expect to see an impact of riots on crime in subsequent months. First, a range of papers has considered the importance of spillovers between individuals for the level of criminal activity. Such spillovers might occur, for instance, because individuals' perceptions of detection probabilities are interdependent (Sah, 1991). Another possibility is that actual detection probabilities depend on the overall level of criminal activity such that each individual that engages in crime lowers detection probabilities for everyone else (e.g., Murphy, Shleifer and Vishny, 1993, p. 409; Tabarrok, 1997). Note that these effects might also lower future crime rates if, e.g., potential criminals in areas affected by the riots expect a higher level of policing in the foreseeable future and thus refrain from criminal activities.

The general idea that such spillovers matter has also been tested in a range of papers: Case and Katz (1991) find some evidence that social interactions between youths and their parents and between then and their peers matter for the youths' propensity to engage in criminal

behaviour. Glaeser, Sacerdote and Scheinkman (1996) build and test a model where individual decisions about criminal activities are influenced by their neighbours' decisions. Their findings suggest that social interactions play a major role in larceny and auto-theft and a smaller but still large role in assault, burglary, and robbery, while they do net seem to matter much for arson, murder and rape. They also find larger effects for crimes committed by younger individuals and in areas with fewer intact families. Further empirical evidence on peer effects in crime was found by Bayer, Pintoff and Pozen (2009) if a study of incarcerated juveniles in Florida. Their findings suggest that exposure to other prisoners who have a history in the same offence as the respective individual tends to increase the likelihood of recidivism in the same offence category. Particular strong effects were found for burglary, petty larceny, felony and misdemeanor drug offenses, aggravated assault, and felony sex offenses.

A second link between riots and crime is directly tied to economic conditions. There is evidence that firms base their location decisions at least partially on local crime rates (e.g., Cullen and Levitt, 1999; Abadie and Dermisi, 2008; Rosenthal and Ross, 2010) and there is a well established link between economic conditions and crime as predicted by the standard Becker model of crime (Becker, 1968; Piehl, 1998; Freeman, 1999). If businesses decide to relocate because of the riots or if businesses are forced to close due to the destruction of their property, areas affected by the riots might be expected to decline economically, which in turn might drive up crime rates.

A third link could occur due to deterrence through penalties handed out after the riots. Punishments after the riots were frequently criticised as being too severe (e.g., Baggini, 2011). An eventual deterrence effect could be larger in the affected areas, if, for instance, people in these areas experience more closely due to their friends and acquaintances being sent to prison.

Finally, if contemporaneous and future crimes are substitutes, we might expect the riots to actually lower future criminal activity. A substitutional relationship could arise, for instance, if individuals occasionally need to "let of steam"[1], in which case rioting might prevent future acts of disorder, or if individuals just steal enough to get by for some time, in which case theft now would lead to less theft in the future.

I use street-level crime data for the period December 2010 to March 2012 from www.police.uk – aggregated at the level of 8 digit postcodes, roughly equivalent to streets or parts of streets – and a full list of all riot-related incidents including their location that was compiled by the British newspaper *The Guardian* (see Rogers and Sedghi, 2011). Identification is based on the fact that the 2011 London riots suddenly and unexpectedly increased crime in some areas in London. Importantly, while the riots happened in some of the more crime ridden areas of London, the event that triggered the riots – the shooting of Mark Duggan by the police on August 4, 2011 and the subsequent behaviour of police officials in the face of early peaceful anti-police protest – are unrelated to any criminal activities in both the affected and unaffected areas of London. I then use difference-in-differences estimators to look at changes in total crime, violent crime, non-violent crime and anti-social behaviour[2] in directly and indirectly affected areas relative to unaffected areas. Furthermore, I investigate two channels through which the riots might have influenced crime rates. First, I look at the effects of the riots on local unemployment as a proxy for changes in the economic conditions in the affected areas using low-level unemployment data for lower layer super output areas from official labour market statistics. In a second step, I consider

[1] Some qualitative interviews after the riots suggest that participants were at least partially motivated by this desire (see The Guardian, 2011).

[2] The notion of "anti-social behaviour" was introduced in the 1998 Crime and Disorder Act with some changes being introduced in the 2003 Anti-social Behaviour Act. It basically describes acting "in a manner that caused or was likely to cause harassment, alarm or distress to one or more persons not of the same household as himself [the perpetrator]" (Part I, Chapter 1, Section 1 of the Crime and Disorder Act 1998).

changes in police deployment using ward and borough level data obtained from the Metropolitan Police Service.

My results indicate that

(a) the riots seem to have decreased violent crime and anti-social behaviour in directly affected areas in the months following August 2011,
(b) the riots seem to have decreased all types of crime in areas that are spatially close to affected areas, but that were themselves unaffected,
(c) most of these effects are relatively small relative to mean number of crimes and their standard deviation, however, they are comparatively large when it comes to the actual number of crimes,
(d) unemployment numbers increased in the directly and indirectly affected areas, and
(e) police deployment increased heavily across London during August 2011, i.e., during the riots, but not so much in the following months.

Validation checks indicate that

(a) affected and unaffected postcodes had very similar crime trends in the period December 2010 to July 2011, i.e., the month before the riots,
(b) no effects or effects that go in an opposite direction to the main estimates are found when artificially moving the treatment date to either February or May 2011, and
(c) results are unaffected by restricting the sample to postcode areas (larger aggregations of postcodes) that contain at least one affected postcode.

Back of the envelope calculations based on the main estimates suggests that directly affected areas experienced around 600 fewer violent crimes and 2,400 fewer cases of anti-social behaviour from September 2011 to March 2012 than they would have experienced in the

absence of the riots. These numbers are even larger for indirectly affected districts, which experienced around 3,500 fewer cases of non-violent crime, 1,500 fewer cases of non-violent crime and 4,800 fewer cases of anti-social behaviour. Given the results on unemployment and police deployment, it seems unlikely that these decreases can be explained by changes in the economic conditions or through reactions by the police.

The remainder of this paper is organised as follows: Section 2 provides background on the London riots; section 3 introduces the data. The empirical approach is outlined in section 4 along with some evidence on its validity. Section 5 presents the main results. Some robustness checks are found in section 6, while section 7 concludes.

2. Background: The 2011 London riots[3]

On August 4, 2011, police investigating gun crimes shoot the 29-year old Mark Duggan in Tottenham, London, allegedly after he fired his gun at them. During the next couple of days tensions in the community built over these claims (which were found to be false on August 9 following an investigation by the Independent Police Complaints Commission, see Vasagar, 2011) and an alleged failing of communication by the police (Lewis, Laville and Davies, 2011). During the late afternoon on August 6, a crowd of protesters marched from Broadwater Farm to Tottenham police station. After several hours of waiting for senior police officials to talk to them, riots broke out at dawn when rumours of a female protester being beaten by policemen started to spread (Lewis, 2011). During the following night, several police cars, a bus and several shops in Tottenham, Tottenham Hale and Wood Green were attacked, looted and set ablaze (Bolesworth et al., 2011). During the night, police had a hard time regaining control and it took several hours before fire engines were able to reach some

[3] Full timelines of the riots can be found at http://www.telegraph.co.uk/news/uknews/crime/8691578/London-riots-timeline-of-violence.html and http://www.guardian.co.uk/uk/interactive/2011/sep/05/england-riots-timeline-interactive.

of the burning buildings (Lewis, 2011). The following day police enforcements from Thames Valley, Essex, Surrey and Kent were brought to London. Nevertheless, on the evening of August 7, the riots spread to Enfield and Brixton and in the early morning of the August 8 also to Walthamstow and Hackney. In all these areas high street shops were targeted and looted, often by groups of people.[4] On the evening and night of August 8/9, riots were reported from Camden, Clapham, Ealing, Hackney, Peckham and Woolwich in London. Furthermore, there were incidents in Birmingham, Bristol and Liverpool, including looting and arson. Later on August 9, riots in London had essentially stopped, however, on the evening of that day incidents were again reported in Birmingham, Gloucester, Liverpool and Manchester.

In total, the riots led to 5,112 recorded crimes across England of which 3,461 occurred in London alone (Home Office, 2011). Five people were killed during the riots and several hundred injured. The Association of British Insurers expect to pay out around £200 million in damages (Association of British Insurers, 2012) with some estimates even suggesting £300 million (Dodd, 2011), not counting the costs of policing and losses through earlier closures or lower business activities for some firms in the affected areas. Further information and analysis on the riots can be found in The Guardian (2011) and Riots Communities and Victims Panel (2012).

3. Data

The crime data originates from www.police.uk, a website operated by the British police forces that provides street-level monthly crime maps and also allows access to the underlying

[4] A detailed coverage of these events can be found at http://www.guardian.co.uk/uk/blog/2011/aug/07/tottenham-riots-police-duggan-live.

raw data. I use data for the Metropolitan Police and the City of London Police. The data record the type of the incident using 12 categories, specifically "Anti-social behaviour", "Burglary", "Criminal damage and Arson", "Drugs", "Other Theft", "Other crime", "Public Disorder and Weapons", "Robbery", "Shoplifting", "Vehicle crime" and "Violent crime". Unfortunately, "Criminal damage and Arson", "Drugs", "Other Theft", "Public Disorder and Weapons" and "Shoplifting" are only recorded as separate categories from August 2011 onwards. This fact also leads to a structural break in the "Other crime" category, where these crimes were previously recorded. To overcome this problem, I will generally look at aggregates of these categories, specifically "Total crime" (the sum of all the of above except for anti-social behaviour), "Non-violent crime" (the sum of all of the above except for anti-social behaviour and violent crime), "Violent crime" and "Anti-social behaviour".

The data also contain the exact location of each incident, given by Easting/Northing-coordinates. These were used to match each crime to the nearest UK 8-digit postcode.[5] These usually correspond to either a street or parts of a street. In a second step, the data were collapsed to counts on the month-postcode level.

Data on the riots is taken from a list of all verified riot-related incidents compiled by the British newspaper *The Guardian* (see Rogers and Sedghi, 2011). The list contains a description of the event as well as the time and location. In most cases postcode information was available for each incident, otherwise latitude and longitude coordinates were given instead. For the latter, google maps was used to find the corresponding postcodes. Note that this paper uses only the riot-related events that took place in London.

[5] Specifically, coordinates were first converted to latitude and longitude and then matched to the closest postcode based on the geodetic distance between the coordinates. All distance calculations in this paper use the ado-files *geonear* and *geodist* by Robert Picard.

Subsequently, postcodes were sorted into the following three groups: Directly affected postcodes are all postcodes that are in the same postcode sector as a reported riot-related incident. Postcode sectors are larger aggregations of postcodes that are regionally close to each other. In total, there are about 10,600 postcode sectors in the UK, of which 1,081 are found in the data used here. This higher level of aggregation is somewhat more sensible than single postcodes as the riots can be expected to affect more people than just those in the immediate vicinity of an incident, be it because larger areas become stigmatised by the rioting or be it because people from a somewhat larger area participated in the rioting. I also consider a second treatment group, specifically indirectly affected postcodes. These are in the same postcode district, but not in the same postcode sector as a riot-related incident. Postcode districts are again larger aggregations of postcode sectors. There are approximately 2,800 of them in the UK. Postcodes that are considered to be unaffected by the riots are those that are in postcode districts without any reported incident. This split basically gives three groups that are increasingly far away from any riot-related incident.

In total my estimation sample contains 13,215 directly affected postcodes with 211,440 observations, 32,110 indirectly affected postcodes with 513,760 observations and 161,685 unaffected postcodes with 2,586,960 observations. Table 1 displays descriptive statistics for these groups.

(TABLE 1 ABOUT HERE.)

4. Empirical approach

I rely on a difference-in-differences approach with two treatment groups – directly and indirectly affected areas – and one control group – unaffected areas. Specifically, I estimate

$$y_{ijt} = \alpha_i + \sum_{k=1}^{2} \gamma_k * D_{kj} + \sum_{l=1}^{4} \delta_l * T_{lit} + \sum_{k=1}^{2} \sum_{l=1}^{4} \tau_{kl} \left(D_{kj} * T_{lit} \right) + \epsilon_{ijt} \quad (1)$$

where y_{ijt} is the number of crimes in postcode *i* (nested within postcode sector *j*) in month *t*, α_i are postcode fixed effects, *D* contains two dummies marking directly and indirectly affected areas, *T* contains four dummies for various post-treatment periods, specifically August 2011 (the month of the riots), September 2011, October to December 2011 and January to March 2012. The parameters of interest are contained in τ_{kl}, which measure the difference in crime numbers between treatment and control groups in the four post-treatment periods. Note that the γ_k are not identified as treatment group definitions are time-invariant and hence absorbed in the postcode fixed effects. The interactions of the treatment group dummies with time, however, are identified. As treatment group definitions vary only on the postcode sector level all standard errors are adjusted for clustering on that level.

The central assumption for the interpretation of τ_{kl} as the causal effect of the riots is that affected and unaffected areas would have experienced the same trends had the riots not happened. This assumption is fundamentally untestable, however, the following will show graphical and econometric evidence suggesting that trends in treatment and control groups were similar in the pre-treatment period.

(FIGURE 1 ABOUT HERE.)

Figure 1 presents evidence on the evolution of crime numbers from December 2010 to March 2012. The first thing to note is that areas that were directly or indirectly affected by the riots generally experienced more crime than unaffected regions. This is consistent with the observation that the riots started in some of the more deprived and crime-ridden areas in London.

Second, the general trend in crime in the period prior to August 2011, i.e., the time of the riots, appears to be broadly similar across the three types of areas, which is reassuring for the

use of difference-in-differences estimators. We will see later that this result is also confirmed using two pseudo-interventions.

A third thing to note is that crime rates do not seem to increase by as much as one might expect during the riots. This fact was also noticed by the British press and initially raised suspicion regarding the accuracy of the reported numbers (e.g., Brown, 2011; Doyle 2011). One reason for this apparent oddity is the very low spatial aggregation used here, which means that even 5,000 additional crimes will not increase the average crime number in every postcode by that much. A second reason for this fact – as was explained by police spokespersons at that time (Brown, 2011; Doyle 2011) –is related to Home Office recording rules: Under these, a crime, say breaking into a shop and looting it, will count as one crime in the statistics regardless of whether it was committed by one or a hundred people. This will inevitably lead to (perceived) undercounting of criminal activity during the riots where crimes were often committed by large groups of individuals.

(TABLE 2 ABOUT HERE.)

Table 2 presents results from two pseudo-interventions where the "riots" were artificially moved to March and May 2011 respectively and the sample was restricted to the pre-treatment period. If the common trend assumption is valid, one can expect to see small and insignificant coefficients for the interaction term defined using the pseudo-treatment. As table 2 shows this appears to be the case for directly affected areas, while the indirectly affected areas appear to have somewhat more strongly rising crime numbers than the unaffected areas. This fact can be expected to lead to an upward bias in the main estimates, however, we will see in the coming section that this would actually bias the results against finding an impact of the riots in this case.

5. Results

A. Base results

Table 3 presents the base estimates. Before turning to the parameters of interest note briefly that crime falls all across London in the months after the riots. During the riots, we observe relative increases in criminal activities, specifically in total crime, non-violent crime and anti-social behaviour, in the directly affected areas. This finding is obviously not surprising and a direct result of the riots. At the same time, crime – with the exception of anti-social behaviour – seems to decrease in unaffected and indirectly affected areas.

(TABLE 3 ABOUT HERE.)

More interesting are the changes in the affected areas in the months following the riots. Note first that all point estimates of the treatment effects, regardless of significance, are negative, indicating a decrease in crime. In the directly affected areas we observe significant negative declines in violent crime and anti-social behaviour from September 2011 onwards. In the indirectly affected areas, crime seems to decrease across the board.

An interesting question is whether these effects are (economically) large. Point estimates are usually in the magnitude of between -0.003 and -0.03, which seems relatively small compared with mean numbers of crime that depending on the type of crime, range from 0.05 to 0.53, and standard deviations that are between 0.3 and 3.7. However, it needs to be kept in mind that these are average changes in crime numbers for relatively small spatial units. Consequently, it might be more illustrative to consider the total change in crime numbers over all affected districts. To arrive at that number, remember that the coefficients, τ, in table 3 give us the average change in crimes per month per postcode. To arrive at the change in the total number of crimes we can simply multiply this number by the number of postcodes, i.e., the cross-sectional units, in each group. The change in crimes per month can then be expressed by $\tau * 13{,}215$ for directly affected postcodes wand by $\tau * 32{,}110$ for indirectly

affected postcode. In the period covering more than one month, this number then needs to be multiplied by the number of months as well.

(TABLE 4 ABOUT HERE.)

Table 4 presents results from these back-of-the-envelope calculations. Non-significant coefficients have been set to zero for this exercise, which implies that the estimated numbers are lower bounds. The results suggest that directly affected areas experienced a total of 572 fewer violent crimes and 2,391 fewer acts of anti-social behaviour because of the riots. For indirectly affected areas the effects are even stronger with 3,526 fewer non-violent and 1,477 fewer violent crimes and 4,849 fewer acts of anti-social behaviour. Compared with an estimated 3,461 riot-related crimes that were reported in London (Home Office, 2011), these numbers appear to be quite substantial although not unreasonably large.

B. Dropping unaffected postcode areas

A potential concern with the estimates in the previous section is that several postcode areas in Greater London, in particular those outside of the London postal district, did not report a single riot-related incident. Specifically, these were DA (Dartford), HA (Harrow), KT (Kingston upon Thames), SM (Sutton), TW (Twickenham), UB (Uxbridge) and WC (Western Central). As many of these are also further away from London's inner city, one might suspect that these are bad control units for affected inner city districts. To address these potential concerns, table 5 reports estimates based on equation (1), but on a reduced sample excluding these areas.

(TABLE 5 ABOUT HERE.)

The results are basically identical to those in table 3. If anything the results seem to become stronger with several (negative) coefficients gaining in magnitude and some being pushed to

statistical significance. However, the qualitative picture remains essentially identical with all estimates pointing towards reductions in crime after the riots.

6. Additional analysis

A. Unemployment estimates

One channel through which the riots and crime rates could be interlinked is the local economy. The riots had an adverse effect on various local businesses, including several stores that were destroyed, which should lower local employment opportunities. We might also imagine an additional effect on local employment if firms decide to locate to other areas of London (see, e.g., Cullen and Levitt, 1999; Abadie and Dermisi, 2008; and Rosenthal and Ross, 2010, for investigations of the link between crime and firms location decisions) Furthermore, it seems possible that the riots led to some stigmatisation of individuals from those areas in the labour market, which should also lower labour market prospects for people from the affected areas. The standard Becker model of crime (Becker, 1968; Piehl, 1998; Freeman, 1999) would then suggest that a decrease in legal employment opportunities should, ceteris paribus, increase crime.

The lowest spatial aggregation at which some information on economic conditions, specifically the number of individuals claiming Jobseeker's Allowance (JSA), the basic unemployment benefit in the UK, is available are lower layer super output areas (LSOAs). These are spatial units used by the UK census to present data in a consistent way over time. LSOAs are relatively small spatial units with a population of on average 1600 inhabitants according to the Small Area Population Estimates by the Office for National Statistics. London has 5,581 LSOAs of which 69 were directly and 314 indirectly affected by the riots.

The data on JSA claimants was obtained from http://www.nomisweb.co.uk/, which provides official labour market statistics for the UK. The available data contains information on all JSA claimants, JSA claimants below 18 and 25 years of age and JSA claimants who have been unemployed for than 6 months and more than 1 year. Table 6 provides descriptive statistics.

(TABLE 6 ABOUT HERE.)

Difference-in-differences estimates can be found in table 7. They suggest that the number of all claimants and claimants who have been unemployed for more than 6 months or more than 1 year indeed increased in both the directly and indirectly affected areas. The effects are relatively large relative to the means displayed in table 6 and are again stronger, both in terms of effect size and statistical significance, in the indirectly affected areas. However, one should keep in mind that the effective sample size for the directly affected areas is comparatively small, which might explain the lack of significance. The effects also seem to become stronger the more time has passed since the riots, which is in line with a sluggish adjustment of labour in the affected firms.

(TABLE 7 ABOUT HERE.)

In terms of explaining the observed drop in crime rates, however, results suggesting an increase in unemployment seem puzzling, at least a first glance. However, the strongest positive link between unemployment and crime is generally found for property crime, while the evidence on violent crime is generally more inconclusive (e.g., Carmichael and Ward, 2001; Raphael and Winter-Ebmer, 2001; Gould, Weinberg and Mustard, 2002; Braakmann, 2012). In fact, the two available studies for England (Carmichael and Ward, 2001; Braakmann, 2012) both find some evidence for a negative correlation between regional unemployment and regional violent crime. Braakmann (2012) also finds evidence for a

negative correlation between (youth) unemployment and anti-social behaviour. In light of these findings, it seems possible that the decrease in violent crime rates observed in the previous section might indeed be related to the increase in unemployment.

B. Policing

A further potential reason for the drop in crime observed in the months after the riots is a reaction by the police. If, e.g., police presence was increased in the affected areas or if the police put in greater effort due to greater public scrutiny, we would expect this to decrease crime rates either due to greater deterrence or simply because more criminals get caught.

To shed some light on this question, police deployment data was obtained from the Metropolitan Police Service. There are two measures of police deployment available: The first is ward-level information on the hours on duty by safer neighbourhood team officers, the second is borough-level information on potential hours on patrol by all police officers in the respective borough. The former is available for a total of 620 cross-sectional observations, of which 581 are observed for the whole period from December 2010 to March 2012. Table 8 presents descriptive statistics. Note that there is wide variation in particular in the ward-level data. The (very low) minimum of 7 hours comes from Lesnes Abbey ward in Bexley, which has correspondingly low number of hours on duty in other months. The maximum is reached by Shepherds Bush Green in Hamersmith and Fulham during August 2011, i.e., at the time of the riots. For the borough level data the minimum comes from Kingston upon Thames, closely followed by Sutton, while the maximum is from Westminster in August 2011.

(TABLE 8 ABOUT HERE.)

I again use difference-in-differences estimators with the measures of police deployment (both in levels and as logs) as dependent variables. Due to the low number of cross-sectional units

in both the ward and the borough level dataset, I do not distinguish between directly and indirectly affected areas, but rather consider a ward/borough to be treated as soon as one riot-related event occurred in it. This is the case for 28% of all wards and 72% of all boroughs.

(TABLE 9 ABOUT HERE.)

Estimation results can be found in table 9. As we can see during August 2011, i.e., during the riots, all areas experienced a large increase in both measures of police deployment, which was even larger in the affected areas. Subsequently differences between affected and unaffected regions become smaller and statistically insignificant. One should note, however, that point estimates are always positive, which might be a hint of some re-deployment of police after the riots. More importantly, the point estimates suggest relatively small effects in terms of their size. Their pattern also does not fit the pattern of the changes in crime rates in table 3: During the months when we observe the strongest declines in crime, we do not observe any increase in police deployment. In fact, if anything the data rather suggests a decrease in deployment. In other words, it seems unlikely that the decreases in crime after the riots were caused by massive increases in police presence in the affected areas.

7. Conclusion

This paper investigated the consequences of the 2011 London riots for crime rates, unemployment and policing in the affected areas. The main results indicate that crime in the affected areas fell substantially in the months following the riots. In total, the estimates suggest that affected areas experienced around 5500 fewer crimes and around 7200 fewer acts of anti-social behaviour than expected without the riots. I also provided estimates on two possible channels through which the riots might influence future crime rates, specifically changes in economic conditions and changes in policing. My estimates suggest that unemployment in the affected areas increased relative to other parts of London. At the same

time there does not seem to be an increase in police strength in the affected areas. None of these factors seems likely to be able to explain the observed drop in crime, however.

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Table 1: Descriptive statistics, main sample

Variable	Mean	Std.dev	Min	Max
Directly affected postcodes				
All crime (excl. ASB)	0.529	2.584	0	216
Non-violent crime	0.431	2.286	0	216
Burglary	0.052	0.294	0	15
Robbery	0.028	0.215	0	10
Violent crime	0.098	0.488	0	22
Anti-social behaviour	0.266	1.548	0	159
Observations		211,440		
Indirectly affected postcodes				
All crime (excl. ASB)	0.516	3.668	0	431
Non-violent crime	0.427	3.269	0	401
Burglary	0.053	0.318	0	24
Robbery	0.025	0.211	0	19
Violent crime	0.089	0.559	0	49
Anti-social behaviour	0.243	1.564	0	104
Observations		513,760		
Unaffected postcodes				
All crime (excl. ASB)	0.264	1.314	0	199
Non-violent crime	0.215	1.147	0	188
Burglary	0.035	0.226	0	21
Robbery	0.012	0.135	0	13
Violent crime	0.049	0.320	0	27
Anti-social behaviour	0.141	0.975	0	155
Observations		2,586,960		

Table 2: Pseudo-interventions, sample from December 2010 to July 2011

	Total crime	Non-violent Crime	Violent Crime	Anti-social behaviour
	Pseudo-intervention 1: "riots" in February 2011			
Post-treatment	0.0253***	0.0215***	0.0038***	0.0174***
	(0.0016)	(0.0015)	(0.0005)	(0.0015)
Directly affected * Post-treatment	0.0093	0.0043	0.0050*	0.0105
	(0.0100)	(0.0094)	(0.0029)	(0.0071)
Indirectly affected * Post-treatment	0.0219***	0.0213***	0.0006	0.0007
	(0.0066)	(0.0064)	(0.0017)	(0.0051)
	Pseudo-intervention 2: "riots" in May 2011			
Post-treatment	0.0271***	0.0230***	0.0042***	0.0197***
	(0.0017)	(0.0015)	(0.0006)	(0.0015)
Directly affected * Post-treatment	0.0107	0.0074	0.0033	0.0091
	(0.0111)	(0.0103)	(0.0030)	(0.0069)
Indirectly affected * Post-treatment	0.0280***	0.0255***	0.0025	0.0140***
	(0.0065)	(0.0064)	(0.0018)	(0.0046)
Observations	1,449,070			

Coefficients, standard errors in parentheses. Standard errors are adjusted for clustering on the level of the postcode sector level. All estimates contain fixed effects for 8-digit postcodes. ***/**/* denote statistical significance on the 1%, 5% and 10% level respectively.

Table 3: Crime estimates, main results

	All crime	Non-violent Crime	Violent Crime	Anti-social behaviour
August 2011 (riots)	-0.0045**	-0.0042**	-0.0003	0.0233***
	(0.0020)	(0.0018)	(0.0007)	(0.0022)
September 2011 (riots + 1 month)	-0.0205***	-0.0135***	-0.0071***	-0.0309***
	(0.0020)	(0.0017)	(0.0007)	(0.0017)
Oct. – Dec. 2011(riots + 1 quarter)	-0.0066***	0.0009	-0.0075***	-0.0316***
	(0.0015)	(0.0014)	(0.0005)	(0.0015)
Jan. – Mar. 2012 (riots + 2 quarters)	-0.0196***	-0.0092***	-0.0103***	-0.0433***
	(0.0025)	(0.0023)	(0.0006)	(0.0019)
Directly affected * August 2011	0.0455***	0.0434***	0.0021	0.0200**
	(0.0157)	(0.0137)	(0.0045)	(0.0094)
Directly affected * September 2011	-0.0131	-0.0029	-0.0102***	-0.0228***
	(0.0192)	(0.0188)	(0.0039)	(0.0082)
Directly affected * Oct. – Dec. 2011	-0.0033	-0.0002	-0.0031	-0.0161**
	(0.0071)	(0.0071)	(0.0026)	(0.0076)
Directly affected * Jan. – Mar. 2012	-0.0198	-0.0088	-0.0110***	-0.0366***
	(0.0125)	(0.0112)	(0.0029)	(0.0091)
Indirectly affected * August 2011	-0.0038	-0.0021	-0.0017	0.0199***
	(0.0108)	(0.0098)	(0.0025)	(0.0063)
Indirectly affected * September 2011	-0.0244***	-0.0210**	-0.0034*	-0.0154***
	(0.0086)	(0.0082)	(0.0019)	(0.0056)
Indirectly affected * Oct. – Dec. 2011	-0.0133***	-0.0085*	-0.0048***	-0.0161***
	(0.0050)	(0.0044)	(0.0016)	(0.0047)
Indirectly affected * Jan. – Mar. 2012	-0.0311***	-0.0217***	-0.0094***	-0.0291***
	(0.0085)	(0.0073)	(0.0023)	(0.0059)
Observations	3,312,160			

Coefficients, standard errors in parentheses. Standard errors are adjusted for clustering on the level of the postcode sector level. All estimates contain fixed effects for 8-digit postcodes. ***/**/* denote statistical significance on the 1%, 5% and 10% level respectively.

Table 4: Implied changes in crime numbers

	Sep. 2011	Oct. – Dec. 2011	Jan. – Mar. 2012	Total Sep. 2011 to Mar. 2012
		Directly affected postcodes, N=13,215		
Total crime	0	0	0	0
Non-violent crime	0	0	0	0
Violent crime	-136.1	0	-436.1	-572.2
Anti-social behaviour	-301.3	-638.3	-1451.0	-2390.6
		Indirectly affected postcodes, N=32,110		
Total crime	-783.5	-1281.2	-2995.9	-5060.6
Non-violent crime	-674.3	-818.8	-2032.6	-3525.7
Violent crime	-109.2	-462.4	-905.5	-1477.1
Anti-social behaviour	-494.5	-1550.9	-2803.2	-4848.6

All calculations are based on the estimates in table 3.

Table 5: Crime estimates, only postcode areas with affected postcodes

	All crime	Non-violent Crime	Violent Crime	Anti-social behaviour
August 2011 (riots)	-0.0041	-0.0041*	0.0000	0.0287***
	(0.0026)	(0.0024)	(0.0009)	(0.0033)
September 2011 (riots + 1 month)	-0.0269***	-0.0187***	-0.0083***	-0.0361***
	(0.0025)	(0.0023)	(0.0009)	(0.0023)
Oct. – Dec. 2011(riots + 1 quarter)	-0.0088***	0.0002	-0.0091***	-0.0361***
	(0.0021)	(0.0020)	(0.0007)	(0.0021)
Jan. – Mar. 2012 (riots + 2 quarters)	-0.0235***	-0.0118***	-0.0117***	-0.0505***
	(0.0030)	(0.0027)	(0.0008)	(0.0026)
Directly affected * August 2011	0.0451***	0.0433***	0.0018	0.0147
	(0.0158)	(0.0138)	(0.0045)	(0.0097)
Directly affected * September 2011	-0.0067	0.0023	-0.0090**	-0.0176**
	(0.0192)	(0.0189)	(0.0039)	(0.0083)
Directly affected * Oct. – Dec. 2011	-0.0010	0.0005	-0.0016	-0.0116
	(0.0072)	(0.0072)	(0.0027)	(0.0078)
Directly affected * Jan. – Mar. 2012	-0.0159	-0.0062	-0.0096***	-0.0294***
	(0.0126)	(0.0113)	(0.0029)	(0.0093)
Indirectly affected * August 2011	-0.0043	-0.0023	-0.0020	0.0145**
	(0.0109)	(0.0099)	(0.0025)	(0.0067)
Indirectly affected * September 2011	-0.0180**	-0.0158*	-0.0022	-0.0102*
	(0.0088)	(0.0083)	(0.0020)	(0.0058)
Indirectly affected * Oct. – Dec. 2011	-0.0110**	-0.0078*	-0.0032*	-0.0116**
	(0.0052)	(0.0046)	(0.0017)	(0.0049)
Indirectly affected * Jan. – Mar. 2012	-0.0272***	-0.0191**	-0.0080***	-0.0219***
	(0.0087)	(0.0075)	(0.0023)	(0.0062)
Observations		2,357,792		

Coefficients, standard errors in parentheses. Standard errors are adjusted for clustering on the level of the postcode sector level. All estimates contain fixed effects for 8-digit postcodes. ***/**/* denote statistical significance on the 1%, 5% and 10% level respectively.

Table 6: Descriptive statistics, unemployment sample

Variable	Mean	Std.dev	Min	Max
All JSA claimants	44.66	29.44	0	260
JSA claimants younger than 18	0.00	0.14	0	10
JSA claimants younger than 25	9.78	8.72	0	125
JSA claimants for more than 1 year	7.94	8.06	0	80
JSA claimants for more than 6 months	17.50	14.58	0	145
Directly affected	0.03	0.16	0	1
Indirectly affected	0.06	0.23	0	1
Observations		89,296		

Table 7: Unemployment estimates, LSOA level regressions

	All JSA claimants	JSA claimants younger than 18	JSA claimants younger than 25	JSA claimants for more than 1 year	JSA claimants for more than 6 months
August 2011 (riots)	2.1494***	0.0044*	1.5107***	0.1741***	1.8294***
	(0.0766)	(0.0024)	(0.0520)	(0.0341)	(0.0542)
September 2011 (riots + 1 month)	2.5293***	0.0005	1.8687***	0.5483***	2.6043***
	(0.0822)	(0.0018)	(0.0555)	(0.0377)	(0.0628)
Oct. – Dec. 2011(riots + 1 quarter)	2.0815***	-0.0004	1.3957***	1.3322***	3.3737***
	(0.0801)	(0.0015)	(0.0484)	(0.0403)	(0.0674)
Jan. – Mar. 2012 (riots + 2 quarters)	2.6634***	-0.0019	1.1584***	2.7595***	4.6924***
	(0.0899)	(0.0013)	(0.0522)	(0.0528)	(0.0799)
Directly affected * August 2011	1.2544**	-0.0024*	0.5518	-0.1334	0.5115
	(0.5456)	(0.0013)	(0.3498)	(0.2343)	(0.4046)
Directly affected * September 2011	0.9444	-0.0003	0.5417	-0.0045	0.7802*
	(0.6165)	(0.0010)	(0.3726)	(0.2457)	(0.4499)
Directly affected * Oct. – Dec. 2011	0.3735	0.0002	0.1025	0.1094	1.3697***
	(0.6071)	(0.0008)	(0.3289)	(0.2727)	(0.4636)
Directly affected * Jan. – Mar. 2012	-0.0826	0.0010	0.1596	0.7379**	1.6008***
	(0.6876)	(0.0007)	(0.3381)	(0.3385)	(0.5856)
Indirectly affected * August 2011	1.2227***	-0.0038*	-0.4270*	0.1015	0.8367***
	(0.3654)	(0.0021)	(0.2324)	(0.1617)	(0.2686)
Indirectly affected * September 2011	1.4254***	-0.0005	-0.0183	0.1427	1.3201***
	(0.3762)	(0.0016)	(0.2321)	(0.1682)	(0.2951)
Indirectly affected * Oct. – Dec. 2011	1.5248***	0.0004	0.0327	0.5475***	1.6220***
	(0.3799)	(0.0013)	(0.2097)	(0.1838)	(0.3246)
Indirectly affected * Jan. – Mar. 2012	1.4617***	0.0016	0.2008	1.1245***	2.2870***
	(0.4226)	(0.0011)	(0.2240)	(0.2458)	(0.3991)
Observations			89,296		

Coefficients, standard errors in parentheses. Standard errors are adjusted for clustering on the level of the LSOA level. All estimates contain fixed effects for 8-digit postcodes. ***/**/* denote statistical significance on the 1%, 5% and 10% level respectively.

Table 8: Descriptive statistics, police deployment sample

Variable	Mean	Std.dev	Min	Max
		Ward level data		
Hours on duty by safer neighbourhood team officers	944.7	338.9	7	5,079
Affected	0.28	0.45	0	1
Observations		9,641		
		Borough level data		
Potential hours on patrol	62359.6	21576.0	32,446	179,088
Affected	0.72	0.45	0	1
Observations		512		

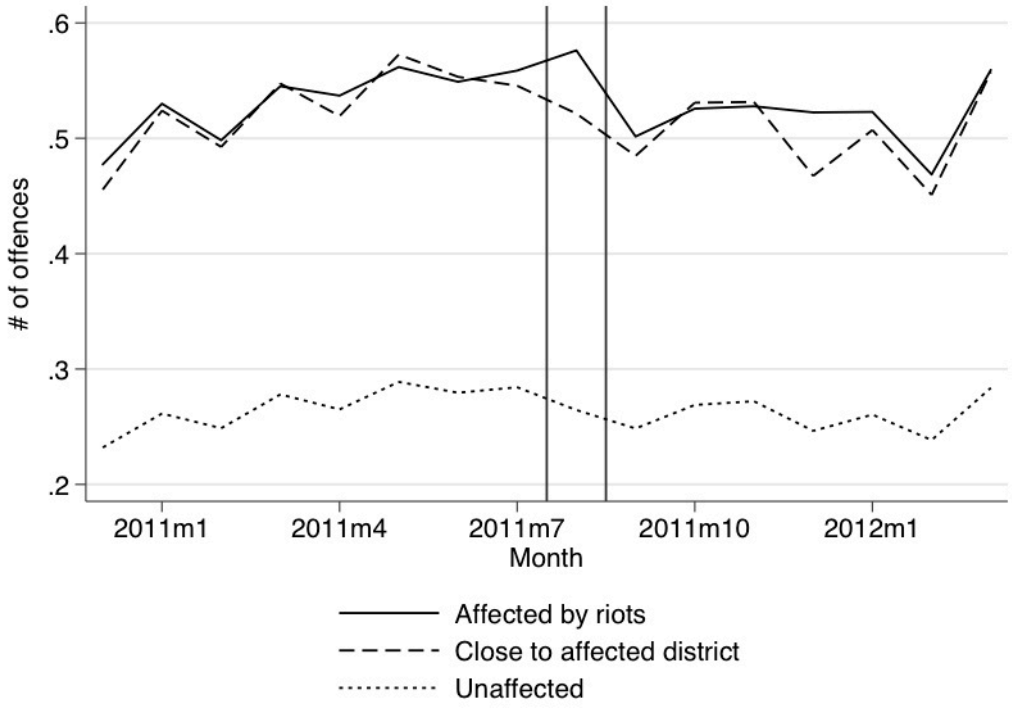
Table 9: Riots and police force deployment

	Hours on duty by safer neighbourhood team officers (Ward level)		Potential hours on patrol (Borough level)	
	Levels	Logs	Levels	Logs
August 2011 (riots)	180.1663***	0.1817***	11564.5679***	0.1922***
	(10.3693)	(0.0098)	(2031.6135)	(0.0271)
September 2011 (riots + 1 month)	22.9151***	0.0334***	-674.4321	-0.0099
	(7.5441)	(0.0089)	(1552.5541)	(0.0271)
Oct. – Dec. 2011(riots + 1 quarter)	0.3710	-0.0058	-1205.7654	-0.0242
	(7.6627)	(0.0110)	(1033.9306)	(0.0183)
Jan. – Mar. 2012 (riots + 2 quarters)	-26.8971***	-0.0389***	-3052.3765***	-0.0602***
	(8.3741)	(0.0129)	(1016.6820)	(0.0186)
Affected * August 2011	48.5674**	0.0500**	5454.2534**	0.0470
	(20.9342)	(0.0194)	(2364.5057)	(0.0315)
Affected * September 2011	2.3874	0.0064	2239.8621	0.0388
	(15.6195)	(0.0168)	(1633.9447)	(0.0285)
Affected * Oct. – Dec. 2011	1.8058	0.0143	1074.1229	0.0255
	(15.4283)	(0.0182)	(1163.4190)	(0.0198)
Affected * Jan. – Mar. 2012	18.1786	0.0396*	1385.1978	0.0418*
	(15.9843)	(0.0206)	(1390.7987)	(0.0208)
Observations	9641		512	

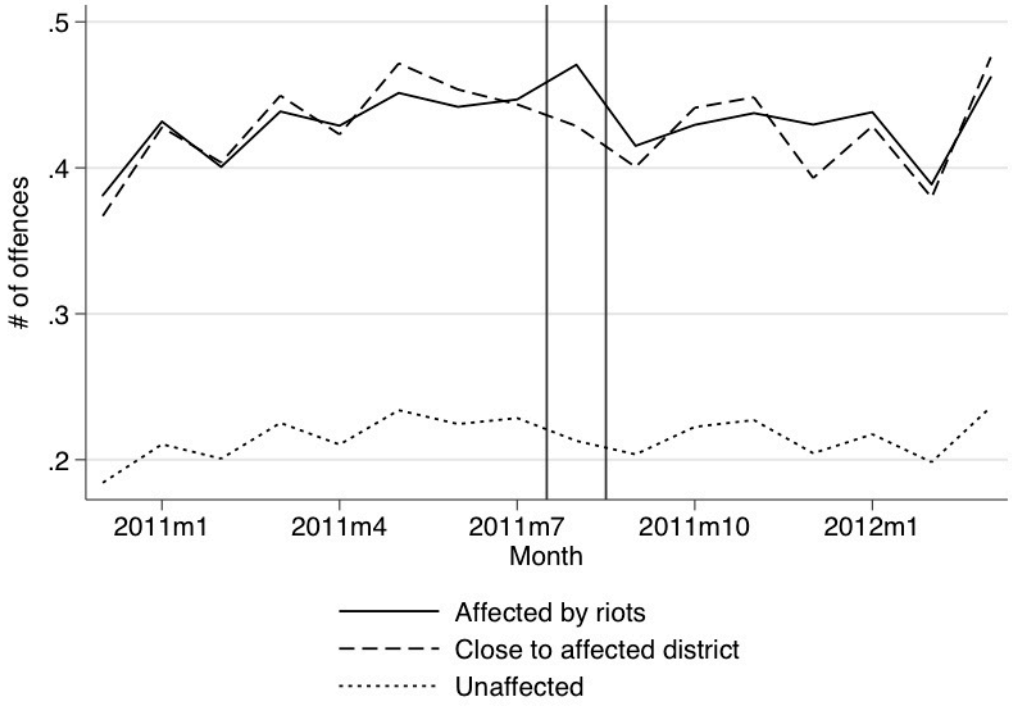
Coefficients, standard errors in parentheses. Standard errors are adjusted for clustering on the ward and borough level respectively. All estimates contain fixed effects for wards and boroughs respectively. ***/**/* denote statistical significance on the 1%, 5% and 10% level respectively.

Figure 1: Crime over time and by treatment/control group

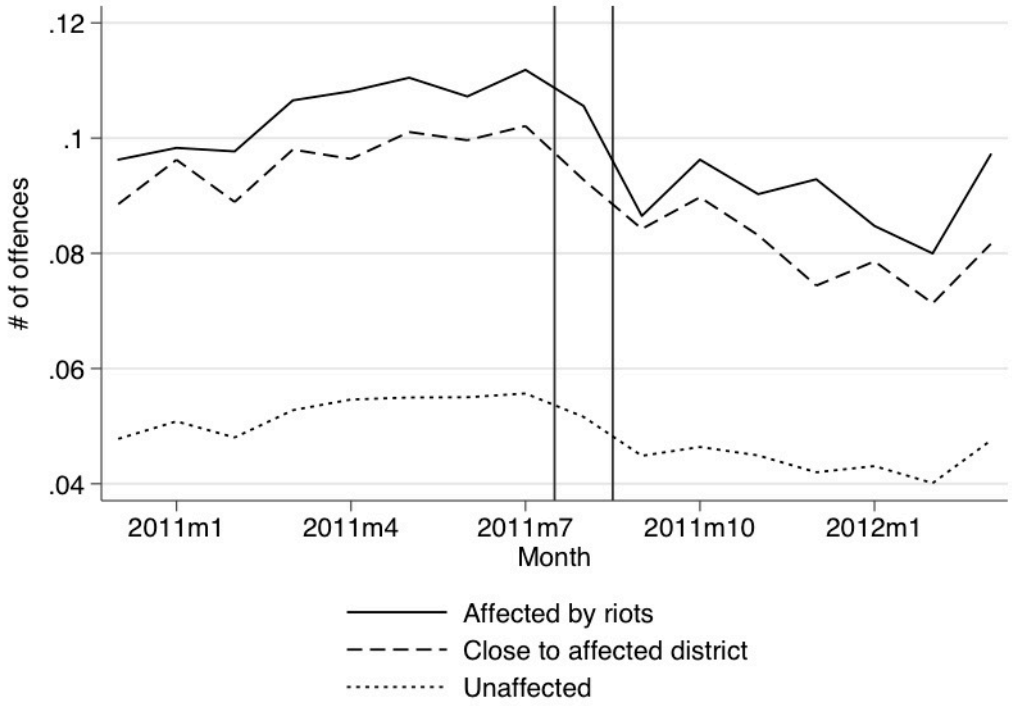
Panel (a): Total crime



Panel (b): Non-violent crime



Panel (c): Violent crime



Panel (d): Anti-social behaviour