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Working Paper

Love Thy Neighbour? Brexit and Hate Crime

IZA Discussion Papers, No. 13902

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Carr, Joel; Clifton-Sprigg, Joanna; James, Jonathan; Vujic, Suncica (2020) : Love Thy Neighbour? Brexit and Hate Crime, IZA Discussion Papers, No. 13902, Institute of Labor Economics (IZA), Bonn

This Version is available at:

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DISCUSSION PAPER SERIES

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Brexit and Hate Crime**

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NOVEMBER 2020

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ISSN: 2365-9793

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ABSTRACT

Love Thy Neighbour? Brexit and Hate Crime*

We provide causal evidence of the impact of the Brexit referendum vote on hate crime in the United Kingdom (UK). Using various data sources, including unique data collected from the UK Police Forces by Freedom of Information (FOI) requests, and various estimation methods (difference-in-differences, event-study analysis and synthetic control methods), we find that the Brexit referendum led to an increase in hate crime by around 15-25%. This effect was concentrated in the first quarter after the referendum and was larger in areas that voted to leave the European Union (EU). We also provide evidence against the hypotheses that this was due to victims' greater willingness to report crimes or due to changes in police behaviour and perceptions of the victims. We also present suggestive evidence that the media and social media played a small but significant role in the increase in hate crime.

JEL Classification: D72, J15, K42

Keywords: Brexit, referendum vote, hate crime, synthetic control method

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* We are grateful to Robert Apel, Joachim De Weerd, Patrick Gaule, Kerry Papps, Sarah Smith, Adam Szeidl, Wouter Van Dooren, Marc Baudinet, and to seminar participants at the University of Antwerp, University of Bath, and Erasmus University Rotterdam who provided useful feedback and comments. This paper is accompanied by Supplementary Material available at: www.mwpweb.eu/JonathanJames/.

1 Introduction

Motivation — Breaking a social norm comes at a cost. When information arrives that suggests a norm is weaker than previously thought, the current cost of breaking that norm falls. Elections, and especially referenda, are the aggregation of private opinions. They are a vehicle for delivering new public information and potentially updating norms. [Bursztyn et al. \(2020\)](#) examine how social norms can deteriorate in a rapid fashion. They find that Donald Trump’s rise in popularity and his 2016 election victory increased the willingness to express anti-immigration views. The social acceptability of these views also increased.

The campaign ahead of the Brexit referendum brought immigration to the forefront of the public debate. The referendum result, much like Trump’s election in 2016, was a surprise. It defied both the betting markets and the polls (see Figure 1). The true extent of society’s private anti-immigration sentiment was now public. This paper examines the impact of the Brexit referendum result on an observable and measured breakdown in social norms – that of committing racial and religious hate crime.

Hate crimes, in general, are costly to victims and communities. Their disruptive nature can cause significant societal problems that may also accumulate over time. For instance, hate crimes can lower societal cohesion. For example, [Gould and Klor \(2016\)](#) find that jihadi terror attacks led to an assimilation slowdown of Muslim immigrants in the US states which experienced biggest increases in hate crime.

There was a documented rise in hate crimes after the Brexit referendum result. The reported spike in racist or religious abuse incidents in England and Wales within the first month since the referendum has been attributed to the vote itself. Whilst these changes coincided with the referendum, they could have been correlated with the vote itself, rather than triggered by it. Specifically, it is possible that other economic and political factors resulted in both the Brexit vote and the changes in hate crime incidents. The vote may have also led to increased reporting of hate crimes by victims and witnesses or better recording by the police. Both trends could have been further amplified by the (social) media reporting.

Motivated by the observed societal response to the UK’s decision to leave the EU, this paper aims to establish whether the Brexit vote *caused* observed changes in hate crime (or merely exacerbated a previous trend).

Our contribution — We provide the first causal evidence of the impact of the Brexit

referendum vote on racial and religious hate crime in England and Wales.¹ To do this we employ three methods: difference-in-differences, event-study analysis and synthetic control methods. Given that the event was national, identifying control groups is not obvious in this case. In order to isolate the causal effect, we use racial and religious hate crime as the treatment group and other crime categories as the control group. The idea is that the Brexit vote was unlikely to impact on other crimes such as burglary, shoplifting or drug use but had a direct impact on racial and religious hate crimes.²

First, we estimate the effect of Brexit vote on hate crime using quarterly data for Community Safety Partnership areas (CSPs).³ Taking an event-study approach allows us to examine the temporal nature of the impact of the Brexit vote on hate crime. However, to pin down the finer temporal effects of Brexit referendum vote, we supplement the analysis with unique data on monthly counts of hate crime at the Police Force Area (PFA) level, collected through Freedom of Information (FOI) requests. Collected in this way, we have hate crime data from over 75% of all police forces in England and Wales.⁴

In general, hate crimes are quite infrequent and have been on a different trend relative to other crimes. Therefore, to address the issue of non-common trends between hate crimes and other crimes as comprehensively as possible, we also use synthetic control methods ([Abadie and Gardeazabal, 2003](#); [Abadie et al., 2010](#); [Abadie, 2020](#)).⁵

We find a 15-25% rise in recorded hate crime as a result of the Brexit referendum vote. This effect is concentrated in the first quarter after the referendum (July to September 2016). Specifically, the impact is largest and most significant in the first month after the referendum (July 2016). This impact is substantially smaller than the 41% effect reported by the Home Office ([Corcoran and Smith, 2016](#)).⁶ Thereafter,

¹The focus on England and Wales is determined by hate crime data quality and availability. The collection of hate crime data in England and Wales is standardised. There are clear definitions of victims of hate crimes. This is an advantage of studying hate crimes reported by English and Welsh police as compared to other countries. The definitions of victims of hate crimes are contained in the National Crime Recording Standard (NCRS) which was implemented in 2002. Furthermore, in 2015 the Home Office made an effort to improve hate crime recording by making it even more uniform and structured and quarterly hate crime reporting became mandatory from April 2015.

²If the Brexit vote did have a direct impact on other crimes, which we think is unlikely, then we are likely to underestimate the effect of Brexit vote on hate crime.

³Community Safety Partnership areas are local bodies made up of councillors and independent people from each council area who work to make the community safer. In practice CSP areas mostly overlap with the Local Authority areas in England and Wales.

⁴For a fuller discussion of the data collected through the Freedom of Information requests and their representativeness, see [Clifton-Sprigg et al. \(2020\)](#).

⁵Synthetic control methods have been used in other applications related to Brexit. [Born et al. \(2019\)](#) and [Breinlich et al. \(2020\)](#) examine the impact of Brexit on GDP and foreign direct investment (FDI), respectively, using other countries as donor countries in the synthetic control.

⁶The Home Office find that the number of racially or religiously aggravated offences recorded by

we do not find a bigger increase in hate crimes relative to other crimes. This suggests that social norms can change quickly, but this change might not be long lasting. We document evidence that suggests that there was a backlash against this rise in hate crime, typified by social media campaigns that rallied against this rise in hate crime. Furthermore, just over a month after the referendum the government announced that prosecutors would be urged to push for tougher sentences for those committing hate crimes (BBC News, 2016). They also pledged additional funding for protective security measures at vulnerable faith institutions.⁷ This combination of measures would increase the cost of committing hate crime and in turn increase the cost of breaking the social norm and may explain why the effect has not lasted.

The estimates reveal a larger relative increase in hate crimes in areas that voted to leave the EU compared to areas that voted to remain. This suggests that when the private anti-immigration sentiment was made public by the referendum, areas where more people agreed with this sentiment now had the norm updated. As a result they were more likely to express the anti-immigrant views by committing hate crime.

We also provide suggestive evidence that media (traditional and social) played a role in increasing hate crime. We find that a 1% increase in hate crime media reporting is correlated with a 0.04% increase in racial and religious hate crimes (henceforth RRHC) the following month. A 1% increase in Brexit coverage is correlated with 0.02% increase in RRHC. Social media coverage is also positively correlated with hate crimes and seems to take effect sooner than that of printed media.

In order to make sure that the results on recorded crime are not simply an artefact of an increase in recording, we examine data from the Crime Survey of England and Wales (CSEW). We find evidence that there was an increase in the probability of reporting hate crimes, having been a victim after the referendum. There were also changes to the outcomes of recorded crimes that could reflect police effort or changing police behaviour. However, the magnitude of these effects and the types of crimes affected by these changes indicate that only a small part of the observed RRHC increase post-referendum can be explained by a change in either victim or police reporting behaviours. Similarly, we show evidence against the argument that changes in the perception of the victims resulted in these large increases in RRHC.

Related Literature — To date, very little is known about the impact of political shocks (their size and persistence) on hate crime. Previous literature examined the impact

the police in July 2016 was 41% higher than in July 2015.

⁷For further details, visit: <https://www.gov.uk/guidance/places-of-worship-security-funding-scheme>

of terrorist attacks, such as the New York 9/11 and London 7/7 bombings, on subsequent hate crimes against Muslims, Arabs, and those perceived to be Middle Eastern (Swahn et al., 2003; Deloughery et al., 2012; Hanes and Machin, 2014). Ivandić et al. (2019) examine the effect of international jihadi terrorist attacks on local⁸ anti-Muslim hate crimes. In these cases, which are most often related to crimes of anti-religious or anti-immigrant nature, the subsequent hate crimes are categorised as retaliation. The perpetrator is motivated by a desire to retaliate against an attack that they perceive as aimed at their group or their community. Conversely, this paper analyses a trigger event, which reinforces a perpetrator's world view, thus adding to their perception that other people think like them, legitimising their views and increasing their probability of committing the crime.⁹

Newly emerging studies of political events include analyses of changes in hate crime patterns following election of Donald Trump as the US President (Sims Edwards and Rushin, 2019; Levin and Grisham, 2016; Jenkins, 2017). These studies, however, do not provide causal evidence of a positive link between hate crime increases and Donald Trump's electoral win. Further analyses, such as Müller and Schwarz (2019) consider role of other factors in escalation of hate crimes, such as social media. However, none of these studies do both – i.e. consider Brexit/other political event and then show how (social) media contributed to it.

There is also an emerging literature on understanding who voted for Brexit and what were the key drivers of the *Leave* vote. Although the 2016 British Election Study (Prosser et al., 2016) points to immigration as the key reason why a person voted to leave the EU, Becker et al. (2017) find that education profiles and the dependence on manufacturing employment in the area, alongside being low income and high unemployment, were important determinants of the *Leave* vote share. Liberini et al. (2019) show that it was not UK citizens' actual income but their feelings about their income that determined whether they voted to leave the EU or not. The paper finds little evidence that Brexit was favoured by the old and the unhappy.

The analyses of consequences of Brexit referendum vote have been mainly focused on the impact on the economy. Born et al. (2019) find that the Brexit vote caused a loss of output in the UK of around 1.7% to 2.5% by the end of 2018. Foreign direct investment has also been negatively affected (Breinlich et al., 2020). Our paper also fits into the literature on the costs of the Brexit referendum albeit in a different domain, outside of the macroeconomy.

⁸Greater Manchester area.

⁹In a different context, Arababa'h et al. (2019) show that exposure to successful celebrities from stigmatised groups reduce prejudice toward that group, including hate crimes.

There are three other papers that also examine the relationship between hate crime and Brexit. [Devine \(2018\)](#) and [Schilter \(2020\)](#) also document the rise in hate crime but use either aggregated UK data or more detailed disaggregated data from just two, albeit large, areas – London and Manchester. Specifically, [Schilter \(2020\)](#) employs machine learning techniques to document the rise in hate crime after the Brexit referendum vote. Using data from two large metropolitan areas, London and Manchester, he finds on average a 21% increase in hate crimes after the referendum. Furthermore, he finds that proxies of the migrant share and, similar to [Becker et al. \(2017\)](#), income, and wealth, are strongly (positively) associated with a higher increase in hate crime after the vote. [Devine \(2018\)](#) finds similar effects implementing a time series analysis. Neither of these papers have an explicit control group.

[Albornoz et al. \(2020\)](#) also provide descriptive empirical evidence of an increase in hate crime after the referendum. However, they focus primarily on the difference between *Leave* and *Remain* areas. In contrast to the results we present, they find that hate crimes rose more in areas that voted to remain in the EU.¹⁰ Specifically, they report that a one percentage point increase in vote share to *Remain* is associated with a rise in hate crime of half a percent. This finding motivates their model where individual behaviour is dictated by a desire to conform to social norms as well as individual preferences. The model predicts that areas that voted *Remain* experience a greater surprise by the result and hence this leads to more hate crime. Our results contrast starkly with these findings. By having other crimes as controls and taking into account that *Leave* and *Remain* areas experienced different trends, which is most comprehensively carried out using synthetic control methods, we find that hate crimes increased more in *Leave* areas.¹¹ A simple explanation for our finding is that there are more people in *Leave* areas who sympathised with, and then acted upon, the anti-immigration sentiment revealed by the referendum.

Paper structure — The remainder of the paper is structured as follows. Section 2 presents the background of the referendum vote and the definition of hate crime. Section 3 describes the variety of data sources used in the analysis and presents econometric methodology, together with the key identification issues. Section 4 presents the main results, as well as several robustness checks, while Section 5 explores a number of mechanisms and explanations of the main results. Section 6 concludes the paper.

¹⁰We discuss the differences between our paper and that of ([Albornoz et al., 2020](#)) in more detail in Section 5.4.

¹¹Our event study models reveal that hate crimes were increasing prior to the referendum in *Leave* areas even when various trends were taken into account.

2 Background

2.1 Theoretical framework

Committing a hate crime is an extreme expression of xenophobia and of breaking a social norm, as well as the law. If the expected benefits of breaking the law exceed the expected costs then, under [Becker \(1968\)](#) seminal framework, a rational criminal will commit a crime. The standard approach models the expected costs as a function of the probability of being caught as well as the expected punishment (fines and time spent in prison). There could also be a psychological cost of committing a crime such that the crime goes against the prevailing social norm over and above that a crime is being committed. In the case of hate crime, therefore, the cost of committing a crime could also be a function of the anti-immigrant sentiment.

We propose a simple framework of criminal behaviour is, in which criminals attempt a crime if the expected benefits are greater than the expected costs. Let the expected cost of crime be a function of the (discounted) length of sentence if captured (T), the probability of being caught (P) and the anti-immigration sentiment in the country (S). The probability of being caught (P) is a function of a number of factors (F), such as the intensity of police efforts, but could also be a function of the anti-immigration sentiment. The experimental evidence provided by [Bursztyn et al. \(2020\)](#) suggests that, as a result of Donald Trump's election victory, not only may people become more willing to express their xenophobic views but also judge others less negatively for doing so. Therefore, if people perceive that society dislikes immigrants, then they may think that they are less likely to be reported to the police, for example, if caught in the act of committing a hate crime. Therefore, S becomes part of the function in the probability of being caught.

An individual will, therefore, commit a hate crime if:

$$E(\text{Benefit}_{\text{crime}}) > E(\text{Cost}(T, S, P(S, F)))$$

In partial equilibrium, we expect $\partial C/\partial S$ and $\partial P/\partial S$ to be negative; that is, as anti-immigration sentiment increases, the psychological cost of committing crime against an immigrant falls. An individual fears less what others will think about the crime they have committed. Furthermore, the perceived risk of being caught falls. Overall, this fall in the cost would lead to an increase in hate crimes.

In case of the Brexit referendum vote, the true extent of the anti-immigrant sentiment was revealed, causing a positive shock to S . Therefore, this simple framework predicts that hate crime would rise.

The spike in hate crimes following the referendum and the media reporting of it led to a backlash. In Section (5.5) we demonstrate that there was a counter-reaction on social media and people began calling out the increase in xenophobia. This may have led people to re-evaluate (again) how much xenophobia society will tolerate. Society may allow having xenophobic views and expressing them in their votes but they do not support physical manifestations of xenophobia. This may have led to a re-evaluation and lowering of the anti-immigration sentiment S .

Furthermore, the government acted in two ways. First, they sent a signal that prosecutions for hate crime would increase. It was reported one month and one day after the referendum that prosecutors would be urged to push for tougher sentences for people committing hate crimes. Second, additional funding would be provided to increase security at places of worship. In the framework above, T , the (discounted) length of sentence if captured, was therefore signalled to rise. This was not just a signal, it was later reported that sentences for hate crime had increased with a higher proportion of hate crime cases having a sentence uplift applied.¹² The Crown Prosecution Service (CPS) reported that in 2016/17, 52.2% had a sentence uplift applied, compared to 33.8% in 2015/16 ([Crown Prosecution Service, 2017](#)).

2.2 The Brexit Referendum Results

The European Union (EU) Referendum, which was held in the United Kingdom on 23rd June 23, 2016, put the future of the country's EU membership to public vote. In the previous years, calls for the referendum had been growing in the United Kingdom with a foothold in the Conservative party. With the Conservative party's promise to hold a referendum in case of victory and outright majority in the 2015 General Election, the referendum became the government's priority.¹³ The European Referendum Act received Royal Assent on 17th December, 2015 with the only opposition coming from the Scottish National Party (SNP). This and the subsequent Acts set forth the rules of the referendum, with the official campaigning period lasting 10 weeks (from 15th April 15, 2016 to 23rd June 23, 2016), with a "purdah" period in the four weeks leading up to the referendum.¹⁴ The government also designated two official campaigns to argue on the behalf of remaining (*Remain*) and leaving (*Leave*) the EU.

The Vote Leave (VL) campaign was the official campaign to leave the EU and was

¹²See <https://tinyurl.com/upliftexamples> for examples of how the uplift is applied.

¹³We have also examined whether the announcement of the referendum had an impact on hate crime and find no effect. These results are available on request.

¹⁴During this period, the government and public bodies could not comment or distribute information related to the referendum.

led by prominent main-party politicians such as Boris Johnson. However, there was also an unofficial campaign – Leave EU – led by controversial figures, such as Nigel Farage. Immigration was a leading issue of both campaigns, with warnings of a massive influx of migrants (for example, see Figures A.1 and A.2 in the Supplementary Material). Figure A.3 in the Supplementary Material displays two word clouds comprising of reasons provided in the exit polls as to why a person voted to leave the EU. By far the most frequent word used by the leave campaign was “immigration”, with other prominent topics such as “economy” and “NHS” being much less salient at the time of the vote (Figure A.3a). In comparison, the remain campaign focused primarily on the economic risks of withdrawing from the EU (Figure A.3b).

Prior to the referendum, the expectation was that *Remain* would win a majority of the votes. In accordance with this, from March through June 22, 2016, *Remain* had at least a 60% chance of victory according to betting data (top panel of Figure 1). Opinion polls also had *Remain* ahead for most of the campaign (bottom panel of Figure 1). On the day of the referendum, the odds of a *Remain* victory were 4:1. However, in the end, nearly 52% of voters elected to leave the European Union, with striking geographic heterogeneity of the results (over 80% of *Leave* votes were cast in England and Wales, while Northern Ireland and Scotland voted to *Remain*). Figure 2 provides a visual representation of the local referendum outcomes in England and Wales. While there is a large geographical variation in the referendum results, it is evident that in England and Wales much of the *Remain* vote originated in London and other urban areas, with *Leave* having more support in North and South East England.

3 Data and Methodology

3.1 Hate Crime Data

In England and Wales hate crime is defined as “any criminal offence which is perceived, by the victim or any other person, to be motivated by hostility or prejudice towards someone based on a personal characteristic,” and is categorised by race or ethnicity, religion or beliefs, sexual orientation, disability and transgender identity (O’Neill, 2017). According to the [College of Policing \(2014\)](#) racial and religious hate crimes (RRHC), the focus of our analysis, include any group defined by “race, colour, nationality or ethnic or national origin, including countries within the UK, and Gypsy or Irish Travellers.”

The collection of hate crime data in England and Wales is standardised, which gives English and Welsh data an advantage over hate crime data from other countries. Hate crime laws are uniform across all areas and jurisdictions within England and Wales, allowing an easy comparison between different areas. The definitions of victims of hate crimes are contained in the National Crime Recording Standard (NCRS) which was implemented in 2002. Furthermore, in 2015 the Home Office made an effort to improve hate crime recording by making it even more uniform and structured and quarterly hate crime reporting became mandatory from April 2015.

According to the Home Office (O’Neill, 2017), there was a total of 80,393 hate crimes recorded by the police in England and Wales in 2016/2017, a 29% increase from 62,518 hate crimes reported in 2015/16. Of these, 78% (62,685) were racially-biased, while 7% (5,949) were religious hate crimes (see Table A.1 in the Supplementary Material).¹⁵ In comparison to other hate crimes, racially-biased hate crimes are more likely to fall under the category of ‘public order offences’ and less likely to be ‘violence against the person’.¹⁶

We use two hate crime data sets in the analysis – quarterly hate crime data reported at the Community Safety Partnership (CSP data) level and monthly hate crime data at the UK Police Force level (FOI data).

Hate Crime at the Quarterly Level – Community Safety Partnership (CSP) Data

To examine the impact of the Brexit referendum vote on hate crime, we first use quarterly crime data at the Community Safety Partnership (CSP) level, in the period from the second quarter of 2007 until the first quarter of 2017. The CSP areas’ boards consist of representatives of the Local Authority, first-responders, and health and probation services. Quarterly crime data for the 315 CSP areas within England and Wales are publicly available and include crime counts of 251 crime descriptions. The CSP data include 14 crime descriptions which measure racially or religiously aggravated crimes.

Hate Crime at the Monthly Level – Freedom of Information (FOI) Requests Data

¹⁵The reported statistics differ across the three sources for the following reasons. First, FOI and Home Office data include racial and religious crimes separately, meaning that a combined raw count of racial and religious crimes will double count crimes that were recorded as having a racial and religious bias. Second, the data sources contain crime statistics at different stages of investigation. The FOI data is more ‘raw’ and contains crimes that may have initially been reported as having a racial or religious bias but were ultimately not classified as a hate crime.

¹⁶Crimes against the person include bodily harm and other injury, assault with or without injury and harassment. Crimes against public and property include criminal damage to a building, dwelling, or vehicle and public fear, alarm, or distress. Therefore crimes against the person have specific individual target(s), while crimes against public and property intend to harm a minority group through destruction or defacement of property and public spaces (think of graffitied hate speech).

We collected monthly hate crime data using Freedom of Information (FOI) Requests. On 2nd March 2017 we contacted all 45 police forces in the UK with an identical request to provide monthly statistics on the reported number of hate crimes by type of crime, by ethnicity and by nationality of the victim, covering the period from January 2011 to February 2017.¹⁷ In total, hate crime data were gathered from 33 of the 45 police force areas (PFAs) in England and Wales. The police forces in Scotland and Northern Ireland, as well as ten police forces in England and Wales were unable to comply with the FOI request.¹⁸ Each complying police force provided, at the minimum, a monthly count of reported hate crimes by the five protected characteristics: race, religion, sexual orientation, transgender identity, and disability. For our analysis, we combined the racially-biased and religiously-biased crimes into one category.

The characteristics of the response across areas are provided in Table A.2 in the Supplementary Material. Specifically, the response rate was 98%, with one police force not replying. The request was completed on average within the legally required 20 days. In 28% of cases the request was completed late, usually due to the need to follow up with clarification. The police forces responded in three ways: by refusing to share any information (11%) due to cost or data unsuitability, by providing some data and by providing all requested data. When only partial information was sent back, it was typically justified by the lack of data or the cost of providing additional data being greater than the cost limits. Among the successful responses, some of the data provided were not in accordance with the requested format (e.g., providing quarterly or annual instead of monthly data). [Clifton-Sprigg et al. \(2020\)](#) show that the observable characteristics of the police forces or the areas are not significantly correlated with the probability that a request was satisfied, suggesting that the data from these FOI requests are broadly representative of the institutions from which they were requested.

3.2 Other Data

Crime and hate crimes are likely to be correlated with a variety of factors other than the referendum, which we control for in the analysis. Demographic and economic control variables are gathered from the Office of National Statistics (ONS). Data on demographics and migration include: total population, share of the population that

¹⁷In the analysis we focus on the time period from May 2013 until February 2017, as the control group – other crime groups – only had a stable categorisation beginning in May 2013.

¹⁸Scotland provided only quarterly data on hate crimes, asserting that due to the lower frequency of hate crimes, monthly data may reveal identities of the victims.

is non-British by ethnicity (henceforth minority population),¹⁹ net migration for the year, and monthly data on population age. In addition, we normalise immigration flows for the year as the number of new international migrants relative to the minority population of the area. This best reflects changes in racial composition of an area. Data on the state of the economy in the PFA and CSP areas include quarterly unemployment rates, occupation levels,²⁰ median annual wages, and industry of employment – specifically the percent of the working age population working in construction and manufacturing in an area, in order to control for the intensity of industries where natives are at higher risk of being replaced by immigrants (Dancygier and Donnelly, 2013).

3.3 Summary Statistics

We begin by showing the long run hate crime trends using the CSP data. Figure A.4 in the Supplementary Material shows that there has been an increasing trend in reported RRHC in England and Wales since 2013.²¹ This trend is largely caused by an increase in RRHC against the public and property, while RRHC against the person has remained constant since 2011. In addition, there is clear evidence of seasonality in the data, with higher occurrences of RRHC during spring and summer relative to autumn and winter seasons. This seasonality has become more pronounced since 2016 with large spikes occurring in the warmer quarters in 2016, 2017, and 2018. Graphically, there is a large increase in RRHC in the third quarter of 2016, following the referendum, of about 2000 crimes. However, it is not clear whether this increase is a product of the increasing trend, a temporary shock after the referendum or the beginning of a long-term increase in RRHC (relative even to the trend from 2013 to mid-2016).

Figure 3a shows the quarterly crime rates observed over the sample period by crime type (i.e., RRHC versus non-RRHC) averaged over all CSPs. We stress the following three points. First, RRHCs are relatively infrequent compared to other crimes. Second, RRHCs have been on a different trend relative to non-RRHCs. Third, as seen in Figure A.4 in the Supplementary Material, we see a spike in the RRHC immedi-

¹⁹This is the percent of the individuals in the area who do not identify as British, English, Welsh or Scottish by ethnicity – irrespective of nationality.

²⁰Data on occupation is a count of jobs based on the type of occupation. In the United Kingdom, occupations are stratified into nine groups. The lowest occupation group (I) is elementary occupations which require little education and training. The highest occupation group (A) is managers, directors, and senior officials which require high levels of education and experience.

²¹In the graphs these crimes are aggregated into two categories for analysis at the national level: crimes against the person and crimes against property and public.

ately after the referendum. Figure 3b shows the monthly crime rates observed over the sample period by crime type (i.e., RRHC versus non-RRHC) aggregated over all PFAs. Similarly, the spike in RRHCs in July 2016, immediately after the referendum, is prominent and apparent.

List of crimes, as well as groups and subgroups in the CSP and FOI datasets, are given in Table A.3. Summary statistics of both sets of data are given in Table A.4 in the Supplementary Material.

3.4 Empirical Methodology

Difference-in-differences

Our goal is to evaluate whether the EU referendum resulted in an increase in hate crimes. To this end we employ three separate (but related) statistical approaches. The first is a standard difference-in-differences (DD) model (Wooldridge, 2002). Letting y_{cat} be the log of the number of crimes (per 100,000 inhabitants) in crime category c , in area a , in time period t , H_c an indicator variable equal to 1 if crime category c is designated as a racial and religious hate crime and 0 otherwise, and $I(z)$ a function indicating that the event z occurs, the DD model is given by

$$y_{cat} = \alpha_0 + \alpha_1 H_c + \alpha_2 I(t \geq \tau) + \beta H_c \times I(t \geq \tau) + \psi(t) + \theta_c + \theta_a + \mathbf{X}'_{at} \gamma + \varepsilon_{cat}, \quad (1)$$

where τ coincides with the quarter/month-year when the referendum took place (June 2016). Our coefficient of interest is therefore β – the coefficient of the interaction of the dummy indicating the quarter after the referendum and the crime being a hate crime; $\psi(t)$ denotes time fixed effects, θ_c refers to crime fixed effects, θ_a refers to local area fixed effects, and \mathbf{X}_{at} is a vector of time-varying characteristics at the area level that can affect crimes as described above. To account for pre-referendum trend differences and seasonality in crime rates, we allow the $\psi(t)$ function to include group-specific linear trends, group-specific year dummies, and crime group-specific seasonal dummies. In some specifications we also include crime-specific trends, and allow crime trends to differ between *Remain* and *Leave* areas. Furthermore, we cluster standard errors at CSP area-crime category level.

Event study

To evaluate possible differences in the impact of the referendum over time, we employ an event study strategy. This includes using pre- and post-referendum dummies which additionally allow us to test the parallel trend assumption of the difference-

in-differences model set out above. In regressions using the CSP dataset, we include three pre-referendum and four post-referendum periods, with the baseline being quarter 1 of 2016, the last quarter which entirely took place before the referendum. In regressions using the FOI dataset, we include three pre-referendum and five post-referendum periods, with May 2016 as the baseline. The specification therefore becomes:

$$y_{cat} = \sum_{t=-3}^4 \beta_{1,t}(H_c \times I_t) + \psi_t + \theta_c + \theta_a + \mathbf{X}'_{at}\gamma + \varepsilon_{cat} \quad (2)$$

where the variable definitions are the same as in the baseline DD specification.

Synthetic control methods

Due to the concerns about differences in the trends of RRHC and other types of crime, and to further reduce the scope for omitted variable bias, we employ the synthetic control method introduced by [Abadie and Gardeazabal \(2003\)](#), [Abadie et al. \(2010\)](#) and [Abadie \(2020\)](#). With this approach we weight crimes other than hate crimes in the control group to construct a synthetic counterfactual that replicates the basic predictors for hate crimes before the EU referendum.

For this analysis we aggregate the crimes up to national level. Adjusting slightly the notation of Rubin's ([Rubin, 1974](#)) potential outcome framework, we define y_{ct}^1 as the log crime rate in quarter/month t if the crime c is a hate crime and y_{ct}^0 is the corresponding outcome if the crime is not designated as being hate-related, so that the treatment effect of the reform is given by $\beta_{ct} = y_{ct}^1 - y_{ct}^0$.²² The synthetic control estimator compares the outcome on the treated crimes (RRHC), y_t^1 , to a weighted average of the outcome over all of the control crimes (i.e., non-hate related crimes), that is:

$$\hat{\beta}_{ct} = y_{ct}^1 - \sum_{c \in C} \omega_c y_{ct}^0, \quad (3)$$

where $\omega_c \geq 0$ is the weight attached to each crime c in the control group of crimes C . Since treated and control crimes are observed in different states after the referendum at time period τ , Equation (3) becomes

$$\hat{\beta}_t = \beta_t + \left(y_t^0 - \sum_{c \in C} \omega_c y_{ct}^0 \right), \quad \text{for all } t \geq \tau. \quad (4)$$

The accuracy of this approach relies on minimising the difference in parenthe-

²²Because of a better pre-referendum fit, we also use relative quarter/month crime rate, i.e, quarter/month crime rate divided by the average crime rate (by crime) during the pre-treatment period (mean of crime rate by crime prior to 2016q2 for quarterly data and prior to June 2016 for monthly data).

ses in Equation (4). A way to achieve this is to minimize the difference between treated and control crimes over the pre-referendum period. As long as the weights reflect features that do not change in the absence of the EU referendum, the synthetic control approximates the (unobserved) counterfactual evolution of the potential outcome y_{ct}^0 from τ onwards.²³ Specifically, let \mathbf{X}_c^1 and \mathbf{X}_c^0 be the vectors of crime determinants for the treated crimes (RRHC) and for each of the crimes c in the control group, respectively. The optimal vector of weights will minimize the square distance $(\mathbf{X}_c^1 - \sum_{c \in C} \omega_c \mathbf{X}_c^0)' \mathbf{V} (\mathbf{X}_c^1 - \sum_{c \in C} \omega_c \mathbf{X}_c^0)$, where \mathbf{V} is a diagonal matrix with non-negative entries measuring the relative importance of each predictor, $\omega_c \geq 0$, for all $c \in C$, and $\sum_c \omega_c = 1$. In turn, the optimal matrix \mathbf{V}^* is chosen to minimize the mean squared error of outcomes over the pre-referendum period, that is, $\frac{1}{t^0} \sum_{t < t^0} (y_t^1 - \sum_{c \in C} \omega_c^* y_{ct}^0)^2$, for $t^0 < \tau$.

Given that RRHCs are relatively infrequent we might be concerned that it is difficult to find a linear combination of control crimes that matches well with the treatment crime. Therefore, in addition to using the log rate of crimes, we demean the crime rate using information from the pre-referendum period, and then construct the synthetic control estimator using these demeaned data. [Ferman and Pinto \(2019\)](#) put forward this as an option to help improve match quality and reduce convex hull violations.

In the traditional synthetic control setting, the synthetic control group is constructed using observable characteristics of the potential controls pre-treatment as vectors of outcome determinants. Previous research, such as analysis of the effect of cigarette taxes in California ([Abadie et al., 2010](#)), use other geographical areas to generate a synthetic match for the treated area, matching by observables such as economic, labour market, and demographic characteristics. In our analysis, such area characteristics cannot be used as they are identical across crimes within areas. Therefore, we create a synthetic RRHC by minimising the difference in pre-treatment characteristics of actual RRHC and its synthetic counterpart. Specifically, we use the pre-referendum characteristics of the crimes themselves, including seasonal averages (by month or quarter) and yearly averages up to March 2016, in order to ensure that the synthetic racial hate crime minimises gaps, taking into account trends and seasonality. Matching on these crime characteristics in the model constructs a synthetic RRHC such that the crime characteristics of the synthetic and actual RRHC are min-

²³As pointed out by [Abadie et al. \(2010\)](#), an analogous identifying assumption, namely that unobserved differences between treated and non-treated crimes are time-invariant, is also imposed by the DD model described above. In fact, the synthetic control method generalises the DD model by allowing the effect of unobserved confounders to vary over time according to a flexible factor representation of the potential outcomes of the treated local authorities.

imised prior to treatment occurring in the second quarter of 2016. The lack of explicit covariates is not necessarily a problem if the match is made on a long set of pre-referendum outcomes (Botosaru and Ferman, 2019), which is what we have in our analysis.

4 Results

4.1 Baseline Estimates

Estimates from Quarterly Data

Difference-in-Differences

Table 1 reports the DD estimates of the effect of the referendum using quarterly data collected at the CSP level. We show the results of five different specifications of Equation (1), depending on whether we include control variables, quarter fixed effects, local authority fixed effects and group-specific time (quarterly) trends. The estimates in column (1), which include sets of variables accounting for the seasonal nature of crime (such as a general time trend, quarterly dummies, quarter-of-the-year fixed effects, racial crimes quarter-of-the-year fixed effects, quarter fixed effects and year fixed effects) and CSP fixed effects, reveal a 14.7% increase in racial and religious hate crime as a result of the referendum. Allowing the trends to differ by area in column (2) leads to a similar increase. The effect falls to 8.7% when crime specific trends are included in column (3), and increases a little when those crime trends are allowed to differ by *Remain* and *Leave* areas in column (4).

In 2015 the Home Office made an effort to improve hate crime recording by making it more uniform and structured. Furthermore, quarterly hate crime reporting became mandatory from April 2015. To adjust for potential increases in RRHC relative to other crimes beginning in 2015, in column (5) we allow the crime trends to differ between crimes across the entire period as well as beginning in 2015. This sees the point estimate rise to around 14.5%. Overall, therefore, there is some evidence that the referendum has led to an increase in hate crime and this is robust to the inclusion of various trends.²⁴

Event Study Analysis

We next test for short-term or temporary shocks in RRHC around the referendum.

²⁴Supplementary Material Table A.5 presents the DD results using the demeaned crime rate, i.e., demeaned using information from the pre-referendum period. The point estimates move in a similar direction but are more precisely estimated.

The results are presented in Table 2, which is organised as follows: specification in column (1) includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects, racial crimes quarter-of-the-year fixed effects, quarter fixed effects and year fixed effects. CSP-specific trends are added in column (2), crime-specific trends are added in column (3), difference in crime-trends between *Remain* and *Leave* areas is added in column (4) and an additional crime-trend beginning in 2015 is added in column (5). We include dummy variables for each of the three quarters pre-referendum and four quarters post-referendum, ending with the first quarter of 2017. Therefore, the coefficients should be interpreted as quarter shocks relative to the first quarter of 2016.

Before turning to the main estimates, we highlight the periods prior to the referendum where point estimates are statistically significant. This indicates that the assumption of parallel trends in pre-treatment period may not hold. One potential reason for the violation could be due to the aforementioned change in police reporting behaviour in 2015. To that end, as in the difference-in-differences analysis, we include the post-2015 crime specific trend. Results in column (5) of Table 2 show that, once we account for a change in trends in 2015, the parallel trend assumption is not violated in all periods apart from the fourth quarter of 2015. The reason we find a statistically significant positive coefficient on the last quarter of 2015 dummy is likely due to the occurrence of the Paris terror attack in that quarter; literature suggests that terror attacks lead to spikes in hate crimes (Ivandić et al., 2019).

Results across all specifications suggest a statistically significant and positive increase in RRHC in the third quarter of 2016 – the first full quarter after the referendum. In this quarter, RRHC increased by 32.5-36% according to the final two specifications. RRHC also increased in the second quarter of 2016. This coefficient measures the impact from April through to June 2016 and may be driven by an increase in RRHC in the last week of June – post referendum – or by an anticipation effect prior to the referendum vote. Our preferred specification (shown in column (5)) reveals that the effect of the referendum was short lived. Due to the concerns of the violation of the parallel trends assumption we next use synthetic control methods to estimate the Brexit referendum effect.²⁵

Synthetic Control Methods

Before turning to the main estimates, we consider the weights applied to other crimes

²⁵Supplementary Material Table A.6 presents the event study results using the demeaned crime rate as the dependent variable. As before with the DD results, the point estimates move in a similar direction, but are more precisely estimated.

to create the synthetic control (see Supplementary Material Table A.8) and compare the pre-referendum means of RRHC and the synthetic control (see Supplementary Material Table A.9). In case of log-rates, the method attaches the highest weights to ‘other sexual offences’ and ‘arson’ in the synthetic control and much smaller weights to crimes such as ‘bicycle theft’, ‘homicide’, ‘possession of weapons’ and ‘violence with injury’. Significantly different weights are used in case of relative rates. We find that the pre-referendum means for both RRHC and the synthetic control are very similar in pre-referendum period from 2007 onwards.

Figure 4a shows crime-specific log rates for RRHCs and synthetic-RRHCs. It suggests that the referendum had large impact on RRHC rates. The estimates for synthetic RRHC closely track the trajectory of RRHC rates for the whole pre-referendum period. After the referendum, the two lines no longer overlap and there is a substantial spike, revealing that the referendum led to a change in crime rates. Using the relative rate (Figure 4c) produces a slightly better fit in the pre-referendum period and a similar spike in the third quarter of 2016.

The treatment coefficients in Panel A of Supplementary Material Table A.7 show the difference between the log rates and the relative rates of actual RRHC and the synthetic RRHC of each post-treatment quarter. In the quarter following the referendum, the number of RRHCs in England and Wales increased by around 20% – 30% relative to synthetic-RRHC, for the log rate and the relative rate, respectively. We conclude that the effect of the referendum lasted at most three months, from July through September 2016, and that there was no significant anticipation effect in the quarter prior to the referendum.

As proposed by [Abadie et al. \(2010\)](#), appropriate inference can be established by performing a falsification test based on the distribution of the (placebo) effects estimated for crime rates in the control group. The null hypothesis that the effect of the referendum is equal to zero is rejected if the effect estimated for the RRHC rate is abnormal relative to the distribution of placebo estimates. If instead the distribution of placebo effects yields effects that are similar to those found for the synthetic RRHC, then it is likely that the referendum did not have any impact. We replicate the synthetic control estimates for all possible sets of crimes in the control group, pretending that each crime experienced the treatment in the second quarter of 2016. The results are reported in Figures 4b and 4d and show the distribution of estimates for the placebo and treated crimes. The black line is our treatment effect as seen in Figure 4c, i.e., the gap in crime rates between RRHC and synthetic RRHC. The grey lines represent the gaps associated with each of the runs of the placebo test. The

placebos are shown only for those with a mean squared prediction error (MSPE) of 10 or below. In the pre-referendum period, the difference between RRHC and synthetic RRHC falls near the top of the placebo tests, with the spike again being prominent. Supplementary Material Table A.7 shows the associated p -values – these standardised p -values can be interpreted as the percent of control crimes with large relative treatment effects. The estimated synthetic control effects are significant at the 10% level when using the log rate. The estimates are more precise and significant at the 5% level when using the relative rate (which produces a better pre-referendum fit).

We next examine the impact of the referendum on hate crime using our monthly dataset, in order to provide more insight into the length of the shock within the third quarter of 2016.

Estimates from Monthly Data

Difference-in-Differences

Table 3 contains the baseline difference-in-differences results using monthly police force data. As with the quarterly data, we find statistically significant estimates which decline (and in this case become statistically insignificant) when crime-specific trends are included. However, in our preferred specification (column (5)), when the post-2015 trend is added, the point estimates are somewhat larger and precisely estimated, suggesting a 26% increase in racial and religious hate crimes.

Event Study Analysis

Having found evidence of a positive and significant increase in RRHC following the referendum in the third quarter, we now analyse the length and the magnitude of the Brexit referendum vote shock. Table 4 presents the results for each month. We see an increase in RRHC in June which was partially treated. As the referendum was held on June 23, 2016, there is a week of post-referendum crimes included in June 2016. While it is not possible to attribute with certainty the June 2016 increase to either an anticipation effect or a reaction to the referendum results, the insignificant coefficients on other monthly dummies up until this point suggest that any increase in RRHC in June 2016 can be attributed to a post-referendum shock rather than an anticipation effect. This is likely because, in the months leading up to the referendum, *Remain* was expected to win.

However, the Brexit referendum vote shock was strongest in July 2016. The increase in RRHC in July is estimated to be 34.6-39.2%, with stable results across different specifications. In August, the shock decreases to 11.4-27.1%, but remains

significant. Similar shocks are observed until after November 2016 (though the estimates become less precisely estimated).

Similarly to when we use the CSP data, also here we find some (though much weaker) evidence against the assumption of parallel trends (columns (1)-(4)). However, once we control for a change in crime specific trends beginning in 2015, the coefficients for all pre-treatment dummies become insignificant; this suggests that the parallel trends assumption holds. Nonetheless, we turn to the synthetic control methods to ensure that the trends of the treatment group match those of the control group.

Synthetic Controls Methods

As with the CSP data, we find that the pre-referendum means are similar for RRHC and the synthetic control (see Supplementary Material Table A.9). The synthetic control when using log-rates is built on a combination of crimes with ‘possession of weapon offences’ and ‘public order offences’ receiving the highest weighting, and ‘bicycle theft’ and ‘other theft’ featuring less prominently (see Supplementary Material Table A.8).

Figures 5a and 5c show the path of RRHC and synthetic RRHC. The pre-treatment trends of the real RRHC and synthetic RRHC follow each other closely in the 3 years prior to the referendum with no significant deviations occurring until treatment in both models. As with the quarterly data, the pre-referendum fit looks better using the relative crime rate. Post-treatment, in July 2016, there is a significant visual jump in the trend of the actual RRHC (dark line) relative to the synthetic RRHC (dashed line). As seen in Panel B of Supplementary Material Table A.7, in that month racial hate crimes increased by 19% and 37% for the log and relative rates, respectively. Both of the July point estimates are statistically significant using the monthly data. Estimation results using the synthetic control methods demonstrate that the estimated post-referendum shock cannot be attributed to a deviation in trends prior to treatment and eliminates concerns of other crimes also being treated by the referendum in the estimated time periods. Moreover, the results show a temporary increase in hate crime in the quarter following the referendum, in particular the month of July 2016.

Why was the shock temporary? As discussed in Section 2, the rise in hate crime was reported by the media and the government reacted in two ways. There was a signal that prosecutions for hate crime would increase and additional funding was to be provided to increase security at places of worship. Further, as will be discussed in further detail in Section 5.5, there was a counter-reaction on social media and people

began calling out the increase in xenophobia. This may have led people to re-evaluate (again) how much xenophobia society will tolerate which led to the reduction in racial and religious hate crimes.

4.2 Robustness checks

In the robustness checks, we explore alternative crime control groups, extend the period of analysis for both quarterly and monthly data, and re-estimate our main results excluding London.

Alternative control groups

Our first robustness check explores the results using different control groups in the CSP data. First, we use a single control group that aggregates all crimes. Second, we use 11 offence groups – these are slightly broader categories of crimes compared to the offence subgroups. We present these results in Supplementary Material Tables A.12 and A.13. For the event study analysis, after including a post-2015 crime-specific trend (column 3), the results using the aggregate non-RRHC crime and offence groups are comparable with our baseline results. We again estimate there to be a significant increase in RRHC, lasting as far as the first quarter of 2017.

Extending the period of analysis

Our next robustness check expands the observation period to include all quarters up to the first quarter of 2019 – or two additional years compared to the baseline estimates.²⁶ The results can be found in Supplementary Material Tables A.14 and A.15. Comparing the tables, we find little changes in the effect on our variables of interest and conclude that the results for shock around the time of the referendum are not sensitive to inclusion of additional post-referendum quarters.

We also extend the analysis period using monthly data, however in this instance we include additional time periods at the beginning of the sample. As a check we include January 2011 through February 2017. While this could be advantageous due to the expanded sample size, the official construction and definitions of the control crimes changed three times during these 28 months due to the changes in reporting practices. These changes have no impact on the hate crime data compiled by the FOI requests and instead reflect changes in official/public data standards. The results can

²⁶The baseline model included time period up to the first quarter of 2017 in order to remove later periods with significant terrorist attacks in the United Kingdom that occurred in the second quarter of 2017.

be found in Supplementary Material Tables A.16 and A.17. While there are significant differences with columns 3 and 4 of the baseline DD model and the event study, once a 2015 trend is included, the results are similar to the baseline estimates.

Excluding London

We next exclude Greater London from the analysis to ensure that the Brexit effect is not driven by changes in London (see Supplementary Material Table A.18). This is important for the interpretation of the results as London is a unique area, especially in terms of minority populations, and as such the mechanisms of the Brexit effect may differ to the rest of the country. We find similar patterns as in the main event study, with a significant shock following the Brexit referendum vote in quarters 2 and 3 of 2016. This will be particularly useful later, for the comparison of the effects in the *Remain* and *Leave* areas.

5 Mechanisms and Further Results

5.1 Differential Reporting

One primary concern that we have is that our results so far are based on the recorded crimes, which are dependent on the victim coming forward. Therefore, it could be the case that the effect we have found is not so much an increase in crime but an increase in reporting. To investigate this possibility, we examine the general trends in reporting of RRHC using data from the Crime Survey for England and Wales (CSEW). Table 5 shows the proportion of crimes that were reported as RRHC compared to all other crimes. RRHCs make up a relatively small proportion of overall crimes. Following methodology used in official statistics from the Home Office that rely on the same data, we aggregate the data by two years to account for the small sample size of RRHC in the CSEW dataset. The two-year average reporting rate for RRHC over a period from 2011/12 to 2014/15 was 50.6%. There was a similar average reporting rate of 50.5% for the post referendum period. For other crimes, the reporting rate was lower. For the period prior to the referendum, from 2011/12 to 2014/15, the average two-year reporting rate was 42.2%, which increased to 43.2% when we look at the period after the referendum. At first glance the referendum period does not appear to be one where reporting was remarkably different.

We test formally for changes following the referendum in the probability of reporting (and thus including in official statistics) an RRHC relative to the probability of reporting other crimes, using CSEW data for years 2011-2017. We employ an empiri-

cal strategy similar to our baseline estimates and estimate the following equation

$$y_{icm} = \alpha_0 + \alpha_1 H_c + \alpha_2 I(t \geq \tau) + \beta H_c \times I(t \geq \tau) + \mathbf{X}'_{ic} \gamma + \varepsilon_{icm}, \quad (5)$$

where y_{icm} is equal to one if the most recent crime incident of crime type c committed against individual i was reported to the police in month m . H_c is an indicator variable equal to 1 if crime c is designated as a hate crime and 0 otherwise, and $I(t)$ a function indicating the referendum.²⁷ In addition, we control for gender, age, income, and education level of the survey respondent (\mathbf{X}'_{ic}), as well as quarter fixed effects and allowing for a quadratic time trend. Later specifications allow for a difference of trends and seasonality by crime type.

As can be seen in Table 6, we find that in the post-referendum period the change in probability of the police being notified of a (perceived) RRHC varies in magnitude from -3.4 to 5.5 percentage points, depending on the specification. The specification that includes the full set of controls and trends suggests that the probability of reporting a RRHC increased by 5.5 percentage points. Comparing the coefficient to the pre-referendum proportion of RRHCs that were reported (49%) we estimate that, at most, around one-third of the post-referendum increase in RRHC is due to a change in the reporting behaviour of the victim or witnesses. However, this is likely an overestimate as the CSEW only captures crimes where an individual or their property was the intended victim or target. This, therefore, excludes crimes where the victim was the general public (i.e., aggravated public fear, alarm, or distress).

5.2 Crime Outcomes

Following the referendum, the police forces of England and Wales may have felt public or governmental pressure to identify and prosecute hate crimes. Individual officers may have changed their behaviour and increased the classification of crimes as racial hate crimes following the referendum. While no official directive came from the Home Office, any changes in police reporting behaviour would have an impact on official RRHC statistics. To see if there were any changes in police behaviour, we analyse the outcomes of crimes. If recorded RRHC increased due to an increase in police sensitivity when designating crimes as having a racial bias, the additional crimes are more likely to be marginal and less substantial, and thus less likely to end in a

²⁷The survey measurement of crime victimisation – whether they had been a victim in the past 12 months without any clarification of victimisation date – forces us to drop observations from July 2016 through June 2017. These 12 months consist of observations that may contain crimes committed before or after the referendum without any means to distinguish the two.

positive outcome. Therefore, any change in official RRHC rates due to alterations in police behaviour would lead to a decrease in positive outcomes for RRHCs relative to other crimes.

To estimate changes in crime outcomes post-referendum, we use quarterly police data on recorded crime outcomes.²⁸ The dataset contains outcomes for 167 crime types during the period from April 2014 to March 2018 in the 44 PFAs of England and Wales. We consider 21 outcomes, of which six are designated as positive – meaning they have resulted in the identification of the suspect, while five are designated as negative – the investigation was terminated without identifying a suspect or further investigation was not in the public interest, with the remaining outcomes being neutral.

First, we analyse changes in the percent of crimes with positive, neutral or negative outcomes to find any changes in outcomes for racial hate crime relative to other crimes. Specifically, we mimic our difference-in-differences and event study approaches and estimate the following equations

$$y_{jpct} = \alpha_{0,j} + \alpha_{1,j}H_c + \alpha_2I(t \geq \tau) + \beta H_c \times I(t \geq \tau) + \psi(t) + \theta_p + \mathbf{X}'_{pt}\gamma + \varepsilon_{jpct}, \quad (6)$$

$$y_{jpct} = \sum_{t=-3}^4 \beta_{1,t}(H_c \times I_t) + \psi(t) + \theta_p + \mathbf{X}'_{pt}\gamma + \varepsilon_{jpct} \quad (7)$$

where the dependent variable is the percent of crimes c ending in outcome j (positive, neutral, negative) in PFA p during quarter t . The other elements are as in equations (1) and (2). Later we regress separately all 21 crime outcomes to find any changes in specific outcomes post-referendum.

Difference-in-differences results can be found in Table 7 and event study results in Table 8. In both tables, the first column group shows that there was a significant decrease in the percent of RRHCs with positive outcomes following the referendum, particularly in the third quarter of 2016. We find that there was a corresponding increase in negative outcomes and no significant changes in neutral outcomes. The results suggest that the overall substance of the RRHC decreased slightly in the period following the referendum relative to other crimes. This could be due to an increase in reporting by the victims as more marginal crimes were reported. It is important to note that while the results are significant, the magnitude only explains a small part of the increase in RRHC, particularly when looking at the increase in the third quarter of 2016.

²⁸Data are obtained from: data.police.uk.

We find similar results when looking at changes in outcomes individually (see Supplementary Material Table A.19). The previously found increase in negative outcomes is due to an increase in incidents where the investigation was completed without any suspect being identified.

Overall, based on the data from the CSEW and PFAs, we conclude that while there were significant changes in crime outcomes in the third quarter of 2016, the magnitude of the change indicates that only a small part of the observed RRHC increase post-referendum can be explained by a change in either victim or police reporting behaviours.

5.3 Perception of the victims

Another concern could be that we are picking up changes in the perception of the victims rather than actual changes in hate crime. While it is not possible to fully rule out this possibility, we present some evidence against this. First, we present more detailed results of the crime outcomes (as described above) where we show the crime outcomes by victim type, i.e., we show results for both crime against the person and crimes against public/property. The latter is possibly easier to identify as it is racially motivated, such as racist graffiti. Supplementary Material Table A.20 shows that, while there does seem to be an increase (decrease) in positive (negative) outcomes for crime's against the person, we do not find this to be the case for crimes against the public/property. Indeed, as we show below (Section 5.4), most of the increase in hate crime is driven by an increase in public/property crimes which are arguably less subject to the perception of the victim.

Second, if changing perceptions are driving the results, then we might expect that other crimes would fall if reporting did not change. In this case crimes that ordinarily would have been reported as non-racial would now be reported as racially aggravated. Consequently, we would expect to see a fall in non-racial crimes as RRHC increases. To check this we run synthetic control analysis using all equivalent non-RRHC as the treated group and all other crimes (excluding RRHC) as the control group. Figure A.8 in the Supplementary Material shows the results when using the relative crime rate.²⁹ These figures indicate no change in the non-RRHC crime rate, and provide suggestive evidence against victim perception driving the results. This eliminates

²⁹Event study results show likely violation of the pre-referendum parallel trends assumption and synthetic control results using log crime rate reveal a very poor fit in the pre-referendum period, therefore we only present the synthetic control rates with a good pre-treatment fit. The figures using the log crime rate are, however, available upon request.

changes in behaviours of victims and police, leaving changes in the behaviour of potential offenders as the driving force behind the increase in RRHC.

5.4 Heterogeneity

Having established a significant spike in hate crimes immediately after the referendum that can only be partially explained by changing in reporting behaviour of both victims and the police, in this section we examine how the effect of the referendum differs based on the characteristics of the area. With that in mind, we use the least aggregated, quarterly CSP data. We begin by looking at how the effects differ according to whether the area voted to leave or to remain in the EU, then moving on to look at the types of crime that occurred, and the socio-economic status of the area.

Remain and Leave

There was significant diversity in the voting outcomes in the regions of the UK. The referendum revealed the full extent of anti-immigrant sentiment in the country. *A priori*, it is not obvious whether hate crime would increase more in *Remain* or *Leave* areas. [Albornoz et al. \(2020\)](#) argue that as the information shock was larger in *Remain* areas, the surprise was larger in those areas, and therefore hate crime might rise more in *Remain* areas. A counterargument can be made that there are more people in *Leave* areas who sympathised with, and then acted upon, the anti-immigration sentiment revealed by the referendum. Hence we might expect a greater rise in hate crime in *Leave* areas.

Results of the DD analysis by *Remain* and *Leave* areas can be found in the Supplementary Material Table A.21. In columns (1) and (2) we find an increase in RRHC of around 12% in *Leave* areas, which is about half of that in *Remain* areas. However, once the underlying crime trends are allowed to differ between the areas, the post-Brexit change in hate crime is smaller in *Remain* areas. According to our final specification in column (5), RRHCs increased by 17% in *Leave* areas and only 11% in *Remain* areas. We find a significant difference in the results between columns (1)-(3) and columns (4)-(5) because prior to the referendum the RRHCs were increasing more in *Remain* areas relative to *Leave* areas. This illustrates the importance of controlling for the difference in trends between these groups ([Kahn-Lang and Lang, 2020](#)).

Table 9 shows the impact of the referendum using the event study approach. For the third quarter of 2016, we estimate a 15-22% rise in RRHCs in *Remain* areas and a 38-42% increase in *Leave* areas. The impact of the referendum shows up in *Leave* areas already in the partially treated second quarter.

As with the main analysis, we are concerned with differential trends. Hence, we perform the synthetic control analysis separately for both *Leave* and *Remain* areas. RRHCs and synthetic RRHC for *Leave* areas can be found in Figures 7a and 7c. The information about weightings of the specific crimes within the synthetic controls and the pre-referendum means of RRHC and synthetic control can be found in Supplementary Material Tables A.23 and A.24. In areas that voted to *Leave*, RRHCs increased by 25-30% (Supplementary Material Table A.22). These estimates for both log and relative rates are statistically significant. By comparison, RRHCs in *Remain* areas increased by 12 to 25% with only the latter, estimated using the relative rate, being statistically significant. For *Remain* areas, the point estimate difference between the areas is smaller but in a similar direction to the results found in the event study model. The synthetic control results provide additional evidence against the hypothesis that hate crimes increased more in *Remain* areas.

These results are in contrast to [Albornoz et al. \(2020\)](#) who find a greater increase in hate crimes in *Remain* areas. While we use, in part, the same data, there are several explanations for the differences that we find. First, we have a control group that consists of other crimes, hence our estimation strategy is different. Second, in our various estimations we take into account not only that these crimes might have been on different trends but also that crimes (and hate crimes) may have been on different trends in *Remain* and *Leave* areas. This is most comprehensively done when using synthetic control methods. Furthermore, in [Albornoz et al. \(2020\)](#) the dependent variable is hate crime and the coefficient of interest is that on the interaction of “Post-Brexit” with the share of the vote for remain in the CSP area. While the share of the vote cannot be estimated due to the inclusion of CSP fixed effects, the “Post-Brexit” dummy can be estimated but it is not included in the regression. In Supplementary Material Table A.25 we show that when we include this “Post-Brexit” dummy we do not find a large effect in *Remain* areas when we just use hate crime as our dependent variable. In the final specification in column (6), the interaction term is in fact negative but not statistically significant, whereas the “Post-Brexit” dummy is large and precisely estimated.³⁰

Results by Crime Type

Next we look at the quarterly Brexit effect on two RRHC subcategories: hate crimes committed against the person and hate crimes committed against property or pub-

³⁰If we just include the interaction term and replace the share that voted to remain with the share that voted to leave then we also find a positive and significant effect – see Supplementary Material Table A.26.

lic. This is important to measure as hate crimes committed against the person carry a greater cost than hate crimes against property or public (Chalfin, 2015). To estimate the effect on different victim types, we use the CSP dataset as it has RRHC subcategories. Model specifications match those used in the final columns of the baseline model (see Supplementary Material Table A.27). The estimates suggest that the overall results for all victims appear to be driven largely by crimes against public and property. This is perhaps not surprising as crimes against the person require a deeper level of xenophobia. Individuals with such a high level of xenophobia likely have a greater reward from committing a crime and, therefore, are likely to commit a hate crime even in the absence of (or prior to) a public information shock. More marginal xenophobes, who are most susceptible to public information shocks, are also more likely to commit more marginal hate crimes, such as those against public or property.

Area Characteristics

We also analyse whether the effect depends on characteristics of areas other than the vote outcome, using quarterly CSP data (see Supplementary Material Figure A.12). Specifically, we focus on the following – income, education, age, gender and ethnic composition of the population in the area, as well as presence of industry. For each of the analyses estimated by subgroups, we allow trends and seasonality to differ between the groups. We also allow for a change in trend in 2015 in order to minimise the risk of violating the parallel trends assumption. To this end, we divide and aggregate the CSPs into higher or lower than the mean as of the first quarter of 2016 along the following measures: the impact of austerity measures, immigration flow as percent of non-white population in the area, industry, minority population,³¹ no qualifications, median salary, standard occupational classification in 2010 (SOC10), unemployment, and young male population.

We find evidence of a difference in the impact following the referendum between areas with low and high young male populations. In the few quarters prior to the referendum, areas with low and high young male populations did not exhibit any differences in shocks. However, beginning in the second quarter of 2016 “high” areas experienced statistically significant RRHC shocks while the shocks in “low” areas were not statistically significant.

While not statistically significant, there is some evidence that hate crimes increased more in areas with low minority and migration populations. The larger shocks in low minority areas could be seen as evidence in support of contact theory –

³¹Defined as those who do not identify as being of British, English or Welsh ethnicity.

as individuals have more (positive) contact with minorities, they view them as less of a threat or an “unknown entity” (Allport, 1954). With sufficient positive contact, the individuals are less likely to both commit a hate crime at any time and be induced to commit a crime after a shock event. As such we would expect to find both lower levels and shocks of hate crimes in high minority areas. The results from our heterogeneity analysis support our previous findings that there was a difference between areas based on referendum results. It is likely that some of the differences in shocks between *Remain* and *Leave* areas can be attributed to differences in the racial and migrant composition of the areas. Furthermore, the estimated post-referendum shock is greater in areas with high young male population, suggesting that young males are more susceptible to public information shocks than other population groups.

5.5 The role of (social) media

Socio-psychological explanations suggest that hate crimes may be a result of particularly sensationalist coverage of spectacular events, which can produce a “hate crime contagion” (Green et al., 2001). According to this line of thought, the media and social media can instigate acts of bias through perpetuating or legitimating stereotypes and, as a result, contributing to increases in crimes of prejudice (Hall, 2014). Further, there is an emerging literature that shows that social media can lead to hate crime (Müller and Schwarz, 2019; Bursztyjn et al., 2019; Ivandić et al., 2019).

We also investigate whether (social) media played a role in the dynamics of hate crime after the referendum vote. We estimate whether (social) media reporting on the referendum created a hate crime contagion due to the saliency of immigration in the referendum discourse, using the monthly FOI data, statistics on print media (specifically article counts obtained from the LexisNexis database) and social media (specifically tweet counts from Twitter). We also consider whether the counter-reaction on social media, where people began calling out the increase in xenophobia, is associated with a fall in hate crime.

Using the LexisNexis publications data base, we searched for all articles published online or in print between 1st January, 2011, and 31st July, 2019, in all UK national newspapers containing any of the following keywords anywhere in the text: for Brexit – “Brexit” or “Vote to leave” or “EU referendum” or “withdrawal agreement” or “divorce bill” or “leave vote” or “remain vote”; for hate crime coverage – “hate crime” or “hate attack” or “hate incident”. We then created monthly counts for each of the searches starting from January 2011 until end of July 2019, dropping potential du-

plicates.³² The plot of intensity of news coverage of the referendum and hate crimes can be found in Figure 8a and shows that both coverage of hate crime and of Brexit spiked around the time of the vote.

Similarly, we obtained tweets published between January 2011 and March 2017 containing any of the following keywords/phrases: “EU Referendum” and “Brexit” and created monthly counts for this time period.³³ Though this does include tweets coming from outside of the United Kingdom, the monthly trend of worldwide tweets on Brexit should follow closely the trend in the United Kingdom. The plot of intensity of the coverage of the referendum can be found in Figure 8b. We also collected a monthly count of tweets containing the hashtags “postrefracism” and “safetypin” which gained popularity following the referendum as the public became informed about a possible hate crime contagion. A second spike is observed in the monthly tweet count in November 2016 following the election of Donald Trump when #safetypin was also used to show solidarity with minorities in the United States.

To investigate the role of (social) media we include in our difference-in-differences specification contemporaneous and/or one period lagged interaction terms of article or tweet counts (in logs) and the RRHC binary variable, estimating the following equation

$$y_{cat} = \beta_0 + \beta_1 H_c + \beta_2 \ln(\text{articles})_t + \beta_3 \ln(\text{articles})_{t-1} \times H_c + \mathbf{X}'_{at} \delta + \epsilon_{cats} \quad (8)$$

where y_{cat} is the log of the crime rate per 100,000 residents of crime c in PFA area a in month t . We include current (log) number of articles (or tweets) covering either Brexit or hate crime at time t . We also have specifications where the first lag of the (log) number of articles (or tweets) and an interaction term with the referendum dummy is included. H_c and \mathbf{X}' are defined as before.

Results can be found in Table 10. We find that lagged, but not current, (log) counts of articles covering either Brexit or hate crimes are positively correlated with RRHC. The correlation shows that as Brexit and hate crimes became more salient in society (as measured by media coverage), racial hate crime rates increased, with some delay. While this is not sufficient proof of causality, it does suggest that media coverage has a mediating effect on racial hate crimes in the near future. This is in line with past research which found that, as minorities face more (negative) media attention, racial hate crimes increase. As the estimates in column (2) of Table 10 show, a 1% increase in hate crime reporting is correlated with a 0.04% in RRHC the following month,

³²We identified duplicates on the basis of similarity of headlines on a given day and removed them from the count to minimise potential overestimation of the coverage.

³³Python code obtained from <https://github.com/Jefferson-Henrique/GetOldTweets-python>, code written by Jefferson Henrique.

and a 1% increase in Brexit coverage is correlated with 0.02% increase in RRHC the following month. Given the 130% increase in reporting in June 2016, any increase due to possible media priming only covers 2.6 percentage points, or 10% of the RRHC shock in July 2016.

Social media coverage is also positively correlated with hate crimes and seems to take effect sooner than that of printed media. Specifically, a 1% increase in Brexit tweets is correlated with 0.03% increase in RRHC the same month, and there is a positive but quantitatively smaller and statistically insignificant correlation between (log) Brexit tweets and hate crimes the following month.

We emphasise that these results should not be considered as causal. First, the monthly observations make it impossible to observe short-term shocks of crime rates and (social) media reporting and the inter-temporal correlations with each other. Second, June 2016 media reporting is an outlier in hate crime articles counts and, as such, the estimation results may not be reliable in this context. Third, while reporting on hate crimes may provoke a change in victim, an increase in reporting could also motivate future attackers as a signal that others support their beliefs (i.e., act as a public information shock). Finally, if media priming was a significant influence on victim reporting, we would expect to find a significant and robust increase in hate crimes lasting into August 2016.

5.6 External validity: Comparison with other events

We consider the possibility that other events, such as terrorist attacks in the UK and elsewhere, as well as elections, may have also caused a spike in hate crime (see for example [Hanes and Machin \(2014\)](#); [Sims Edwards and Rushin \(2019\)](#); [Müller and Schwarz \(2019\)](#); [Ivandić et al. \(2019\)](#)). Therefore, using the FOI data we include in the event-study specification time dummies (and their interactions with RRHC) corresponding to the following events prior to the referendum: the Lee Rigby murder in May 2013, the Charlie Hebdo attack in January 2015, the Paris attacks in November 2015, and the Brussels bombings in March 2016, as well as the 2014 European Parliament election in May 2014, and the General election in May 2015. In doing so we ensure that these shocks are not (partially) captured in any trends or fixed effects. We can also compare the effects of these events and Brexit referendum vote. Results can be found in Supplementary Material Table A.29. The coefficients measuring the changes in RRHC around the time of the referendum are similar to those presented in our baseline estimates.

We find strong evidence of an increase in racial crimes in the two months following the murder of Lee Rigby. The magnitude of the coefficients for the July 2016 shock and the Lee Rigby murder shock are comparable, though the July 2016 shock is generally larger. This suggests that the effect of a terrorist attack and the public information shock of the referendum are comparable in length and relative magnitude.³⁴

6 Conclusion

Although the results of the event study suggest that the Brexit referendum vote shock persisted many months after the referendum, we only find robust evidence of an increase in RRHC in July 2016 by 26%. The results of the synthetic control methods – of no increase in the advent of the referendum and a significant and temporary increase post-referendum – suggest that the referendum results created a public information shock. In turn, this led to a re-evaluation of society’s tolerance for racism, decreasing the expected social costs of committing a hate crime. These findings complement research by [Sims Edwards and Rushin \(2019\)](#) and [Müller and Schwarz \(2019\)](#) who found significant increases in anti-Muslim hate crimes in the United States during the campaign and the subsequent election of Donald Trump.

Many possible explanations exist for why the shock was short-term. One is that of a widespread negative reaction in British society (and politics) triggered by the increased reporting of RRHC in the British media. This reaction could have potentially led to a re-evaluation of society’s tolerance toward racist actions. Second, it is possible that in the month following the referendum the actual certainty of the UK withdrawing from the EU became less clear as the process began. This may have in turn suppressed the excitement among xenophobes and resulted in hate crimes returning to the pre-referendum levels. Finally, it is possible that the shock only persisted into July or August of 2016 because those are the warmest months with the most exposure to other individuals. As exposure to others decreased over time, xenophobic individuals who only committed hate crimes when induced by the public information shock may have been less willing to spend additional time to encounter a potential RRHC victim.

Changes in reported hate crimes may not have reflected a change in hate crime incidents but rather a change in victim or police reporting behaviour. For this reason,

³⁴As the dependent variable is log-transformed these are relative increases in hate crimes and not measures of absolute differences. Since hate crime rates have increased throughout the past decade and July has the greatest baseline RRHC count, the number of additional RRHC in July 2016 is greater than that of May and June 2013 combined (1896 versus 1848).

we tested if crimes were more likely to be reported following the referendum and if there were any changes in crime outcomes. Results using CSEW victimisation data rule out the potential of a change in the reporting behaviour of victims, while investigation of the crime outcomes shows that police behaviour did not change significantly post-referendum.

Evidence from the difference-in-differences estimator and synthetic control methods demonstrate that the relative shock in the third quarter of 2016 was positive in the *Remain* and the *Leave* areas, as all areas were treated by the public information shock. However, evidence that the shock was greater in *Leave* areas suggests that *Leave* voters with xenophobic views were more strongly treated by the public information shock and induced into committing additional RRHCs. Finally, the increase in crime outcomes involving minors suggests that a disproportional share of the additional RRHC were committed by minors who may be more affected or vulnerable to public information shocks.

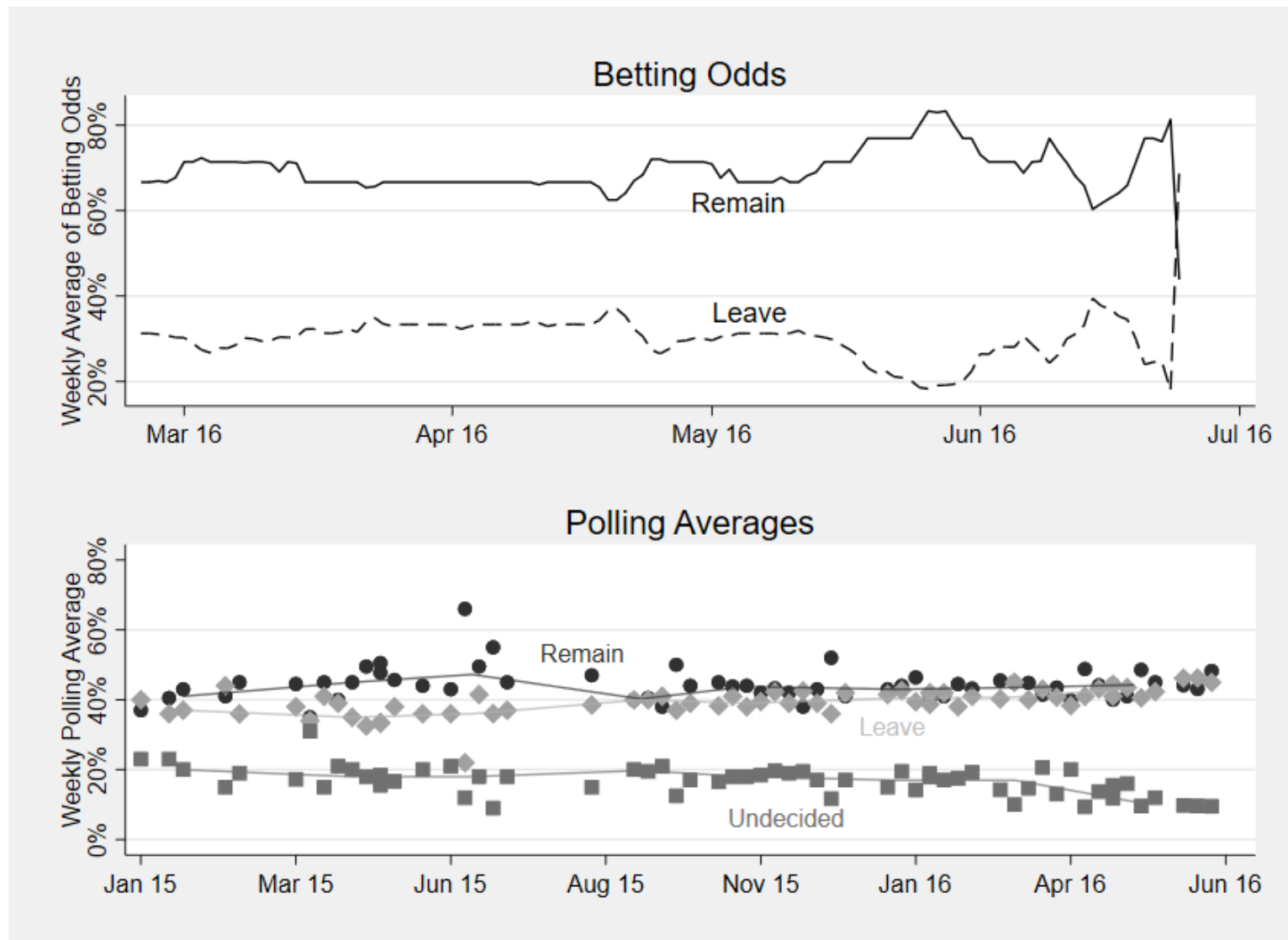
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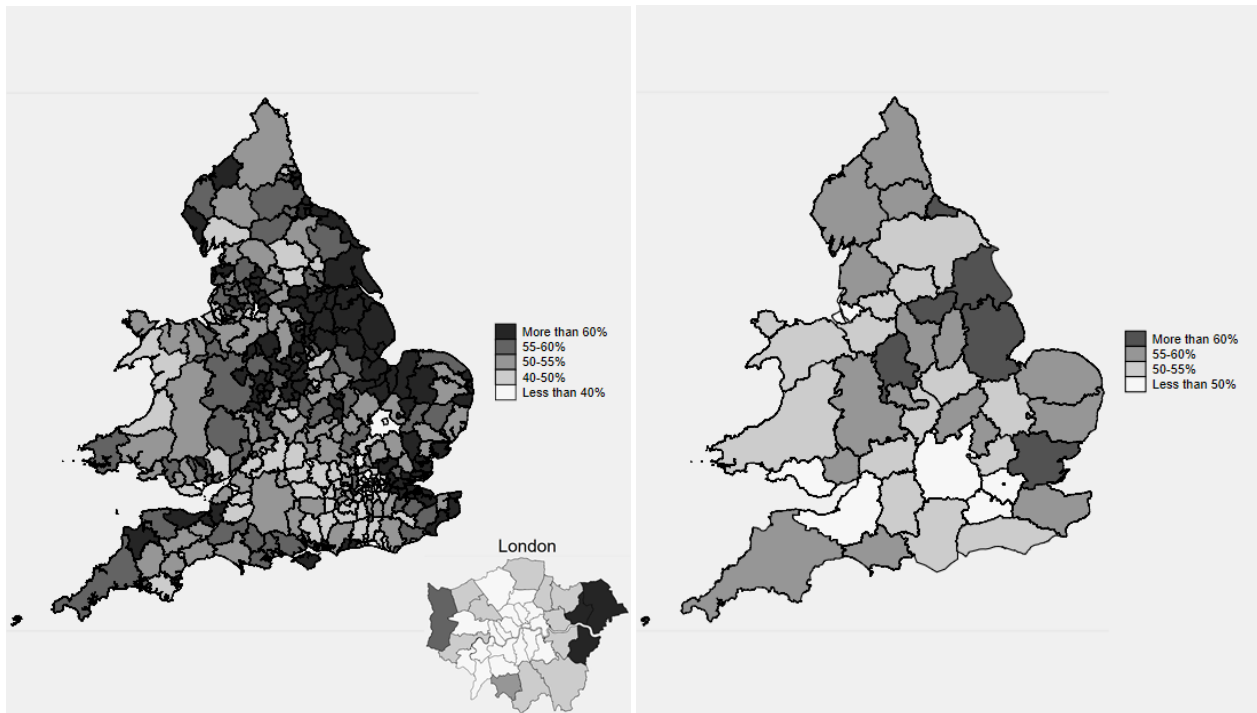
Figure 1: Betting Odds and Opinion Polls in the Run up to the EU Referendum



Source: BETdata (top) available at <https://betdata.io/historical-odds/brexit-referendum-2020> and FT Research data (bottom) available at <https://ig.ft.com/sites/brexit-polling/>.

Notes: Top figure: Weekly averages of implied betting odds, from March 2016 up to the referendum. Bottom figure: Weekly polling averages of the EU referendum opinion surveys from January 2015 up to the referendum.

Figure 2: Map of England and Wales Showing the Proportion of Those Who Voted to Leave in Each Local Authority District (LAD) and Police Force Area (PFA)



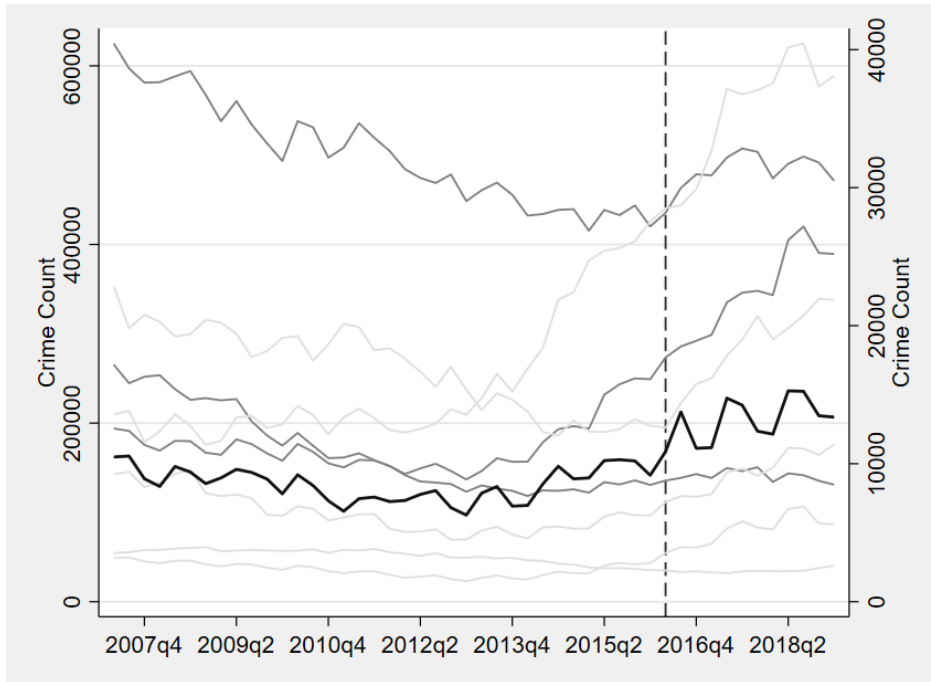
(a) Local Authority District

(b) Police Force Area

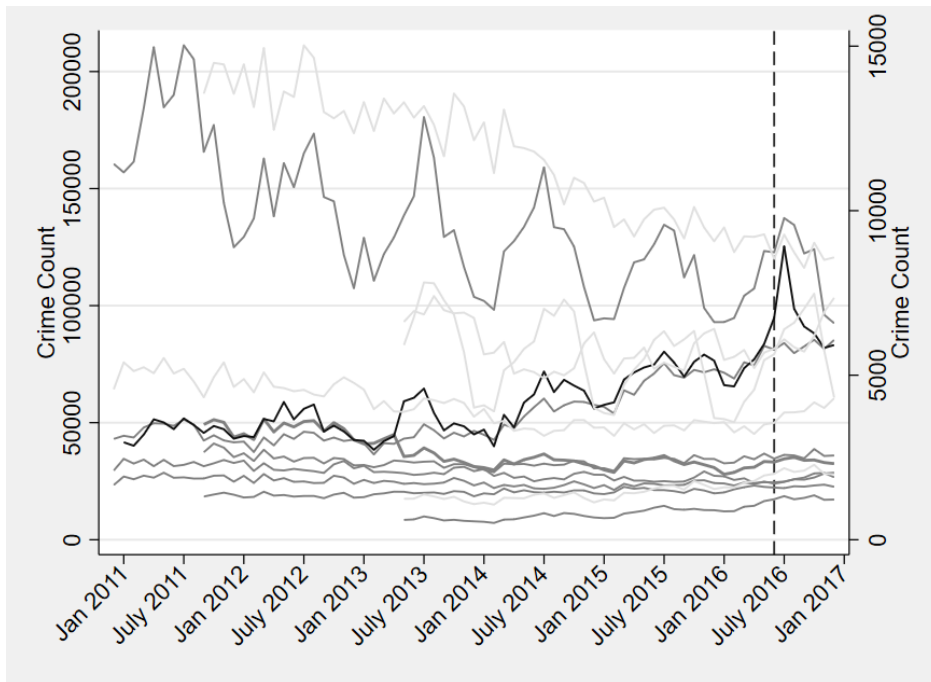
Source: Referendum results are from the Electoral Commission: <https://www.electoralcommission.org.uk/>.

Notes: Percent leave votes is defined as the number of votes to leave the EU divided by the number of votes cast in the area. A separate window on bottom right in the left panel is a close-up of the results by LADs in London.

Figure 3: RRHC versus non-RRHC: CSP and FOI data



(a) CSP data



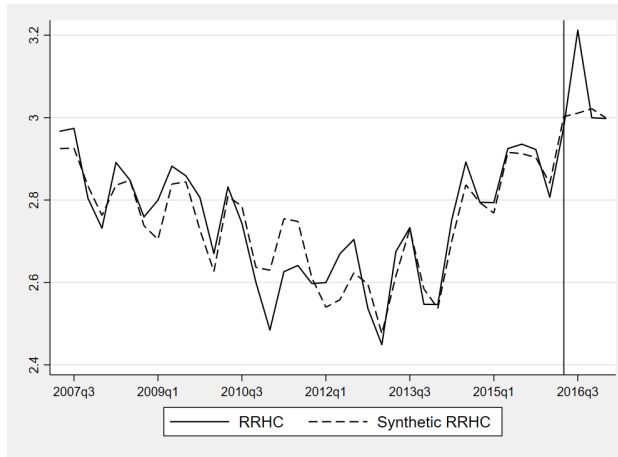
(b) FOI data

Source: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and data collected via the Freedom of Information (FOI) requests. Authors' own calculations.

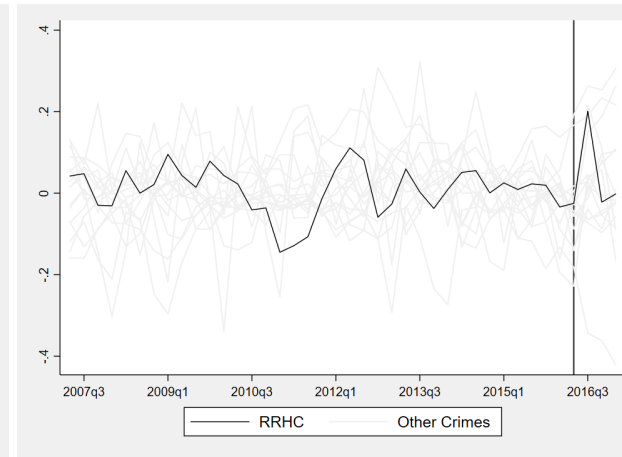
Notes: Panel A: Comparison of trends between RRHC and control offence subgroups, using CSP data for period between 2007q1 and 2017q1. Crime count (per 100,000 population) has been aggregated across all CSPs in England and Wales by quarter. The thick black line represents racial and religious hate crimes. The other lines represent other crime groups. The darker lines correspond to the left y-axis and the lighter lines correspond to the right y-axis. The vertical line denotes the quarter of the referendum, 2016q2.

Panel B: Comparison of trends between RRHC and control crimes, using FOI data. Crime count has been aggregated across all PFAs by month. The thicker black line represents racial and religious hate crimes. The other lines represent other crime groups. The darker lines correspond to the left y-axis and the lighter lines correspond to the right y-axis. The vertical line denotes the month of the referendum, June 2016.

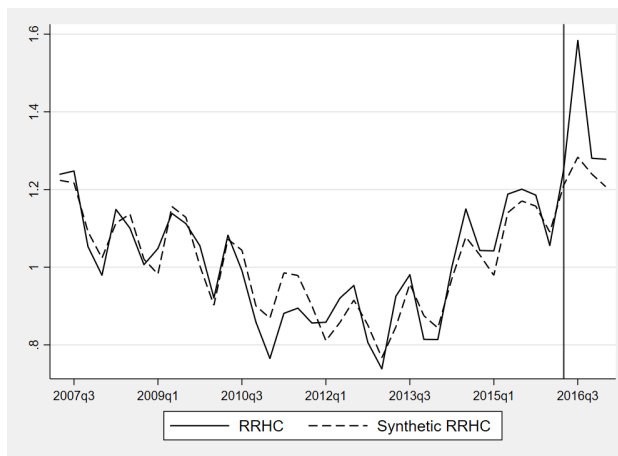
Figure 4: The Impact of the Brexit Referendum on Hate Crime
Synthetic Control Estimates and Effects using Quarterly Data



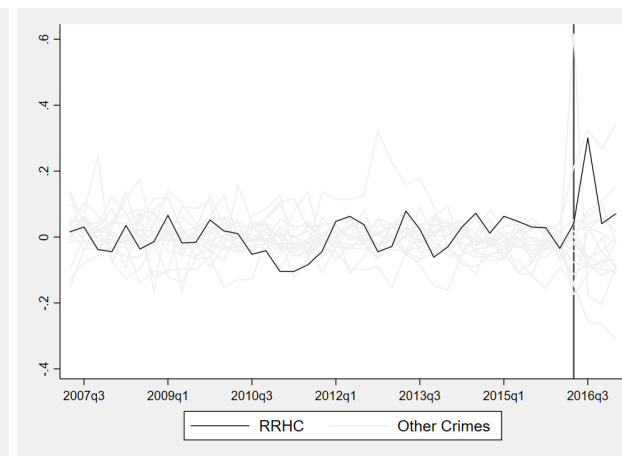
(a) Estimates: log(rate)



(b) Effects: log(rate)



(c) Estimates: relative rate

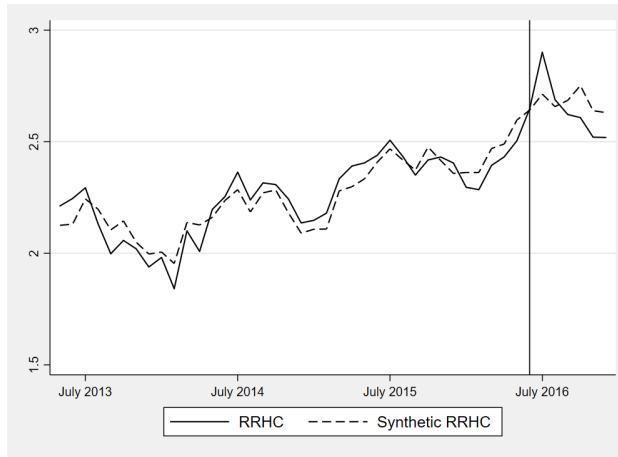


(d) Effects: relative rate

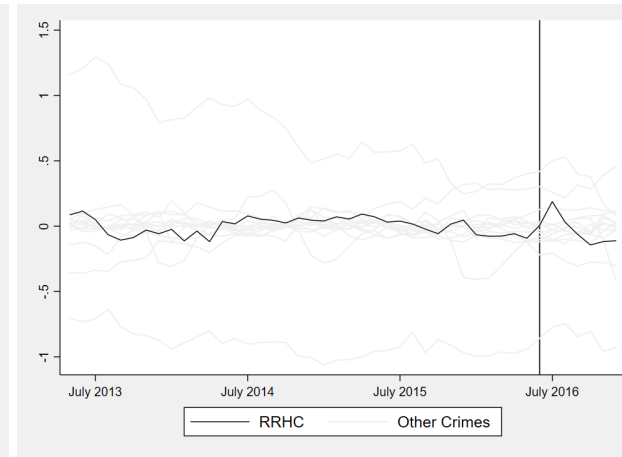
Source: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk.

Notes: CSP data have been aggregated across areas in England and Wales which voted to leave the EU during the period between 2007q1 and 2017q1. Crime is measured as the number of crimes in England and Wales by quarter. The dashed line is a constructed synthetic RRHC using weights of other offence subgroups. The vertical line indicates the EU referendum in 2016q2.

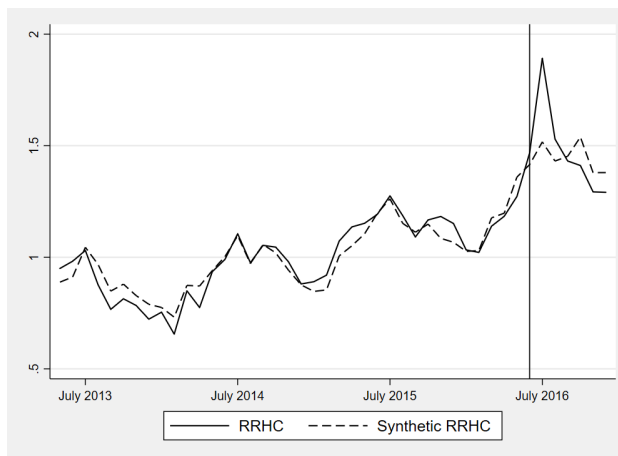
Figure 5: The Impact of the Brexit Referendum on Hate Crime
Synthetic Control Estimates using Monthly Data



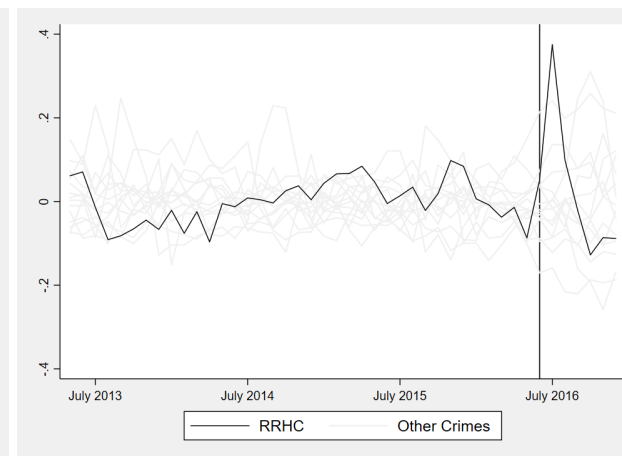
(a) Estimates: log(rate)



(b) Effects: log(rate)



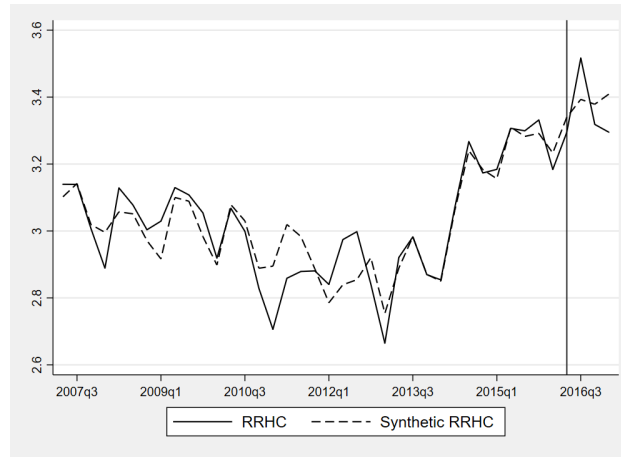
(c) Estimates: relative rate



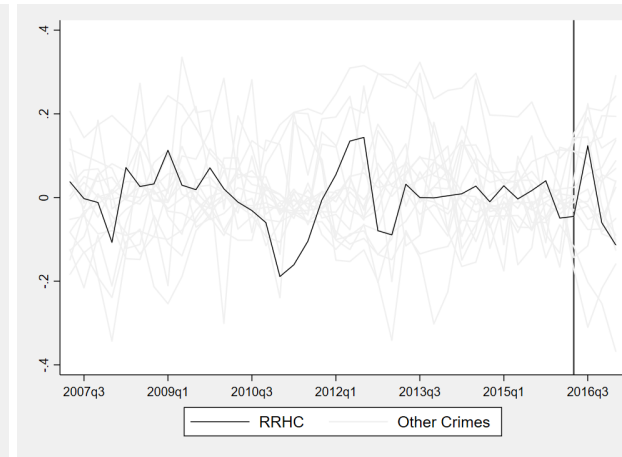
(d) Effects: relative rate

Source: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests.
Notes: FOI data has been aggregated across England and Wales over the period between May 2013 and December 2016. Crime is measured as the number of crimes in England and Wales by month. The dashed line is a constructed synthetic RRHC using weights of other offence subgroups. The vertical line indicates the EU referendum in June 2016.

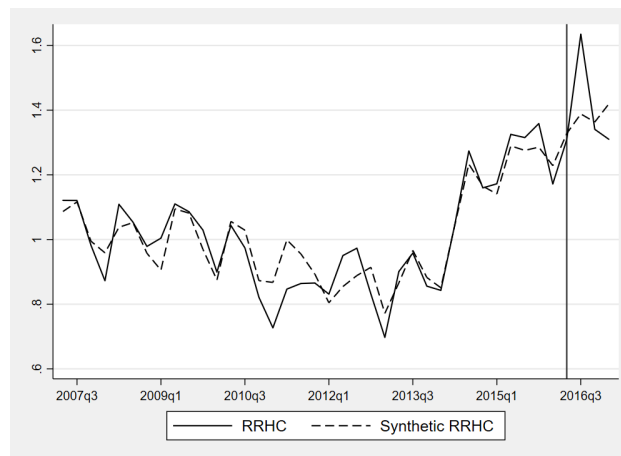
Figure 6: The Impact of the Brexit Referendum on Hate Crime for *Remain* Areas
Synthetic Control Estimates



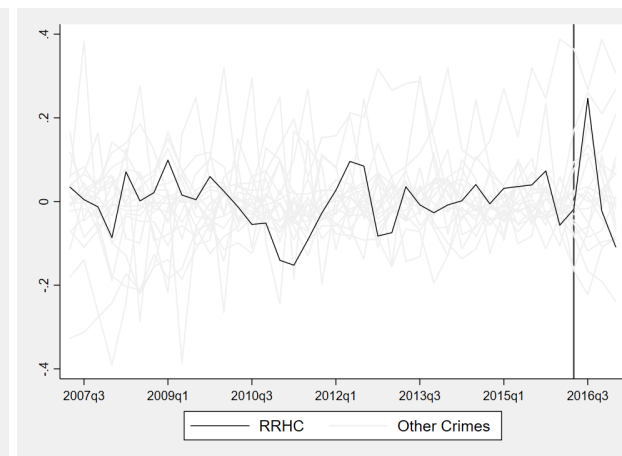
(a) Estimates: log(rate)



(b) Effects: log(rate)



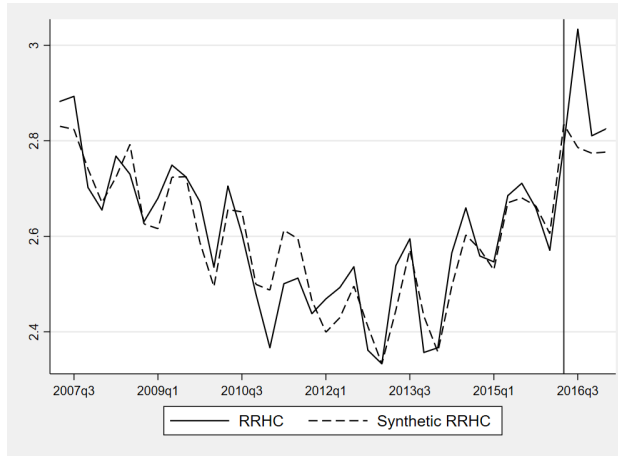
(c) Estimates: relative rate



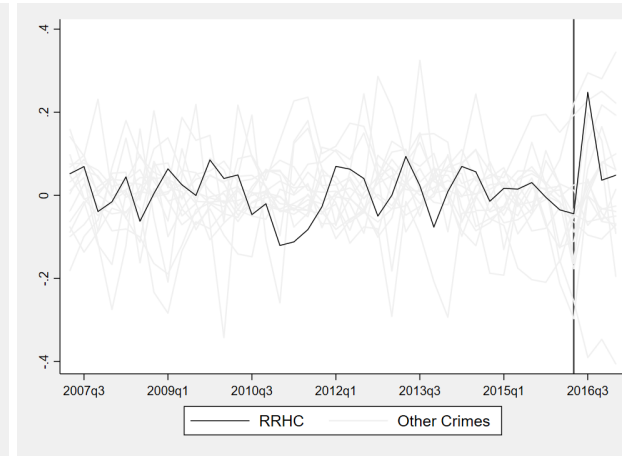
(d) Effects: relative rate

Source: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk.
Notes: CSP data have been aggregated across areas in England and Wales which voted to leave the EU during the period between 2007q1 and 2017q1. Crime is measured as the number of crimes in England and Wales by quarter. The dashed line is a constructed synthetic RRHC using weights of other offence subgroups. The vertical line indicates the EU referendum in 2016q2.

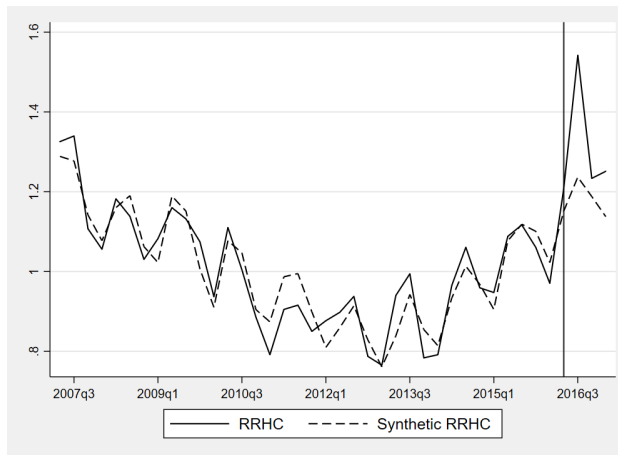
Figure 7: The Impact of the Brexit Referendum on Hate Crime for *Leave* Areas
Synthetic Control Estimates



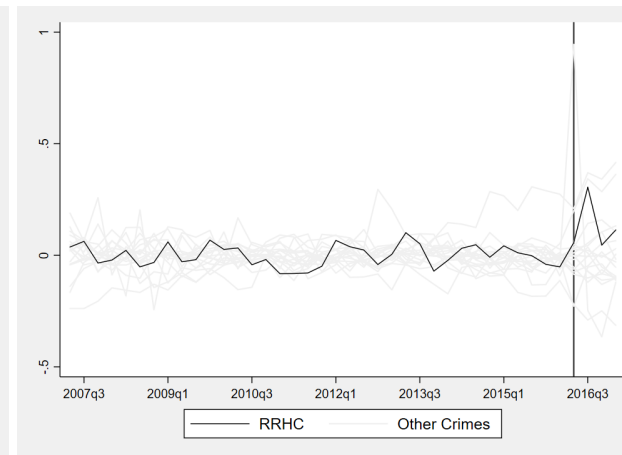
(a) Estimates: log(rate)



(b) Effects: log(rate)



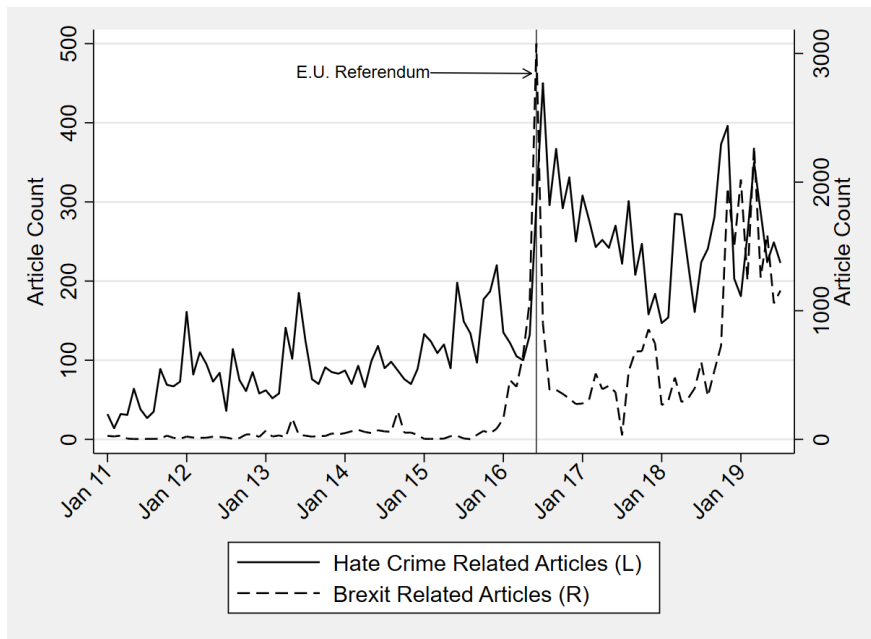
(c) Estimates: relative rate



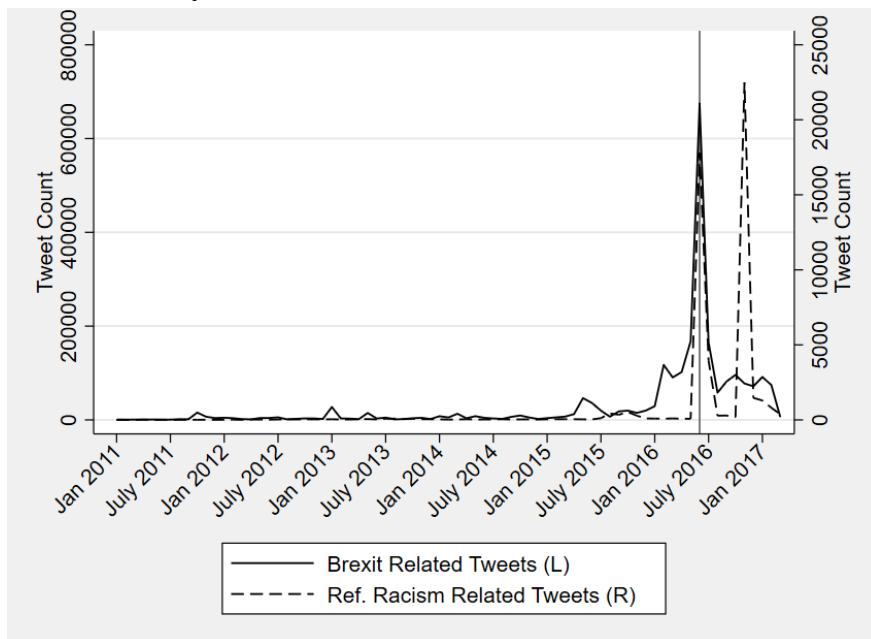
(d) Effects: relative rate

Source: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk.
Notes: CSP data have been aggregated across areas in England and Wales which voted to leave the EU during the period between 2007q1 and 2017q1. Crime is measured as the number of crimes in England and Wales by quarter. The dashed line is a constructed synthetic RRHC using weights of other offence subgroups. The vertical line indicates the EU referendum in 2016q2.

Figure 8: Trends in Newspaper Articles and Tweets



(a) Monthly article count related to Brexit and hate crimes



(b) Monthly tweet count related to the EU Referendum and Brexit

Source: LexisNexis database https://www.lexisnexis.com/ap/academic/form_news_wires.asp for article counts and Twitter for social media counts, and authors' own calculations.

Notes: In Panel A: the count of articles in the UK national newspapers from January 2011 through June 2019 containing Brexit and hate crime keywords. Brexit key words include for example "Brexit" "Vote to leave" or "EU referendum". Hate crime keywords include for example "hate crime" "hate incident" and "racism". In Panel B: the monthly count of tweets containing key EU referendum and Brexit related hashtags.

Table 1: The Impact of the Brexit Referendum on Hate Crime
Difference-in-Differences Estimates Using Quarterly Data

	(1)	(2)	(3)	(4)	(5)
Post-RRHC	0.147*** (0.024)	0.147*** (0.022)	0.087*** (0.030)	0.099*** (0.0217)	0.146*** (0.029)
Observations	195,744	195,744	195,744	195,744	195,744
No. of CSP-crime subgroups	6,564	6,564	6,564	6,564	6,564
Time trend	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
CSP-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations are at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups, which include: All other theft offences, Arson, Bicycle theft, Criminal damage, Miscellaneous Crimes, Domestic burglary, Homicide, Non-domestic burglary, Other sexual offences, Possession of drugs, Possession of weapons offences, Public order offences, Rape, Robbery, Shoplifting, Theft from the person, Trafficking of drugs, Vehicle offences, Violence with injury, and Violence without injury. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects and year fixed effects; column 2 includes CSP-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: The Impact of the Brexit Referendum on Hate Crime
Event Study Estimates Using Quarterly Data

	(1)	(2)	(3)	(4)	(5)
Pre-2015q2-RRHC	0.036 (0.031)	0.036 (0.030)	0.096*** (0.029)	0.082*** (0.029)	0.035 (0.120)
2015q3-RRHC	0.125*** (0.033)	0.125*** (0.033)	0.132*** (0.033)	0.124*** (0.033)	0.072 (0.076)
2015q4-RRHC	0.139*** (0.033)	0.139*** (0.032)	0.148*** (0.032)	0.141*** (0.032)	0.110** (0.048)
2016q2-RRHC	0.148*** (0.034)	0.148*** (0.033)	0.147*** (0.033)	0.147*** (0.033)	0.165*** (0.042)
2016q3-RRHC	0.344*** (0.034)	0.344*** (0.033)	0.323*** (0.033)	0.326*** (0.033)	0.363*** (0.066)
2016q4-RRHC	0.132*** (0.038)	0.132*** (0.037)	0.111*** (0.037)	0.114*** (0.037)	0.172* (0.103)
2017q1-RRHC	0.155*** (0.035)	0.155*** (0.033)	0.123*** (0.034)	0.134*** (0.034)	0.222* (0.134)
Observations	195,744	195,744	195,744	195,744	195,744
No. of CSP-crime subgroups	6,564	6,564	6,564	6,564	6,564
Time trend	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
CSP-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups, which include: All other theft offences, Arson, Bicycle theft, Criminal damage, Miscellaneous Crimes, Domestic burglary, Homicide, Non-domestic burglary, Other sexual offences, Possession of drugs, Possession of weapons offences, Public order offences, Rape, Robbery, Shoplifting, Theft from the person, Trafficking of drugs, Vehicle offences, Violence with injury, and Violence without injury. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects and year fixed effects; column 2 includes CSP-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: The Impact of the Brexit Referendum on Hate Crime
Difference-in-Differences Estimates Using Monthly Data

	(1)	(2)	(3)	(4)	(5)
Post-RRHC	0.194*** (0.047)	0.200*** (0.045)	0.044 (0.044)	0.042 (0.044)	0.260*** (0.054)
Observations	22,736	22,736	22,736	22,736	22,736
No. of PFA-crimes	495	495	495	495	495
Time trend	Y	Y	Y	Y	Y
PFA FE	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y
Racial month-of-year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PFA-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the log crime rate per 1,000,000 inhabitants. All observations are at the police force-month level. The sample period runs from January 2011 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crimes categories and include: Anti-social behaviour, Bicycle theft, Burglary, Criminal damage and arson, Drug offences, Other offences, Other theft, Public order offences, Robbery, Shoplifting, Theft, and Vehicle offences. The table is structured as follows: Column 1 includes a general time trend by month, police force fixed effects, month-of-the-year fixed effects and racial crimes by month-of-the-year fixed effects, month fixed effects, and year fixed effects; column 2 includes PFA-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. All specifications include controls for PFA economic and demographic characteristics. Standard errors are clustered at the PFA-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: The Impact of the Brexit Referendum on Hate Crime Event Study Estimates Using Monthly Data

	(1)	(2)	(3)	(4)	(5)
Pre-February 2016-RRHC	-0.131*** (0.046)	-0.048 (0.052)	0.123** (0.050)	0.123** (0.050)	0.015 (0.078)
March 2016-RRHC	-0.088** (0.045)	0.032 (0.052)	0.075 (0.054)	0.075 (0.054)	-0.007 (0.066)
April 2016-RRHC	-0.076 (0.058)	-0.004 (0.062)	0.039 (0.063)	0.039 (0.063)	-0.018 (0.063)
June 2016-RRHC	0.158*** (0.045)	0.142*** (0.053)	0.141*** (0.054)	0.141*** (0.054)	0.160*** (0.052)
July 2016-RRHC	0.346*** (0.051)	0.351*** (0.055)	0.351*** (0.056)	0.351*** (0.056)	0.392*** (0.070)
August 2016-RRHC	0.114** (0.049)	0.205*** (0.048)	0.206*** (0.047)	0.206*** (0.047)	0.271*** (0.084)
September 2016-RRHC	0.074 (0.051)	0.177*** (0.057)	0.179*** (0.057)	0.178*** (0.057)	0.272** (0.111)
October 2016-RRHC	-0.014 (0.058)	0.089 (0.058)	0.091 (0.058)	0.091 (0.058)	0.217** (0.109)
Post November 2016-RRHC	-0.047 (0.050)	0.083* (0.049)	0.085* (0.049)	0.083* (0.049)	0.277* (0.167)
Observations	22,736	22,736	22,736	22,736	22,736
No. of PFA-crimes	495	495	495	495	495
Time trend	Y	Y	Y	Y	Y
PFA FE	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y
Racial month-of-year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PFA-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the log crime rate per 1,000,000 inhabitants. All observations are at the police force-month level. The sample period runs from January 2011 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crime categories and includes: Anti-social behaviour, Bicycle theft, Burglary, Criminal damage and arson, Drug offences, Other offences, Other theft, Public order offences, Robbery, Shoplifting, Theft, and Vehicle offences. The table is structured as follows: Column 1 includes a general time trend by month, police force fixed effects, month-of-the-year fixed effects and racial crimes by month-of-the-year fixed effects, month fixed effects, and year fixed effects; column 2 includes PFA-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the PFA-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Percent of Crimes Reported – Crime Survey of England and Wales (CSEW)

Year	RRHC			Other Crimes		
	Incidents	Reported	% Reported	Incidents	Reported	% Reported
2011/12	220	102	46.4%	77,001	32,189	41.8%
2012/13	145	57	39.3%	53,472	22,760	42.6%
2013/14	107	77	72.0%	46,466	19,386	41.7%
2014/15	87	39	44.8%	40,505	17,300	42.7%
2015/16	101	43	42.6%	39,981	18,000	45.0%
2016/17	96	49	51.0%	38,992	16,998	43.6%
2017/18	131	76	58.0%	39,225	16,120	41.1%
2018/19	107	55	51.4%	41,171	17,820	43.2%

Sources: Crime Survey of England and Wales (CSEW) available from ukdataservice.ac.uk and authors' own calculations.

Notes: CSEW is conducted in waves by financial year, April through March of the following year. CSEW participants disclose crime victimisation in the prior 12 months. Figures represent aggregate statistics for England and Wales for the financial year the respondent was interviewed in, not the financial year the crime occurred due to lack of adequate information.

Table 6: Changes in the Reporting of Hate Crime Post-Brexit Referendum

	(1)	(2)	(3)	(4)	(5)
Post-RRHC	-0.048 (0.044)	0.014 (0.022)	0.051*** (0.005)	-0.034*** (0.011)	0.055*** (0.003)
Observations	85,065	68,837	68,837	68,837	68,837
Time trend	Y	Y	Y	Y	Y
Individual characteristics		Y	Y	Y	Y
Quarter-of-year FE		Y	Y	Y	Y
Racial quarter-of-year FE		Y	Y	Y	Y
Year FE			Y	Y	Y
Crime FE			Y	Y	Y
RRHC-specific trend				Y	Y
Crime-specific trend					Y

Sources: Crime Survey of England and Wales (CSEW) available from ukdataservice.ac.uk and authors' own calculations.

Notes: Dependent variable is a dummy variable equal to 1 if any crime in crime c was reported. The sample period runs from 2011-2018 financial year. The treatment group contains racial and religious hate crimes, the control group contains other CSEW crime groups. The table is structured as follows: column 1 includes a general time trend by quarter; column 2 includes controls for individual characteristics, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects; column 3 also includes year fixed effects and crime fixed effects; column 4 includes a separate RRHC time trend; column 5 includes time trends for each crime group. Standard errors are clustered at the crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Changes in the Crime Outcomes Post-Brexit Referendum

	(1)	(2)	(1)	(2)	(1)	(2)
	Positive		Negative		Neutral	
Post-RRHC	-0.030**	-0.030**	0.032**	0.032**	0.029	0.028
	(0.014)	(0.014)	(0.013)	(0.013)	(0.041)	(0.041)
Observations	63,509	63,509	63,509	63,509	63,509	63,509
No. of PFA-crimes	5,199	5,199	5,199	5,199	5,199	5,199
Time trend	Y	Y	Y	Y	Y	Y
Police force FE	Y	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
PF-specific trend	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y
Remain-crime trend	Y	Y	Y	Y	Y	Y
Post-2015 crime trend		Y		Y		Y

Sources: Recorded crime outcome data at Police Force Area (PFA) level, available from data.police.uk and authors' own calculations.

Notes: Dependent variable is the percent of reported crime c resulting in a positive, negative or neutral outcome. All observations are at the PFA-quarter level. The sample period runs from 2011q2 to 2019q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. The table is structured as follows: column 1 includes a general time trend by quarter, police force fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, year fixed effects, PF-specific trends, crime-specific trends, and a difference in crime-trends between *Remain* and *Leave* areas; column 2 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the PF-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Changes in Crime Outcomes Post-Brexit Referendum
Event Study Approach

	(1)	(2)	(1)	(2)	(1)	(2)
	Positive		Negative		Neutral	
Pre 2015q2-RRHC	-0.019 (0.023)	-0.019 (0.023)	0.015 (0.023)	0.015 (0.023)	-0.034 (0.051)	-0.037 (0.051)
2015q3-RRHC	-0.020 (0.020)	-0.020 (0.020)	0.017 (0.020)	0.018 (0.020)	-0.008 (0.040)	-0.010 (0.040)
2015q4-RRHC	-0.017 (0.018)	-0.018 (0.018)	0.014 (0.018)	0.014 (0.018)	-0.104 (0.129)	-0.104 (0.130)
2016q2-RRHC	0.004 (0.018)	0.004 (0.018)	-0.006 (0.018)	-0.006 (0.018)	-0.012 (0.033)	-0.010 (0.033)
2016q3-RRHC	-0.048*** (0.017)	-0.048*** (0.018)	0.043** (0.017)	0.043** (0.017)	-0.003 (0.034)	0.001 (0.034)
2016q4-RRHC	-0.020 (0.021)	-0.019 (0.021)	0.026 (0.020)	0.025 (0.020)	-0.009 (0.041)	-0.004 (0.042)
2017q1-RRHC	-0.038 (0.023)	-0.038 (0.023)	0.043* (0.023)	0.042* (0.023)	-0.008 (0.062)	-0.010 (0.063)
Observations	63,509	63,509	63,509	63,509	63,509	63,509
No. of PFA-crimes	5,199	5,199	5,199	5,199	5,199	5,199
Time Trend	Y	Y	Y	Y	Y	Y
PF FE	Y	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
PF-specific trend	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y
Remain-crime trend	Y	Y	Y	Y	Y	Y
Post-2015 crime trend		Y		Y		Y

Sources: Recorded crime outcome data at Police Force Area (PFA) level, available from data.police.uk and authors' own calculations.

Notes: Dependent variable is the percent of reported crimes c resulting in a positive or negative outcome. All observations at the PFA-quarter level. The sample period runs from 2011q2 to 2019q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. The table is structured as follows: column 1 includes a general time trend by quarter, police force fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, year fixed effects, PF-specific trends, crime-specific trends, and a difference in crime-trends between *Remain* and *Leave* areas; column 2 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Differential Impact of Brexit on Hate Crime by Vote
Event Study Approach Using Quarterly Data

	(1)	(2)	(1)	(2)
	Remain		Leave	
Pre 2015q2-RRHC	0.017 (0.052)	-0.029 (0.203)	0.112*** (0.034)	0.047 (0.146)
2015q3-RRHC	0.088* (0.046)	-0.028 (0.116)	0.137*** (0.041)	0.102 (0.094)
2015q4-RRHC	0.124** (0.062)	0.050 (0.087)	0.149*** (0.038)	0.131** (0.057)
2016q2-RRHC	0.063 (0.053)	0.099 (0.062)	0.177*** (0.040)	0.191*** (0.052)
2016q3-RRHC	0.157*** (0.050)	0.224** (0.095)	0.384*** (0.040)	0.418*** (0.082)
2016q4-RRHC	-0.015 (0.063)	0.092 (0.166)	0.159*** (0.044)	0.210* (0.126)
2017q1-RRHC	0.042 (0.058)	0.224 (0.207)	0.161*** (0.041)	0.230 (0.166)
Observations	51,087	51,087	144,657	144,657
No. of groups	1,636	1,636	4,928	4,928
Time trend	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
CSP-specific trend	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y
Post-2015 crime trend		Y		Y

Sources: Recorded crime data at Community Safety Partnership (CSP) area level, available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. The table is structured as follows: column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, year fixed effects, CSP-specific trends, and crime-specific trends; column 2 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: The Role of Media and Social Media

	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Brexit Articles			Hate Crime Articles			Brexit Tweets		
Log Count Articles/Tweets * Hate Crime	0.015 (0.010)		-0.008 (0.013)	0.007 (0.008)		-0.014 (0.008)	0.038*** (0.012)		0.028** (0.013)
Lag Log Count Articles/Tweets * Hate Crime		0.021** (0.010)	0.025** (0.012)		0.036*** (0.008)	0.039*** (0.008)		0.022* (0.013)	0.019 (0.014)
Observations	22,603	22,108	22,108	22,603	22,108	22,108	22,603	22,108	22,108
No. of PFA-crimes	495	495	495	495	495	495	495	495	495
Quadratic time trend	Y	Y	Y	Y	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y	Y	Y	Y
Remain-crime trend	Y	Y	Y	Y	Y	Y	Y	Y	Y
Post-2015 crime trend	Y	Y	Y	Y	Y	Y	Y	Y	Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected via Freedom of Information Requests (FOI), print media counts from LexisNexis, and social media Twitter data. Authors' own calculations.
Notes: Dependent variable is the log crime rate per 1,000,000 inhabitants of crime c . All observations are at the police force-month level. The sample period runs from January 2013 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crimes categories and include: anti-social behaviour, bicycle theft, burglary, criminal damage and arson, drug offences, other offences, other theft, public order offences, robbery, shoplifting, theft, and vehicle offences. The table is structured as follows: all estimations include a quadratic time trend, month seasonal effects, year FE, crime trends, PFA trends, remain trend, and post-2015 trend. Standard errors are clustered at the PFA-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

ONLINE APPENDIX

Supplementary Material

Love thy Neighbour? Brexit and Hate Crime

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This Appendix reports additional analyses and results discussed in the main text, which could not be included in the paper due to space concerns. To locate the material more easily in the context of the paper, in what follows we use the same numbering and titling of the sections used in the text.

2. Background

Figure A.1: Vote Leave Turkey Poster



Sources: The advertisement was released by the official Vote Leave campaign in May 2016. <https://www.theguardian.com/politics/2016/may/21/vote-leave-prejudice-turkey-eu-security-threat>

Figure A.2: Leave EU Breaking Point Poster



Sources: The advertisement was released by the unofficial Leave EU campaign on June 16, 2016. <https://www.theguardian.com/politics/2016/jun/16/nigel-farage-defends-ukip-breaking-point-poster-queue-of-migrants>

Figure A.3: EU Referendum Word Clouds by *Leave* and *Remain* Vote

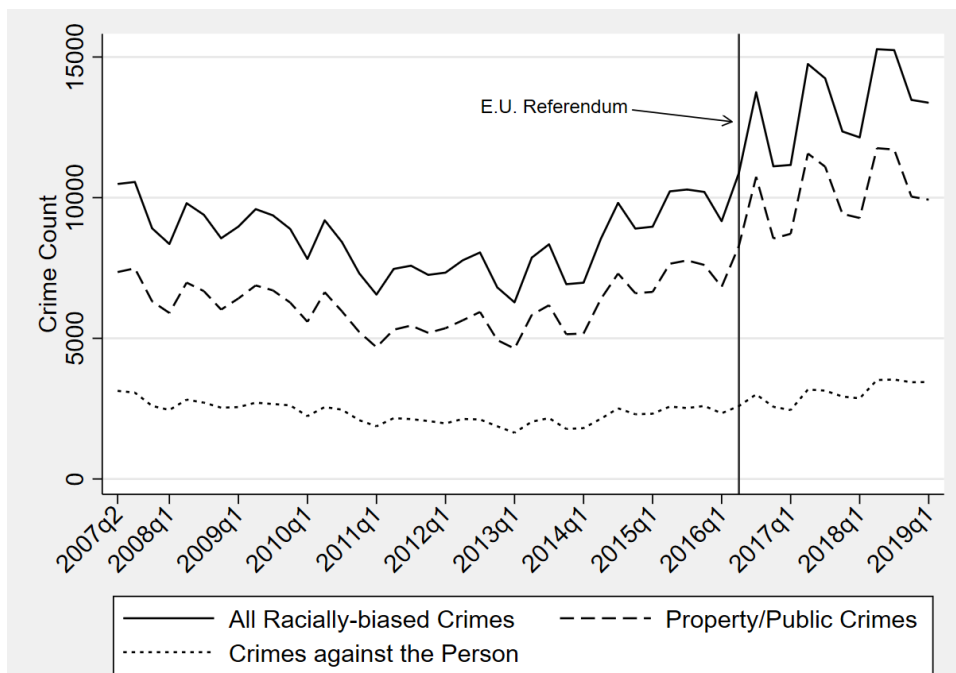


Sources: Prosser et al. (2016). www.britishelectionstudy.com/bes-findings/what-mattered-most-to-you-when-deciding-how-to-vote-in-the-eu-referendum

Notes: Word clouds generated from 15,070 unique answers to the question “What matters most to you when deciding how to vote in the EU referendum?”

3. Data and Methodology

Figure A.4: CSP Hate Crime Trends



Sources: Recorded crime data at the Community Safety Partnership (CSP) level from ons.gov.uk.

Notes: Sum of racial, religious, and racial-religious hate crimes of all CSPs in England and Wales by quarter.

Table A.1: Racial and Religious Hate Crimes

Year	Home Office data		CSP data	FOI data	
	Racial	Religious	Racial	Racial	Religious
2011	35944	1618	35417	39329	9888
2012	35845	1572	29971	42085	11462
2013	37575	2264	29415	41210	11972
2014	42862	3293	34227	47964	15017
2015	49419	4400	39686	58122	19402
2016	62685	5949	44902	67897	23340
2017	71264	8339	52509	9820 ^a	3290 ^a

^a Up to February 2017.

Sources: Home Office, Authors' Freedom of Information (FOI) requests and recorded crime data at the Community Safety Partnership (CSP) level from ons.gov.uk.

Notes: Home Office data collected for a financial year (April to March), while FOI and CSP data collected for a calendar year.

Table A.2: Summary statistics – FOI Request to Police Forces

Panel A. Descriptives		Panel B. Justification provided			
				<i>Number of police forces</i>	
Number of police forces	47	<i>Reasons for refusal to provide data overall</i>			
Request response rate	98%	Not appropriate for this research		1	
Follow up; clarification required	28%	Cost		5	
Late request completion	28%				
<i>Average completion time (working days)</i>	<i>19.8</i>	<i>Reasons not all data provided</i>			
Refused data provision	11%	Information not held		5	
Provided data of some kind	89%	Cost		2	
<i>All requested data</i>	<i>44.7%</i>				
<i>Most (or all) requested data</i>	<i>78.7%</i>	<i>Reasons data provided not suitable</i>			
<i>Unsuitable data</i>	<i>10.3%</i>	Wrong information (e.g. annual or quarterly)		3	
		Police force not territorial		2	
Panel C. Police force characteristics		Panel D. Local area characteristics			
	<i>Mean</i>	<i>St. Dev.</i>		<i>Mean</i>	<i>St. Dev.</i>
Total police force	6111.96	12600.76	Disposable income per head in 2016	18640.83	2573.63
Total administrative staff	83.54	93.77	Unemployment rate (16-64 year olds) in 2016	4.49	1.07
Administrative staff (per 100 police force)	2.02	0.81			
Administrative staff (per 1 inhabitant)	1.69	6.23	% Population working age	63.29	2.62
Number of non-white employees (per 100 police force)	1.5	1.63	% Population U.K. born	88.37	14.97
			% Population white	91.63	9.08
Funding (per 10000 population)	2771296	8446972			
			% Population Christian	62.78	6.88
Total offences (per 100 police force)	2210.78	643.65	% Population no religion	25.19	5.19
Reported hate crimes, 2014-2015 (per 100 population)	0.101	0.11			
Reported racist incidents, 2014-2015 (per 100 population)	0.112	0.102	Migration flow (per 100 population)	0.32	0.26

Sources: Data come from the following sources: Police force characteristics and crime statistics – Home Office; Local area demographic characteristics – 2011 Census; Labour market characteristics – ONS.

Notes: Information about the police forces refers to year 2015/2016, the most recent data available. The crime statistics capture year 2014/2015. The local area demographics reflect the situation at the time of the 2011 Census. The reference year for labour market characteristics is 2015.

Table A.3: Lists of Crimes in the FOI and CSP Datasets

FOI groups	CSP subgroups	CSP groups	CSP RRHC subcategories
Anti-social Behaviour	All other theft offences	Criminal damage and arson	<i>Crimes against the person</i>
Bicycle Theft	Arson	Drug offences	Racially or religiously aggravated actual bodily harm and other injury
Burglary	Bicycle theft	Fraud offences	Racially or religiously aggravated assault with injury
Criminal Damage and Arson	Criminal damage	Miscellaneous crimes	Racially or religiously aggravated assault without injury
Drugs	Miscellaneous Crimes	Possession of weapons offences	Racially or religiously aggravated harassment
Other	Domestic burglary	Public order offences	Racially or religiously aggravated inflicting grievous bodily harm without intent
Other Theft	Homicide	Robbery	Racially or religiously aggravated less serious wounding
Public Disorder and Weapon	Non-domestic burglary	Sexual offences	<i>Crimes against property or the public</i>
Public Order	Other sexual offences	Theft Offences	Racially or religiously aggravated criminal damage
Robbery	Possession of drugs	Violence against the person	Racially or religiously aggravated criminal damage to a building other than a dwelling
Shoplifting	Possession of weapons offences	RRHC	Racially or religiously aggravated criminal damage to a dwelling
Vehicle	Public order offences		Racially or religiously aggravated criminal damage to a vehicle
Violent Crimes	Rape		Racially or religiously aggravated other criminal damage
Weapon	Robbery		Racially or religiously aggravated public fear, alarm, or distress
RRHC	Shoplifting		
	Theft from the person		
	Trafficking of drugs		
	Vehicle offences		
	Violence with injury		
	Violence without injury		
	RRHC		

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk. Recorded crime data at Police Force Level, collected using Freedom of Information (FOI) requests.

Notes: List of crime groups and subgroups from the main sample periods (May 2011-February 2017 for FOI and 2009q2-2017q1 for CSP data). RRHC refers to crimes with a racial and/or religious bias. In the main analysis the CSP RRHC subcategories are aggregated to measure total RRHC.

Table A.4: Summary Statistics of CSP and FOI Data

Variable	Community Safety Partnership (CSP)					Freedom of Information (FOI)				
	N	Mean	Std. Dev.	Min	Max	N	Mean	Std. Dev.	Min	Max
Percent with Low SOC10	2,007,875	0.257	0.065	0.063	0.57	46,778	0.268	0.036	0.168	0.362
Percent with High SOC10	2,090,798	0.428	0.094	0.169	0.775	46,778	0.412	0.051	0.313	0.585
Percent with No Qualifications	2,104,998	0.097	0.043	0.011	0.323	46,778	0.095	0.030	0.038	0.213
Percent Workers in Industries C & F	2,060,250	0.200	0.063	0.033	0.498	46,778	0.199	0.039	0.059	0.308
Median Yearly Salary	1,941,108	27461.300	4,452.87	18,194	46,143	46,778	21,472.12	2,567,836	17,839.65	29,200.88
Cost of Austerity per Person	2,214,190	4,521,827	1,251,922	1,770,007	9,140,131	49,590	4,524,151	8,676,937	1,770,007	6,713,004
Percent Non-British Population	1,903,714	0.075	0.069	0	0.381	46,631	0.072	0.067	0.007	0.382
Percent Migration Relative	1,819,722	0.126	0.082	0.019	1,333	46,102	0.259	0.490	0.002	3,291,071
Year Change in Migration	1,697,692	0.008	0.322	-0.812	125,916	45,327	0.030	0.125	-0.406	0.339
Unemployment Rate	1,969,069	0.064	0.028	0.01	0.223	46,778	0.039	0.013	0.011	0.081
<i>Remain Areas</i>	2,221,058	0.255	0.436	0	1	49,590	0.171	0.376	0	1
Percent Remain	2,221,058	0.457	0.100	0.244	0.786	49,590	0.445	0.057	0.348	0.620
Population	2,178,803	168,634.10	112,293.60	2,200	1,141,400	47,595	1,135,238	1,074,525	407,200	6,994,700
Areas	2,221,058	1,748,164	102,741	1	348	49,590	1,679,661	9,446,863	1	33
RRHC count	15,502	299,782	422,213	0	540	2,409	3,742,259	3,742,259	1	4664
RRHC Personal Count	15,502	7,809,186	1,191,679	0	240					
RRHC Public/Property Count	15,502	2,217,894	3,127,756	0	423					

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk. Recorded crime data at Police Force Level, collected using Freedom of Information (FOI) requests. Authors' own calculations.

Notes: CSP data contain observations at the CSP-offence description level by quarter, 2007q2 to 2019q1. FOI data contain observations at the PFA-crime level by month, January 2011 to February 2017.

4. Results

Table A.5: The Impact of the Brexit Referendum on Hate Crime
Difference-in-Differences Estimates Using Quarterly Data (Relative Crime Rate)

	(1)	(2)	(3)	(4)	(5)
Post-RRHC	0.1671*** (0.0294)	0.1666*** (0.0275)	0.1127*** (0.0267)	0.1202*** (0.0267)	0.1889*** (0.0323)
Observations	202,632	202,632	202,632	202,632	202,632
Number of CSP-Crimes	6,570	6,570	6,570	6,570	6,570
R-squared	0.178	0.189	0.248	0.250	0.267
Time Trend	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
CSP-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-Crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the relative crime rate (demeaned using the pre-referendum data) per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups, which include: All other theft offences, Arson, Bicycle theft, Criminal damage, Miscellaneous Crimes, Domestic burglary, Homicide, Non-domestic burglary, Other sexual offences, Possession of drugs, Possession of weapons offences, Public order offences, Rape, Robbery, Shoplifting, Theft from the person, Trafficking of drugs, Vehicle offences, Violence with injury, and Violence without injury. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects and year fixed effects; column 2 includes CSP-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: The Impact of the Brexit Referendum on Hate Crime
Event Study Estimates Using Quarterly Data (Relative Crime Rate)

	(1)	(2)	(3)	(4)	(5)
Pre 2015q2-RRHC	0.0215 (0.0266)	0.0231 (0.0256)	0.0676*** (0.0257)	0.0614** (0.0257)	-0.0388 (0.1241)
2015q3-RRHC	0.0929*** (0.0342)	0.0924*** (0.0340)	0.0933*** (0.0339)	0.0890*** (0.0339)	0.0090 (0.0720)
2015q4-RRHC	0.1014*** (0.0307)	0.1012*** (0.0303)	0.1011*** (0.0303)	0.0989*** (0.0302)	0.0546 (0.0460)
2016q2-RRHC	0.0831** (0.0352)	0.0833** (0.0350)	0.0834** (0.0350)	0.0829** (0.0349)	0.1136*** (0.0425)
2016q3-RRHC	0.3512*** (0.0367)	0.3518*** (0.0362)	0.3334*** (0.0364)	0.3359*** (0.0363)	0.4013*** (0.0704)
2016q4-RRHC	0.1050*** (0.0350)	0.1059*** (0.0346)	0.0865** (0.0351)	0.0891** (0.0351)	0.1901* (0.1025)
2017q1-RRHC	0.1411*** (0.0460)	0.1421*** (0.0451)	0.1220*** (0.0454)	0.1283*** (0.0451)	0.2736** (0.1375)
Observations	202,632	202,632	202,632	202,632	202,632
Number of CSP-Crimes	6,570	6,570	6,570	6,570	6,570
R^2	0.178	0.189	0.248	0.250	0.267
Time Trend	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
CSP-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-Crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the relative crime rate (demeaned using the pre-referendum data) per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups, which include: All other theft offences, Arson, Bicycle theft, Criminal damage, Miscellaneous Crimes, Domestic burglary, Homicide, Non-domestic burglary, Other sexual offences, Possession of drugs, Possession of weapons offences, Public order offences, Rape, Robbery, Shoplifting, Theft from the person, Trafficking of drugs, Vehicle offences, Violence with injury, and Violence without injury. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects and year fixed effects; column 2 includes CSP-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7: The Impact of the Brexit Referendum on Hate Crime Synthetic Control Estimates

	Log(rate)	Relative rate
Panel A: Quarterly Data (CSP)		
2016-q2	-0.025 (0.75)	0.041 (0.55)
2016-q3	0.201 (0.10)	0.300 (0.05)
2016-q4	-0.022 (0.90)	0.041 (0.85)
2017-q1	-0.002 (1.00)	0.071 (0.60)
Panel B: Monthly Data (FOI)		
June 2016	0.006 (1.00)	0.052 (0.50)
July 2016	0.188 (0.00)	0.375 (0.00)
August 2016	0.031 (0.857)	0.099 (0.357)
September 2016	-0.063 (0.429)	-0.021 (0.429)
October 2016	-0.144 (0.286)	-0.128 (0.286)
November 2016	-0.119 (0.286)	-0.086 (0.286)
December 2016	-0.112 (0.286)	-0.088 (0.286)

Sources: Panel A: Recorded crime data at Community Safety Partnership (CSP) level available from ons.gov.uk. Panel B: Recorded crime data at Police Force Level, collected using Freedom of Information (FOI) requests. Authors' own calculations.

Notes: CSP data has been aggregated across England and Wales during the period 2007q1 and 2017q1. FOI data has been aggregated across England and Wales over the period May 2013 and December 2016. Crime rate is measured as the number of crimes per 100,000 population by quarter. Relative crime rate is divided by the average crime rate (by crime) during the pre-treatment period (mean of crime rate by crime prior to 2016q2 for quarterly data and prior to June 2016 for monthly data). Standardised p -values in parenthesis.

Table A.8: Weights for the Synthetic Controls

Log(rate)		Relative rate	
Crime	Weight	Crime	Weight
Panel A: Quarterly Data (CSP)			
Arson	0.215	Bicycle theft	0.132
Bicycle theft	0.090	Other sexual offences	0.117
Homicide	0.082	Violence with injury	0.751
Other sexual offences	0.435		
Possession of weapons offences	0.089		
Violence with injury	0.089		
Panel B: Monthly Data (FOI)			
Bicycle Theft	0.011	Anti-social Behaviour	0.125
Other Theft	0.015	Drugs	0.034
Weapon	0.576	Other Theft	0.100
Public Order	0.398	Public Order	0.741

Sources: Panel A: Recorded crime data at Community Safety Partnership (CSP) level available from ons.gov.uk. Panel B: Recorded crime data at Police Force Level, collected using Freedom of Information (FOI) requests. Authors' own calculations.

Notes: Weights used to construct a synthetic RRHC from a complete basket of control crimes. Left column are weights when the outcome is measured in log crime rate per 100,000, right column are the weights when the outcome variable is the crime rate relative to the pre-treatment average.

Table A.9: Pre-referendum Means for Racial and Religious Hate Crime and in the Synthetic Control

	Log(rate)		Relative rate	
Averages	Treated	Synthetic	Treated	Synthetic
Panel A: Quarterly Data (CSP)				
Q1	2.662	2.683	0.914	0.919
Q2	2.809	2.794	1.058	1.041
Q3	2.820	2.825	1.070	1.070
Q4	2.716	2.740	0.964	0.981
2007	2.915	2.895	1.180	1.178
2008	2.807	2.796	1.059	1.074
2009	2.837	2.779	1.088	1.067
2010	2.711	2.714	0.963	0.980
2011	2.589	2.691	0.849	0.934
2012	2.630	2.581	0.884	0.859
2013	2.607	2.607	0.865	0.861
2014	2.754	2.725	1.002	0.981
2015	2.896	2.878	1.154	1.112
2016	2.807	2.841	1.056	1.090
Panel B: Monthly Data (FOI)				
Jan	2.150	2.171	0.893	0.883
Feb	2.119	2.157	0.866	0.872
Mar	2.284	2.306	1.021	1.019
Apr	2.295	2.317	1.032	1.040
May	2.338	2.324	1.078	1.074
Jun	2.317	2.267	1.055	1.037
Jul	2.392	2.338	1.137	1.134
Aug	2.277	2.274	1.013	1.031
Sep	2.233	2.257	0.970	1.006
Oct	2.272	2.312	1.009	1.016
Nov	2.246	2.228	0.982	0.952
Dec	2.178	2.161	0.918	0.911
2013	2.120	2.127	0.866	0.895
2014	2.177	2.166	0.917	0.930
2015	2.375	2.344	1.118	1.074
2016	2.549	2.591	1.331	1.325

Sources: Panel A: Recorded crime data at Community Safety Partnership (CSP) level available from ons.gov.uk. Panel B: Recorded crime data at Police Force Level, collected using Freedom of Information (FOI) requests. Authors' own calculations.

Notes: Comparison of the variables used to construct a synthetic RRHC. Treated refers to the true observed RRHC with synthetic being the constructed RRHC from the basket of control crimes. Each variable captures the pre-treatment (prior to June 2016 or 2016q2) average log crime rate (left) or the relative crime rate (right) by month or quarter and year. Data has been aggregated to England and Wales for all CSPs or reporting police forces.

Table A.10: The Impact of the Brexit Referendum on Hate Crime – Difference-in-Differences Estimates Using Monthly Data

	(1)	(2)	(3)	(4)	(5)
Post-RRHC	0.212*** (0.051)	0.229*** (0.054)	0.094* (0.051)	0.093* (0.052)	0.387*** (0.071)
Observations	22,603	22,603	22,603	22,603	22,603
Number of PFA-crimes	495	495	495	495	495
Time trend	Y	Y	Y	Y	Y
PFA FE	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y
Racial month-of-year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PFA-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the log crime rate per 1,000,000 inhabitants. All observations are at the police force-month level. The sample period runs from January 2011 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crimes categories and include: anti-social behaviour, bicycle theft, burglary, criminal damage and arson, drug offences, other offences, other theft, public order offences, robbery, shoplifting, theft, and vehicle offences. The table is structured as follows: Column 1 includes a general time trend by month, police force fixed effects, month-of-the-year fixed effects and racial crimes by month-of-the-year fixed effects, month fixed effects, and year fixed effects; column 2 includes PFA-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the PFA-crime level. All specifications include controls for PFA economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

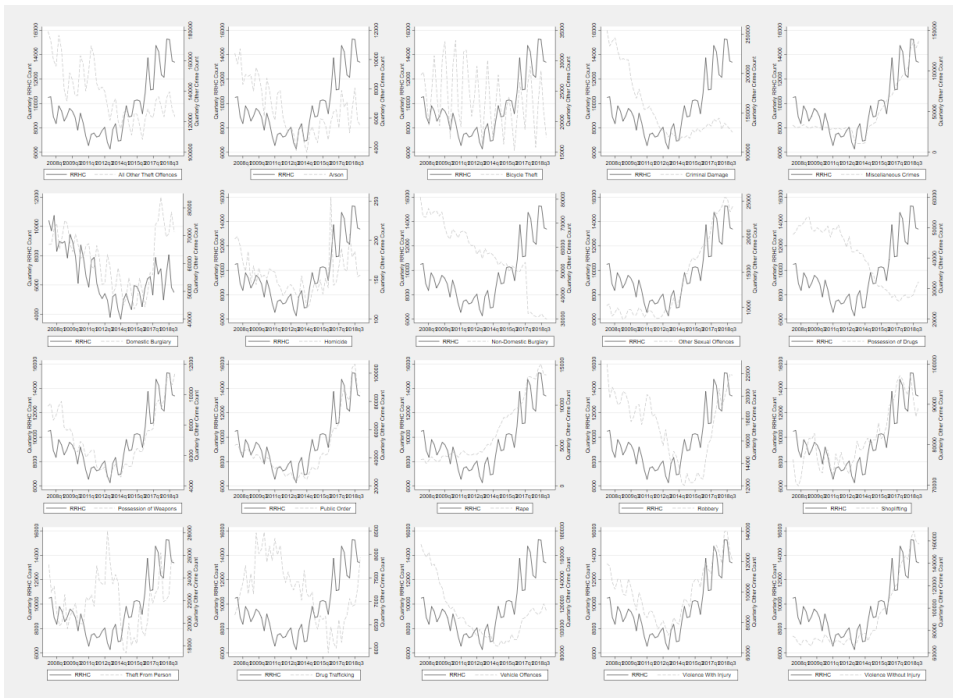
Table A.11: The Impact of the Brexit Referendum on Hate Crime Event Study Estimates Using Monthly Data (Relative Crime Rate)

	(1)	(2)	(3)	(4)	(5)
Pre-February 2016-RRHC	-0.096* (0.054)	-0.011 (0.056)	0.143*** (0.055)	0.144*** (0.055)	-0.010 (0.097)
March 2016-RRHC	-0.105* (0.055)	0.013 (0.060)	0.056 (0.058)	0.056 (0.058)	-0.036 (0.079)
April 2016-RRHC	-0.072 (0.063)	0.004 (0.067)	0.041 (0.064)	0.041 (0.064)	-0.020 (0.067)
May 2016-RRHC					
June 2016-RRHC	0.197*** (0.063)	0.175** (0.072)	0.175** (0.073)	0.175** (0.073)	0.203*** (0.071)
July 2016-RRHC	0.548*** (0.083)	0.553*** (0.085)	0.544*** (0.083)	0.544*** (0.083)	0.602*** (0.090)
August 2016-RRHC	0.186*** (0.068)	0.259*** (0.065)	0.249*** (0.062)	0.249*** (0.062)	0.342*** (0.092)
September 2016-RRHC	0.127* (0.065)	0.233*** (0.074)	0.224*** (0.073)	0.223*** (0.073)	0.356*** (0.129)
October 2016-RRHC	-0.013 (0.077)	0.096 (0.075)	0.079 (0.074)	0.079 (0.074)	0.254** (0.125)
Post November 2016-RRHC	-0.012 (0.069)	0.110 (0.068)	0.081 (0.065)	0.080 (0.065)	0.331* (0.176)
Observations	22,603	22,603	22,603	22,603	22,603
Number of PFAcrime	495	495	495	495	495
Time trend	Y	Y	Y	Y	Y
PFA FE	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y
Racial month-of-year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PFA-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the log crime rate per 1,000,000 inhabitants. All observations are at the police force-month level. The sample period runs from January 2011 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crimes categories and include: anti-social behaviour, bicycle theft, burglary, criminal damage and arson, drug offences, other offences, other theft, public order offences, robbery, shoplifting, theft, and vehicle offences. The table is structured as follows: Column 1 includes a general time trend by month, police force fixed effects, month-of-the-year fixed effects and racial crimes by month-of-the-year fixed effects, month fixed effects, and year fixed effects; column 2 includes PFA-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the PFA-crime level. All specifications include controls for PFA economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

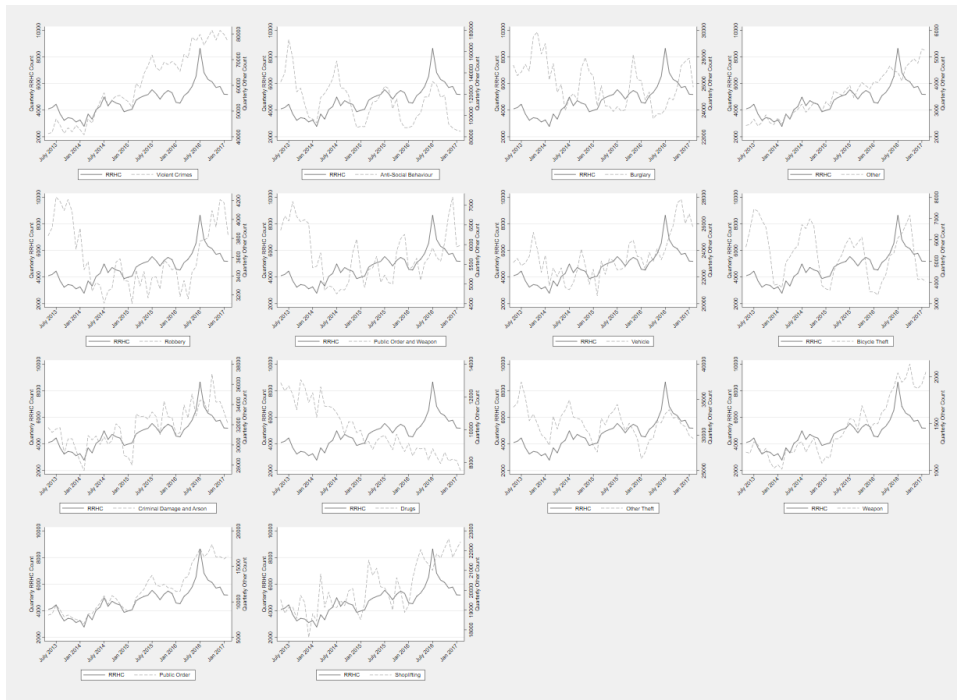
Figure A.5: Plots of RRHC Against Other Crimes Over Time, CSP data



Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Comparison of trends and levels of RRHC and offence subgroups aggregated to England and Wales. For each, the left axis measures the quarterly count of RRHC and the right axis measures the quarterly crime count of the specified offence subgroup.

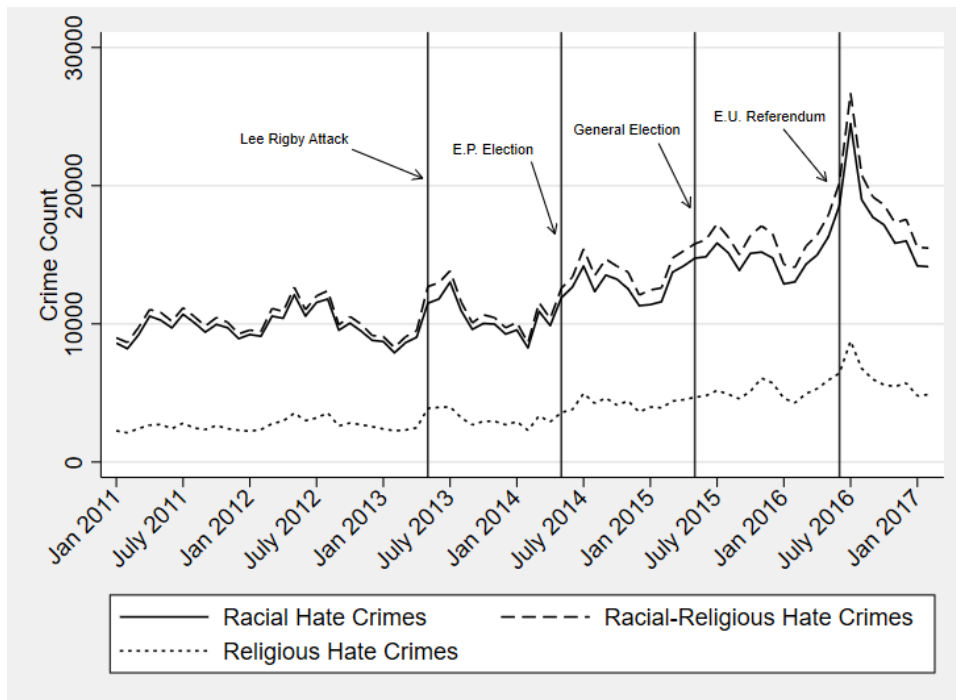
Figure A.6: Plots of RRHC Against Other Crimes Over Time, FOI data



Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Comparison of trends and levels of RRHC and other crimes aggregated to England and Wales for reporting PFAs. For each, the left axis measures the monthly count of RRHC and the right axis measures the monthly crime count of the specified crime.

Figure A.7: Racial and Religious Hate Crime Trends



Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Sum of racial, religious, and racial-religious hate crimes of reporting police forces by month.

5. Robustness checks

Alternative definitions of the control group

Table A.12: The Impact of Brexit on Hate Crime Using Alternative Definitions of the Control Group
Difference-in-Differences using Quarterly Data

	(1)	(2)	(3)	(1)	(2)	(3)
	Aggregate			Offence Groups		
Post-RRHC	0.078*** (0.019)	0.089*** (0.019)	0.130*** (0.029)	0.026 (0.022)	0.042* (0.022)	0.157*** (0.030)
Observations	20,010	20,010	20,010	96,226	96,226	96,226
Nr. of CSP-Crime Subgroups	626	626	626	3,130	3,130	3,130
R^2	0.984	0.984	0.984	0.924	0.929	0.931
Time Trend	Y	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
CSP-specific trend	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y
Remain-Crime trend		Y	Y		Y	Y
Post-2015 crime trend			Y			Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants. All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group is an aggregate of all other offences. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects, year fixed effects, CSP-specific trends and crime-specific trends; column 2 includes a difference in crime-trends between *Remain* and *Leave* areas; column 3 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.13: The Impact of Brexit on Hate Crime Using Alternative Definitions of the Control Group – Event Study

	(1)	(2)	(3)	(1)	(2)	(3)
	Aggregate			Offence Groups		
Pre 2015q2-RRHC	0.078*** (0.027)	0.067** (0.027)	-0.041 (0.125)	0.162*** (0.029)	0.145*** (0.029)	0.008 (0.121)
2015q3-RRHC	0.137*** (0.033)	0.133*** (0.033)	0.029 (0.080)	0.159*** (0.033)	0.149*** (0.033)	0.063 (0.077)
2015q4-RRHC	0.141*** (0.033)	0.137*** (0.033)	0.077 (0.050)	0.178*** (0.032)	0.170*** (0.032)	0.125** (0.048)
2016q2-RRHC	0.151*** (0.033)	0.151*** (0.033)	0.189*** (0.043)	0.124*** (0.033)	0.124*** (0.033)	0.159*** (0.042)
2016q3-RRHC	0.302*** (0.033)	0.306*** (0.033)	0.384*** (0.068)	0.308*** (0.033)	0.310*** (0.033)	0.388*** (0.067)
2016q4-RRHC	0.09-** (0.037)	0.095*** (0.037)	0.217** (0.106)	0.085** (0.037)	0.088** (0.037)	0.206** (0.104)
2017q1-RRHC	0.120*** (0.033)	0.130*** (0.033)	0.313** (0.140)	0.076** (0.034)	0.089*** (0.034)	0.253* (0.136)
Observations	20,010	20,010	20,010	96,226	96,226	96,226
Nr. of CSP-Crime Subgroups	626	626	626	3,130	3,130	3,130
R^2	0.984	0.984	0.984	0.924	0.929	0.931
Time Trend	Y	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
CSP-specific trend	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y
Remain-Crime trend		Y	Y		Y	Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants. All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group is an aggregate of all other offences. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects, year fixed effects, CSP-specific trends and crime-specific trends; column 2 includes a difference in crime-trends between *Remain* and *Leave* areas; column 3 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Extended period of analysis

Table A.14: The Impact of the Brexit Referendum on Hate Crime
Difference-in-Differences Estimates Using Quarterly Data, Extended Period

	(1)	(2)	(3)
Post-RRHC	0.1199*** (0.0204)	0.1346*** (0.0201)	0.1181*** (0.0233)
Observations	254,749	254,749	254,749
Nr. of CSP-Crime Subgroups	6,569	6,569	6,569
Time Trend	Y	Y	Y
CSP FE	Y	Y	Y
Quarter-of-year FE	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y
Quarter FE	Y	Y	Y
Year FE	Y	Y	Y
CSP-specific trend	Y	Y	Y
Crime-specific trend	Y	Y	Y
Remain-Crime trend		Y	Y
Post-2015 crime trend			Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants. All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2019q1. The treatment group contains racial and religious hate crimes, the control group is an aggregate of all other offences. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects, year fixed effects, CSP-specific trends and crime-specific trends; column 2 includes a difference in crime-trends between *Remain* and *Leave* areas; column 3 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.15: The Impact of the Brexit Referendum on Hate Crime Event Study Approach Estimates Using Quarterly Data, Extended Period

	(1)	(2)	(3)
Pre 2015q2-RRHC	0.0291 (0.0280)	0.0191 (0.0278)	0.0699** (0.0336)
2015q3-RRHC	0.0926*** (0.0312)	0.0850*** (0.0311)	0.0779** (0.0334)
2015q4-RRHC	0.1079*** (0.0323)	0.1024*** (0.0322)	0.0945*** (0.0332)
2016q2-RRHC	0.1001*** (0.0319)	0.1006*** (0.0319)	0.0989*** (0.0317)
2016q3-RRHC	0.2941*** (0.0322)	0.2940*** (0.0321)	0.2870*** (0.0314)
2016q4-RRHC	0.0835** (0.0362)	0.0847** (0.0362)	0.0767** (0.0371)
Post 2017q1-RRHC	0.1696*** (0.0314)	0.1817*** (0.0314)	0.1780*** (0.0357)
Observations	254,749	254,749	254,749
Nr. of CSP-Crime Subgroups	6,569	6,569	6,569
Time Trend	Y	Y	Y
CSP FE	Y	Y	Y
Quarter-of-year FE	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y
Quarter FE	Y	Y	Y
Year FE	Y	Y	Y
CSP-specific trend	Y	Y	Y
Crime-specific trend	Y	Y	Y
Remain-Crime trend		Y	Y
Post-2015 crime trend			Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2019q1. The treatment group contains racial and religious hate crimes, the control group is an aggregate of all other offences. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects, year fixed effects, CSP-specific trends and crime-specific trends; column 2 includes a difference in crime-trends between *Remain* and *Leave* areas; column 3 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.16: The Impact of the Brexit Referendum on Hate Crime
Difference-in-Differences Estimates Using Monthly Data, Extended Period

	(1)	(2)	(3)	(4)	(5)
Post-RRHC	0.340*** (0.055)	0.358*** (0.056)	-0.100** (0.049)	-0.102** (0.049)	0.240*** (0.047)
Observations	32,496	32,496	32,496	32,496	32,496
Number of PFA-crimes	528	528	528	528	528
Time Trend	Y	Y	Y	Y	Y
PFA FE	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y
Racial month-of-year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PFA-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-Crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the log crime rate of crime c per 1,000,000 inhabitants. All observations are at the police force-month level. The sample period runs from January 2011 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crimes categories and include: anti-social behaviour, bicycle theft, burglary, criminal damage and arson, drug offences, other offences, other theft, public order offences, robbery, shoplifting, theft, and vehicle offences. The table is structured as follows: Column 1 includes a general time trend by month, police force fixed effects, month-of-the-year fixed effects and racial crimes by month-of-the-year fixed effects, month fixed effects, and year fixed effects; column 2 includes PFA-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the PFA-crime level. All specifications include controls for PFA economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.17: The Impact of the Brexit Referendum on Hate Crime
Event Study Approach Estimates using Monthly Data, Extended Period

	(1)	(2)	(3)	(4)	(5)
Pre-February 2016-RRHC	-0.316*** (0.054)	-0.258*** (0.055)	0.207*** (0.049)	0.207*** (0.049)	0.005 (0.063)
March 2016-RRHC	-0.088** (0.045)	0.065 (0.047)	0.061 (0.047)	0.061 (0.047)	0.015 (0.056)
April 2016-RRHC	-0.076 (0.058)	0.041 (0.052)	0.036 (0.052)	0.036 (0.052)	0.015 (0.052)
June 2016-RRHC	0.158*** (0.045)	0.149*** (0.047)	0.148*** (0.048)	0.148*** (0.048)	0.177*** (0.046)
July 2016-RRHC	0.346*** (0.051)	0.358*** (0.052)	0.357*** (0.052)	0.357*** (0.052)	0.415*** (0.058)
August 2016-RRHC	0.114** (0.049)	0.167*** (0.052)	0.169*** (0.052)	0.168*** (0.052)	0.255*** (0.075)
September 2016-RRHC	0.073 (0.051)	0.082 (0.056)	0.075 (0.055)	0.074 (0.055)	0.205** (0.094)
October 2016-RRHC	-0.014 (0.058)	0.007 (0.055)	0.000 (0.054)	-0.001 (0.054)	0.160* (0.085)
Post November 2016-RRHC	-0.050 (0.051)	0.044 (0.047)	0.002 (0.046)	-0.001 (0.046)	0.224 (0.140)
Observations	32,496	32,496	32,496	32,496	32,496
Number of PFA-crimes	528	528	528	528	528
Time Trend	Y	Y	Y	Y	Y
PFA FE	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y
Racial month-of-year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PFA-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-Crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the log crime rate of crime c per 1,000,000 inhabitants. All observations are at the police force-month level. The sample period runs from January 2011 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crimes categories and include: anti-social behaviour, bicycle theft, burglary, criminal damage and arson, drug offences, other offences, other theft, public order offences, robbery, shoplifting, theft, and vehicle offences. The table is structured as follows: Column 1 includes a general time trend by month, police force fixed effects, month-of-the-year fixed effects and racial crimes by month-of-the-year fixed effects, month fixed effects, and year fixed effects; column 2 includes PFA-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the PFA-crime level. All specifications include controls for PFA economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Excluding observations for London

Table A.18: The Impact of Brexit on Hate Crime (Excluding Observations for Greater London)

	(1)	(2)	(3)
Pre 2015q2-RRHC	0.0978*** (0.0314)	0.0930*** (0.0314)	0.0611 (0.1343)
2015q3-RRHC	0.1398*** (0.0362)	0.1366*** (0.0362)	0.0985 (0.0843)
2015q4-RRHC	0.1386*** (0.0358)	0.1367*** (0.0358)	0.1137** (0.0536)
2016q2-RRHC	0.1804*** (0.0366)	0.1802*** (0.0366)	0.1927*** (0.0467)
2016q3-RRHC	0.3664*** (0.0360)	0.3670*** (0.0360)	0.3936*** (0.0740)
2016q4-RRHC	0.1403*** (0.0408)	0.1409*** (0.0408)	0.1823 (0.1153)
2017q1-RRHC	0.1594*** (0.0374)	0.1633*** (0.0375)	0.2273 (0.1507)
Observations	173,137	173,137	173,137
Number of CSP areas	5,893	5,893	5,893
Time Trend	Y	Y	Y
CSP FE	Y	Y	Y
Quarter-of-year FE	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y
Quarter FE	Y	Y	Y
Year FE	Y	Y	Y
CSP-specific trend	Y	Y	Y
Crime-specific trend	Y	Y	Y
Remain-Crime trend		Y	Y
Post-2015 crime trend			Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants. All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group is an aggregate of all other offences. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects, year fixed effects, CSP-specific trends and crime-specific trends; column 2 includes a difference in crime-trends between *Remain* and *Leave* areas; column 3 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6. Mechanisms

Table A.19: Changes in Specific Crime Outcomes Post-Brexit Referendum

Outcome	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Pre 2015q2-RRHC	0.0004 (0.0011)	-0.0084 (0.0095)	-0.0018 (0.0030)	0.0044 (0.0221)	-0.0081 (0.0059)	-0.0227 (0.0145)	0.0176 (0.0203)	0.0269*** (0.0084)	0.0038 (0.0061)	-0.0023 (0.0181)	0.0002 (0.0036)	-0.0137** (0.0068)	-0.0410 (0.2565)	0.0010 (0.0035)	0.0006 (0.0014)	-0.0009 (0.0034)	0.0029 (0.0026)	-0.0006 (0.0035)	-0.0008 (0.0018)	-0.0002 (0.0066)	0.0016 (0.0026)
2015q3-RRHC	0.0005 (0.0010)	-0.0011 (0.0083)	-0.0020 (0.0026)	-0.0089 (0.0192)	0.0072 (0.0052)	-0.0158 (0.0126)	0.0003 (0.0176)	0.0184** (0.0073)	0.0037 (0.0053)	0.0006 (0.0158)	0.0002 (0.0031)	-0.0057 (0.0059)	-0.0131 (0.2232)	0.0014 (0.0031)	0.0004 (0.0012)	-0.0010 (0.0029)	0.0038* (0.0022)	-0.0001 (0.0031)	-0.0001 (0.0016)	-0.0029 (0.0057)	0.0006 (0.0023)
2015q4-RRHC	0.0004 (0.0009)	-0.0026 (0.0079)	-0.0015 (0.0025)	-0.0148 (0.0183)	0.0065 (0.0049)	-0.0122 (0.0120)	0.0070 (0.0168)	0.0111 (0.0070)	0.0019 (0.0050)	0.0040 (0.0151)	0.0014 (0.0030)	-0.0045 (0.0056)	-0.1088 (0.2133)	0.0028 (0.0029)	0.0002 (0.0012)	-0.0011 (0.0028)	0.0033 (0.0021)	-0.0005 (0.0029)	0.0002 (0.0015)	-0.0020 (0.0055)	0.0004 (0.0022)
2016q1-RRHC																					
2016q2-RRHC	0.0001 (0.0009)	0.0024 (0.0079)	0.0033 (0.0025)	-0.0158 (0.0183)	0.0087* (0.0049)	0.0044 (0.0120)	0.0014 (0.0168)	0.0050 (0.0070)	-0.0006 (0.0050)	-0.0158 (0.0150)	-0.0003 (0.0030)	0.0056 (0.0056)	-0.0122 (0.2133)	0.0000 (0.0029)	0.0009 (0.0012)	0.0013 (0.0028)	0.0022 (0.0021)	-0.0008 (0.0029)	0.0015 (0.0015)	-0.0029 (0.0055)	-0.0004 (0.0022)
2016q3-RRHC	0.0001 (0.0010)	-0.0002 (0.0082)	0.0042 (0.0026)	-0.0197 (0.0189)	0.0060 (0.0051)	-0.0155 (0.0124)	-0.0219 (0.0174)	0.0067 (0.0072)	-0.0002 (0.0052)	0.0341** (0.0156)	0.0007 (0.0031)	0.0013 (0.0058)	-0.0036 (0.2206)	-0.0008 (0.0030)	0.0010 (0.0012)	-0.0016 (0.0029)	0.0087*** (0.0022)	-0.0012 (0.0030)	0.0031** (0.0015)	-0.0039 (0.0057)	-0.0008 (0.0022)
2016q4-RRHC	0.0001 (0.0010)	0.0064 (0.0087)	0.0071** (0.0028)	-0.0184 (0.0201)	0.0041 (0.0054)	-0.0250* (0.0132)	0.0073 (0.0185)	0.0010 (0.0077)	-0.0028 (0.0055)	0.0152 (0.0165)	0.0015 (0.0033)	0.0100 (0.0062)	0.0020 (0.2343)	-0.0031 (0.0032)	0.0003 (0.0013)	-0.0007 (0.0031)	-0.0006 (0.0023)	-0.0013 (0.0032)	0.0027 (0.0016)	-0.0030 (0.0060)	-0.0008 (0.0024)
Post 2017q1-RRHC	0.0001 (0.0012)	0.0060 (0.0102)	0.0169*** (0.0032)	-0.0221 (0.0237)	0.0004 (0.0064)	-0.0262* (0.0155)	-0.0123 (0.0217)	-0.0001 (0.0090)	-0.0060 (0.0065)	0.0337* (0.0194)	0.0013 (0.0038)	0.0130* (0.0073)	-0.0061 (0.2753)	-0.0044 (0.0038)	0.0007 (0.0015)	-0.0008 (0.0036)	0.0041 (0.0028)	-0.0017 (0.0038)	0.0023 (0.0019)	-0.0032 (0.0071)	-0.0014 (0.0028)
Observations	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509	63,509
Number of PFA-crimes	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199	5,199

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the percent of reported crime c resulting in outcome o . The sample period runs from 2014q2 to 2019q1. The dependent variable in the columns are as follows: 1. Neutral: Cannabis/Khat Warning, 2. Positive: Caution – adults, 3. Positive: Caution – youths, 4. Positive: Charged/Summoned, 5. Positive: Community Resolution, 6. Positive: Evidential difficulties: suspect identified; victim does not support further action, 7. Positive: Evidential difficulties: suspect identified; victim supports action, 8. Negative Evidential difficulties: suspect not identified; victim does not support further action, 9. Negative Further investigation to support formal action not in the public interest – police decision, 10. Negative Investigation complete – no suspect identified, 11. Negative: Not in public interest (CPS), 12. Negative: Not in public interest (Police), 13. Neutral: Not yet assigned an outcome, 14. Neutral: Offender died, 15. Neutral: Penalty Notices for Disorder, 16. Neutral: Prosecution prevented: suspect too ill, 17. Neutral: Prosecution prevented: suspect under age, 18. Neutral: Prosecution prevented: victim/key witness dead/too ill, 19. Neutral: Prosecution time limit expired, 20. Neutral: Responsibility for further investigation transferred to another body, 21. Neutral: Taken into consideration. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. The table is structured as follows: each column includes a general time trend by quarter, PFA fixed effects, quarter-of-the-year dummies, year fixed effects, PFA-specific trends, and crime-specific trends. Standard errors are clustered at the PFA-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

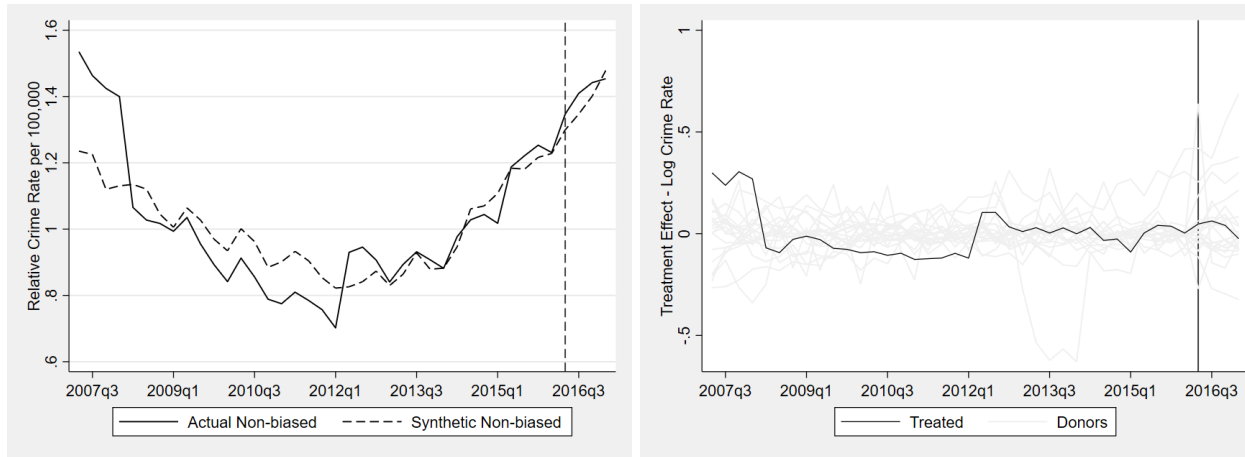
Table A.20: Crime Outcomes by Victim Type

	(1) Crimes Against Person			(1) Crimes Against Public/Property		
	(2) Negative	(3) Positive	(3) Neutral	(1) Negative	(2) Positive	(3) Neutral
Pre 2015q2-RRHC	0.0322 (0.0237)	-0.0355 (0.0245)	-0.0422 (0.0567)	-0.00918 (0.0300)	0.00403 (0.0301)	-0.0279 (0.0591)
2015q3-RRHC	0.0328 (0.0244)	-0.0336 (0.0242)	0.00718 (0.0467)	-0.00418 (0.0301)	-0.00106 (0.0302)	-0.0344 (0.0510)
2015q4-RRHC	0.0158 (0.0235)	-0.0230 (0.0237)	-0.106 (0.133)	0.0118 (0.0276)	-0.0105 (0.0272)	-0.101 (0.133)
2016q2-RRHC	0.00485 (0.0214)	-0.00359 (0.0213)	-0.00390 (0.0362)	-0.0214 (0.0318)	0.0150 (0.0320)	-0.0179 (0.0518)
2016q3-RRHC	0.0637*** (0.0238)	-0.0648*** (0.0243)	0.00554 (0.0388)	0.0128 (0.0211)	-0.0229 (0.0219)	-0.00448 (0.0488)
2016q4-RRHC	0.0394 (0.0281)	-0.0354 (0.0293)	0.0108 (0.0485)	0.00487 (0.0260)	0.00498 (0.0264)	-0.0253 (0.0570)
2017q1-RRHC	0.0629** (0.0271)	-0.0628** (0.0277)	0.00390 (0.0656)	0.0121 (0.0266)	-0.00176 (0.0277)	-0.0296 (0.0711)
Observations	63,509	63,509	63,509	63,509	63,509	63,509
Number of PFA-crimes	5,199	5,199	5,199	5,199	5,199	5,199
Time Trend	Y	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
CSP-specific trend	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y
Remain-Crime trend		Y	Y		Y	Y
Post-2015 crime trend			Y			Y

Sources: Recorded crime outcome data at Police Force Area level from data.police.uk

Notes: Dependent variable is the percent of reported crime c resulting in outcome o . The sample period runs from 2014q2 to 2019q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. See Table A12 in the Appendix for a list of outcomes and designation of positive/negative/neutral. The table is structured as follows: each column includes a general time trend by quarter, PFA fixed effects, quarter-of-the-year dummies, year fixed effects, PFA-specific trends, and crime-specific trends. Standard errors are clustered at the PFA-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.8: The Impact of the Brexit Referendum on Non-Hate Crimes
 Synthetic Control Estimates and Effects using Quarterly Data



(a) Estimates: relative rate

(b) Effects: relative rate

Source: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk.

Notes: CSP data have been aggregated across areas in England and Wales which voted to leave the EU during the period between 2007q1 and 2017q1. Crime is measured as the number of crimes in England and Wales by quarter. The dashed line is a constructed synthetic non-RRHC using weights of other offence subgroups. The vertical line indicates the EU referendum in 2016q2.

Table A.21: The Impact of Brexit on Hate Crime, Differential Impact by Vote

	(1)	(2)	(3)	(4)	(5)
Post-RRHC	0.1172*** (0.0272)	0.1176*** (0.0252)	0.0686*** (0.0252)	0.1289*** (0.0249)	0.1746*** (0.0321)
Post-RRHC-Remain	0.1114** (0.0504)	0.1108** (0.0442)	0.0734* (0.0428)	-0.1094*** (0.0425)	-0.1106*** (0.0421)
Observations	195,744	195,744	195,744	195,744	195,744
Nr. of CSP-Crime Sub-Groups	6,564	6,564	6,564	6,564	6,564
Time Trend	Y	Y	Y	Y	Y
Area FE	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y
Racial Quarter-of-year FE	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Area-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-Crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations are at the CSP-quarter level. The table is structured as follows: Column 1 includes a general time trend by quarter, area fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects and year fixed effects; column 2 includes area-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the area-crime level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.22: The Impact of the Brexit Referendum on Hate Crime – Synthetic Control Estimates – *Remain* and *Leave* Areas

	Log(rate)	Relative rate
Panel A: Remain		
2016-q2	-0.045 (0.55)	-0.019 (0.75)
2016-q3	0.124 (0.20)	0.247 (0.05)
2016-q4	-0.060 (0.60)	-0.023 (0.75)
2017-q1	-0.114 (0.30)	-0.109 (0.35)
Panel B: Leave		
2016-q2	-0.044 (0.70)	0.057 (0.45)
2016-q3	0.248 (0.05)	0.305 (0.05)
2016-q4	0.036 (0.85)	0.046 (0.75)
2017-q1	0.048 (0.65)	0.114 (0.45)

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: CSP data have been aggregated across areas in England and Wales which voted to *Remain* (top) or *Leave* (bottom) in the EU during the period between 2007q2 and 2017q1. Crime is measured as the log crime rate per 100,000 (left) or the crime rate relative to the pre-treatment average (right). The coefficients measure the distance between the observed treated crime (RRHC) and the synthetic counterfactual. In parentheses are standardised p -values which measure the percent of control groups with a larger relative placebo effect in that quarter.

Table A.23: Weights for the Synthetic Controls – *Remain* and *Leave* Areas

Log(rate)		Relative rate	
Crime	Weight	Crime	Weight
Panel A: Remain			
Arson	0.136	Arson	0.030
Bicycle theft	0.067	Bicycle theft	0.137
Other sexual offences	0.714	Death or serious injury - unlawful driving	0.020
Public order offences	0.080	Other sexual offences	0.559
Violence with injury	0.004	Violence with injury	0.255
Panel B: Leave			
Arson	0.131	Bicycle theft	0.123
Bicycle theft	0.102	Criminal damage	0.035
Homicide	0.141	Possession of weapons offences	0.092
Other sexual offences	0.208	Violence with injury	0.750
Possession of weapons offences	0.272		
Violence with injury	0.146		

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Weights used to construct a synthetic RRHC from a complete basket of control crimes aggregate to England and Wales by *Remain* (top) or *Leave* (bottom). Left column are weights when the outcome is measured in log crime rate per 100,000, right column are the weights when the outcome variable is the crime rate relative to the pre-treatment average.

Table A.24: Pre-Referendum Means for Racial and Religious Hate Crime and in the Synthetic Control – *Remain* and *Leave* Areas

	Log(rate)		Relative rate	
Averages	Treated	Synthetic	Treated	Synthetic
Panel A: Remain				
Q1	2.934	2.970	0.913	0.934
Q2	3.074	3.069	1.050	1.036
Q3	3.092	3.092	1.069	1.066
Q4	3.012	3.026	0.987	0.993
2007	3.095	3.088	1.075	1.066
2008	3.025	3.019	1.003	1.002
2009	3.080	3.022	1.057	1.013
2010	2.954	2.974	0.934	0.958
2011	2.834	2.949	0.826	0.929
2012	2.916	2.853	0.897	0.865
2013	2.866	2.879	0.853	0.872
2014	3.103	3.095	1.081	1.073
2015	3.282	3.263	1.293	1.248
2016	3.184	3.233	1.172	1.228
Panel B: Leave				
Q1	2.510	2.521	0.913	0.911
Q2	2.662	2.640	1.064	1.046
Q3	2.669	2.676	1.071	1.072
Q4	2.548	2.575	0.949	0.974
2007	2.826	2.798	1.257	1.236
2008	2.696	2.703	1.102	1.123
2009	2.706	2.663	1.112	1.092
2010	2.581	2.575	0.984	0.985
2011	2.456	2.545	0.866	0.939
2012	2.467	2.436	0.875	0.853
2013	2.462	2.451	0.871	0.849
2014	2.543	2.514	0.944	0.932
2015	2.652	2.639	1.053	1.050
2016	2.571	2.606	0.971	1.022

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Comparison of variables used to construct a synthetic RRHC. Treated refers to the true observed RRHC with synthetic being the constructed RRHC from the basket of control crimes. Each variable captures the pre-treatment (before 2016q2) average log crime rate (left) or the relative crime rate (right) by quarter and year. Data has been aggregated to England and Wales by *Remain* and *Leave*.

Table A.25: The Impact of the Brexit Referendum on Hate Crime using just log hate crime as a dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
Post-Brexit x Share Remain	0.3760** (0.1503)	0.3378* (0.1825)	0.2050 (0.1819)	0.2744 (0.1779)	-0.0386 (0.1560)	-0.0384 (0.1533)
Post-Brexit	0.0241 (0.0745)	0.0390 (0.0913)	0.1227 (0.0911)	0.0613 (0.0899)	0.2291*** (0.0813)	0.2249*** (0.0805)
Log Longterm In-Migration		0.0247 (0.0540)	0.0180 (0.0548)	-0.0278 (0.0543)	-0.0158 (0.0454)	-0.0070 (0.0448)
Log NINO registrations		-0.0719 (0.0638)	-0.0720 (0.0634)	-0.0488 (0.0625)	-0.0060 (0.0464)	-0.0174 (0.0452)
Log Births to non-UK Mums		-0.0414 (0.0834)	-0.0554 (0.0901)	-0.0551 (0.0877)	-0.0463 (0.0715)	-0.0575 (0.0711)
Log Population		-0.1390 (0.1119)	-0.1065 (0.1136)	-0.1039 (0.1120)	-0.1207 (0.1018)	-0.1353 (0.1017)
Log Unemployment			0.0524** (0.0253)	0.0570** (0.0250)	0.0277 (0.0214)	0.0265 (0.0209)
Log Median Salary			0.0004 (0.1398)	-0.0146 (0.1345)	-0.0377 (0.0977)	-0.0280 (0.0950)
Log Other Crimes				0.2730*** (0.0323)	0.1100*** (0.0289)	0.1050*** (0.0297)
Lag Dependent Variable						0.0266** (0.0126)
Observations	14,725	11,650	10,730	10,730	10,730	10,562
Number of CSPs	315	314	313	313	313	313
R-Squared	0.819	0.817	0.820	0.821	0.850	0.848
CSP FE	YES	YES	YES	YES	YES	YES
Seasonal Dummies	YES	YES	YES	YES	YES	YES
Sectoral Composition	-	-	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	-	-
Force-Year FE	-	-	-	-	YES	YES

Sources: Recorded crime data at the Community Safety Partnership (CSP) level.

Notes: Dependent variable is the log hate crime. The specification follows [Albornoz et al. \(2020\)](#)'s Equation 1 (Table 2) with the "Post-Brexit" dummy additionally included.

Table A.26: The Impact of the Brexit Referendum on Hate Crime (using log hate crime as a dependent variable without including a “Post-Brexit” dummy)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Share Remain						
Post-Brexit x Share Remain	0.4122*** (0.0629)	0.4091*** (0.0590)	0.4292*** (0.0635)	0.3862*** (0.0621)	0.4045*** (0.0605)	0.3960*** (0.0614)
Observations	14,725	11,650	10,730	10,730	10,730	10,562
Number of CSPs	315	314	313	313	313	313
R-Squared	0.819	0.817	0.820	0.821	0.850	0.848
Panel B: Share Leave						
Post-Brexit x Share Leave	0.1806*** (0.0545)	0.2698*** (0.0546)	0.3232*** (0.0567)	0.2670*** (0.0568)	0.3594*** (0.0547)	0.3521*** (0.0556)
Observations	14,725	11,650	10,730	10,730	10,730	10,562
Number of CSPs	315	314	313	313	313	313
R-Squared	0.819	0.816	0.820	0.821	0.850	0.848
CSP FE	YES	YES	YES	YES	YES	YES
Seasonal Dummies	YES	YES	YES	YES	YES	YES
Sectoral Composition	-	-	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	-	-
Force-Year FE	-	-	-	-	YES	YES

Sources: Recorded crime data at the Community Safety Partnership (CSP) level.

Notes: Dependent variable is the log hate crime. Panel A shows the interaction of “Post-Brexit” and the share of the Remain vote. Panel B includes the interaction of “Post-Brexit” and the share of the Leave vote. In both cases the specification follows [Albornoz et al. \(2020\)](#)’s Equation 1 (Table 2) by not including the “Post-Brexit” as a separate term. All Controls are as in Appendix Table [A.25](#).

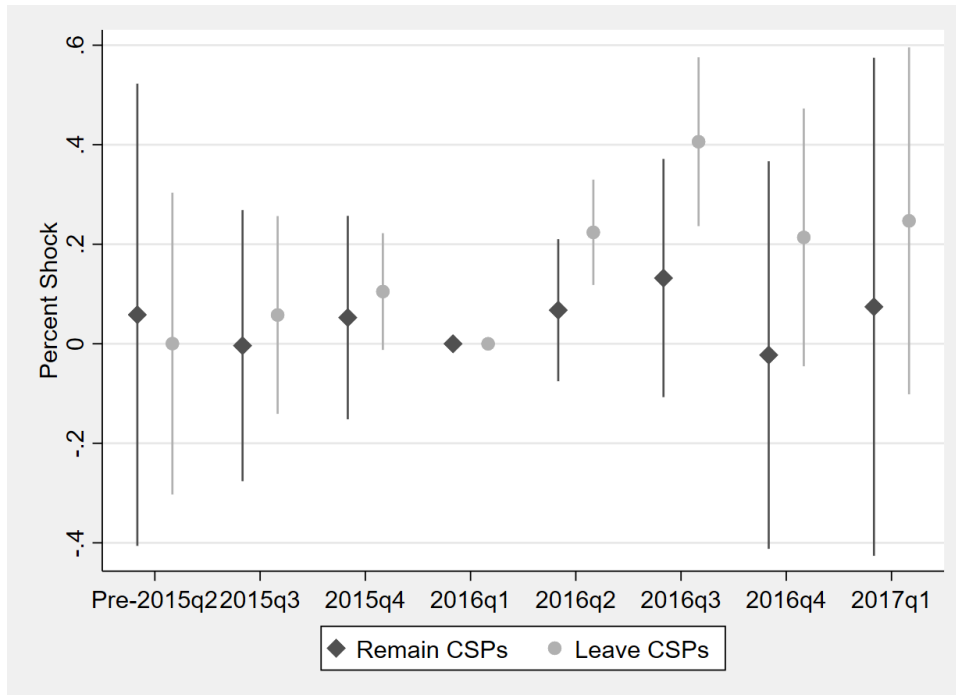
Table A.27: The Impact of Brexit on Hate Crime by Victim Type

	(1)	(2)	(3)	(1)	(2)	(3)
	RRHC Against Public/Property			RRHC Against Persons		
Pre 2015q2-RRHC	0.1043*** (0.0319)	0.0863*** (0.0322)	0.1026 (0.1413)	0.0042 (0.0388)	-0.0009 (0.0387)	-0.0364 (0.1718)
2015q3-RRHC	0.1197*** (0.0379)	0.1091*** (0.0380)	0.1006 (0.0877)	-0.0011 (0.0496)	-0.0035 (0.0496)	-0.0460 (0.1073)
2015q4-RRHC	0.1496*** (0.0366)	0.1412*** (0.0367)	0.1338** (0.0520)	0.0119 (0.0475)	0.0096 (0.0474)	-0.0161 (0.0685)
2016q2-RRHC	0.1436*** (0.0353)	0.1433*** (0.0353)	0.1439*** (0.0480)	0.0270 (0.0495)	0.0277 (0.0495)	0.0416 (0.0642)
2016q3-RRHC	0.3323*** (0.0354)	0.3363*** (0.0353)	0.3360*** (0.0798)	0.0968** (0.0476)	0.0987** (0.0476)	0.1276 (0.1064)
2016q4-RRHC	0.1280*** (0.0409)	0.1321*** (0.0410)	0.1328 (0.1216)	-0.0556 (0.0493)	-0.0531 (0.0493)	-0.0076 (0.1472)
2017q1-RRHC	0.1337*** (0.0394)	0.1478*** (0.0392)	0.1555 (0.1600)	-0.0655 (0.0459)	-0.0601 (0.0460)	0.0108 (0.1958)
Observations	195,647	195,647	195,647	194,905	194,905	194,905
Number of CSP-crimes	6,564	6,564	6,564	6,564	6,564	6,564
Time Trend	Y	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y	Y
Racial Quarter-of-year FE	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
CSP-specific trend	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y
Remain-Crime trend	Y	Y	Y	Y	Y	Y
Post-2015 crime trend	Y	Y	Y	Y	Y	Y

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants. All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group is an aggregate of all other offences. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects, year fixed effects, CSP-specific trends and crime-specific trends; column 2 includes a difference in crime-trends between *Remain* and *Leave* areas; column 3 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

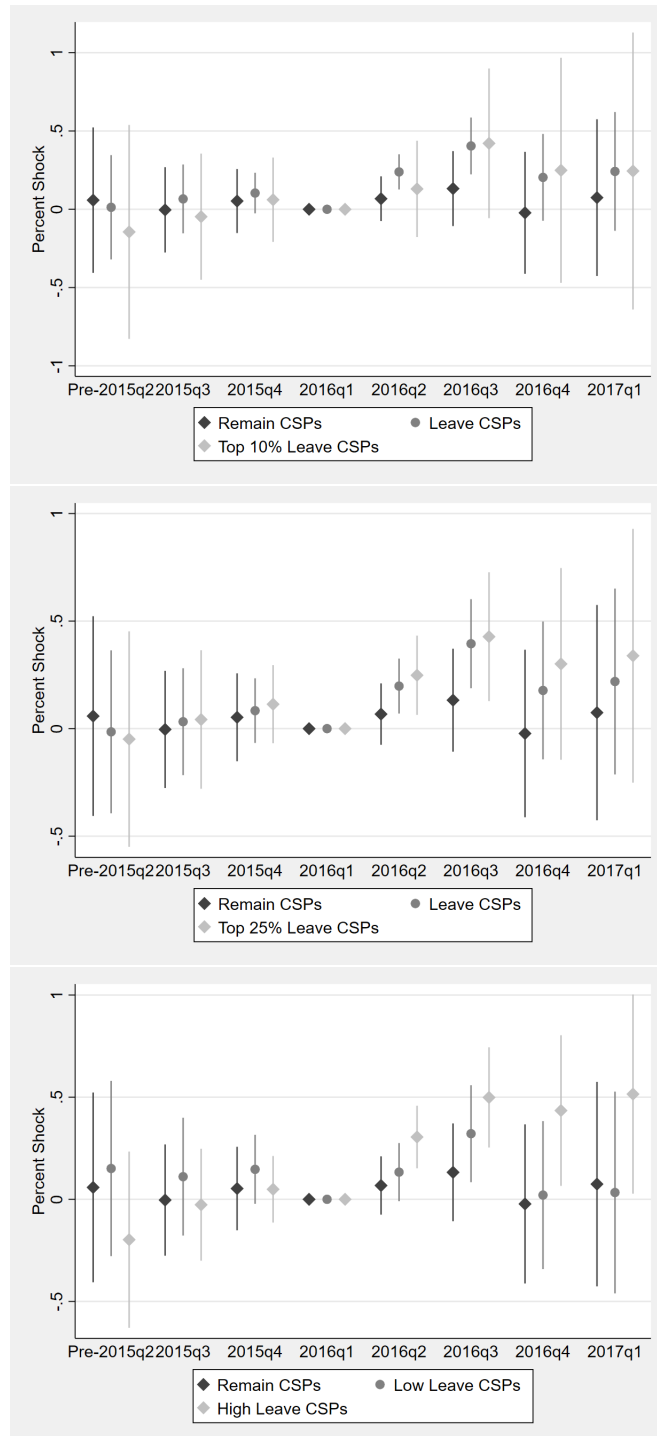
Figure A.9: Brexit Shock by Referendum Outcomes (Quarterly Data)



Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. Each estimation includes a general time trend by quarter, CSP fixed effects, seasonal effects, year fixed effects, CSP-specific trends, crime-specific trends, and an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level.

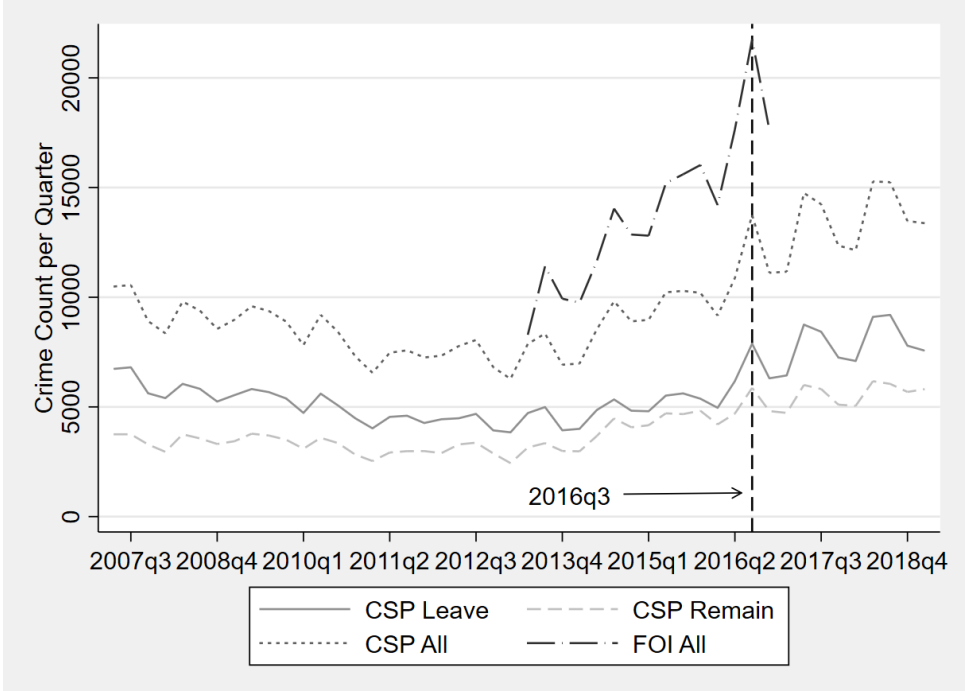
Figure A.10: Brexit Shock by Intensity of *Remain* and *Leave* Vote in Areas



Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. Each estimation includes a general time trend by quarter, CSP fixed effects, seasonal effects, year fixed effects, CSP-specific trends, crime-specific trends, and an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level.

Figure A.11: Crime Trends for *Remain* and *Leave* Areas Versus the Whole Sample



Sources: Recorded crime data at Community Safety Partnership level from data.police.uk, data collected via FOI requests and authors' own calculations.

Notes: Quarterly crime count of RRHC. CSP data has been aggregated to England and Wales by leave, remain, and both, 2007q2 to 2019q1. FOI data has been aggregated to all reporting PFAs of England and Wales by quarter, 2014q2 to 2016q4. Dashed vertical line is 2016q3.

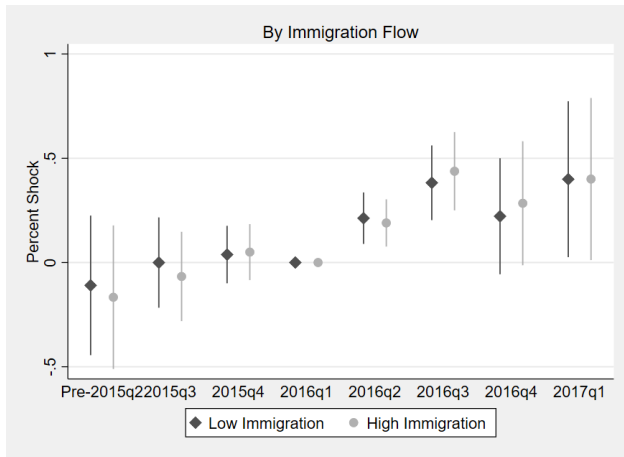
Table A.28: Brexit Referendum Effect on Hate Crime by Areas

	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Remain w/o London		London (All)		Low Leave w/o London		High Leave w/o London	
Pre 2015q2-RRHC	0.019 (0.076)	0.139 (0.301)	-0.008 (0.052)	-0.165 (0.141)	0.081* (0.049)	0.266 (0.213)	0.144*** (0.048)	-0.209 (0.210)
2015q3-RRHC	0.120* (0.070)	0.077 (0.169)	-0.003 (0.048)	-0.1403 (0.089)	0.137** (0.060)	0.210 (0.140)	0.142** (0.058)	-0.024 (0.132)
2015q4-RRHC	0.098 (0.096)	0.057 (0.134)	0.130*** (0.046)	0.052 (0.058)	0.138*** (0.053)	0.170** (0.084)	0.156*** (0.056)	0.076 (0.082)
2016q2-RRHC	0.167** (0.079)	0.170* (0.097)	-0.091** (0.043)	-0.041 (0.052)	0.160*** (0.057)	0.123* (0.074)	0.213*** (0.059)	0.286*** (0.075)
2016q3-RRHC	0.241*** (0.072)	0.230 (0.145)	0.037 (0.047)	0.141* (0.085)	0.401*** (0.054)	0.317*** (0.118)	0.397*** (0.060)	0.569*** (0.119)
2016q4-RRHC	0.022 (0.091)	0.013 (0.250)	-0.067 (0.058)	0.096 (0.138)	0.143** (0.058)	0.018 (0.179)	0.203*** (0.069)	0.460** (0.184)
2017q1-RRHC	0.143* (0.086)	0.173 (0.316)	-0.057 (0.042)	0.187 (0.143)	0.134** (0.059)	-0.024 (0.242)	0.215*** (0.059)	0.551** (0.236)
Observations	32,048	32,048	22,607	22,607	74,106	74,106	66,983	66,983
Number of Groups	1,070	1,070	671	671	2,432	2,432	2,391	2,391
Time Trend	Y	Y	Y	Y	Y	Y	Y	Y
CSP FE	Y	Y	Y	Y	Y	Y	Y	Y
Quarter-of-year FE	Y	Y	Y	Y	Y	Y	Y	Y
Racial quarter-of-year FE	Y	Y	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
CSP-specific trend	Y	Y	Y	Y	Y	Y	Y	Y
Crime-specific trend	Y	Y	Y	Y	Y	Y	Y	Y
Remain-Crime trend	Y	Y	Y	Y	Y	Y	Y	Y
Post-2015 crime trend		Y		Y		Y		Y

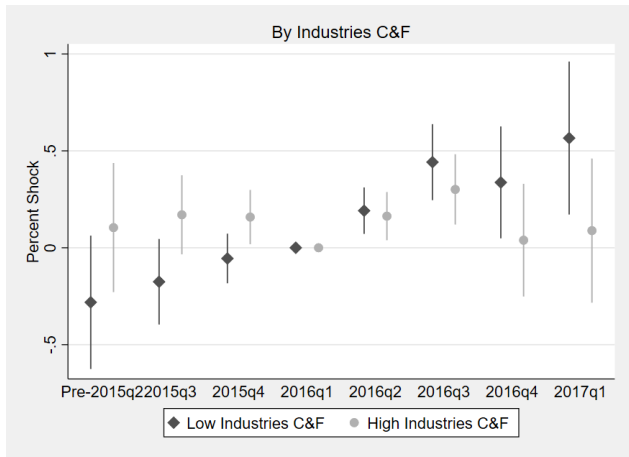
Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Dependent variable is the log crime rate per 100,000 inhabitants of crime c . All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. The table is structured as follows: Column 1 includes a general time trend by quarter, CSP fixed effects, quarter-of-the-year fixed effects and racial crimes by quarter-of-the-year fixed effects, quarter fixed effects, year fixed effects, CSP-specific trends, crime-specific trends and a difference in crime-trends between *Remain* and *Leave* areas; column 2 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level. All specifications include controls for CSP economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

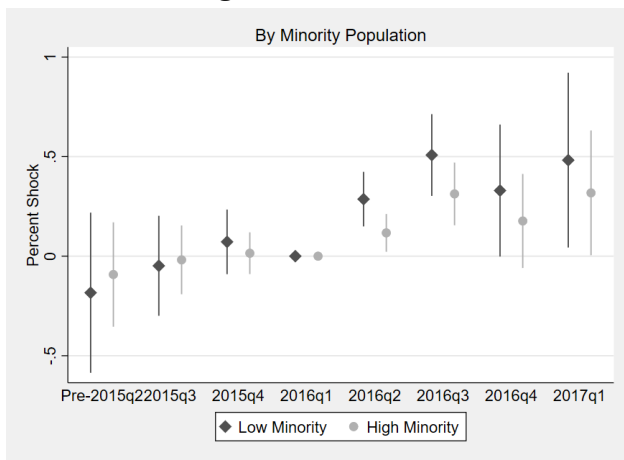
Figure A.12: Event Study: Heterogeneity by CSP Area Characteristics



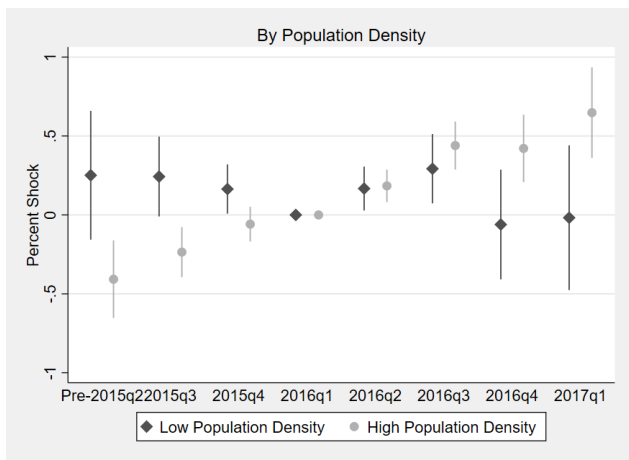
(a) Immigration flow in the area



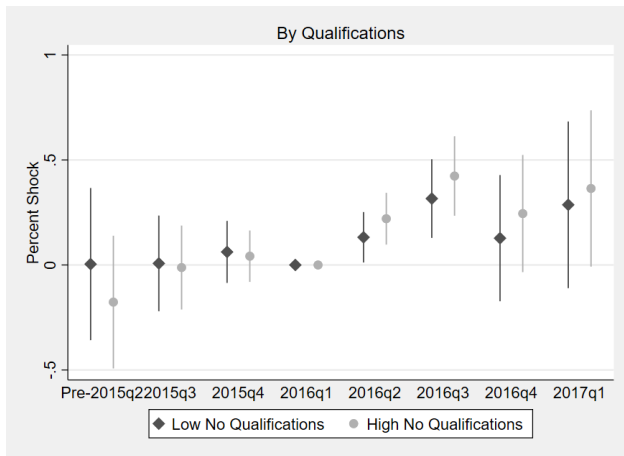
(b) Industries C & F



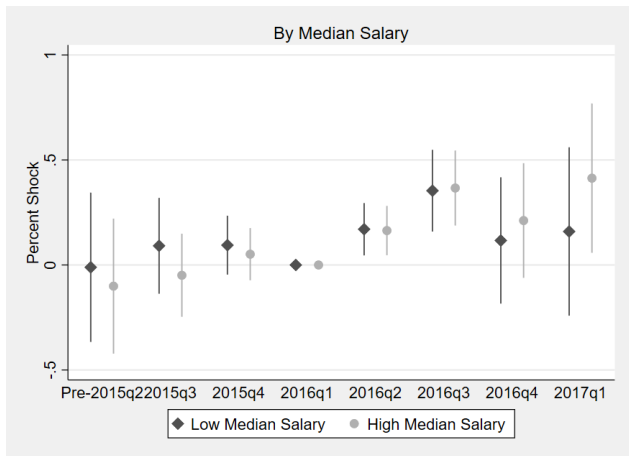
(c) Minority Population



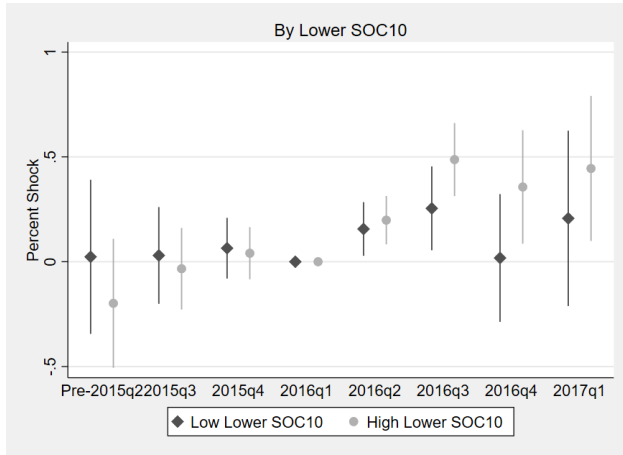
(d) Population density



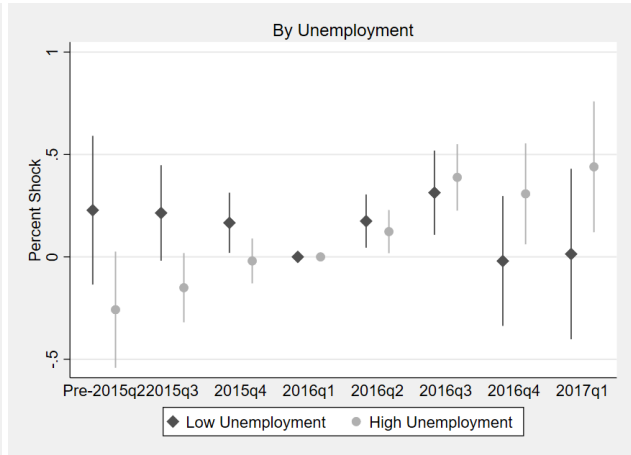
(e) Qualifications



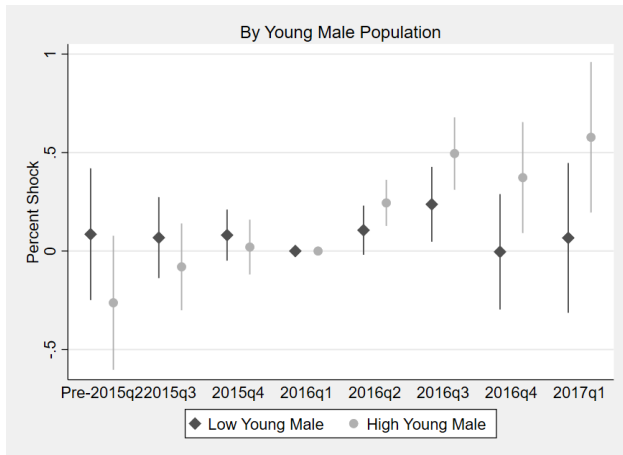
(f) Median salary



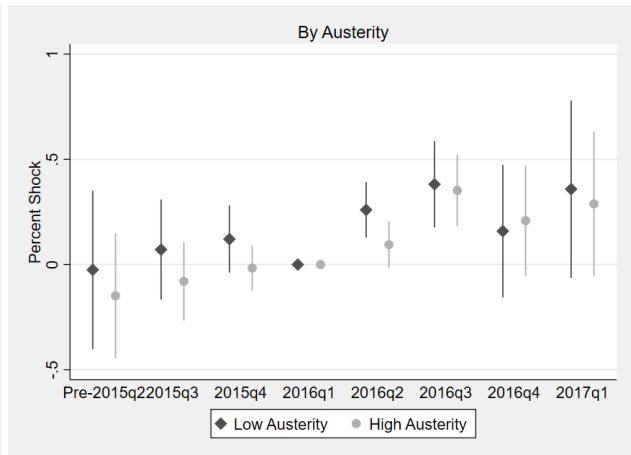
(g) Lower SOC 10



(h) Unemployment



(i) Young Male Population



(j) Austerity

Sources: Recorded crime data at the Community Safety Partnership (CSP) level available from ons.gov.uk and authors' own calculations.

Notes: Note: Dependent variable is the log crime rate per 100,000 inhabitants. All observations at the CSP-quarter level. The sample period runs from 2007q2 to 2017q1. The treatment group contains racial and religious hate crimes, the control group contains other offence subgroups. Areas are divided into high and low based on if they are above the CSP average in 2016q1. Each estimation includes a general time trend by quarter, CSP fixed effects, seasonal effects, year fixed effects, CSP-specific trends, crime-specific trends, and an additional crime-trend beginning in 2015. Standard errors are clustered at the CSP-crime level.

Table A.29: The Impact of the Brexit Referendum on Hate Crime - Event Study
Estimates using Monthly Data, Event Comparison

	(1)	(2)	(3)	(4)	(5)
Pre-February 2016-RRHC	-0.1357*** (0.0459)	0.1678*** (0.0553)	0.0594 (0.0660)	0.0607 (0.0662)	0.0689 (0.0800)
EU Ref: June 2016-RRHC	0.1584*** (0.0453)	0.3533*** (0.0825)	0.0971** (0.0429)	0.0979** (0.0430)	0.2365* (0.1396)
EU Ref: July 2016-RRHC	0.3465*** (0.0508)	0.5670*** (0.0886)	0.2599*** (0.0593)	0.2606*** (0.0593)	0.4106*** (0.1505)
EU Ref: August 2016-RRHC	0.1139** (0.0493)	0.4206*** (0.0935)	0.1151** (0.0570)	0.1152** (0.0570)	0.2858* (0.1705)
EU Ref: September 2016-RRHC	0.0735 (0.0513)	0.3925*** (0.0904)	0.0875* (0.0473)	0.0876* (0.0474)	0.2801 (0.1908)
Lee Rigby May 2013-RRHC	-0.0373 (0.0728)	-0.0373 (0.0729)	0.2634*** (0.0548)	0.2639*** (0.0549)	0.1714** (0.0807)
Lee Rigby June 2013-RRHC	-0.0394 (0.0765)	0.1555** (0.0663)	0.1996*** (0.0664)	0.2010*** (0.0664)	0.2327* (0.1274)
Lee Rigby March 2014-RRHC	-0.2396*** (0.0673)	0.0105 (0.0719)	0.0041 (0.0842)	0.0054 (0.0842)	0.0370 (0.0991)
Lee Rigby April 2014-RRHC	-0.2107*** (0.0601)	-0.2107*** (0.0601)	-0.0065 (0.0822)	-0.0052 (0.0825)	0.0139 (0.0930)
Charlie Hebdo January 2015-RRHC	-0.1863** (0.0932)	0.1376 (0.1057)	0.0261 (0.1011)	0.0276 (0.1016)	0.0010 (0.0664)
EP Election 2014-RRHC	-0.0905 (0.0630)	-0.0905 (0.0630)	0.1083* (0.0580)	0.1088* (0.0581)	-0.0308 (0.1008)
General Election 2015-RRHC	-0.0164 (0.0504)	-0.0164 (0.0504)	0.0806 (0.0554)	0.0811 (0.0555)	-0.0749 (0.0592)
Paris Attacks-RRHC	-0.0911 (0.0683)	0.2800** (0.1152)	0.0302 (0.0888)	0.0311 (0.0888)	0.0855 (0.0955)
Brussels Attacks March/April 2016-RRHC	-0.0820* (0.0472)	0.1485** (0.0747)	-0.0575 (0.0571)	-0.0567 (0.0571)	0.0437 (0.1289)
Observations	22,736	22,736	22,736	22,736	22,736
Number of PFA-crime	495	495	495	495	495
Time Trend	Y	Y	Y	Y	Y
PFA FE	Y	Y	Y	Y	Y
Month-of-year FE	Y	Y	Y	Y	Y
Racial month-of-year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PFA-specific trend		Y	Y	Y	Y
Crime-specific trend			Y	Y	Y
Remain-Crime trend				Y	Y
Post-2015 crime trend					Y

Sources: Recorded crime data at Police Force Area (PFA) level, collected using Freedom of Information (FOI) requests and authors' own calculations.

Notes: Dependent variable is the log crime rate of crime c per 1,000,000 inhabitants. All observations are at the police force-month level. The sample period runs from January 2011 to February 2017. The treatment group contains racial and religious hate crimes, the control group contains other crimes categories and include: anti-social behaviour, bicycle theft, burglary, criminal damage and arson, drug offences, other offences, other theft, public order offences, robbery, shoplifting, theft, and vehicle offences. The table is structured as follows: Column 1 includes a general time trend by month, police force fixed effects, month-of-the-year fixed effects and racial crimes by month-of-the-year fixed effects, month fixed effects, and year fixed effects; column 2 includes PFA-specific trends; column 3 also includes crime-specific trends; column 4 includes a difference in crime-trends between *Remain* and *Leave* areas; column 5 also includes an additional crime-trend beginning in 2015. Standard errors are clustered at the PFA-crime level. All specifications include controls for PFA economic and demographic characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

References

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