Atypical Violence and Conflict Dynamics: Evidence from Jerusalem

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Abstract

What is the impact of uncommon but notable violent acts on conflict dynamics? We analyze the impact of the murder of a Palestinian child on the broader dynamics of Israeli-Palestinian violence in Jerusalem. By using novel micro-level event data and utilizing Discrete Furrier Transform and Bayesian Poisson Change Point Analysis, we compare the impact of the murder to that of two other lethal but more typical Israeli-Palestinian events. We demonstrate that the murder had a large and durable effect that altered the broader conflict dynamics, whereas the other events caused smaller, short-term effects. We demonstrate that scholars should devote more attention to the analysis of atypical violent acts and present a set of tools for conducting such analysis.

Introduction

Intra-state violent conflicts, especially those unfolding over long periods of time often have clearly identifiable logic, dynamics, and actors. This allowed scholars to uncover important characteristics and outcomes of conflicts, such as civilian targeting (Kalyvas 2006), repertoires of contentious actions (Tilly 2010), actors leading the violence (Horowitz 2001), and cycles of escalation, retaliation, and revenge (Haushofer et al. 2010; Souleimanov and Siroky 2016).

Yet even conflicts with well-established patterns of contention might occasionally experience highly unusual but significant events, such as large-scale attacks, assassinations of leaders, or previously unknown or especially brutal forms of violence. We view violent acts as atypical if they differ from the observed contemporaneous conflict dynamics in form, the identity of the perpetrators or the victims, either separately or combined. Atypical violent acts are identified inductively and are conflict and period specific. Thus, rape would be atypical in Israel/Palestine but not so in the 1990s Bosnia whereas the opposite would be true for suicide bombings.

Do such atypical events have a durable impact on conflict dynamics or are they just notable, but temporary blips, short-term deviations from the normal, established patterns of contention? Despite the high visibility and importance of such acts, the scholarship has yet to fully explore this question, in part due to the lack of appropriate analytical tools. What is the impact of such atypical events and how can scholars detect such an impact amidst broader conflict dynamics?

We address these questions by focusing on the Israeli-Palestinian conflict. The violence in Israel-Palestine is not only long-lasting but also subject to well researched cycles of escalation and retaliation (Jaeger and Paserman 2008), predictable conflict dynamics (Haushoferet al. 2010), and established repertoires and patterns of contention, from stone throwing to suicide bombings. Thus, when on July 2, 2014 three Israeli civilians kidnapped, tortured, and murdered a Palestinian

teenager Mohammed Abu Khdeir (**محمد أبو خضير**) (hereafter AK) in East Jerusalem this unprecedented act was universally perceived as a deviation from the well-established conflict dynamics (Shehadeh 2014).[1] That a Palestinian teenager was killed by Israelis was hardly unique; deadly intergroup violence is common in the city. Rather, the mode of the action: Jewish civilians kidnapping, torturing and murdering a Palestinian for political reasons was something the city has not witnessed before or since.

More specifically, we compare the impact of the AK murder on patterns and levels of violence to the impact of two more typical violent events that took place in Jerusalem in 2013-2015. These events each also resulted in a single Palestinian fatality. The first was the commemoration of the 2nd Intifada (September 27 – October 3, 2013), a recurring and predictable standoff. Fifty-one Palestinians, twelve of them children, were injured and one killed during violent clashes. The second is the set of "Al Aqsa clashes" (September 13-19, 2015) that began with Palestinian protesters throwing stones at Israeli forces that stormed the Temple Mount compound. The violence then spread out to other parts of the city. One Palestinians and one Israeli Jew were killed, and 238 Palestinians, including forty-seven children, were injured (UN OCHA n.d.).

To establish the independent impact of these events we analyze novel micro-level data obtained from the Israeli police and use two techniques: Discrete Fourier Transform, a signal-processing tool common in engineering and physics but rarely used in political science (i.e., Aguiar-Conraria et al. 2012), and Bayesian Poisson Change Point Analysis. Both methods demonstrate that the typical 2nd Intifada commemoration violence and the Al Aqsa clashes led to short-term spikes after which conflict dynamics returned to pre-escalation levels. On the other

[1] Indeed, the event was so unusual that it became the focus of an HBO miniseries *Our Boys*.

hand, the AK murder—a highly atypical event—not only led to noticeably higher short-term violence, but also altered the longer-term dynamics of Israeli-Palestinian contention.

This Letter makes both substantive and methodological contributions. First, we show that atypical violent events can fundamentally alter established conflict dynamics and have durable effects even in protracted, well-choreographed conflicts with predictable cycles and repertoires. Therefore, scholars cannot fully understand conflict dynamics by focusing only on the established, typical, and predictable patterns of violence. Second, by utilizing DFT, we expand the political violence analysis toolkit. Political violence is a dynamic, complex, and often non-linear process, and therefore standard analytical tools and methods have important limitations (Bohorquez et al. 2009; Helbing et al. 2015). The application of DFT improves our understanding of conflict and opens new possibilities for analyzing structured, cyclical dynamics of contention.

Political Violence in Jerusalem

In this Letter we concentrate on the AK murder effects in the context of ongoing Israeli-Palestinian violence in Jerusalem. In the aftermath of the 1967 war, the Israeli government annexed East Jerusalem, creating a sharply divided and highly segregated city featuring Jewish neighborhoods in the West and Palestinian neighborhoods in the East. Fifty-four years after the annexation, the city remains segregated and divided economically, socially, and politically. Political violence is a constant feature of city life, but the repertoires and intensity of contention do change over time.

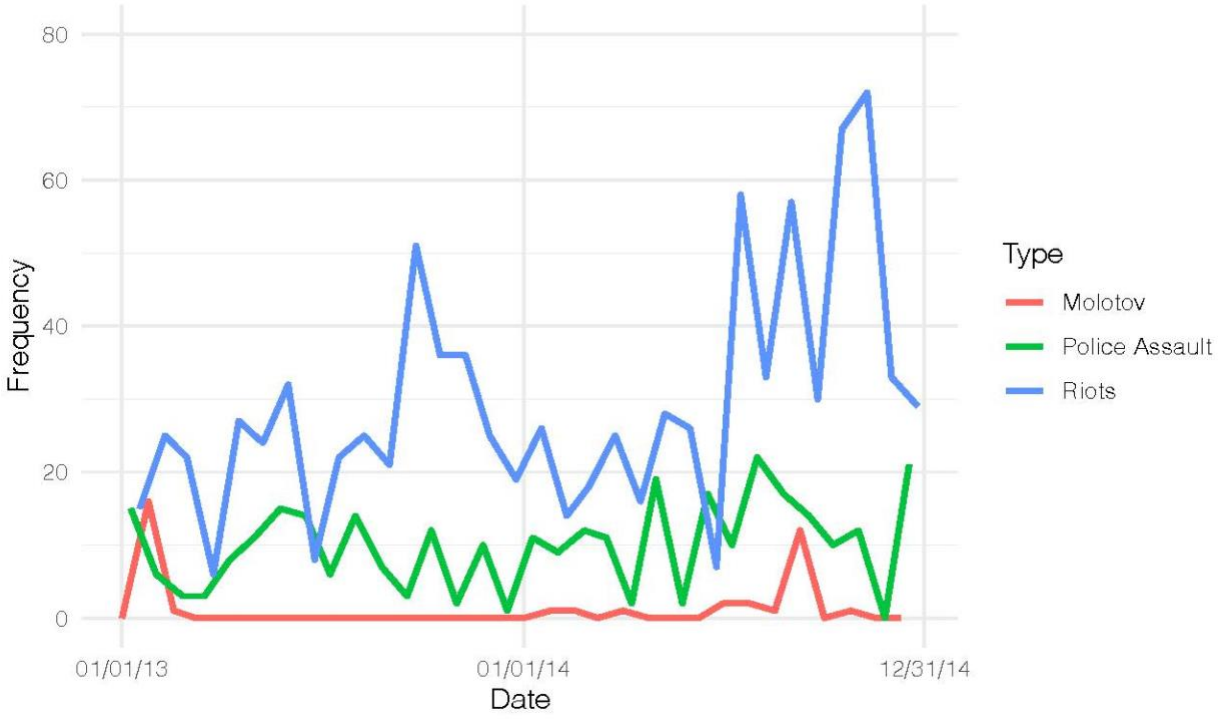

Figure 1: Typical Political Contention in Jerusalem, 2013-2015.

Typical modes of contention, such as stone throwing and what Balcells et al. (2016) define as "low intensity violence", are constantly present in Jerusalem (see Figure 1). Under such conditions of established patterns of contention, including numerous violent events with multiple victims, the ex-ante likelihood of a single event with a single victim having a significant impact on conflict dynamic for a long period is low, making Jerusalem a hard case to uncover the impact of a single non-typical conflict event.

The conflict intensified substantially in the summer of 2014. On June 12, a cell of Hamas, an Islamic terrorist organization, kidnapped and murdered three Israeli teenagers who were hitchhiking in the West Bank. Their bodies were discovered eighteen days later, and the teenagers' funeral sparked rallies, calls for revenge, and sporadic Jewish mob attacks against Arab civilians in various parts of Jerusalem. On July 1, 2014 three young religious Jews, 29-year-old Yosef

Chaim Ben David and two of his relatives, both minors, took it upon themselves to avenge the teenagers' murder.

Ben David, a successful small business owner and the driving force behind the revenge plan, was not previously engaged in political activism or violence. At about 3:45 am on July 2, 2014, Ben David and his accomplices kidnapped AK, a randomly targeted resident of the Shu'fat (شعفاط) neighborhood in north-east Jerusalem, tortured and brutally murdered him. The kidnapping and the brutal murder sharply differed from the modes of violence the city is accustomed to. The event immediately sparked riots in Shu'fat and other parts of the city. The war between Israel and Hamas in the Gaza Strip, which followed later in July, also contributed to the clashes. In the two-month period following the AK murder more than 20 Israelis and 100 Palestinians were killed and many more injured – a substantial escalation and change in patterns from the previous patterns of violent but largely non-lethal conflict.

Data

We use geo-coded incident-level data obtained from the Israeli police obtained under the Israeli Freedom of Information legislation. The police data—more than 70,000 observations—encompasses all reported incidents of crime and political violence that took place within the municipal borders of Jerusalem between January 2013 and December 2015. Police reports consist of a verbal description of the event; demographic information (age, religion, gender) and place of residence (listed in the reports as "statistical areas," which largely correspond to neighborhoods) of both victims and suspects; and the police file number. In the underlying police data, the unit of observation is an individual (either a victim or a suspect), and as some events involved multiple participants, a single event can result in several observations in the police data. We focus on events,

rather than individual characteristics of participants, and therefore we omit repeated observations, keeping only the first recorded suspect or victim.

We focus on incidents where information regarding both victim(s) and suspect(s) is available. There are several reasons for why an incident would have a reported victim but no suspect: first, some incidents might turn out to be false and hence do not result in any suspect being detained. Even when an event is real, the police are not always able to apprehend a suspect. Additionally, not all events that do have a suspect would have a recorded victim, e.g., attacks against municipal or state property. Finally, there might be reporting issues driving this dynamic. We are aware of these potential biases, but in order to demonstrate the general dynamics of violence focus only on events for which we have complete data. Our data set includes 48,507 events, which include the date, location, type of violation committed, and demographic data on suspect(s) and victim(s).

Police records include a detailed classification of over one hundred different crimes and violations, such as loitering, rape, burglary, physical assaults against police officers, homicide, stone, and Molotov cocktail throwing. We aggregated events into five categories: *Riot*, *Molotov Cocktail Throwing*, *Physical Assaults*, *Assault against Police Officers*, and *Crime*. We devote our attention in this paper to incidents involving riots. The data do not indicate which riot events satisfy those definitions of riots that have a numerical threshold of participants and/or require participation of members of different identity groups. However, in the Arab neighborhoods of Jerusalem, riots predominantly feature groups, targeting Jewish/Israeli civilians and Israeli security forces and property, and do not target Arabs. Riots occurred on 967 (88%) of the 1096 days in our data. There were 4590 riots in total, with as many as 37 on one day (July 6, 2014). Prior to the AK murder,

there were riots on 82% of days, and there were riots on 94% of days after the murder. Thirty-five percent of the riots occurred before the murder, and 65% after.

Our choice of focusing on riots is driven by several main considerations. First, riots are the most prominent forms of Palestinian violence in Jerusalem in recent years. Second, unlike acts of homicide and other violent crimes, which can be either criminally or politically motivated, riots are unambiguously a form of political and social violence. Third, contrary to other forms of intergroup violence, such as physical assaults against civilians, riots are unlikely to be underreported, while we suspect that attacks against police—a category that encompass a range of actions—might be over-reported.

Methods and Results

What was the impact of the AK murder on the broader patterns of political violence? In this section we use two methods—Discrete Fourier Transform (DFT) and Change Point Analysis—to evaluate the impact of the murder. We begin by analyzing the timing and scale of riots in Jerusalem both in the short and in the longer term. To do so, we utilize DFT (Cooley et al. 1969), a model that estimates cycles (or frequencies) and their strength (or amplitudes) based on time-series data. Transforming the time series into its frequency components allow finding cyclic patterns (for example weekly or daily cyclic behaviors).

Both the detection of cycles and the use of DFT-like methods to identify cycles have been used in political science, including to analyze cycles of elections, wars, terrorist attacks, and even political cycles' influence on the stock market (Herbst and Slinkman 1984; Im et al. 1987). This work mostly focuses on *identifying* cycles. For example, in the U.S. we might have co-evolving cycles for the House of Representatives, Senate, and Presidential elections with different degrees

of intensity across time. Our approach, on the other hand, is to utilize DFT to filter out cycles and thus better understand *non-cyclic* phenomena. In other words, after measuring the cycles of violence, we recreate (inverse transform) our data without the strong cyclic frequencies that we remove. This allows us to examine the extent to which specific events are not part of the regular cycle and the extent to which such events have enduring effects.

This approach outperforms other methods used to detect seasonality in data. For example, Exponential Weighted Moving Average (EWMA) (Holt 2004) requires delicate fitting, which might create error. DFT, however, is a strictly mathematical transformation of the data into a spectral dimension, which does not have the potential for information loss, unlike EWMA and similar methods. Seasonality methods also fail, unlike DFT, when several cycles co-exist simultaneously, as might be in the case of our data.

To illustrate this method, consider the example of demand for electricity over time. One can imagine a cycle occurring every 24 hours, increasing in the morning when people wake up and decreasing at night when users go back to sleep. DFT would detect a strong cycle of 24 hours. Yet there could also be anomalous daily power demand – For example as a result of a local festival or holiday, which DFT would detect after filtering out the daily cycle. DFT can also detect broader cyclical patterns (e.g., seasonality) that occur alongside daily cycles. By removing all such strong cycles, we can recreate a time series representing only unique, non-cyclical electricity consumption. In other words, to detect and analyze irregularities we first filter out regularities. We use the same logic (and method) to analyze the violent events data. We identify cyclical patterns occurring in Jerusalem (typically every week – on Fridays), remove them from the overall data and recreate the time series in order to identify the unique consequences of a specific event (the AK murder).

Formally, DFT is presented by the following mathematical notation[2] where x_n is the time series. N is the number of data points in x_n. k is the sinusoid frequency. X_k is a sequence of complex numbers with a length N representing each of the k frequencies. This calculation was done using the Fast Fourier Transform algorithm.

$$X_k = \sum_{n=0}^{N-1} x_n e^{-\frac{i2\pi}{N}kn} = \sum_{n=0}^{N-1} x_n * [cos\left(\frac{2\pi kn}{N}\right) - i * sin(2\pi kn/N)]$$

Although other advanced frequency selection methods exists, we keep our approach simple by selecting frequencies with amplitudes above the 95 percentile -- a threshold calculated using a bootstrap confidence procedure to mitigate the chance of selecting noise frequencies. 12 different frequencies, ranging from 3.5 days to 1 year were selected using this procedure. For threshold sensitivity we repeated this procedure for the 99 percentile. The cycles of 7 days and 1 year kept their predominance under this higher threshold, however overall result did not change. For the rest of the analysis, we show the 95 percentile results.

Figure 2 shows the results of the DFT analysis. The upper plot (blue line) shows all riot events in Jerusalem between 2013 and 2015.[3] The plot highlights three major events in the time series: (A) clashes between Israeli security forces and Palestinians commemorating the anniversary of the Second Intifada; (B) the AK murder; and (C) the Al Aqsa clashes. There were several spikes in riots during the period, as well as an overall intensity of riots in the aftermath of the AK murder. The middle plot (green line) shows the cyclical riot behavior detected by the DFT model. The pattern is complex, but also indicates that some of the riots in Jerusalem *are* seasonal and come in

[2] Notice the formula is for the discrete Fourier transform which is more relevant to our discrete data. A continuous form exists as well.
[3] We computed the DFT based on the daily riot counts, but to attain visual clarity Figure 2 shows daily events aggregated into weeks.

cycles, for instance a 7-days cycle with riots occurring after Friday prayers. The bottom plot (red line) reconstructs the time series after removing the cyclical behavior. The bottom plot indicates a change in pattern in the wake of each of the three major events, followed by a relatively quick decline in September 2013, but also a rise in the overall frequency of riots following the AK murder – a new level of violence that does not change even in the post-Al Aqsa clashes period. In other words, the entire system moves into a higher rate of riots in July 2014 and does not revert to its initial, pre-AK-murder state.

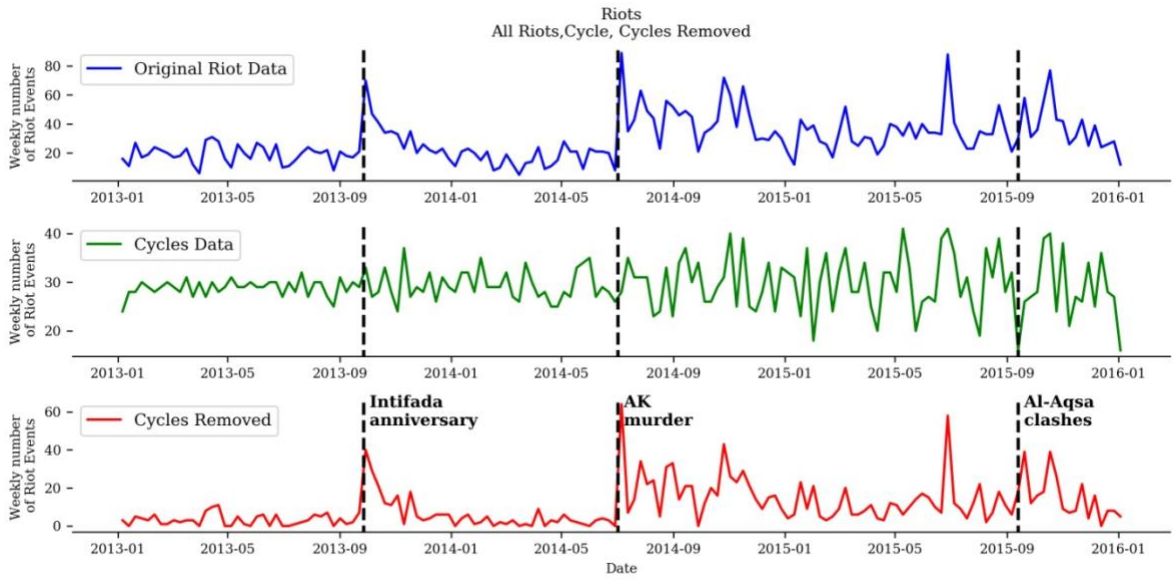

Figure 2: Riots in Jerusalem, 2013-2015. The top panel shows all riot events. The middle panel depicts filtered riot data that contains only the prominent cycles. The bottom panel visualizes the riot data after cyclic behavior is removed. Dashed lines symbolize important events, namely the 2nd Intifada anniversary, the AK murder, and the Al-Aqsa clashes.

In Figure 3, we examine these observations in greater detail. The plots in Figure 3 show shorter time-series of sixty days prior to and after each of the three major events referred to in Figure 2. The red lines show the time series of riots with cycles removed. μ refers to the mean number of riot events per day in a given time window. Each plot also presents data on the average

number of daily riots during the sixty days before (μ(t-60)) and after (μ(t+60)) the event. The middle plot points to a steep increase in riots in the sixty days following the murder of Abu Khdeir: 3.84 compared to 0.34 in the sixty days prior to the murder, *an increase by a factor of 11*. The effect lasts. By July 14 of the following year, the average number of daily riots remained elevated at 2.2 (over 6 times what it was before the murder). By contrast, the effects of the other two events are smaller and less enduring. The top plot shows the impact of the Second Intifada anniversary. Within the +/- 60-day window, average riots increase from 0.92 to 2.25 (a 2.44x increase), but this effect vanishes over time as the average number of daily events declines to 0.79 (μ(Jul14)). As evident in the bottom plot, the al-Aqsa clashes in September of 2015 did increase daily riots from 1.64 to 2.79, a relatively small 1.7x increase. Overall, Figure 3 demonstrates that (1) multiple events precipitated short-term increases in daily riots; but (2) unlike other events, the AK murder had a larger and enduring effect that endured at least through the next major event over a year later.

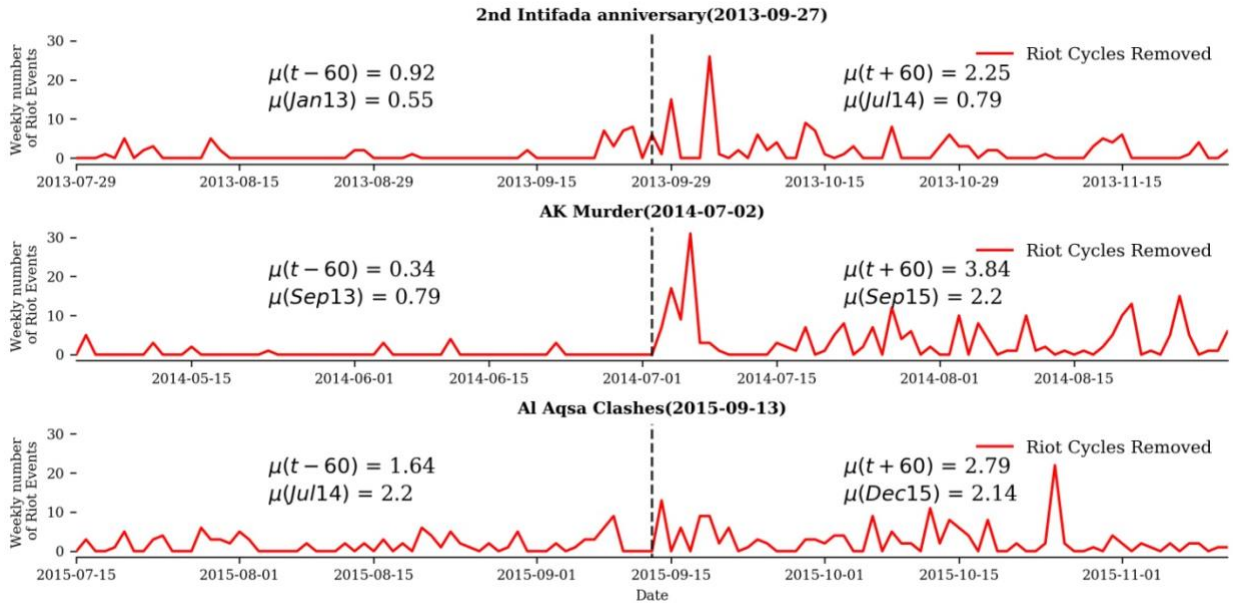

Figure 3: Riots Before and After Major Events (Cycles Removed). The top panel displays riots 60 days prior to and after the 2nd Intifada anniversary; the middle panel and bottom panels show

similar time riot data for the AK murder and Al-Aqsa clashes. μ is the mean number of riot events per day in a given window. All windows start or end at the significant event in question.

We have identified the changes in the frequency of riots over time, but did the AK murder lead to a fundamental change in the patterns of contention or are we simply observing an amplification of the already ongoing processes? Also, are these effects the outcome of the murder or of the ensuring war, which started on July 8, 2014? To answer these questions, we conduct a Bayesian Poisson Change Point Analysis in which the daily count of riots is the outcome variable, and the previous day's count of riots is the predictor. The model estimates whether, at some point in the time series, the relationship between the incident count in day *t* and the incident count in day *t-1* changed significantly. This can occur when an important exogenous event leads to a much greater or much smaller number of events in day *t* than we would expect based on the number of events in day *t-1 – and* when this change in the relationship persists over a sufficient number of days.

Our analysis indicates that the *only* change point in the pattern of riots indeed took place on July 2, 2014, the day of the AK murder (several days before the ensuing war began). We estimated the probability that a change point occurred on each day. The probability is greater than zero only for July 1, 2, and 3, 2014, with the probability being largest (~0.5) for July 2. This indicates that the data-generating process (DGP) most likely changed on July 2. Figure 4 shows the probability that that day's riots were produced by the first DGP (in black) or the second DGP (red). The change on July 2 could hardly be starker. The probability that a day's riots were produced by the first DGP is 1 (or trivially close to 1) for every day prior to July 2, and 0 thereafter. And the reverse is true for the second DGP as of July 2. This indicates that, not only did a change point indeed occur on July 2, 2014, the day of the AK murder, but that we can be

quite certain that the riots that occurred before and after that date resulted from significantly different DGPs.

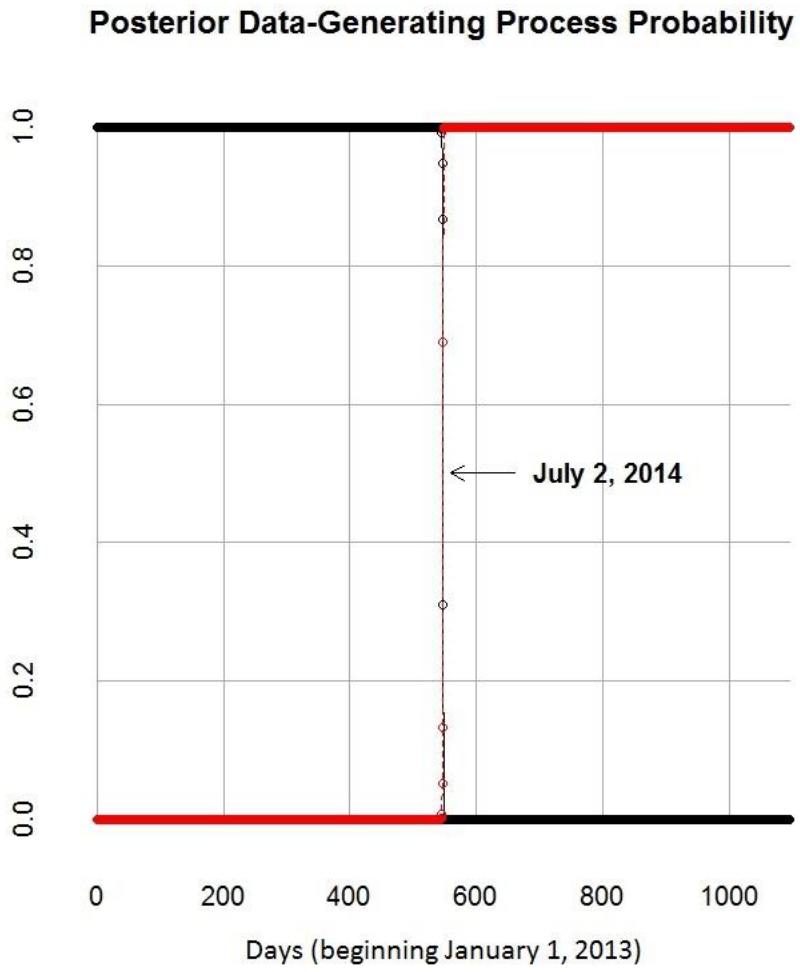

Figure 4: Bayesian Poisson Change Point Analysis

Conclusion

Do atypical violent acts have a durable impact on conflict dynamics? We answer this question by analyzing the effects of AK murder. By utilizing novel police data and using DFT techniques and Bayesian Poisson Change Point Analysis, we demonstrate that the AK murder had a lasting impact well beyond the original shock.

Such a potential effect is not simply an outcome of the target's prominence; a murder, by Jewish civilians, of a teenager randomly chosen on the street can and does leave a profound behavioral legacy. This suggests that rare, extraordinary violent events merit serious attention in political violence and contentious politics scholarship.

Specifically, we hope scholars will use this contribution as the basis to develop a broader research agenda. An important question for future research relates to causal mechanisms. What is it about such violent acts that makes them impactful? Why would a particular civilian murder have a lasting impact on a conflict that is already known to feature many civilian killings? A second area for future research concerns the durability and magnitude of the effects we observe. Our analysis extends 1.5 years after AK murder, so additional data would be needed to assess the full length of the impact. Similarly, do some atypical violent acts have larger effects than others? Finally, what are the scope conditions that determine the impact of such violent events on the broader conflict dynamics? Understanding these relationships will help future researchers better understand how, when, and the extent to which atypical political violence matters most.

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