Ferguson, Gray, and Davis
With De Sousa, Tuggle, and Harrison Too:

An Analysis of Recorded Crime Incidents and Arrests in Baltimore City, March 2010 to March 2020

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This document can be downloaded from this link:
https://osf.io/preprints/socarxiv/fcm7t/

The original report (dated March 15, 2016) can be downloaded from this link:
https://osf.io/preprints/socarxiv/nshme/

The updated report (dated November 15, 2016) can be downloaded from this link:
https://osf.io/preprints/socarxiv/6gdra/

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1. Motivation for This Final Report

In the midst of a debate on twenty-first-century policing in the US, and in the aftermath of a breakdown in police-community relations in Baltimore, we released a report sponsored by the 21st Century Cities Initiative at Johns Hopkins University as

> Morgan, Stephen L. and Joel A. Pally. 2016. "Ferguson, Gray, and Davis: An Analysis of Recorded Crime Incidents and Arrests in Baltimore City, March 2010 through December 2015." A Report Prepared for the 21st Century Cities Initiative at Johns Hopkins University. Baltimore, MD: Johns Hopkins University. (URL: https://osf.io/preprints/socarxiv/nshme/)

The original report was prepared to enhance the local dialogue on policing in Baltimore, primarily by providing objective and credible analysis to local media outlets. With this same rationale, an updated report was released six months later as

> Morgan, Stephen L. 2016. "Fall Update for Ferguson, Gray, and Davis: An Analysis of Recorded Crime Incidents and Arrests in Baltimore City, March 2010 through October 2016." Baltimore, MD: Johns Hopkins University. (URL: https://osf.io/preprints/socarxiv/6gdra/)

Through subsequent citations by others, the original report has entered into the scholarly literature on policing and crime. Because the original report has proven useful for the broader research literature, we decided to produce this final report to update others on the patterns of crime incidents and arrests in Baltimore through the beginning of March 2020.

We intend to continue with research on crime and arrest patterns in Baltimore, but this report will be the final one that uses as primary motivation the debate on the Ferguson effect from 2014 and how any such Ferguson effect shaped the causes and consequences of the unrest in spring 2015 that followed the death of Freddie Gray while in police custody. That focus was wholly appropriate for our reports from 2016, given the debates that were of interest to media outlets and researchers at the time. It is still a reasonable motivation for continued analysis. But, as we move forward to new modeling efforts, and into a new phase of policing in Baltimore as the BPD attempts to fully implement reforms, Ferguson-effect framing is less useful for the scope of the new analysis that will be needed. To begin to appreciate why, we next offer background details on the depth of the institutional challenges faced by Baltimore since 2016.

2. Tough Times for Baltimore City and the Baltimore Police Department, 2016-2020

In this final report, we offer conclusions based on an analysis that includes an additional 40 months of data, covering the three full "crime seasons" from March to November of 2017, 2018, and 2019. During these 40 months, the city has suffered from considerable institutional instability, and all of the instability is entangled with the concern over elevated rates of violent crime. Before proceeding to our full analysis of crime incidents and arrests, we provide in this section relevant background on these changes in Baltimore City.

2.1. Scandal, Instability, and Change

We first characterize federal interventions into crime and policing in Baltimore, and we then consider how these developments have interacted with changes in the leadership of the BPD and city government. We conclude with the attendant population decline in the city, which may be a response to the erosion in police-community relations alongside a prolonged period of elevated violent crime and reduced public safety.

The DOJ investigation and resulting consent decree. Following the death of Freddie Gray in 2015, the federal government launched an investigation of the BPD. The investigation was welcomed by the city's political leadership, and it received considerable support from the community as well.

In August of 2016, the Civil Rights Division of the US Department of Justice offered a 163-page report of its investigation, alleging a pattern of policing at odds with constitutional standards and well below DOJ's best-practice benchmarks for twenty-first-century policing. Baltimore City subsequently signed a consent decree with the federal government on April 7, 2017, pledging to reform the police department under the guidance of a court-appointed monitoring team accountable to the Chief Justice of the US District of Maryland, James K. Bredar.

The scope of the requirements of the consent decree are broad, and at the outset full compliance was not expected for at least five years. The core reforms agreed to were centered on the need to restructure all street-level policing so that it would align with the constitutional standards articulated by the federal government. In order to do so, investigative stops would need to be based on reasonable and articulable suspicion of involvement in criminal activity, as carefully defined in new department policies. Dispersals of groups of individuals would need to be justified similarly by new policies, typically in response to a call from a business or residence and then based on an officer's own observation that action is authorized by existing policy. At the same time, police officers would be required to document more completely their interactions with members of the community, and the department would be required to upgrade its technology and modeling capacity to analyze the data on all such interactions. With new data, and a twenty-first-century records management system, the department would be required to enact accountability-based management while also evaluating regularly whether its

policing met the constitutional standards defined in its consent-decree-approved policies. To gain the trust of the community, and thereby promote cooperation in the fight against crime, a new model of community policing would need to be developed and then deployed. Finally, the department would also be required to overhaul its internal affairs and public accountability functions in order to more effectively prevent police misconduct.

Since April of 2018, the presiding judge has convened all parties to the agreement – the city (including the police department), attorneys from the DOJ, and his own monitoring team – for quarterly public hearings. The transcripts of these hearings (URL here) indicate that progress has been slower than expected. The first stage of scheduled reform was to develop new BPD policies and then to train officers to adhere to these policies.[1] While the rewriting of department policy has proceeded largely on schedule, in coordination with the DOJ and the court's monitoring team, the department's training materials and staff were still being developed through the end of 2019.

The slow progress has made policing even more difficult. In August of 2019, the *Baltimore Sun*, which has played an important role in arguing for police reform and accountability, lamented on its editorial page that

> Officers face new standards on the use and reporting of force but have not been thoroughly trained on what they are or how to do their jobs well within them. They are being burned out by mandatory overtime. They are being told to build relationships in the community but face so many demands that such interactions are perfunctory. They are stuck with outdated technology and facilities. And they see a revolving door in the commissioner's post, resulting in a department with no consistent leadership and direction.[2]

Not unrelated to these challenges, over the same time period the BPD has declined in size, losing more officers than it has been able to hire. While undertaking more fundamental reforms, the BPD has also had to overhaul its recruitment program in order to attempt to maintain its standing capacity.

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[1] As part of the agreement, the city agreed that, in the initial period of reform, the BPD would also use its existing data resources to establish baselines for street-level policing (e.g., "hit rates" after investigative searches, broken down by the race of the individual stopped). As the presiding judge gradually learned over the course of the first two years of consent-decree monitoring, the BPD had no capacity to provide such baseline estimates. Since then, and in spite of commissioning a thorough technology and data plan by outside consultants, progress has stalled. As of this writing, the monitoring team estimates that a fully implemented, field-based records management system will not be deployed until 2021 at the earliest. Thus, the BPD will not be able to produce the interim reports on progress toward meeting constitutional standards, using any data from the field before 2022, and only if additional resources are provided by the city and state. With the budget crises created by the coronavirus pandemic, such resources seem less likely to be provided.

[2] "Baltimore's consent decree is hurting police officer morale. It's also the solution." Editorial board, *Baltimore Sun*, August 29, 2019.

The GTTF scandal. The consent decree process, while the most important set of activities for the future of policing in Baltimore, has been overshadowed for the past three years by a more dramatic form of federal intervention. Around the same time that the DOJ launched its investigation of the BPD, the FBI launched a specific investigation of corruption and abuse by a plainclothes tactical unit of the BPD named the Gun Trace Task Force (GTTF). The investigation became public in March 2017 when seven Baltimore police officers were indicted on a range of charges from racketeering to robbery and extortion. During the investigation, enough evidence of criminal conduct was uncovered that twelve long-serving Baltimore police officers were convicted and sent to federal prison.[3] The revelations from the cases slowed over the course of 2019, but federal prosecutors indicated in February of 2020 that they were "not finished."

While the consent decree process and the convictions of police officers have been welcomed by the community, we have seen no evidence that the community has interpreted these developments as evidence that the BPD has been "cleaned up." Many of Baltimore's residents appear to hold the view that corruption within the BPD is endemic and that the GTTF investigation has only scratched the surface of the problems. Some of these same residents, if media portrayals are accurate, also appear to believe that the only solution is to cut funding to the BPD by enough that the police presence in the city will decline noticeably. In response, communities, it is argued, will then develop their own strategies to control low-level deviance, cooperating with what remains of the police force to combat violent crime when necessary.

Other residents, of course, do not take this view. They appear to regard the federal interventions as necessary catalysts that will result in a better police department that will earn back a higher level of legitimacy. These residents do not advocate less policing, only more effective policing. They may suspect that the GTTF investigation has not uncovered all of the corruption problems in the department, but they appear to believe that "crooked cops" are comparatively rare. This group also appears to lay more blame at the feet the city's leadership, which we discuss next.

Leadership instability. Mayor Stephanie Rawlings-Blake chose not to seek re-election in 2016, following pronounced criticism from all directions of her leadership during the unrest that followed the death of Freddie Gray. Catherine Pugh, a sitting Maryland State Senator from Baltimore, won the 2016 election. She took leadership alongside a shaken-up Baltimore City Council, with nine new members joining five re-elected incumbents.

After signing the consent decree with the federal government on April 7, 2017, Mayor Pugh fired the sitting police commissioner Kevin Davis eight months later on January 19, 2018, noting her "impatience" with his inability to reverse the increase in violent crime since 2016.

[3] It is hard to overstate fallout of the GTTF trials. For example, the Baltimore State's Attorney has had to toss nearly 800 cases in which the convicted officers participated, given the evidence presented in federal court of how easily the GTTF officers were willing to plant false evidence and provide misleading testimony in court.

She elevated Deputy Commissioner Darryl De Sousa to Acting Commissioner on the same day, and she directed him "to reduce the numbers and to reduce them quickly."[4]

De Sousa pledged to surge officers to violent hotspots and reduce crime quickly. After securing confirmation from the city council on a 14-to-1 vote, he was sworn in as police commissioner on February 28, 2018. Apparently, De Sousa was well-liked by BPD officers because of his long career in the department. Yet, with the consent decree implementation process just beginning in earnest, De Sousa seemed a puzzling choice to many outside of the department. Some community leaders wondered whether he could introduce the sweeping reforms that the mayor had agreed to on behalf of the city.

Whether De Sousa could lead reform effectively would never become known. Less than three months after his confirmation, he was charged by federal prosecutors with failure to file tax returns for three years. After a brief period during which Mayor Pugh continued to express support for him, De Sousa was forced to resign. When he entered into a plea deal, the full extent of his tax fraud was publicly revealed. As the *Baltimore Sun* noted, even for the years when he did file tax returns, "He also claimed deductions he was not entitled to, including for unreimbursed employee expenses that he did not incur, mortgage interest and local property taxes when he did not have a mortgage or own any property, and business losses when he didn't operate a business."[5] De Sousa was sentenced to 10 months in federal prison.

When De Sousa resigned on May 15, 2018, Gary Tuggle was appointed by Mayor Pugh as interim commissioner. He had just been hired by De Sousa in March as a deputy commissioner, having served as a young BPD officer in the 1980s before taking various postings in the Drug Enforcement Agency (including, for a few years, as the head of the Baltimore DEA office). Shortly after his appointment as interim commissioner, Tuggle expressed interest in the permanent position. He later announced in October 2018 that he was no longer interested in being a candidate for commissioner, following several months of pronounced violence in the city that appeared to have eroded support for his candidacy among members of the city council.

After a protracted national search, with multiple restarts and disagreements with members of the city council, including the public dithering of Interim Commissioner Tuggle, Mayor Pugh turned to a genuine outsider. Michael Harrison was the superintendent of the New Orleans Police Department, and he had experience implementing reforms from a consent decree while in that position. He was appointed as acting commissioner on February 11, 2019, and he was sworn in as commissioner on March 12, 2019 after confirmation by the city council. The judge presiding over the consent decree reforms echoed the praise and hope of others, repeating the claim that the city had finally attracted the sort of leader who could take charge and lead reform of the BPD.

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[4] "Press conference transcript: Baltimore Mayor Catherine Pugh, new police chief Darryl De Sousa." Wesley Case, *Baltimore Sun*, January 19, 2018.

[5] "Plea deal sheds new light on former Baltimore policy commissioner De Sousa's tax crimes." Tim Prudente, *Baltimore Sun*, December 18, 2018.

One month later, Mayor Pugh withdrew from service as mayor under a cloud of suspicion, created by *Baltimore Sun* accounts of corruption while in office (a truly bizarre kickback scheme, involving fictitious "sales" of a children's book that she had written and self-published). She resigned office on May 2, 2019, later pleading guilty to tax evasion and conspiracy. She was sentenced to three years in federal prison. In retrospect, Mayor Pugh's initial support of Darryl De Sousa's defense against charges of tax evasion seemed less surprising than was the case at the time.

The chair of the City Council, Bernard Young, was elevated to mayor in May of 2019, but he appears unlikely to win a full term in the November 2020 election. The two leading contenders, as of this writing, are (1) the former BPD spokesman T.J. Smith, hired by then-Commissioner Kevin Davis, and (2) the former Mayor Sheila Dickson, who was herself convicted of "fraudulent misappropriation" while in office 2008. None of the candidates who can claim meaningful separation from past city politics and Baltimore policing has yet gained enough support to suggest that a genuine "outsider" will be able to offer a fresh form of city leadership. As a result, few residents of Baltimore seem optimistic that more effective political leadership will emerge.

Population change. The population of Baltimore City grew very slightly before the death of Freddie Gray – from an estimate of 620,862 in 2010 to an estimate of 623,165 in 2014. This growth was touted as evidence of a genuine renaissance for the city. Unfortunately, following the unrest in 2015, the city's population resumed its prior decline, falling to 593,490 by 2019. Thus, from the 2014 peak, the city's population declined by an estimated 4.8 percent. We do not yet have enough data to determine whether the decline differs by age, race, or neighborhood.[6]

Nonetheless, it seems plausible, as highlighted by local media portrayals, that some portion of the decline is an individual-level response to the elevated rate of violent crime in the city since 2015. Other factors must be important as well, including a general level of dissatisfaction with the city's leadership and the evolving structure of economic opportunity. Responses to changes in economic opportunities are especially complicated to assess. On the one hand, it is possible that the strength of the regional labor market between 2015 and 2019 boosted net family income, which in turn fueled residential mobility to surrounding areas where schools and other social services are thought to be of higher quality. On the other hand, the realized pattern of economic opportunity may be a function of patterns of violent crime,

[6] Table 1 of the original report (Morgan and Pally 2016, page 17) offers the US Census Bureau's total population estimate for Baltimore City as 642,300, and this was based on our analysis of the American Community Survey, which tends to suggest higher population counts (for reasons related to how the group quarters population is handled). We performed that analysis so that we could decompose the results across census tracts and attempt to estimate the demographic composition of each BPD district. We have not undertaken a similar but updated analysis for this final report.

which may have affected business investment and the willingness of those outside of the city to move into the city (or even simply travel into the city for recreation and leisure).

2.2. Changes in the Policy and Practice of Policing, From the Streets to 8,500 Feet

In our analysis below, we will offer detailed models of trends in arrests on different charges, and these findings suggest a continuing decline in police activity when measured by this metric alone. We do not have much additional systematic data on "street-level" change in the activity of BPD police officers, but a number of developments allow for a characterization of some types of change.

In this section, we discuss first how the consent decree itself has shifted the environment that the police confront. Then, we present the 2019 dispute over Commissioner Harrison's crime plan to demonstrate both some recent on-the-ground changes, as well as opposition to them from the police union. Finally, we discuss changes in technology, and lack thereof, that constrain the options for policing in Baltimore.

Misinformation and the consent decree. As we discussed above, rather few reforms from the consent decree process have been implemented since 2017. Yet, as the *Baltimore Sun* quotation above suggests, it is likely that policing practice has changed in response to the existence of the consent decree. The environment in which officers must do their work is different than it was, and almost certainly more challenging.

Consider Judge Bredar's lengthy statement, offered during a public hearing in January of 2020, on the challenges that misinformation about the consent decree creates for reform efforts, as well as those who must still police their posts:

> While I believe that the parties themselves are crystal clear on what the consent decree does and does not require, there are additional interested entities with whom the parties and the monitoring team interact, and they may misunderstand some of the decree's many provisions, particularly its more subtle ones.
>
> I first want to address the topic of investigative stops. Under the United States Supreme Court's 1968 opinion deciding the case of Terry v. Ohio, a police officer in Baltimore, or any other American city, for that matter, is authorized to stop and question a person when that officer has a reasonable and articulable suspicion that the person is involved in, is about to be involved in, or just immediately was involved in criminal activity. If, during the course of that stop, the officer develops a further reasonable suspicion that the individual is armed and presently dangerous, then that officer is allowed to pat the person down, searching for weapons or other items that could reasonably pose a danger to the officer.
>
> Sometimes these police/citizen encounters are, in my view erroneously, referred to as stops and frisks. This is bad terminology because the Terry opinion never authorized a frisk in every instance where there was a stop. Stops and frisks are

separate concepts. First the stop, then maybe a patdown, depending on what suspicions reasonably arise in the officer's mind.

Nothing in the consent decree forbids Baltimore officers from conducting appropriate investigative stops. As has always been true under federal constitutional law, though, the stop must always be preceded by the development of a truly reasonable suspicion, not a hunch, not a guess that someone is involved in criminal activity, but a solidly reasonable and articulable suspicion of the same.

So to the extent that some in our community are suggesting that Baltimore officers are no longer permitted to make investigative stops, Terry stops, that's just plain incorrect.

As part of the consent decree implementation process, Baltimore officers are being retrained, though, on what constitutes reasonable suspicion. As I said, a mere hunch or a guess that someone is involved in criminal activity is not enough. The officer has to know something, have seen something, have heard something, something concrete that gives rise to a reasonable suspicion in him or her, and any other reasonable police officer or commander had they been present, that criminal activity is afoot, something concrete and describable.

To the extent that Baltimore officers previously stopped and searched persons on a hunch that they were carrying a gun, on an educated guess that they were carrying illegal drugs for sale, yes, those days are over. Those hunches and guesses didn't amount to reasonable suspicion. So they by themselves could not support a stop or a patdown.

Stopping persons on less than reasonable suspicion is destructive to the essential relationship between the police and the community. It's that sort of police practice that led us to where we are now, in the midst of a crime wave during which many in the community don't trust the police and, therefore, won't help them to do the work necessary to stop the shootings and the drug dealing.

As we meet here today, Baltimore officers are being retrained, trained to lean into the crime fight while simultaneously respecting constitutional rights. Constitutional policing and effective policing go together. You don't get one without the other.

This sort of reform has been accomplished in other cities, L.A., New Orleans, Seattle, and it will happen here as well. The community demands it. The parties – the City, the Police Department and the Department of Justice – are all acting to deliver it. Most of all, the law, in the form of the consent decree, requires it.

Accordingly, as noted so many times previously, this Court intends to ensure that the reforms are accomplished exactly as the decree specifies. It's the law of the land and, as a judge in this court, that's where I get my orders.

Let's deal with some other misinformation. Some individuals and entities with whom the Court's monitoring team regularly interact have suggested that Baltimore

police officers no longer have the authority to prevent congregations of people form blocking access to businesses, no authority to interfere with persons who are blocking others who simply wish to go about their daily activities, passing in and out of shops and stores and other business establishments. This is incorrect.

While there have been serious questions in the past about whether the Baltimore Police Department was properly enforcing ordinances that forbid activities such as loitering, and while the Department's new policies in training reflect the best practices of policing in 2020, where concepts like clearing corners give way to more sophisticated methods, emphasizing more careful analysis of street dynamics and who's doing exactly what, it nevertheless remains true that when officers receive a call for service wherein a business or property owner or tenant is complaining that congregated individuals are impeding access to their business or property, the officers may act to correct that situation, provided their own observations corroborate those of the caller.

Whenever there's a significant change in a large organization such as the Baltimore Police Department, it's common that certain mythologies develop, a sort of separate set of truths that lots of people believe in but, upon close examination, aren't rooted in anything and aren't true at all. It's the responsibility of the Police Department, as part of this implementation process, to root out and expose those myths, and then dispel them through good internal and external communication strategies, and through training.

Nothing in the consent decree forbids investigative stops. No provision prevents officers from clearing congregations that are blocking access to a business when the business requests that service. On the most general level, the court detects nothing in the consent decree directing police officers in this city to pull back from the difficult job of enforcing our state's and our nation's criminal statutes.

The task in 2020 under this consent decree and in the midst of this crime wave is to embrace modern best practices of policing, respect the Constitution, and then lean in, using all appropriate police powers, investigative strategies, apprehension techniques, communities engagement, and trust-building methods to help secure this city.

The Baltimore Police Department is capable of coming into compliance with the decree and simultaneously making progress in the crime fight. The experiences of other cities, again, L.A., New Orleans, Seattle, even Cleveland, teach this. Reforms in policing bring a reduction in crime, not the opposite. The data's there.

Police departments that embrace reform earn back the trust of their communities, and people who trust the police drop the dime. They tell the police what they know and who's up to what. They don't stand by and tolerate the kicking of a police officer who's on the ground, trying to make a lawful arrest. Instead, they assist that officer and they readily report on others who help the resistor.

There will always be lawbreakers. But in Baltimore in 2020, the fight is to regain for the police the support of the people in the middle, those that aren't offenders, but

> also now don't trust the cops. Compliance with the decree will help achieve this. Most significantly, this is the strategy that this city has embraced. It's set out in the consent decree. It carries with it the force of law.[7]

It is not so important to fully understand which "individuals and entities" may be spreading misinformation, whether they be community members resisting the police, or even police officers looking for an excuse for not acting when they know they should. What is important is that the judge overseeing the reforms recognizes that confusion prevails, and to infer from it that this is a common feeling among parties to the agreement. This confusion must make policing even more challenging than it would otherwise be.

The 2019 crime plan and its reception. After the leadership volatility in the BPD from January of 2017 through February of 2019, Commissioner Harrison introduced a crime plan in June of 2019, responding to calls from the city's leadership that a crime plan be developed. The plan was released in June of 2019 as two documents: a "five-year vision," titled "Crime Reduction and Departmental Transformation Plan" (URL here) as well as a plan for immediate implementation, the "Baltimore Police Department Crime Reduction Strategy" (URL here). An example page from the vision document follows on the next page as an image in Figure 1.

We will discuss more details of Harrison's 2019 crime plan when presenting the pattern of results for 2016-2020 below, and in our concluding section. The primary tactical change was to propose additional hotspot targeting and new proposals for surge patrol in particular neighborhoods at particular times of the day. In addition, the plan proposed returning more sworn officers into patrol positions, rather than allowing them to serve in positions that could be staffed effectively by civilians. The plan retained some important changes implemented by prior commissioners, including a decrease in reliance on plainclothes tactical units, more restrictions on overtime work by officers, and a change in shift structure that was negotiated with the police union during the collective bargaining process at the end of 2018.

The crime plan was well received by the city's political leadership, but rather less well by the police union (i.e., Baltimore City Lodge #3 Fraternal Order of Police). Moving beyond critique-via-twitter, in October of 2019 the FOP leadership released its own glossy report, "The Mismanagement of the Baltimore Police Department and Its Impact on Public Safety" (URL here). And, at the end of 2019, the elected president of the union offered a blistering press release, displayed below as Figure 2 (see the following page). We cannot determine how much of the union's criticism is genuine and how much is posturing in the hopes of influencing future negotiations. It is possible that Harrison's crime plan has more support among the "rank and file" than the FOP claims that it does.

[7] James K. Bredar, Chief Judge, US District of Maryland in the Transcript of Proceedings (pages 4-10) for a public hearing held on January 22, 2020 (Civil Case No. JKB-17-0099, United states of American v. Baltimore Police Department, et al.). (URL here.)

Figure 1. Overview of the vision for Harrison's 2019 crime plan (page 4 from the document)

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MICHAEL T. MANCUSO
President

LISA M. RIHA
Secretary

FOR IMMEDIATE RELEASE

December 31, 2019

Yesterday's Mayoral press conference is just another example of how out of touch this administration has become. This is not the first year we have had over 300 homicides, so why has it taken so long for this "plan" to be presented? The idea for a citywide coordination to assist in the fight on crime is not new and has been promoted by law enforcement experts, and others, for years. It's not rocket science and to see it announced as though a light bulb suddenly went off in the minds of both the Mayor and Police Commissioner is terribly disconcerting. This was just another Jedi mind trick perpetrated on the citizens and media of Baltimore. At this point, 347 people are dead and there have been almost another 1000 failed murders this year, all a result of the complete ineffectiveness of the team at the top of the fight to protect the public's safety.

As for Commissioner Harrison's suggestion that the FOP leadership does not speak for the rank and file members of the BPD, we can say, without question, that claim is patently untrue. It is laughable when the PC says things like the men and women of the department tell him the opposite of what you hear from FOP leadership. Commissioner Harrison, the rank and file know this is a paramilitary organization and fear retribution if they tell you exactly how they feel about your crime fight. We hear the truth from them, and it is contrary to your claims of support. Unlike the PC, our FOP leadership listens to our members every day. We hear directly from them - their problems, their complaints, and their struggles.

The rank and file of the BPD are stretched thin! Our patrol ranks remain hundreds of officers short and our detectives are handling caseloads that would make law enforcement experts gasp if they knew the volume. The Commissioner's plan to solicit help from both the Federal and State governments has, unfortunately, become his only option. He cannot recruit or retain BPD officers because of the working conditions, the unrealistic expectations of the Consent Decree, and the consistent fear of unwarranted prosecution against our members. Currently, the 2019 numbers reflect a deficit of 25 officers when factoring the number hired versus the number resigning or retiring.

We ask that the citizens of Baltimore know that the men and women of the BPD understand how difficult these times are for them. We continue to work every day to provide as much protection as possible. Sadly, though, we do not have the support of the City's leadership or the current BPD administration. Each day another policy or plan is announced that effectively neuters our ability to help you! We believe that Baltimore will, someday, turn around but not with the current leadership team.

Figure 2. The response of the local FOP to statements by the mayor and commissioner

Technology and its constraints. The title of this subsection is only partly figurative. One innovation, to be introduced for the 2020 crime season, is to supplement Baltimore's policing with the flights of three Cessna propeller planes at 8,500 feet, outfitted with cameras, for approximately 12 hours per day. As a pilot program, the BPD's new unit, Aerial Investigation Research, will attempt to capture all movement in Baltimore at a resolution that enables examination of the routes that individuals and cars in the vicinity of violent crime scenes take after the conclusion of each incident. Activist groups, and some civil liberties watchdogs, have opposed the "spy planes" as both an invasion of privacy and another form of over-policing. Court battles over how the images can be used have already begun.[8]

Three lower-altitude changes were implemented earlier. From 2017 onward, the city has invested resources to repair and extend its network of 750 fixed-position, closed-circuit television cameras. Consistent with national trends, body cameras have also been introduced. Finally, in 2018, the department introduced a ShotSpotter audio detection system, which can determine the approximate location of gunshots based on a web of microphones across the city (along with some risk of false positives, it is believed, from backfiring dirt bikes, motorcycles, and cars).

At altitudes between the planes and the cameras and microphones, the city continues to use its helicopters to assist regular patrol as well as tactical operations. A favorite of police radio enthusiasts, the various helicopters, referred to as "Foxtrot" when airborne, remain actively engaged in the crime fight in the city, whether assisting officers on the ground attempting to make arrests or directing patrol cars and tactical units toward the expected routes of packs of dirt bike riders.

The BPD continues to rely very heavily on car patrol, coordinated by traditional district-based dispatch through police radio. Most cars do not contain computers, and the 2019 crime plan proposed that within a number of years, in alignment with consent-decree-related reforms, most patrol cars will contain computers that enable immediate field-based input into a new records management system. These changes are on the distant horizon, and thus they have not affected policing practice during the period considered by our analysis below. The odds of full implementation are difficult to assess, given that the consent-decree process has estimated that launching the new plan will require at least $65 million in new investment. Many residents of the city favor budget cuts for the BPD, and thus it seems only likely to be provided if the State of Maryland allocates the necessary resources. However, as noted above, the budget crises at both the city and state levels, generated by the coronavirus pandemic, suggests this level of supplemental funding is unlikely to be provided.

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[8] After test flights and demonstrations since 2016, a contract was signed by Baltimore City and Persistent Surveillance Systems, LLC, to put the planes in service beginning in spring 2020 for six months. The contract is funded by private philanthropy (Arnold Ventures). The program has already been challenged in federal court by the ACLU, which seeks to prevent the usage of any images taken. See details here. As of this writing, the courts have allowed the planes to fly, with the first flights apparently on April 27, 2020. The full flight schedule began on May 1, 2020.

3. Design, Data, and Methods

The core design strategy in this final report is the same as in the original report, which is described in detail there (see Morgan and Pally 2016, pages 11-22). In brief, we seek to determine how the patterns of recorded crime incidents and arrests by the BPD have evolved between 2010 and 2020, using interrupted time series models.

Since the original reports were written in 2016, we have updated the data and underlying modeling strategy. For this final report, we re-estimated all findings from the prior reports, implementing two types of changes: (1) changes that improve the original analysis without changing the core estimation strategy and (2) changes that deliver an analysis of the 2010-2016 interval that are fully consistent with the requirements of the new analysis in this final report of the 2016-2020 interval. For the most important example of the first type of change (explained further below), we have used a more refined set of measures to take account of the types of days when school is out of session. This change was implemented after we came to understand how much weekly arrest patterns are a consequence of whether Thanksgiving or Christmas falls within the week. For the most important example of the second type of change, we improved our categorization of arrests. This change was necessary because of the growth in types of arrests for the additional 40 months of data as well the need to standardize how non-violent, drug-related arrests are best characterized over a longer time interval that includes data from 2013 through 2020.

In the remainder of this section, we present the focal time intervals for our analysis in this final report, which now include periods for the 40 months of data that were not considered for the reports written in 2016. We also present the data sources and specific measures that we use in the subsequent analysis to adjust for the seasonality of recorded crime incidents and arrests. In conclusion, we provide a few details of the models that we will estimate for this report, holding off on providing many of the details until we present the results in subsequent sections.

3.1. Time Intervals for the Analysis

We consider how trends in both recorded crimes and arrests changed in nine periods, after a baseline period that ended in early August of 2014. The first five periods of change, demarcated in weeks that begin with Mondays, were analyzed in the two reports from 2016:

1. the *Ferguson Period*:

   <u>August 11, 2014 – April 19, 2015</u>
   The interval beginning with the nationally broadcast protests in Ferguson, Missouri and ending before substantial protests began in Baltimore in response to the arrest of Freddie Gray

2. the *Gray Period*:

   April 20, 2015 – July 12, 2015
   The interval beginning with substantial protests following the death of Freddie Gray and ending with the week of the firing of Baltimore Police Commissioner Batts

3. the *Unrest Week*:

   April 27, 2015 – May 3, 2015
   The week that began with a riot/unrest/uprising, was followed by large-scale peaceful protest activity, and was accompanied by the deployment of the National Guard and the imposition of a night-time curfew

4. the *Davis Transition*:

   July 13, 2015 – October 18, 2015
   The interval beginning with the first full week during which Interim Police Commissioner Davis was appointed and ending with his confirmation as Police Commissioner Davis

5. the *Davis First Year*:

   October 19, 2015 – October 16, 2016
   The interval beginning with the first full week during which Kevin Davis was confirmed as Police Commissioner Davis through the last full week of his first year as police commissioner

For this final report, we consider four additional periods of change:

6. the *Davis Final 15 Months*:

   October 17, 2016 – January 21, 2018
   The interval beginning with the first full week of Davis' second year as police commissioner, through the signing of the consent decree in April of 2017, and ending with his firing by the mayor three months into his third year as police commissioner

7. the *De Sousa Spring*:

   January 22, 2018 – May 13, 2018
   The interval beginning with the first full week during which Acting Police Commissioner Darryl De Sousa was appointed, through his confirmation as

police commissioner in February of 2018, and ending when he took a leave of absence because of allegations of tax fraud (after which he subsequently resigned)

8. the *Tuggle Interregnum*:

   May 14, 2018 – February 10, 2019
   The interval beginning with the first full week during which Interim Police Commissioner Gary Tuggle was appointed, ending with the appointment of Acting Police Commissioner Michael Harrison

9. the *Harrison First Year*:

   February 11, 2019 – March 1, 2020
   The interval beginning with the first full week during which Acting Police Commissioner Michael Harrison was appointed, through his confirmation as Police Commissioner in March of 2019, and continuing through the end of his first full year (and concluding just before Governor Larry Hogan declared a State of Emergency because of the approach of the coronavirus pandemic)

Note that all intervals are sequential, except for interval 3 which lies within interval 2. For intervals 1 to 5, we will re-estimate the effects already presented in the original 2016 reports (and only small changes will result). For intervals 6 to 9, we will provide new estimates. As noted in the next subsection, none of these estimated effects have simple interpretations from a counterfactual perspective.

3.2. Effects of Interest

As explained in the original report, our initial interest was in the assessment of changes in response to the events in Ferguson, the emergent national dialogue on police conduct, and the arrest of Freddie Gray and events that followed it. We were also interested in whether the appointment of the new Police Commissioner Kevin Davis would restore confidence in the BPD. These effects were featured in the title of the original report, "Ferguson, Gray, and Davis … ."

For the original report, we explained the complexity of defining these effects from a counterfactual perspective. For example, consider this excerpt:

> ***The Ferguson Effect.*** A Ferguson effect on crime in Baltimore would exist, by our reasoning, if the number of crime incidents recorded after the beginning of the Ferguson period differs from the number that would have been recorded if the events in Ferguson had not set off a shift in the national dialogue on policing. The Ferguson effect for arrests would have the same basic structure and would not necessarily align with the Ferguson effect for crime. Indeed, there is good

reason to expect substantial divergence. Consider the following possibilities. Suppose that police officers, because of concerns about additional monitoring and the need to document the appropriateness of their conduct, take a more deliberate approach to routine police activity. Or suppose that they decide to refrain from some discretionary police activity in order to minimize the odds that they will find themselves in encounters that are hard to control. In either case, the arrest count would decrease, especially for discretionary arrests, and a Ferguson effect on arrests would emerge. This decrease could occur regardless of changes in the pattern of crime incidents. Suppose, however, that individuals inclined to commit crimes anticipate that the police may be about to back off from aggressive policing, or, more plausibly, observe a decline in discretionary arrests in their communities. In these circumstances, crime incidents might increase, and such a change would qualify, by our reasoning, as a Ferguson effect on crime. This effect on crime could accompany or follow a Ferguson effect on arrests.

The structure of these sorts of effects is established through a comparison of what is observed to an expectation of what would have been observed in the absence of the cause, which in this case is the shift in the national dialogue on police conduct that emerged following the protests in Ferguson. In the language of academic research, the assessment of such effects requires the modeling of counterfactual values: what would have happened in the absence of something that actually did happen. In order to make any progress in an empirical assessment of effects such as these, the analyst needs to develop a model of unobserved counterfactual trajectories that yield comparison values.

The Gray Effect. If this type of analysis were not challenging enough already, additional complications immediately arise when considering the onset of effects in response to the arrest of Freddie Gray. As with the Ferguson effect, we can start by defining a Gray effect using a simple counterfactual: the difference in crime incidents or arrests between what is observed and what would have been observed if Freddie Gray had not been arrested and had not died from the injuries he sustained while in police custody. The complication with this definition is the possible presence of a preexisting Ferguson effect during the post-Ferguson, pre-Gray time interval, labeled above as the "Ferguson period." There is no good reason to believe that a preexisting Ferguson effect would vanish the moment a Gray effect begins. Rather, it would be most reasonable to assume that the existence of any ongoing Ferguson effect would then shape the nature of a subsequent Gray effect, either for crime incidents, or arrests, or both.

Moreover, the Gray effect itself has two components, each of which is clearly observable in the raw data that we will analyze below: (1) changes during the dramatic events of the week of unrest that began on April 27, 2015 and ended when the National Guard stood down seven days later, and (2) the more

encompassing period delineated above, which began after the death of Freddie Gray on April 19th, and which included substantial journalistic coverage of both peaceful and violent protests. Furthermore, it is reasonable to assume that substantial discussion of Freddie Gray's arrest would have been present in the ranks of the Baltimore police before April 27th, given that he was arrested on April 12th and his death was widely reported on April 19th. Indeed, the officers involved in his arrest were suspended on April 21st, which was six days before the riot/uprising began.

Altogether, our strategy is to interpret changes that are observed in the Gray period relative to the Ferguson period in counterfactual terms, but with the stipulation that the changes produced by a Gray effect are not cleanly separable from any preexisting Ferguson effect. We will not attempt to estimate complex counterfactuals, such as the Gray effect that would have occurred if the Ferguson protests and all associated events had not occurred in the months prior to Freddie Gray's arrest. Similarly, we will not attempt to evaluate the Ferguson effect in the Gray period, as if Freddie Gray had not been arrested or had been arrested but had not died. Rather, we will allow all change in the Gray period to be attributed to a nominal Gray effect. But we will then discuss in our subsequent interpretations how the Ferguson and Gray effects may be fundamentally entangled because of how the size of the Gray effect may depend on the nature of an underlying Ferguson effect.

Finally, even though we will model the nominal Gray effect in two pieces, generating estimates that allow us to separate the piece of the Gray effect that is attributable to the Gray period as a whole from the additional spike that occurred during the week of unrest, this separation is artificial as well, since the overall Gray period cannot be fundamentally separated into these two pieces. The pattern of crime and arrests in the weeks following the unrest would not have been the same if the week of unrest had not occurred. (Morgan and Pally 2016, pages 13-15)

In this final report, we remain interested in these entangled effects, and we will re-estimate them just as we did in the original report. The new analysis that we offer in this report is based only on the final four periods detailed above: from Davis' final 15 months through Harrison's first full year. The same cautions from the original report apply to effects defined by these four periods as well. However, as we will show below, the estimated effects for these later periods are similar enough that our inability to cleanly separate them in a counterfactual framework is less consequential for overall interpretations and conclusions.

3.3. Data Sources and Measures

Crime and arrest data. The BPD releases data, over the citywide Open Baltimore data portal, on a regular basis. In this analysis, we consider 487,762 recorded crime incidents from March 1, 2010 through March 1, 2020. For arrests, we use all data that are publicly available to

us: 198,360 arrests of individuals from January 1, 2013 through March 1, 2020. We bin these crime incidents and arrests into weeks beginning on Monday and ending on Sunday in order to cumulate rare events into meaningful counts. Accordingly, all of the outcomes we consider are weekly counts.[9]

For types of crime, we use BPD's own released categories. One of these categories, assaults by threat, has been discontinued since our analysis in 2016. In fact, the BPD changed the data on assaults by threat that we analyzed for our prior two reports. As shown in Appendix 2 (see section 45), and unlike in our original report, assaults by threat declined abruptly to zero in the pre-Ferguson period and remained at zero through March 1, 2020. We have handled this change in the data by allowing assaults by threat, which number only about 10 per week when categorized for the first portion of the time series, to continue to count as a category within the total crime incident count that we analyze. We then also offer models for assault by threat in Appendix 2 (see section 45) in order to show when the abrupt decline to zero appears. We do not include conclusions about assaults by treat in the main document of this report, and we do not include assaults by threat in the rows of the summary tables below, except insofar as they are included within the total weekly counts of crime incidents when they were a recognized crime category by the BPD and reported in the data that the BPD released.[10]

All other measurement issues for crime incidents are the same as was the case for the original report. And the caveats from the original report still apply, notably that crime is almost surely under-reported and that the under-reporting is not random.

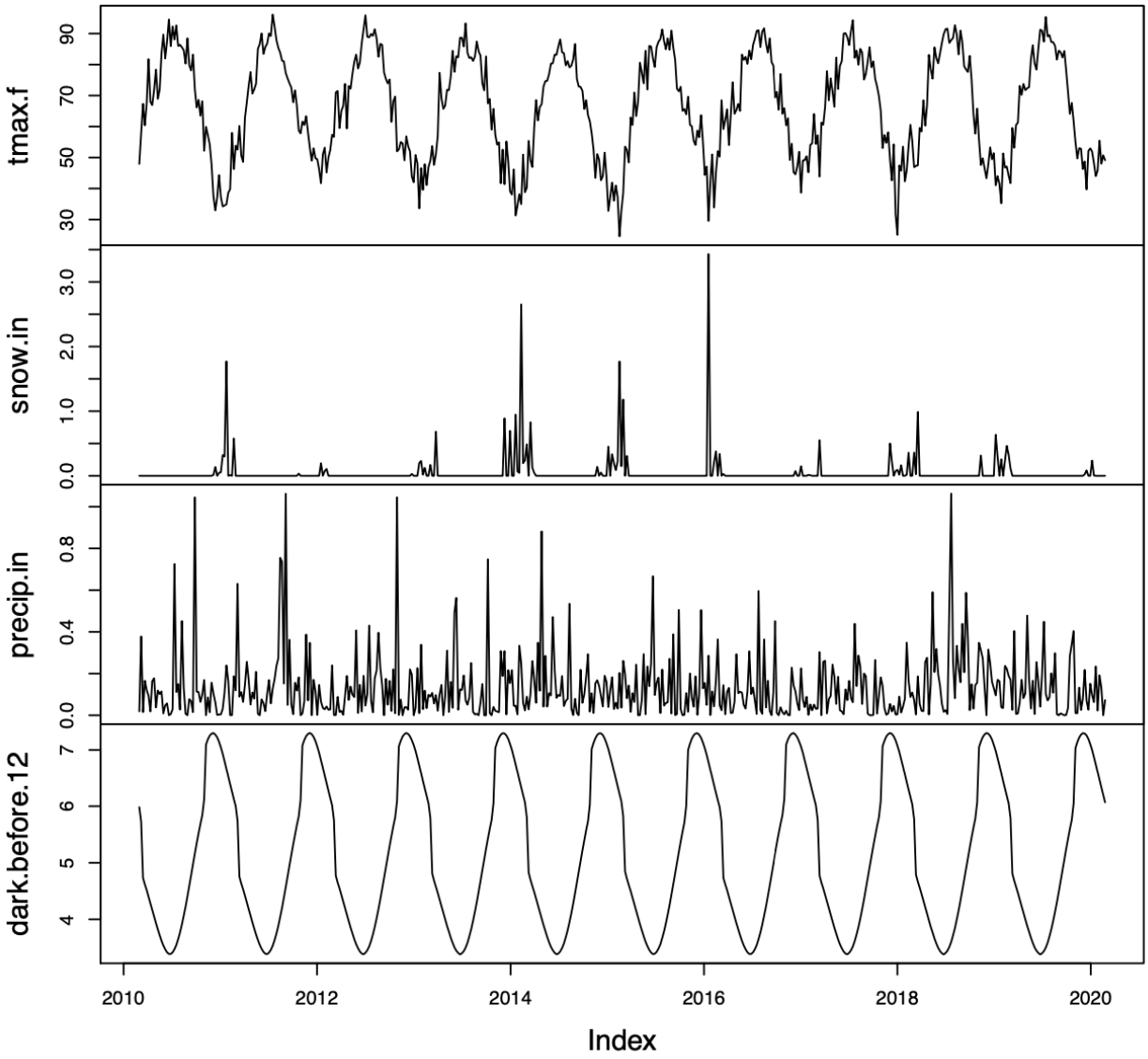
For arrests, we use an updated version of our hierarchical keyword-based coding of types of arrests. We detail the coding procedure and coding results in Appendix 1, which shows how we categorized more than 16,000 types of charge descriptions into 25 meaningful groups for analysis. For this final report, we updated the severity ranking of types of charges, which determines how arrests on multiple charges are categorized by our coding. We also then combined groups of arrests in slightly different fashion for the analysis. Most importantly, in the original report, non-violent drug arrests with intent to distribute were categorized as substantially more serious than drug possession alone, and both types of arrests were then analyzed separately. For this final report, we combined non-violent drug distribution and drug possession for subsequent analysis because we doubt that charges that include "intent to distribute" are comparable over the full time period, given how the policing of drug crime has evolved in the city. Note that this change only matters for arrests that do not contain charges that our categorization deemed more serious. For example, an individual who was arrested for a handgun violation and drug possession is placed in our "deadly weapon" group (which is 7th in severity, after murder, attempted murder, rape, arson, robbery, and aggravated assault).

[9] Our analysis is based on data that we downloaded on April 18, 2020, combined with data that are no longer available online, but which we had archived previously.

[10] We have been unable to verify the rationale or exact contours of the change, but it appears that incidents of assault by threat were reclassified by BPD as civil disputes rather than crime incidents. It does not appear that assaults by threat were reclassified as either common assaults of aggravated assaults.

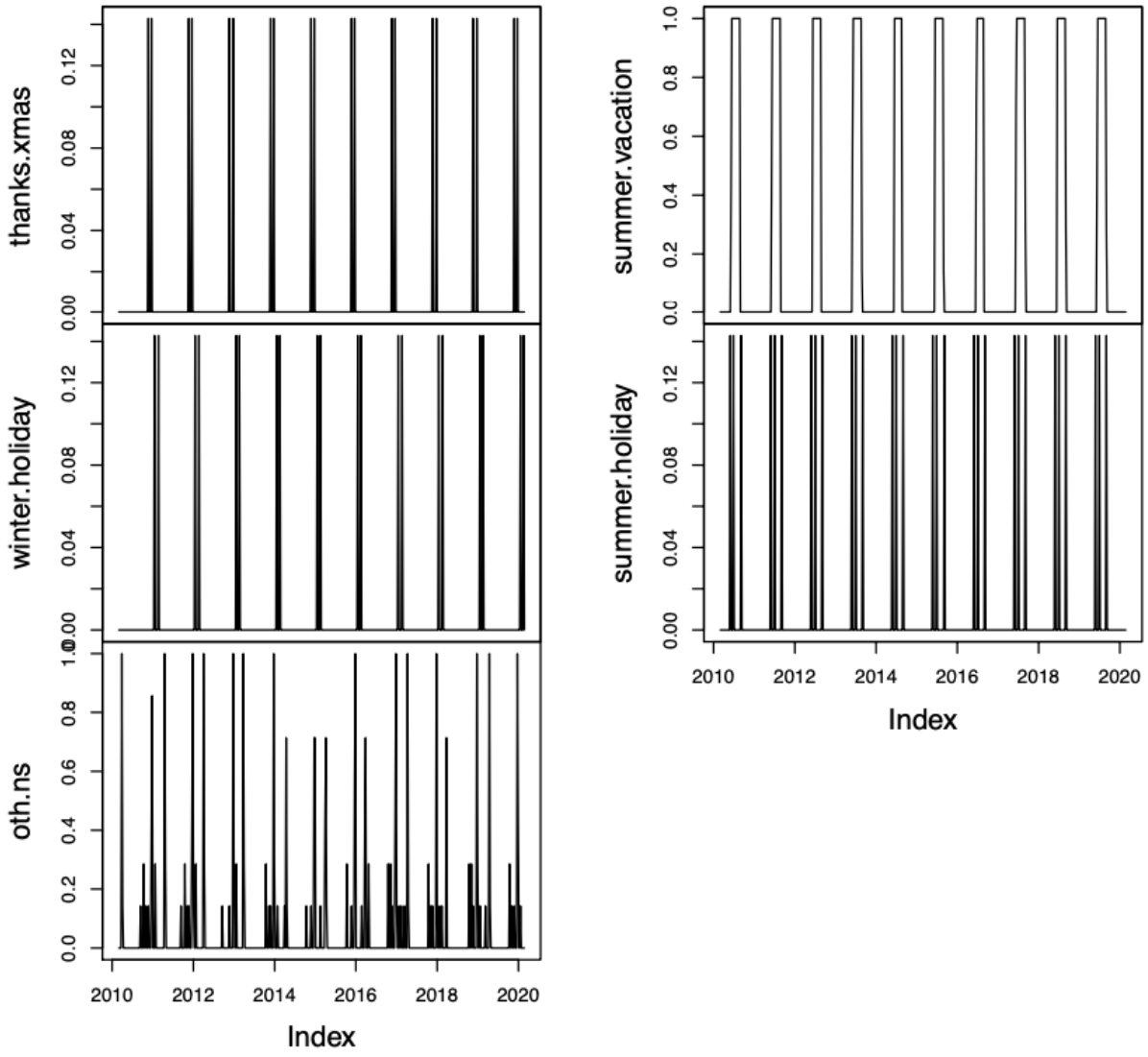
Seasonal adjustment. We use the same external data sources as in the original report to account for temperature, daylight, snowfall, and precipitation. The values for the four measures are presented in Figure 3 (see next page), with the horizontal axis representing time as the index and with the measurements in the panels representing weekly averages of the variables detailed on the vertical axes (see also the legend).

More refined measures of non-school days. For the original report, we used an adjustment variable for the proportion of the week that school was in session, as determined using the school calendar of the Baltimore City School District. In subsequent analysis, we determined that arrest counts were more variable across weeks with different types of non-school days, especially for the weeks that include Thanksgiving or Christmas. Figure 4 (see the page after the next page) shows the five variables that we use simultaneously to adjust for the mix of days in each week in this final report.



- tmax.f is the weekly average of the daily maximum temperature, measured in degrees Fahrenheit
- snow.in is the weekly average of total daily snowfall, measured in inches
- precip.in is the weekly average of total daily precipitation, measured in inches
- dark.before.12 is the weekly average of daily hours between sunset and midnight

Figure 3. Seasonal adjustment variables for the analysis



- thanks.xmas is the proportion of days of the week that are either Thanksgiving or Christmas
- winter.holiday is the proportion of days of the week that are a winter holiday other than Thanksgiving or Christmas
- other.ns is the proportion of days of the week that are other types of non-school days for the Baltimore City Schools (e.g., professional development days and winter vacation days)
- summer.vacation is the proportion of days of the week that are summer vacation for the Baltimore City Schools
- summer.holiday is the proportion of days of the week that are a summer holiday (e.g., 4th of July)

Figure 4. Adjustment variables for the proportion of each week with different types of non-school days.

Note: The scales of the vertical axes differ. Summer holiday weeks and non-school-day weeks are the only ones that can reach weekly values of 1.

3.4. Methods and Models

We use the same basic modeling approach as in the original 2016 reports. We explain the approach briefly in this section for those who are familiar with the original reports. For those who are new to our approach, the following paragraphs will read as unreasonably obtuse. If so, we recommend skipping ahead to the results, where the approach will be explained as it is demonstrated in use.

Equivalent modeling strategy. As for the original reports, we first estimate pre-Ferguson models for crime incidents and arrests (after settling on a core right-hand-side specification of predictors, based on an analysis only of total crime incidents and total arrests). We then use coefficients estimated from models for each outcome (but still using the core right-hand-side specification of predictors to protect against overfitting) in order to generate counterfactual trajectories. These counterfactual trajectories are used for graphical displays in our figures.

For our preferred models of change, we estimate period-specific change in the same interrupted time series design, after de-trending the outcome for the full time series (using the observed predictor values in each time period along with the estimated coefficients from each outcome-specific, pre-Ferguson model). We then offer interpretations of these estimates, often as percentage change, scaled by the count of the outcome variable in the last year of the pre-Ferguson period.

Slight changes to the specifications. For this final report, we have improved the pre-Ferguson prediction models slightly. In the case of crime incidents, we have also used them in a more constrained way to structure counterfactual trajectories. The main improvement is the more variegated specification of types of non-school days presented above in Figure 4. We implemented this improvement for both crime incidents and arrests.

We have also changed the specifications of the underlying time trajectories. For the models for arrests, we removed the baseline time counter altogether. As a result, the counterfactual trend after the pre-Ferguson period is determined only by seasonality and types of days. We implemented this change because the pre-Ferguson time period for arrests is comparatively short, resulting in estimated underlying time trends that were more of a distraction than an aid to interpretation (because they were either zero, and thus uninformative for the analysis, or something other than zero, and therefore suspect because of the amount of data they were based on). With several more years of data, it is now clear that the pattern for arrests is easily interpretable without the need to fit an underlying time trend to help structure a counterfactual trajectory.

For the models for crime incidents, we kept the baseline time counter as a predictor variable in the pre-Ferguson model. As with the original reports, we still believe that we have enough data from the pre-Ferguson period to be able to offer sufficiently precise estimates of

underlying time trends for crime incidents. As a result, these estimated time trends can be used to structure the counterfactual trend through the post-Ferguson intervals.

However, for the final four intervals considered in this report, we made the decision that the underlying time trend should be constrained. Following Davis' first year as commissioner, the cyclical pattern of the counterfactual trend is determined only by seasonality, weather variation, and types of days. The consequences of this change are best seen in figures for types of crime incidents where substantial pre-Ferguson trajectories are present, such as for aggravated assault. As can be seen in the relevant figure in Appendix 2 (see section 11), the counterfactual trend line in red slopes downward through Davis' first year but then flattens for the remainder of the time series, net of the cyclicality modeled throughout. As we will explain below, we implemented this constraint because we believe that crime patterns settled into a new quasi-equilibrium from the second year of Davis' term as commissioner onward.

4. Minor Revisions to the Conclusions of the 2016 Reports

To introduce the results from the new analysis in this report, we begin by offering in this section updated conclusions for the original reports. We regard the analysis in this final report as providing definitive estimates of the Ferguson, Gray, and Davis effects that we presented previously in 2016. The latest results leave the core conclusions unaltered, as we show below, with only minor changes in the magnitudes of some of the supporting evidence.

4.1. Revisions to the Estimates and Conclusions of the Original Report (March 15, 2016)

This final report offers updated full results for the 2010-2016 interval below, and the new analysis continues to support the conclusions of the original report. To demonstrate, we paste below the conclusions from the Executive Summary of the original report.[11] We show how the results presented below in subsequent sections of this final report provide a very slightly different set of supporting findings for the same overall conclusions. We use crossed out ~~text~~ for deletions and underlined <u>text</u> for additions.

Conclusions for the Time Period Before the Arrest of Freddie Gray

1. Adjusting for seasonality, evidence of a Ferguson effect on crime is very weak for the eight months after the Ferguson protests were widely publicized and before Freddie Gray was arrested.

- Demarcating the post-Ferguson, pre-Gray period as the interval from August 11, 2014 through April 19, 2015, many categories of crime decreased slightly relative to the expected seasonal trend, such as homicide (down ~~3%~~ <u>5%</u>), automobile theft (down ~~7%~~ <u>10%</u>), common assault (down ~~13%~~ <u>12%</u>), and larceny (down ~~12%~~ <u>10%</u>). Other categories of crime were unchanged, such as street robbery and burglary. Small increases were recorded for larceny from automobiles (up ~~3%~~ <u>6%</u>) and aggravated assault (up ~~6%~~ <u>5%</u>). Against such stability and what we regard as trendless fluctuation, the only substantial increases in recorded crime were themselves modest in comparison to the changes that unfolded from April 20, 2015 onward. These increases included shootings (up ~~13%~~ <u>14%</u>) and commercial robbery (up ~~19%~~ <u>20%</u>).
- Overall, we conclude that it is unlikely that the full profile of change in recorded crime in this period reflects any substantial response to protest events in Ferguson, or a reaction to any other police conduct that received national press coverage before the arrest of Freddie Gray.

2. During this same time period, changes in arrest rates are consistent with a Ferguson effect on police conduct. Arrests decreased substantially for

[11] The original text is drawn from pages 2-5 of Morgan and Pally (2016).

many areas of less serious crimes, and these declines occurred during a period characterized by typical fluctuation in recorded crime incidents.

- The total arrest count, which is not subject to under-reporting, fell by ~~19%~~ 22% between August 11, 2014 through April 19, 2015 in comparison to the prior 52-week period, and after adjustments for seasonality. In particular, the average weekly total of ~~800~~ 792 arrests declined by ~~152~~ 174 arrests per week. These changes unfolded alongside a mostly stable period in recorded crime incidents (see, above, for our first conclusion on crime incidents).
- Although the charges associated with each arrest are very difficult to categorize, the declines are most substantial for categories of less serious crime, such as property destruction (down ~~34%~~ 27%), ~~driving violations (down 33%),~~ prostitution (down ~~33%~~ 34%), police non-compliance (down 38%), non-violent drug-related charges (down 44%), and disorderly conduct (down ~~34%~~ 21%). Many categories of arrest for violent crimes, such as murder, attempted murder, and robbery~~, and aggravated assault~~ did not decrease over the same time period, suggesting that the declines in arrests were in areas where police have discretionary alternatives to arrest.

Taken together, these two conclusions for the period before Freddie Gray was arrested suggest that the only evidence in support of a "Ferguson effect" in Baltimore is for the pattern of arrests. Recorded crime varied as expected, but arrests declined, nonetheless. Baltimore's police officers may have used discretionary alternatives to arrest more frequently in this time period, possibly out of concern that the appropriateness of their conduct could become the subject of controversy.

Conclusions for the Time Period After the Arrest of Freddie Gray

3. The heavily reported spike in shootings and homicides that emerged in the three months following the arrest of Freddie Gray occurred alongside large increases in other types of crime.

- Adjusting for the seasonality of crime, and removing the week of unrest from the calculations, shootings and homicides increased by ~~140%~~ 138% and ~~92%~~ 91%, respectively, in the interval from April 20, 2015 through July 12, 2015. Over the same time period, street robbery increased by ~~31%~~ 33%, commercial robbery increased by ~~82%~~ 89%, carjacking increased by ~~33%~~ 44%, and automobile theft increased by ~~53%~~ 36%.

4. Arrests declined further from April 20, 2015 through July 12, 2015, even after removing the complex pattern of arrests that emerged during the week of unrest. These declines are consistent with the widely discussed

conjecture that the Baltimore police pulled back from some routine policing in response to a perceived lack of support from the city's leadership. These declines are also consistent with other narratives, such as the onset of a period of recovery following the overtime work of the police during the week of unrest, an accentuation of a Ferguson effect on arrests that had already emerged during the post-Ferguson, pre-Gray period, and a decline in cooperation from the community that made police work more challenging.

- The total arrest count declined by an additional ~~30%~~ 31% between April 20, 2015 and July 12, 2015, excluding the disrupted pattern of arrests during the week of unrest that began on Monday, April 27th, 2015.
- Among the areas of arrest that declined during the post-Ferguson, pre-Gray period and that may reflect a Ferguson effect on police activity, many of these areas of arrest continued to decline. Arrests for ~~driving violations~~ police non-compliance, prostitution, and disorderly conduct declined by an additional ~~44%~~ 38%, 40%, and ~~49%~~ 58%, respectively.
- Some areas of arrest that did not decline substantially during the post-Ferguson, pre-Gray period contributed to the ~~30%~~ 31% decline in the total arrest count during this period. Arrests for burglary, larceny, driving violations, and trespassing declined by ~~37%~~ 19% ~~and 39%,~~ 41%, 47%, and 74%, respectively~~, while arrests for a broad category that we label "police noncompliance" declined by a further 58%~~. Arrests for murder and attempted murder decreased by ~~30%~~ 28%, and arrests for ~~deadly weapons violations~~ robbery decreased by ~~18%~~ 29%.

5. It is fundamentally unclear whether the crime spike after April 20, 2015 should be regarded as evidence in support of a Ferguson effect on crime in Baltimore.

- It is notable, as detailed above for our first conclusion, that crime incidents evolved as expected over the eight months that followed the protests in Ferguson and that preceded the arrest of Freddie Gray. At the same time, arrests declined in many areas of less serious crime. In this sense, there is little or no evidence of a Ferguson effect on crime in Baltimore for many months when there could have been such evidence.
- It is undeniable that the unrest and its aftermath were shaped deeply by the media coverage of Freddie Gray's arrest, including the available cellphone video of it. These influential journalistic treatments drew connections to the nationwide focus on police conduct. In view of these explicit connections, it would be

unreasonable to conclude that the week of unrest was an inward-focused event, disconnected from the emergent national discourse on police conduct.

- One reasonable interpretation is that the crime spike is a Ferguson effect that might have remained dormant had it not been ignited by a localized Gray effect. Nonetheless, the size and duration of the crime spike is almost certainly attributable to particular features of the unrest and its aftermath, possibly including an increase in gang-related conflict over drug distribution as well as a police pullback in protest of the city's leadership. These accelerants have little or no connection to the core narrative of the Ferguson effect, although they may have been shaped to some extent by the cumulative events of spring 2015, which appear to include a decline in community cooperation with the police.

6. [Prefatory note: The larger number of changes for this conclusion arises from the shift in the time periods adopted for the updated report and which have been carried forward for the analysis in this final report.] Arrests increased during ~~the remainder of 2015, after the appointment of a new police commissioner~~ the transition period when Kevin Davis served as interim police commissioner and before he was confirmed as permanent commissioner on October 19th, 2015. During the same time period, recorded crime incidents declined.

- Adjusting for seasonality, the weekly total arrest count increased by ~~20%~~ 16% between July 13, 2015 and ~~the end of the year~~ October 19th, 2015, bringing the count back up to ~~77%~~ 64% of the weekly total arrest count that prevailed in the year before the Ferguson protests.
- These increases in arrests surely reflect a natural response to types of crime that increased in the summer of 2015, such as arrests for murder and attempted murder, which increased by ~~43%~~ 33%, and arrests for deadly weapons violations, which increased by ~~39%~~ 47%.
- Arrests in other areas that had declined before Interim Commissioner Davis was appointed also increased. Arrests for burglary, larceny, and driving violations increased by ~~28%, 19%, and 25%~~ 11%, 17%, and 37%, respectively. ~~Arrests for our category of "police noncompliance" increased by 25% as well.~~
- ~~With the exception of carjacking, which continued to increase,~~ Recorded crime incidents decreased during the ~~remainder of 2015~~ transition period. Shootings and homicides decreased by ~~64%~~ 62% and ~~29%~~ 23%, respectively, leaving net increases ~~at the end of the year~~ of ~~76%~~ 90% and ~~63%~~ 64% relative to the period before Freddie Gray was arrested. Street robbery, commercial robbery, and automobile

theft declined by ~~12%, 68%, and 28%~~ 16%, 66%, and 11%, leaving net increases of ~~19%, 14%, and 26%~~ 17%, 42%, and 16%.

The main text of the original report explains these conclusions in considerable detail. The models that we offer in this final report continue to support these core conclusions, even though some changes in modeling decisions have altered the fine detail of the supporting results. For example, as discussed above, the arrest coding algorithm shifted some arrests out of the "disorderly conduct" category into the "police non-compliance" category, but this shift does not change the overall conclusion about the trajectories of levels of arrests for incidents where police officers have substantial discretion in how to proceed.

4.2. Revisions to the Estimates and Conclusions of the Updated Report (November 15, 2016)

The updated report, released in November 2016, included additional analysis of the first 10 months of 2016, and it subdivided the Davis effect into two pieces (an estimated effect for the transition period while Davis served as interim commissioner and an estimated effect for his first full-year as the city-council-confirmed commissioner with a five-year contract). As with the original report, the additional conclusions of the updated report are also supported by the more definitive results we offer in this final report. To demonstrate, we paste the conclusions of the updated report below, again using crossed out ~~text~~ for deletions and underlined text for additions to incorporate the results offered in subsequent sections of this final report.[12]

1. During the period between the appointment of Kevin Davis as Interim Police Commissioner in July 2015 and his confirmation as the 38th Police Commissioner of Baltimore in October 2015, crime rates decreased substantially from the levels that prevailed in the months following the April 2015 death of Freddie Gray while in police custody.

- Adjusting for the seasonality of crime, shootings and homicides decreased by ~~64%~~ 62% and ~~26%~~ 23%, respectively, between Monday, July 13, 2015 and Sunday, October 18, 2015. Street robbery, commercial robbery, and aggravated assault declined by 16%, 66%, and 11%.
- In this same period, most categories of property crime changed only modestly. Although automobile theft declined by ~~15%~~ 11%, burglary and larceny from automobiles declined by only 2%, while other types of larceny increased by 4%.

2. During the first full year of Kevin Davis' five-year term as the 38th Police Commissioner of Baltimore, progress on reducing both violent and property crime was substantial in many categories but uneven overall.

[12] The original text is drawn from pages 1-2 of Morgan (2016).

- Homicides declined by an additional 23% for the one-year interval beginning on October 19, 2015, in comparison to the transition period before it, and after adjusting for seasonal differences. However, in this same time period, shootings did not decline. In addition, street robbery and residential robbery increased by ~~9%~~ 10% and ~~18%~~ 20% while carjacking soared by ~~117%~~ 120%.
- In contrast, property crime declined consistently. Automobile theft declined by ~~25%~~ 5%, burglary by ~~5%~~ 4%, larceny from automobiles by ~~15%~~ 17%, and other types of larceny by ~~11%~~ 8%.

3. Even after the progress in many categories of crime during the first year of Kevin Davis' appointment, violent crime remained much higher than before the national dialogue on policing began in the summer of 2014. The absolute level of violent crime presents a continuing challenge for Baltimore, its police, and its residents.

- Averaged over a year from October 19, 2015 onward, and in comparison to levels of crime that prevailed before the national dialogue on policing began in the summer of 2014, violent crime rates remained much higher. Homicides remained at ~~140%~~ 141% of prior levels, and shootings at ~~190%~~ 193%. Street robbery, commercial robbery, and aggravated assault stood at 127%, ~~137%~~ 140%, and 132% of prior levels. And, finally, carjacking soared to ~~313%~~ 321% of prior levels.

4. The fall-off in arrests of 31% during the period following the death of Freddie Gray was turned around by an increase of ~~23%~~ 16% during the transition period when Kevin Davis was Interim Police Commissioner. Levels of arrests then changed very modestly during the first full year of Kevin Davis' term as the 38th Police Commissioner of Baltimore, declining by ~~4%~~ 3% during the year. As of the end of his first year, the arrest level stood at ~~67%~~ 60% of its prior level before the national dialogue on policing began, with most of the decline explained in the original report.

While the results we will offer below are still consistent with these conclusions, in retrospect the tone of the conclusions in the updated report now feels a bit too naïve, and perhaps a bit too sanguine as well. It is clear, as shown below, that the limited improvements achieved through the first 10 months of 2016 were not sustained. We turn next to a full reporting of analysis we have undertaken for this final report.

5. Results for Crime Incidents and Arrests That Include Data Through March 1, 2020

We first explain the updated prediction models for the pre-Ferguson time periods, along with graphical displays of total counts for crime incidents and arrests. We then offer summary estimates and additional graphical displays for types of crime incidents and types of arrest.

5.1. Pre-Ferguson Models That Are Used to Generate Counterfactual Trajectories

Like the original report, all results in this report are structured by two omnibus pre-Ferguson prediction models, which are then used subsequently to model types of crime incidents and types of arrests. In this section, we present the right-hand-side specifications of these two models. Before doing so, we demonstrate their fit to the pre-Ferguson raw data as well as their subsequent usage over the full time series to generate the key counterfactual trajectories.

Before detailing the model specifications and coefficient estimates, we offer four summary figures (see the next four pages). The vertical dimension of Figures 5 and 6 is the weekly count of total crime incidents per week, and the horizontal dimension is weeks from March 1, 2010 through March 1, 2020. Figures 7 and 8 are the analogous figures for the weekly count of total arrests, with the horizontal dimension over the more limited time interval from January 1, 2013 through March 1, 2020.

For Figures 5-8, the vertical bars demarcate the time intervals of interest, as defined above.[13] For Figures 5 and 7, the gray dots are the observed weekly totals. For Figures 6 and 8 the gray dots are replaced by jagged blue lines, which are the three-week moving averages of the weekly totals for crime incidents and arrests, respectively. The jagged black lines are predicted values from the pre-Ferguson models detailed below, based on a fit to the data (i.e., gray dots) for the pre-Ferguson period only. The jagged red lines are then counterfactual predictions, which are formed using the coefficients from the pre-Ferguson models along with the values of the same predictor variables observed from the Ferguson period onwards. The differences between the gray dots and the red lines are the sources of the interval estimates of change, as explained fully in the original report and below.

[13] The unrest period is not depicted because it is embedded within the Gray period that begins to the right of the line labelled "Great Protests Begin." In some subsequent figures, the unrest week is easy to identify as an outlier gray dot (e.g., for the figure for arrests for disorderly conduct).

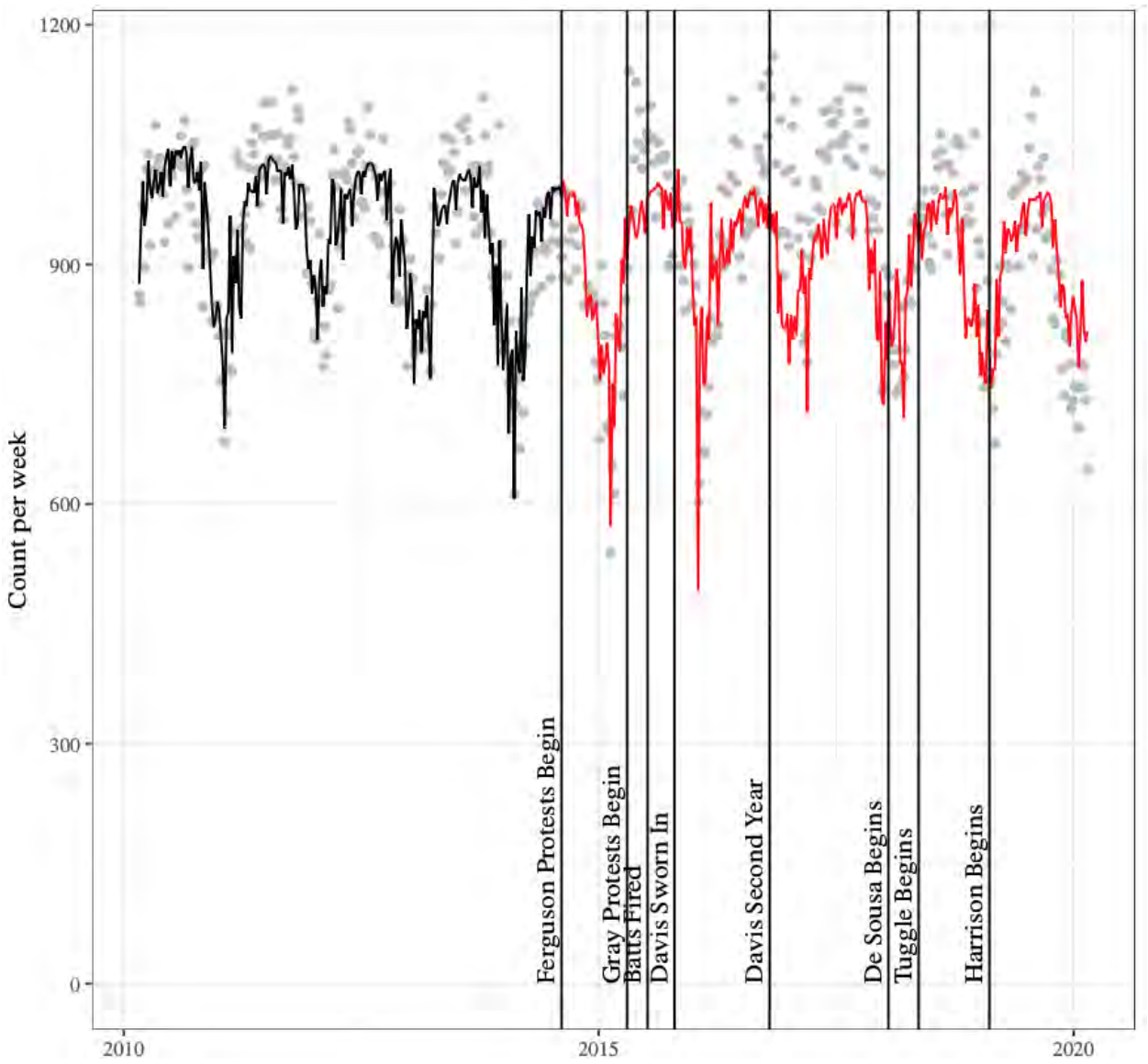


Figure 5. Total weekly recorded crime incidents (gray dots) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

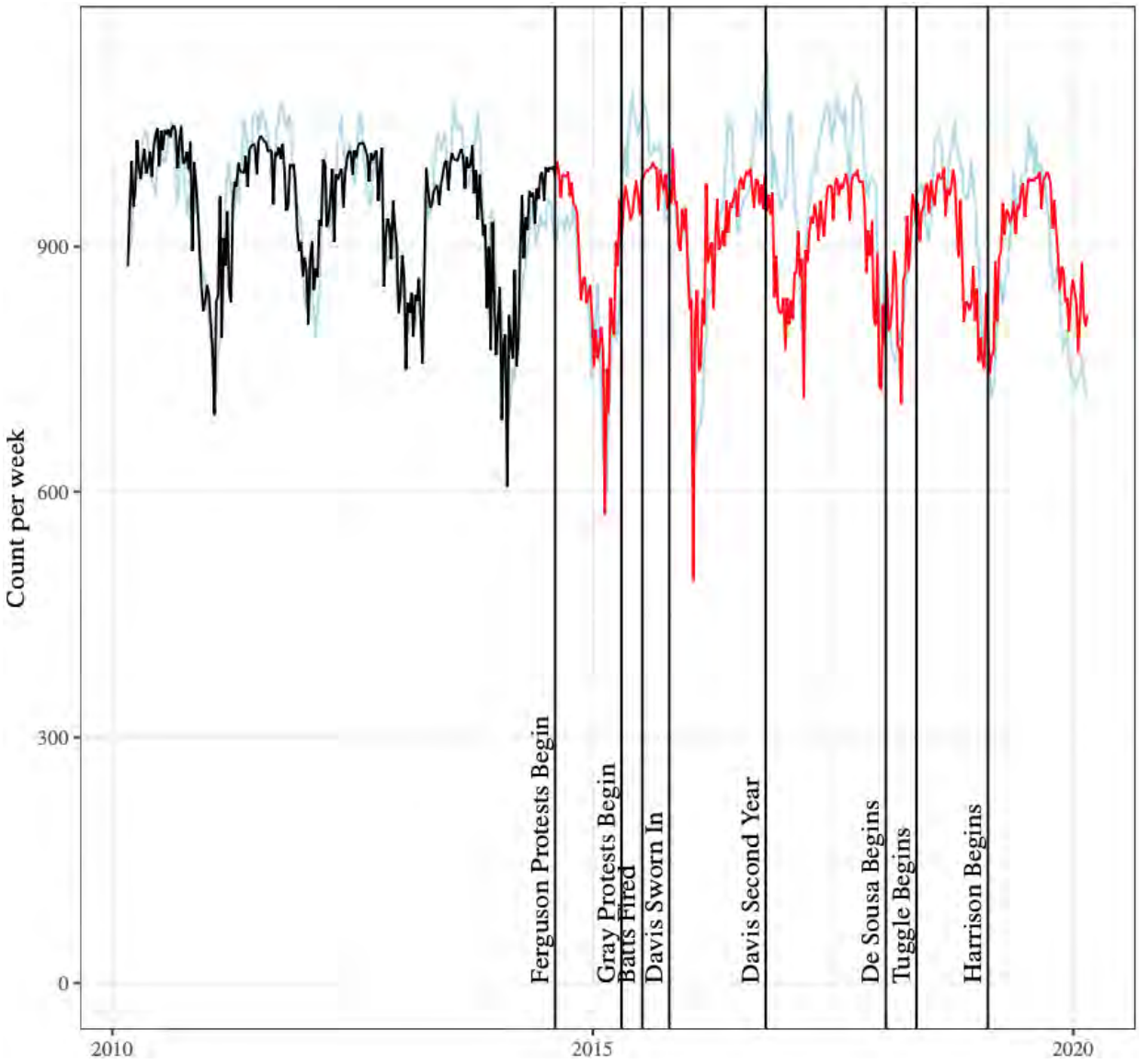


Figure 6. Total weekly recorded crime incidents (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

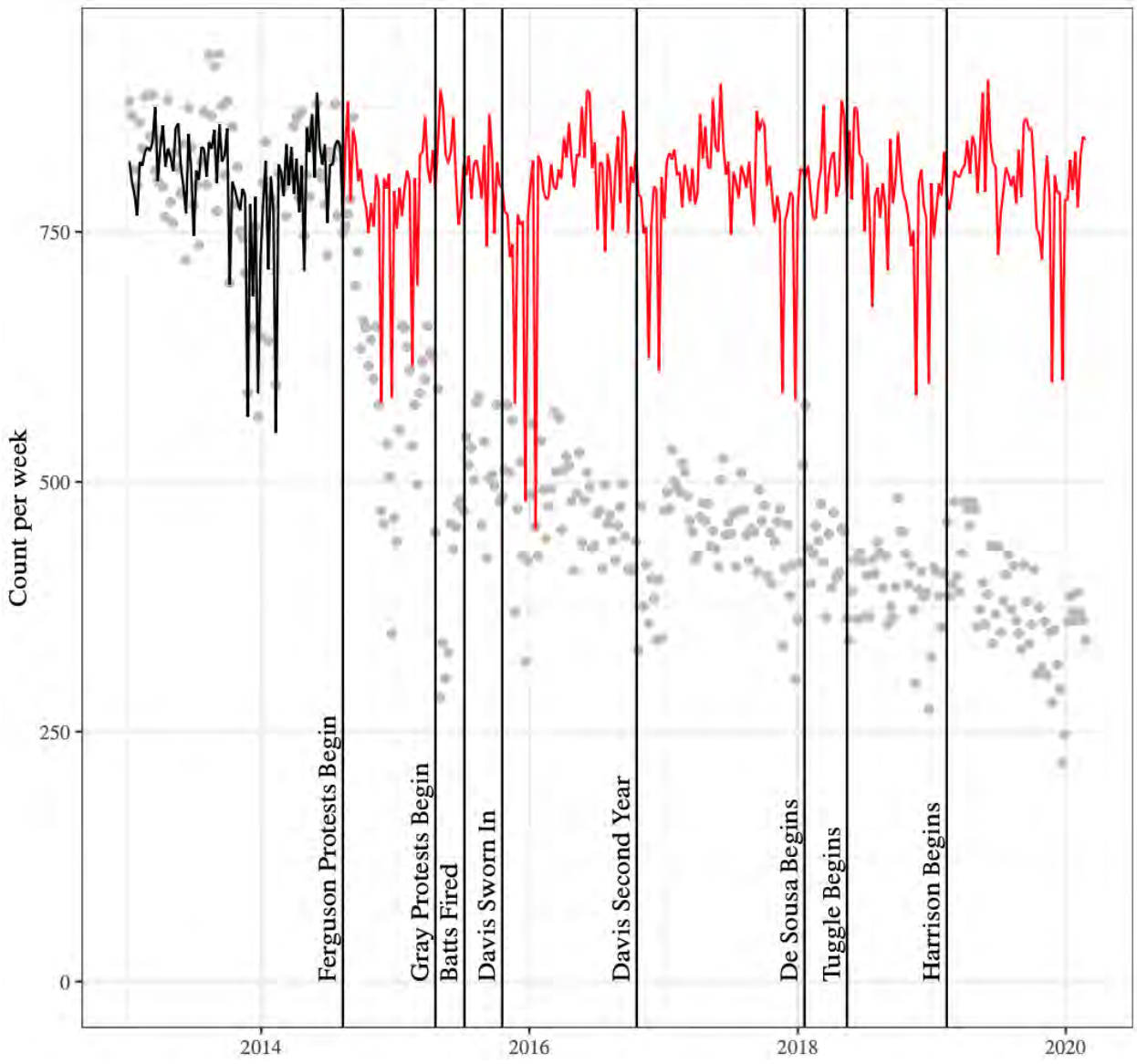


Figure 7. Total weekly arrests (gray dots) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

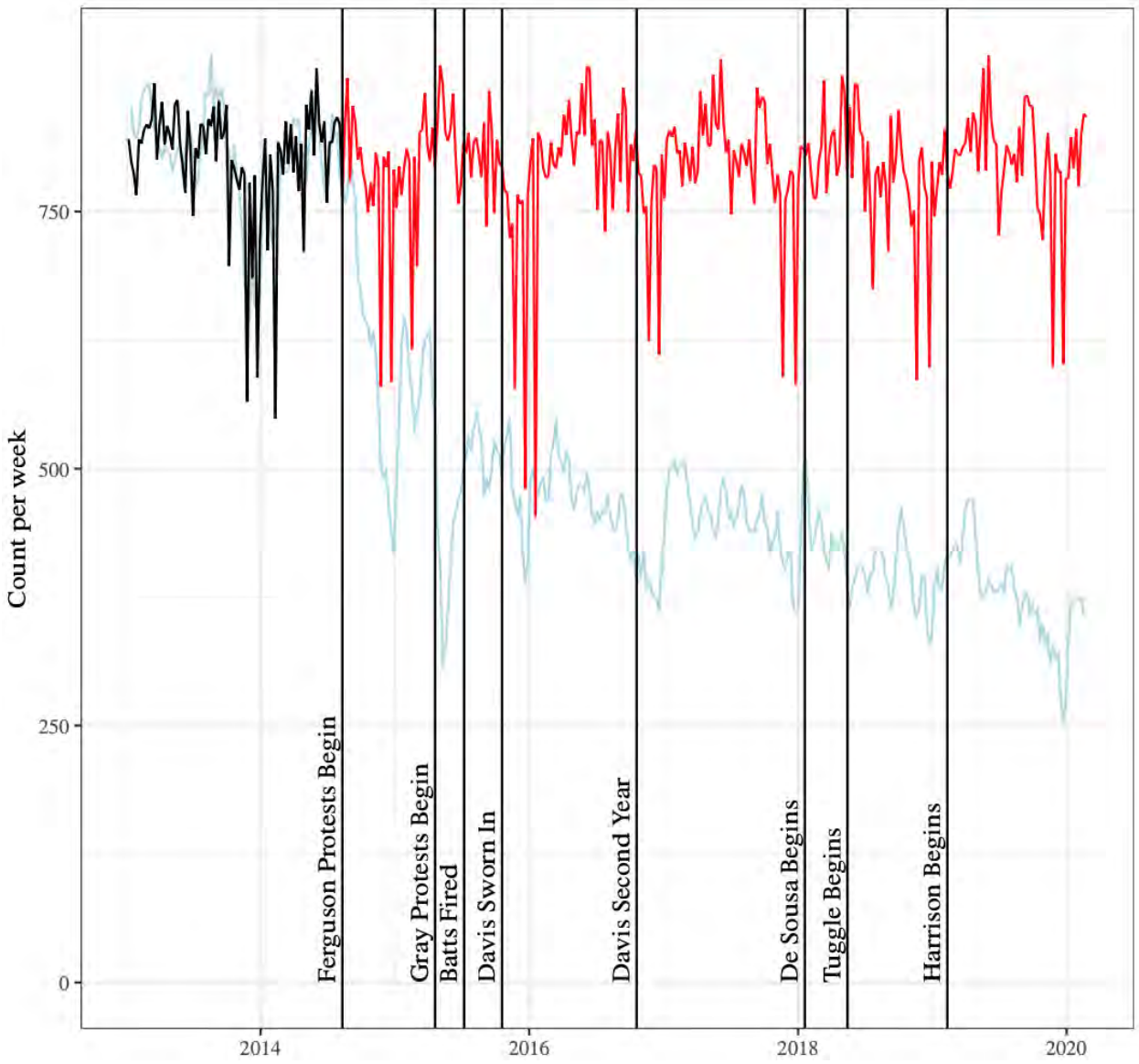


Figure 8. Total weekly arrests (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

Specifications of the two models. The right-hand-side specifications of the two pre-Ferguson prediction models were selected using only the weekly total crime incidents and weekly total arrests displayed in Figures 5-8. We then used the same specifications for the comprehensive sets of models that are presented in Appendix 2 for types of crime incidents and Appendix 3 for types of arrests.

Consider first Table 1, which offers results from three models for total crime incidents. The first column presents coefficients for the model that generates the predictions plotted as the jagged black line in Figure 5. The predictor variables for the model are presented in the row labels, and they collectively generate a model that explains 70 percent of the variance of weekly crime totals in the pre-Ferguson period from March 1, 2010 through August 10, 2014. Although we caution against attaching too much meaning to any single coefficient, since most of these predictor variables move together in seasonal fashion, it is clear that temperature, snowfall, precipitation, and hours of darkness are strongly predictive. The nonlinear partial relationship between temperature and crime is notable, with the effects appearing to accelerate with changes in the 50s, before leveling off in the 70s and then further in the 80s and above. These associations, however, are net of snowfall and precipitation, which themselves are temperature related. Overall, it is clear that the black jagged line in Figure 5 traces the core of the variation in the gray dots very well. For Table 2, the same model does nearly as well in predicting arrests. But, for arrests, holidays are particularly important. In Figure 7, these are the downward spikes in the jagged black line that reach down to the corresponding gray dots.

The coefficients in the second column of both Tables 1 and 2 represent our preferred estimates for the effects of change over time, and they provide the values that, when scaled by an appropriate baseline count for the outcome, determine the percent-change findings reported below. The coefficients are calculated by first "de-trending" the outcome variables, which in this case is equivalent to transforming the weekly totals by subtracting from each week's value the corresponding value in that week for the value on the jagged line (the black line before the Ferguson period began and the red line afterwards). As a result, for this model, the outcome variable is the difference between the raw observed total crime count (the gray dots) and the modeled value represented by the black/red line. The coefficients for the model in the second column are then determined by fitting coefficients for indicator variables for each time period, with the periods switching on from 0 to 1 when each period begins (and remaining on at 1 through the end of the time series). One period is handled differently. The indicator variable for the week of unrest switches on from 0 to 1 during its single week, and it then switches off from 1 to 0 for all subsequent weeks. This "spike" parameterization for the week of unrest results in a Gary-period estimate that nets out the anomalous pattern of crime for that week, during which the National Guard was deployed to enforce a nighttime curfew.

Table 1. Three models for total weekly recorded crime incidents

Predictor variable	3/1/2010 – 8/10/2014 model	Preferred model	Alternative model
Time counter (in weeks)	-0.19		-0.20
After Ferguson protests begin (week of 8/11/14 onward)		-37.35	-34.85
After Gray protests begin (week of 4/20/15 onward)		110.13	107.27
Unrest and National Guard (during week of 4/27/15)		126.39	139.87
After Batts fired (week of 7/13/15 onward)		-46.13	-46.39
After Davis confirmed (week of 10/19/15 onward)		-24.64	-20.69
After Davis first year (week of 10/17/16 onward)		88.41	94.98
After De Sousa begins (week of 1/19/18 onward)		-114.06	-104.99
After Tuggle begins (week of 5/14/18 onward)		77.84	76.09
After Harrison begins (week of 2/11/19 onward)		-88.03	-75.08
Average maximum temperature to 50 degrees	4.49		5.94
Plus degrees in the 50s	5.35		0.95
Plus degrees in the 60s	-2.89		1.28
Plus degrees in the 70s	-4.90		-4.00
Plus degrees Greater Than 80	-1.02		-2.35
Snowfall (inches)	-65.58		-47.26
Precipitation (inches)	-28.96		-23.24
Darkness before midnight (hours)	23.87		26.38
Thanksgiving/Christmas (proportion of week)	-32.28		-44.45
Winter holiday (proportion of week)	-211.39		-269.33
Other non-school days (proportion of week)	-27.91		-54.92
Summer vacation (proportion of week)	20.88		1.81
Summer holiday (proportion of week)	-261.19		-222.81
Observations (weeks)	232	522	522
Proportion of variance explained (R-squared)	0.70	0.30	0.71

Notes: The outcome variable for the first and third columns is the same – the total weekly recorded crime count – but the R-squared values cannot be compared across the two columns because the weeks for the model differ. Relatedly, the outcome for the second column is a residualized total weekly crime count, and as such the R-squared value of 0.30 cannot be meaningfully compared to either 0.70 or 0.71 in the first and third columns, even though the models in the second and third columns are estimated for the same weeks.

Table 2. Three models for total weekly arrests

Predictor variable	1/1/2013 – 8/10/2014 model	Preferred model	Alternative model
After Ferguson protests begin (week of 8/11/14 onward)		-170.07	-171.84
After Gray protests begin (week of 4/20/15 onward)		-245.64	-237.88
Unrest and National Guard (during week of 4/27/15)		169.59	160.30
After Batts fired (week of 7/13/15 onward)		127.73	119.17
After Davis confirmed (week of 10/19/15 onward)		-25.87	-32.95
After Davis first year (week of 10/17/16 onward)		-37.50	-30.51
After De Sousa begins (week of 1/19/18 onward)		-20.94	-14.51
After Tuggle begins (week of 5/14/18 onward)		-15.30	-21.99
After Harrison begins (week of 2/11/19 onward)		-37.18	-32.82
Average maximum temperature to 50 degrees	1.83		2.55
Plus degrees in the 50s	-9.51		-3.43
Plus degrees in the 60s	9.32		1.66
Plus degrees in the 70s	3.27		-1.79
Plus degrees Greater Than 80	-8.33		-1.73
Snowfall (inches)	-88.87		-30.07
Precipitation (inches)	-143.98		-91.09
Darkness before midnight (hours)	-23.89		-13.17
Thanksgiving/Christmas (proportion of week)	-1,396.50		-765.85
Winter holiday (proportion of week)	-1.88		237.57
Other non-school days (proportion of week)	-5.46		-38.26
Summer vacation (proportion of week)	-46.77		10.16
Summer holiday (proportion of week)	-468.88		-148.99
Observations (weeks)	83	373	373
Proportion of variance explained (R-squared)	0.66	0.87	0.91

Notes: The outcome variable for the first and third columns is the same – the total weekly recorded arrest count – but the R-squared values cannot be compared across the two columns because the weeks for the model differ. Relatedly, the outcome for the second column is a residualized total weekly arrest count, and as such the R-squared value of 0.91 cannot be meaningfully compared to either 0.66 or 0.87 in the first and third columns, even though the models in the second and third columns are estimated for the same weeks.

We offer one additional model in each table, which is an alternative to our preferred model. It fits coefficients for weather, hours of darkness, and types of days per week simultaneously with coefficients for the period indicator variables. The advantage of the model is that it uses additional data on the seasonal adjustment variables, which could provide better estimates of the underlying seasonal trend. The disadvantage is that the periods of interest are not randomly distributed relative to the adjustment variables, and thus the model is forced to simultaneously estimate all coefficients at once, which may generate misleading estimates of the period effects. Also, in the case of crime in Table 1, we do not have quite as much control because the baseline time counter is specified to be constant over all weeks. We cannot detrend the data for the alternative model, as we did for the preferred model, by suppressing the effect of the time counter after Davis' first year (although we could re-specify to do so). This is one reason why the coefficients for period differ between the preferred and the alternative model. However, for arrests in Table 2, the coefficients for the periods are very similar, suggesting little difference over the years on this pattern of cyclicality.

5.2. Changes in Shootings and Homicides

To explain how the models in Tables 1 and 2 are utilized, we first present results for the topic of greatest concern to many in the city: changes over time in shootings and homicides. Figures 9-12 (see next four pages), which are drawn from Appendix 2, present graphical displays of the results for shootings and homicides. Several patterns are immediately clear from the figures.

First, shootings and homicides are low frequency events, and thus the scale of the vertical dimensions in these figures is much different than for Figures 5-8 above. Also, as a consequence, week-to-week variability is more notable. For this reason, it is easier to interpret Figures 10 and 12, which represent the raw outcomes (the gray dots from Figures 9 and 11) as the blue lines that are three-week moving averages of shootings and homicides.

Second, the spread around the jagged black line appears more substantial than for total crime incidents (see Figure 5 above for comparison). As can be seen in Appendix 2, this pattern is genuine. The pre-Ferguson model, with the right-hand-side specified exactly as the one presented above in the first column of Table 1, has a proportion of variance explained (the model fit R-squared) of 0.26 for shootings and 0.12 for homicides. As shown in Table 1, the R-squared for the model for total crime incidents is 0.70. Some of the difference is attributable to variability across weeks, which is amplified for comparatively rare events. But this is only part of the story. The seasonality of shootings and homicides is less pronounced than for other types of crime, and these other types are collectively captured by the total crime incident count analyzed for Figures 5 and 6.

Third, the overall pattern is clear for the city as a whole. The jagged blue lines move above the counterfactual red line after the Gray period begins. For both shootings and homicides, they remain above the counterfactual red line for almost all weeks through 2020.

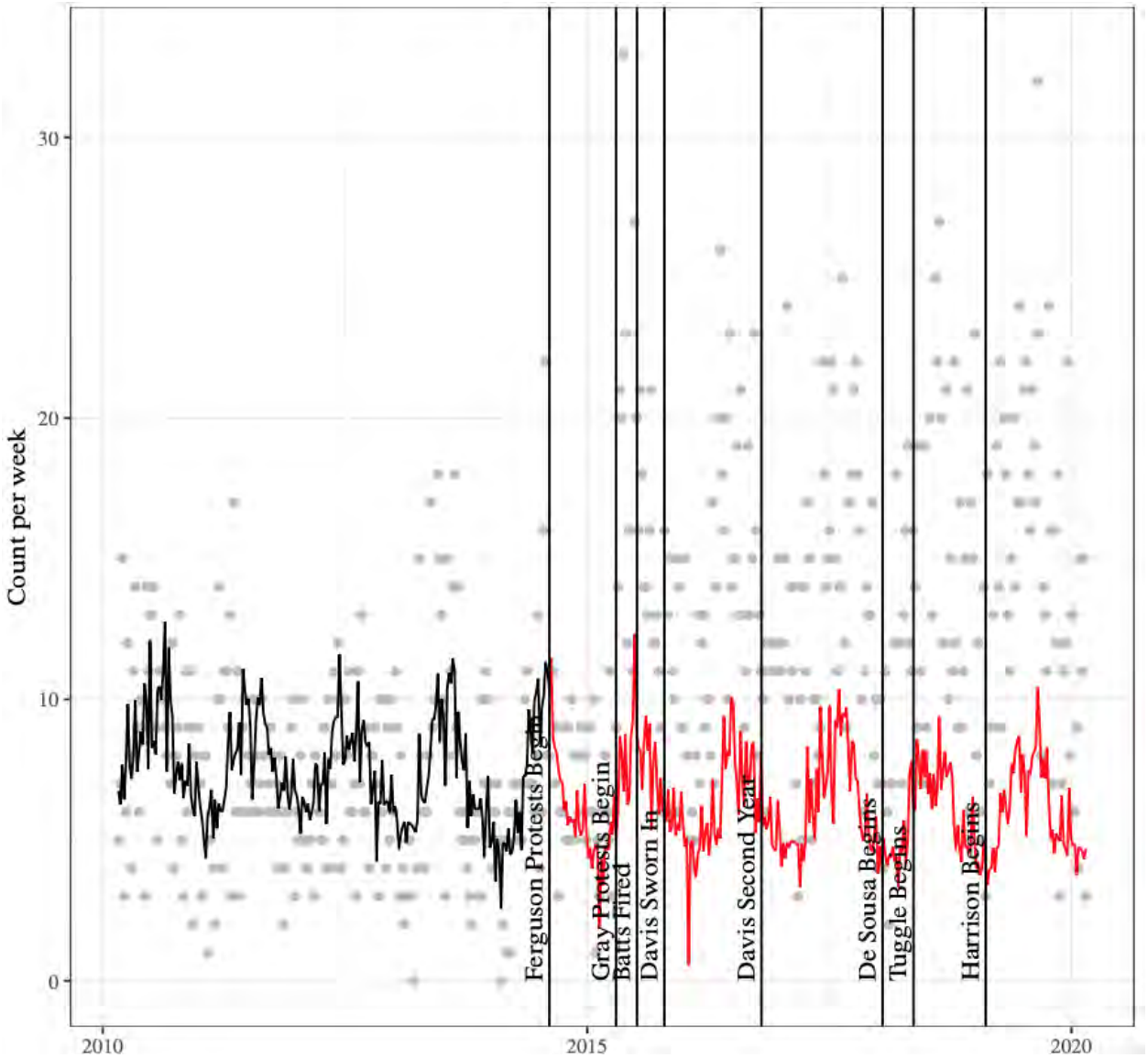


Figure 9. Total weekly shootings count (gray dots) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

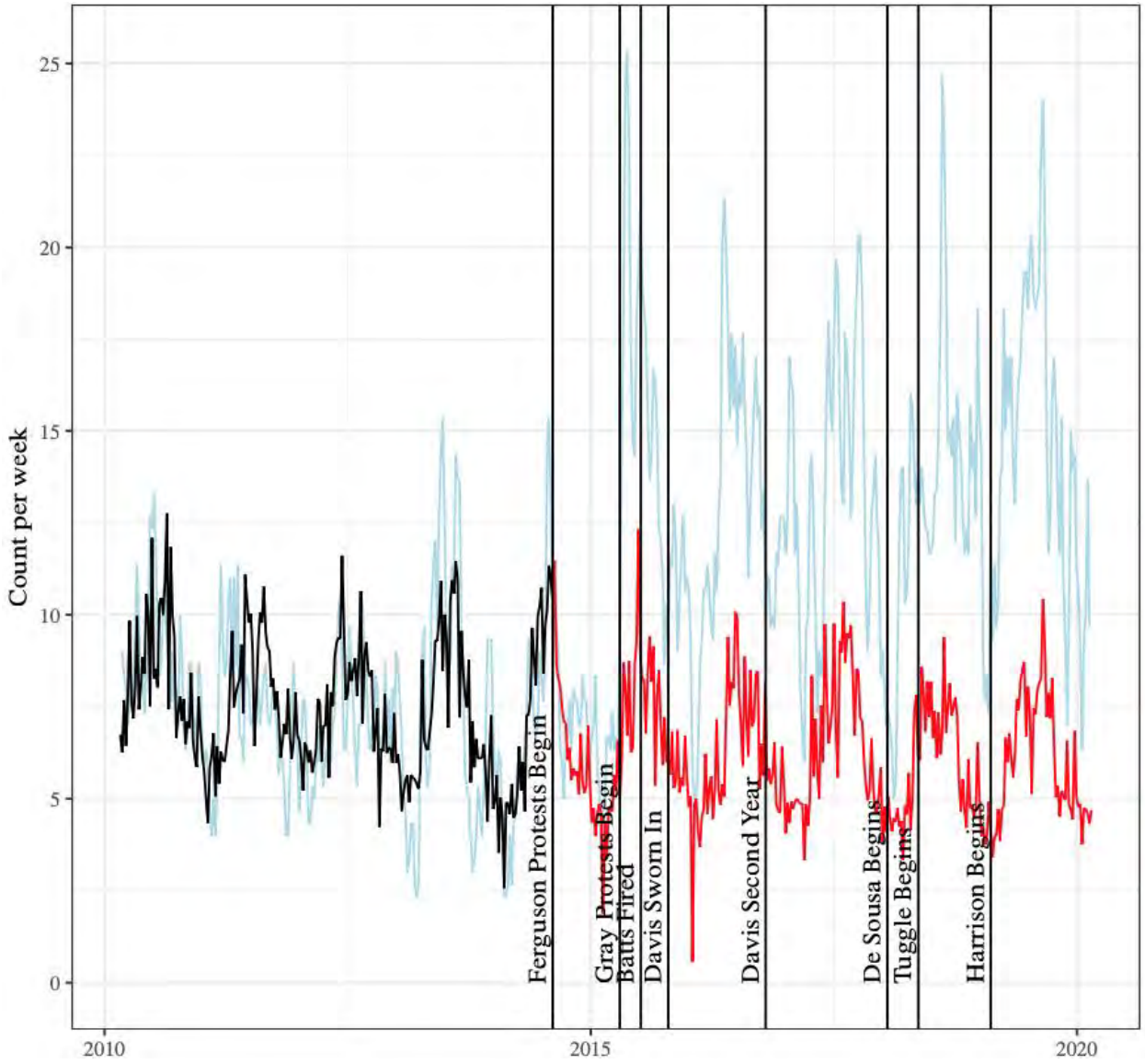


Figure 10. Total weekly shootings count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

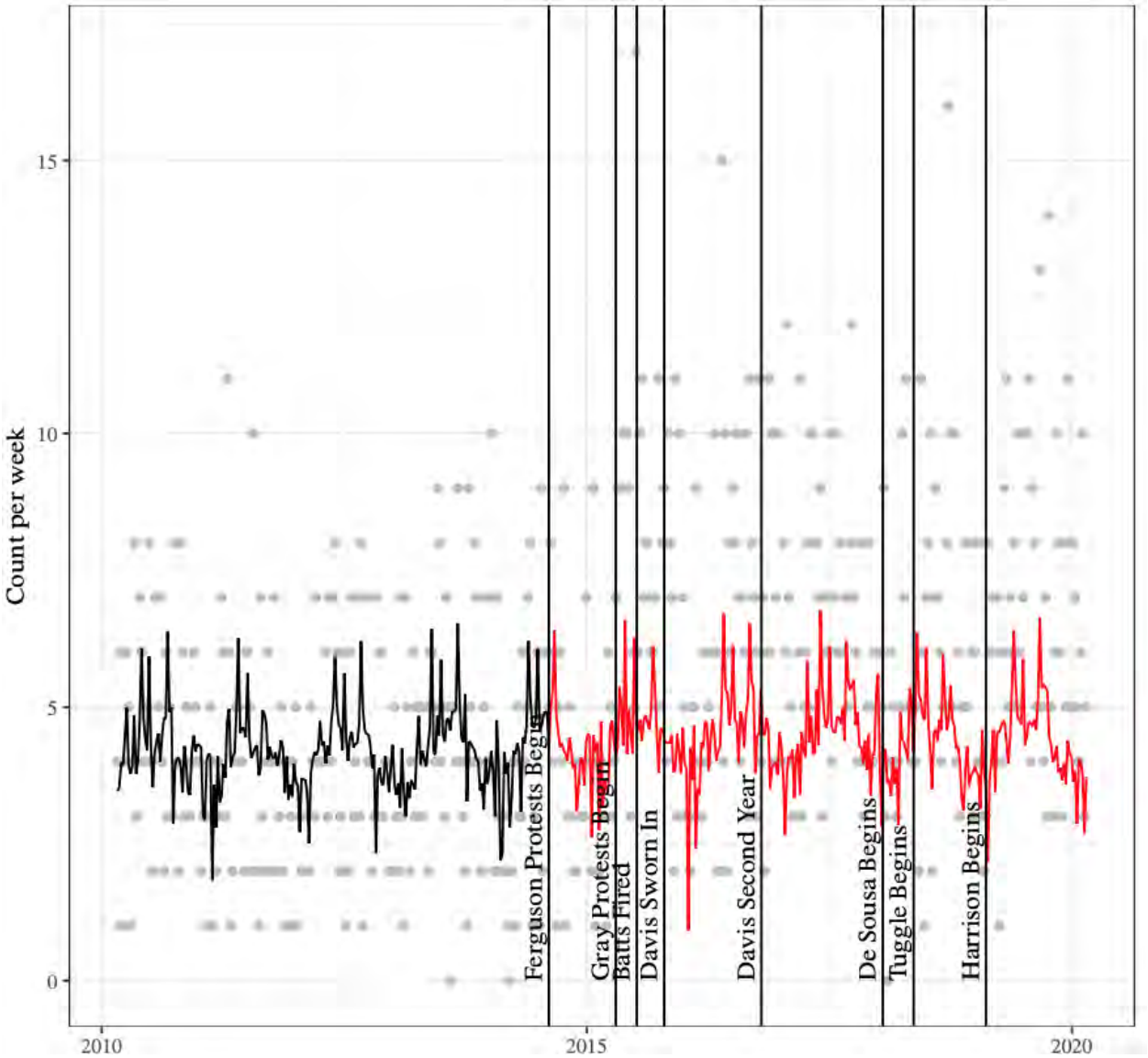


Figure 11. Total weekly homicide count (gray dots) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

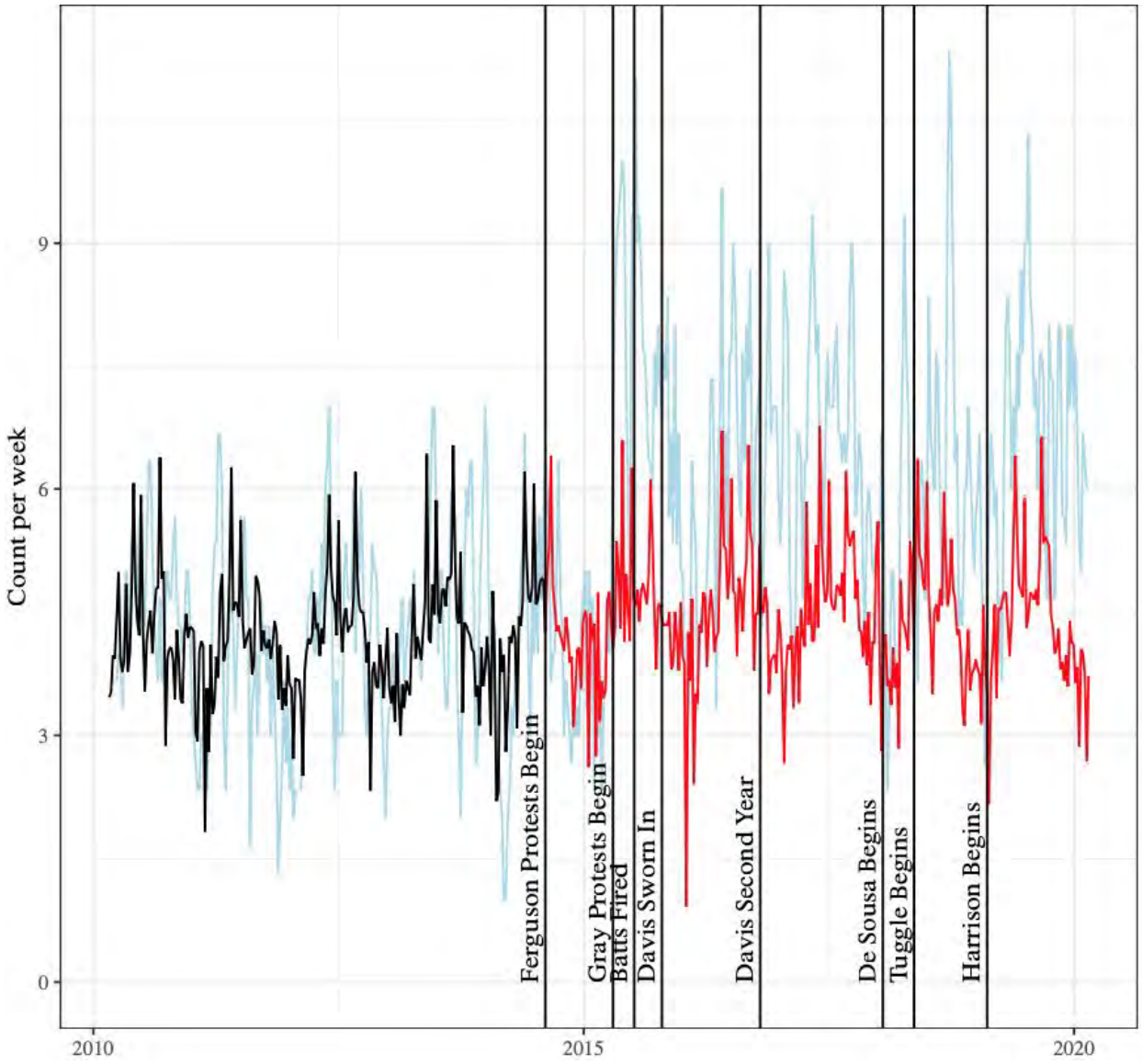


Figure 12. Total weekly homicide count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

The pattern of findings suggested by a visual inspection of Figures 9-12 can be estimated precisely using underlying models analogous to those presented in Table 1. The specific models that do so are presented in detail in Appendix 2 (see sections 4 and 5). Table 3 (see next page) combines estimated coefficients from these models in order to produce period-specific estimates of shootings and homicides for the city as a whole. In addition, Table 3 also offers results for each police district, using estimated coefficients from eighteen subsequent models in Appendix 2 (see sections 27-44).

For Table 3, the "baseline count" in the first column is the number of shootings and homicides for the 52 weeks of the year immediately before the Ferguson period (i.e., early August 2013 through early August 2014). The numbers in subsequent columns are the estimated average weekly totals, adjusted for seasonality, weather, and types of days. Because these periods differ in length, and because they start and end at different points in each year, the estimated average weekly totals are not simple averages of the raw values for shootings and homicides. With reference to Figures 9 and 11, the period-specific estimates in Table 3 are not the averages of the gray dots in these two figures. Instead, the estimates are the average differences between the gray dots and the jagged red line in each period, added to the appropriate estimated baseline count (and removing the contribution of the unrest week).

For a guide to interpretation, consider some comparisons in Table 3. In the year before the Ferguson period began, the city as a whole averaged 7.1 shootings per week. This average increased to a high of 17.9 shootings per week during the Gray period. During the periods when Davis was commissioner, the shooting rate declined to less than 14 per week. This level was still far above the baseline of 7.1 per week. Davis was then fired, according to the mayor (see above), because the shooting rate was still too high. Finally, shootings have increased slightly since Tuggle and Harrison took control of the BPD. As of March 1, 2020, the prior year's weekly average shooting rate was 15.4 per week, more than twice the 7.1 average observed for the baseline year before the Ferguson period. The other rows of the first panel show that the increases in shootings were widespread across police districts, with the largest relative increases as of 2020 occurring in the Central, Eastern, and Southeastern districts. The high point of shootings, during the Gray period, was more localized in the Western and Eastern districts. (For a map of the districts, see page 16 of Morgan and Pally 2016 or Figure 34 below.)

The homicide estimates in the second panel of Table 3 reveal similar patterns. The overall rate of increase is lower, and the spatial distribution is slightly different. However, homicides are elevated in nearly all districts in every period. And, as shown in the final column, the elevated level of homicides as of March 2020 is strongly related to the elevated level of shootings. One specific comparison should be offered. In the baseline year, the estimated homicide count was 224 (e.g., 52.14 weeks x 4.3 homicides per week). For the most recent time period since Harrison became commissioner, the estimated homicide count was 344 homicides (e.g., 52.14 * 6.6). This matches the actual raw count for 2019 very closely, which ended with 348 homicides. Thus, the current level of elevation in homicides is approximately 120 deaths per year.

Table 3. Adjusted estimates of weekly shootings and homicides by time period for the city as a whole and for each BPD police district separately

	Baseline count per week	Adjusted number for eight sequential periods: Ferguson period	Gray period	Davis transition	Davis first year	Davis last 15 months	De Sousa spring	Tuggle interregnum	Harrison first year
Shootings									
Northwestern	0.7	1.2	1.2	1.6	1.3	1.9	1.3	2.2	1.7
Northern	0.4	0.5	0.6	1.6	0.9	0.8	0.9	0.9	0.8
Northeastern	0.9	0.9	1.7	1.3	1.7	1.7	1.6	1.6	2.0
Western	1.2	1.7	4.7	1.9	2.5	2.5	2.3	2.3	2.4
Central	0.5	0.2	1.2	0.3	0.9	0.9	0.8	1.1	1.5
Eastern	1.1	1.1	4.2	1.9	2.3	1.8	2.0	2.4	2.7
Southwestern	1.0	1.2	1.9	2.6	1.8	1.5	1.9	1.6	1.5
Southern	0.7	0.7	1.7	1.7	1.6	2.0	1.1	1.6	1.5
Southeastern	0.5	0.5	0.8	0.7	0.8	0.7	1.0	1.3	1.4
Total shootings	7.1	8.1	17.9	13.5	13.7	13.7	12.8	14.9	15.4
Homicides									
Northwestern	0.7	0.6	0.9	0.7	0.5	0.7	0.5	0.5	0.6
Northern	0.4	0.3	0.4	0.7	0.3	0.5	0.5	0.4	0.5
Northeastern	0.5	1.0	1.3	1.1	1.0	1.0	0.8	1.0	1.2
Western	0.6	0.4	1.4	1.5	1.1	0.8	0.8	0.9	1.1
Central	0.3	0.3	0.2	0.4	0.3	0.4	0.3	0.4	0.2
Eastern	0.6	0.5	1.2	0.9	1.1	1.0	0.8	1.0	1.0
Southwestern	0.6	0.6	1.4	0.8	0.7	0.7	0.6	0.9	0.8
Southern	0.4	0.3	0.8	0.6	0.7	0.7	0.8	0.8	0.7
Southeastern	0.3	0.2	0.2	0.3	0.5	0.5	0.4	0.2	0.6
Total homicides	4.3	4.1	8.0	7.0	6.0	6.3	5.5	5.9	6.6

5.3. Percentage Changes in the Prevalence of Crime Incidents, Disaggregated by Type

In this section, we provide tabular summaries of period-specific estimates of change in the prevalence of crime incidents. We follow these summaries with graphical depictions of types of crime incidents that are of particular interest. For the tabular summaries, we first present updated estimates of types of changes reported in the original reports. Then, we offer wholly new estimates for the four intervals from 2016 through 2020. We scale all estimates by percentages to facilitate comparisons in the trajectories of low-prevalence crimes, such as homicides and carjackings, to high-prevalence crimes, such as common assaults and larceny.

Changes in crime incidents through Davis' first year as police commissioner. Table 4 (see next page) presents period estimates for all types of crime incidents for the Ferguson period through the first Davis period. The estimates are expressed as percentage change and as a percentage of the count in the baseline reference year (in particular, the weekly average for the 52 weeks before the Ferguson protests began). For both sets of numbers, the percentage scale is set by the baseline reference year. These numbers are presented in the first column of the table.

To understand the scaling, consider homicides again. For the Ferguson period, the weekly rate of homicides fell by 4.6 percent for the Ferguson period and then increased by 91.6 percent for the Gray period. The second panel then presents the rate of homicides as a percentage of the rate in the baseline reference year. For example, the 4.6 percent decline for the Ferguson period rendered the Ferguson period's homicide rate as 95.4 percent of the homicide rate for the baseline reference year. Then, the 91.6 percent increase for the Gray period rendered the Gray period's homicide rate as 186.9 percent of the homicide rate for the baseline reference year. Note that relationships among these latter numbers match those among the unscaled numbers from the bottom row of Table 3 above, subject to slight differences from rounding.[14]

The first three columns of estimated change in Table 4 were also estimated for the original report, with slightly different specifications and without BPD's edited data (see Table 2 in Morgan and Pally 2016). All of the estimates in Table 4 were also re-estimated for the updated report (see Tables 2 and 3 in Morgan 2016). While we regard the estimates in Table 4 of this final report as improved for the reasons discussed above, the improvements are small enough that the core conclusions from these periods for crime incidents do not require any meaningful revisions. See the prior section for these conclusions, which plug in values from Table 4 to demonstrate why we stand by the conclusions from 2016.

[14] The value of 4.1 in the bottom row of Table 3, when divided by 4.3, is 0.953. The value of 8.0, when divided by 4.3, is 1.860. If the raw numbers in Table 3 were not rounded to the first decimal place, such division would deliver the exact same numbers as in Table 4, after multiplying by 100 to place them on a percent-change scale.

Table 4. Baseline and percentage change in the weekly count of recorded crime incidents from the Ferguson period through Davis' first year

	Baseline count per week	Adjusted percentage change from prior period					Adjusted percentage of baseline during period			
		Ferguson period	Gray period	Unrest period	Davis transition	Davis first year	Ferguson period	Gray period	Davis transition	Davis first year
Homicide	4.3	-4.6	91.6	23.5	-23.0	-23.2	95.4	186.9	163.9	140.8
Shooting	7.1	13.6	138.3	-40.4	-61.9	2.9	113.6	252.0	190.1	193.0
Rape	5.3	-7.1	29.7	4.1	-36.9	20.9	92.9	122.5	85.7	106.6
Robbery (carjacking)	2.6	65.9	43.8	377.4	-8.4	120.0	165.9	209.7	201.3	321.3
Robbery (street)	51.5	0.4	33.0	-31.4	-16.4	9.8	100.4	133.4	117.0	126.8
Robbery (commercial)	11.0	20.0	88.5	-7.7	-66.2	-2.2	120.0	208.5	142.3	140.0
Robbery (residence)	9.8	-10.2	21.7	9.4	-28.9	19.5	89.8	111.5	82.6	102.1
Aggravated assault	82.3	5.4	30.5	59.0	-11.6	7.3	105.4	135.9	124.4	131.7
Common assault	157.4	-12.4	1.5	-29.7	-3.0	6.5	87.6	89.1	86.1	92.5
Burglary	139.0	0.3	13.3	187.3	-2.1	-4.3	100.3	113.6	111.5	107.2
Larceny from auto	125.6	6.2	15.6	-61.4	-2.3	-16.6	106.2	121.8	119.5	102.9
Larceny	226.7	-9.9	-13.7	-25.5	3.6	-8.2	90.1	76.4	80.0	71.8
Auto theft	79.3	-9.7	36.4	-23.4	-10.6	-8.7	90.3	126.7	116.1	107.4
Arson	4.3	18.0	23.1	646.3	9.0	-3.2	118.0	141.1	150.1	146.9
Total	913.2	-4.1	12.1	13.8	-5.1	-2.7	95.9	108.0	102.9	100.2

Notes: The unrest period is modeled with a "spike" specification, and this modeling choice removes it from the calculation of cumulated change in the second panel.

Changes in crime incidents through Harrison's first year as police commissioner. Table 5 (see next page) offers analogous estimates for the final four time periods considered: from Davis' last 15 months as commissioner through Harrison's first year as commissioner. The same baseline count is used to scale the estimated percentages.

Much could be written on the patterns in Table 5, and we will hold our overall conclusions for the final section of this report. Nonetheless, it should be clear from the final four columns of Table 5 that all categories of violent crime remain substantially above the baseline reference year before the Ferguson protests and the unrest in Baltimore. The variation across police commissioners from late 2016 through early 2020 is small, whether one considers homicides, shootings, carjackings, street robbery, or aggravated assault.

In contrast, property crimes – burglary, larceny from auto, other types of larceny, and auto theft – have trended lower, especially during Harrison's first year. The decline in incidents of property crime is consistent with the decline in commercial robbery during Harrison's first year as well. It is therefore possible that the 2019 crime plan, which has shifted resources even more heavily toward particular hotspots, has reduced property crime. Nonetheless, during the same period, violent crime did not decline meaningfully, except perhaps for street robbery. Thus, it would be inappropriate to infer that violent crime has been reduced just because of the overall 9.6 percent decline in total crime incidents during Harrison's first year (see the last row of Table 5). While it is true that the total number of crime incidents is now lower than in the baseline year, that decline does not reflect what city residents, and its leadership, have good reason to care most about.

Finally, it is possible that the decline in property crime is an artefact. It could be that police officers have pulled back from some types of routine policing, and thus fewer incidents of larceny from auto, for example, have been recorded. According to this line of thinking, fewer genuine incidents of property crime have been noticed and recorded by officers patrolling their posts. It is also possible that fewer incidents have been reported to the police because the legitimacy of the department has eroded further as the GTTF scandal has unfolded. We will return to these matters of interpretation in the concluding section of this report.

Graphical displays of change for selected types of crime. Figures 13-20 (see subsequent pages) offer times series plots for types of crime incidents, analogous to Figures 6, 8, 10, and 12 above. These figures are again drawn from Appendix 2, where crime-incident-specific analogs to Table 1 can be found. Figure 13 is the most dramatic, insofar as it shows the relentless increase in carjackings. Other figures present trends for street robbery, aggravated assault, common assault, burglary, larceny from automobiles, and larceny. Recall also that similar figures for shootings and homicides were presented above in Figures 10 and 12. Altogether, the figures are an alternative way to understand the changes that are summarized in a targeted fashion in Tables 3, 4, and 5. Both types of representations should not be over-interpreted. Inherent variability is prominent, especially for low-prevalence types of crime.

Table 5. Baseline and percentage change in the weekly count of recorded crime incidents from Davis' second year through Harrison's first year

	Baseline count per Week	Adjusted percentage change from prior period				Adjusted percentage of baseline during period			
		Davis last 15 months	De Sousa spring	Tuggle interregnum	Harrison first year	Davis last 15 months	De Sousa spring	Tuggle interregnum	Harrison first year
Homicide	4.3	5.2	-17.9	9.9	16.6	146.0	128.1	138.0	154.6
Shooting	7.1	-0.4	-13.2	30.5	6.4	192.6	179.4	209.9	216.4
Rape	5.3	25.2	4.2	-15.1	-23.2	131.8	136.0	120.9	97.7
Robbery (carjacking)	2.6	136.3	-100.2	41.5	73.0	457.6	357.4	398.9	471.9
Robbery (street)	51.5	12.0	-22.4	10.0	-13.2	138.9	116.4	126.4	113.2
Robbery (commercial)	11.0	39.6	-48.2	29.9	-44.1	179.6	131.4	161.2	117.2
Robbery (residence)	9.8	16.6	7.6	-22.5	-6.1	118.7	126.3	103.8	97.7
Aggravated assault	82.3	23.6	-12.1	13.5	-5.7	155.3	143.2	156.7	151.0
Common assault	157.4	19.4	-6.7	5.5	-4.1	111.9	105.3	110.8	106.7
Burglary	139.0	8.8	-21.0	-4.1	-11.4	116.0	95.0	90.9	79.5
Larceny from auto	125.6	1.3	-11.0	21.1	-21.5	104.2	93.1	114.2	92.8
Larceny	226.7	-0.1	-8.9	14.6	-6.8	71.7	62.8	77.4	70.6
Auto theft	79.3	8.5	-10.5	-5.9	-9.5	115.8	105.4	99.4	90.0
Arson	4.3	-0.1	-43.6	-21.2	-1.9	146.8	103.1	82.0	80.0
Total	913.2	9.7	-12.5	8.5	-9.6	109.9	97.4	105.9	96.3

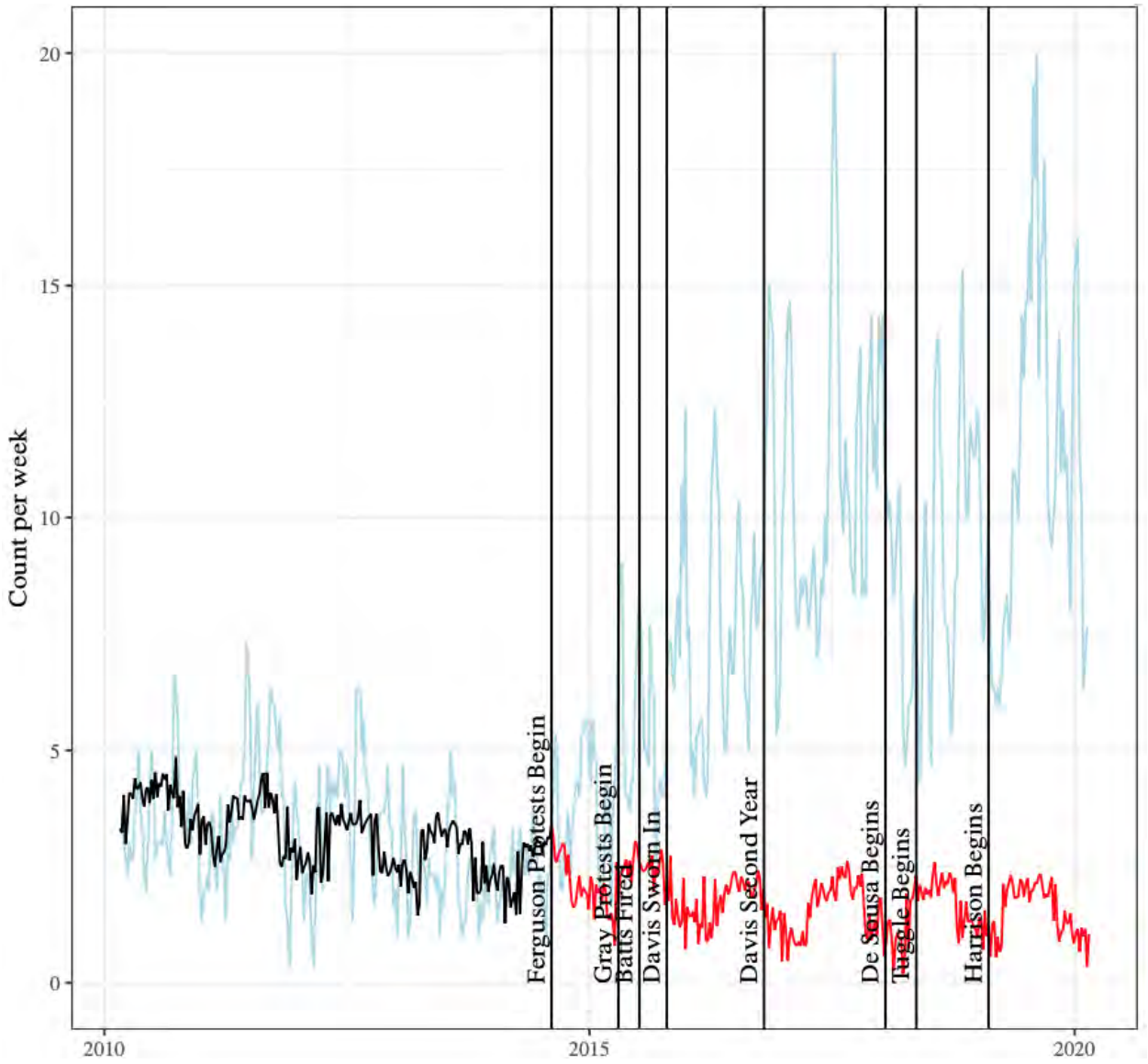


Figure 13. Total weekly carjacking count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

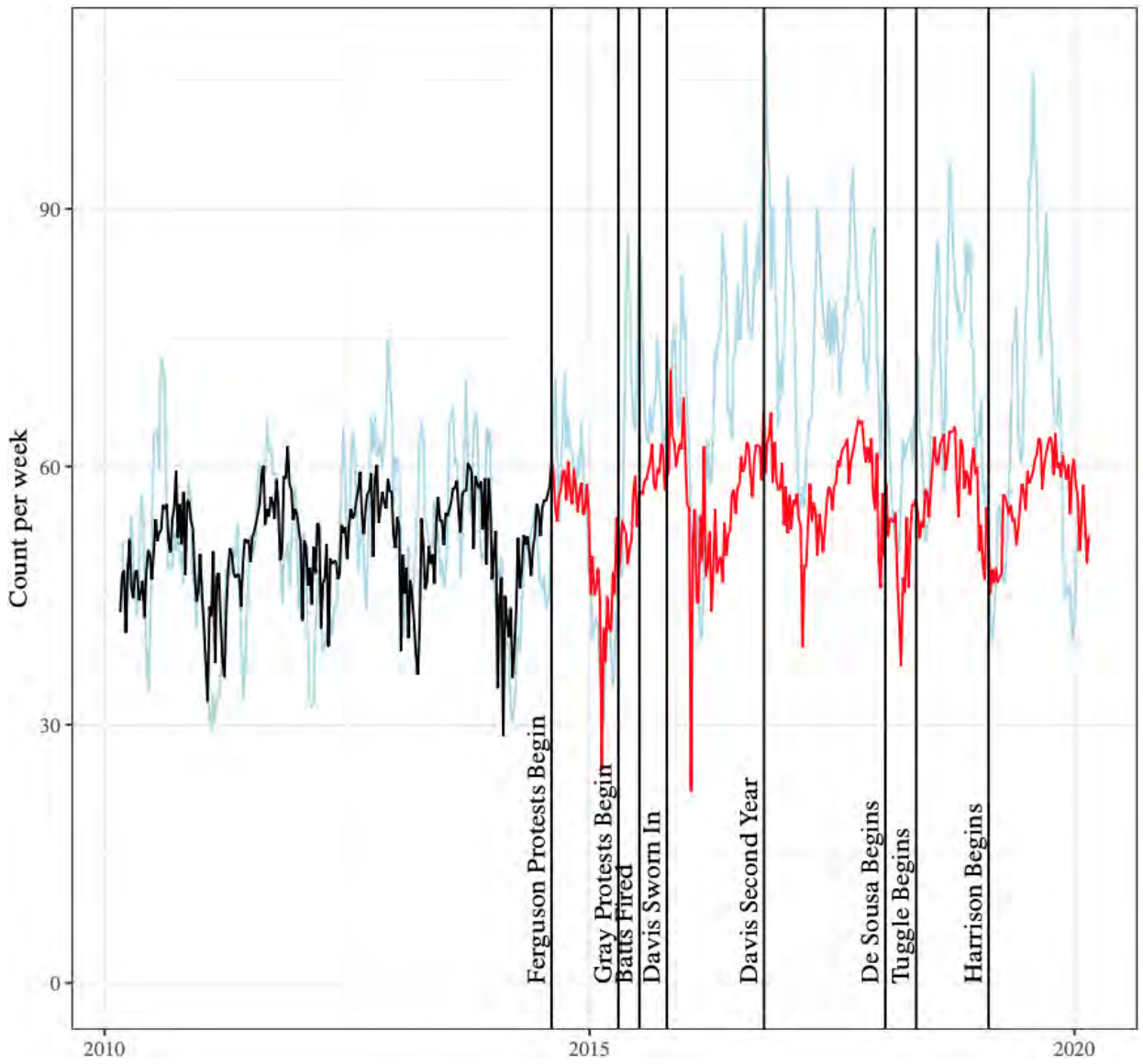


Figure 14. Total weekly street robbery count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

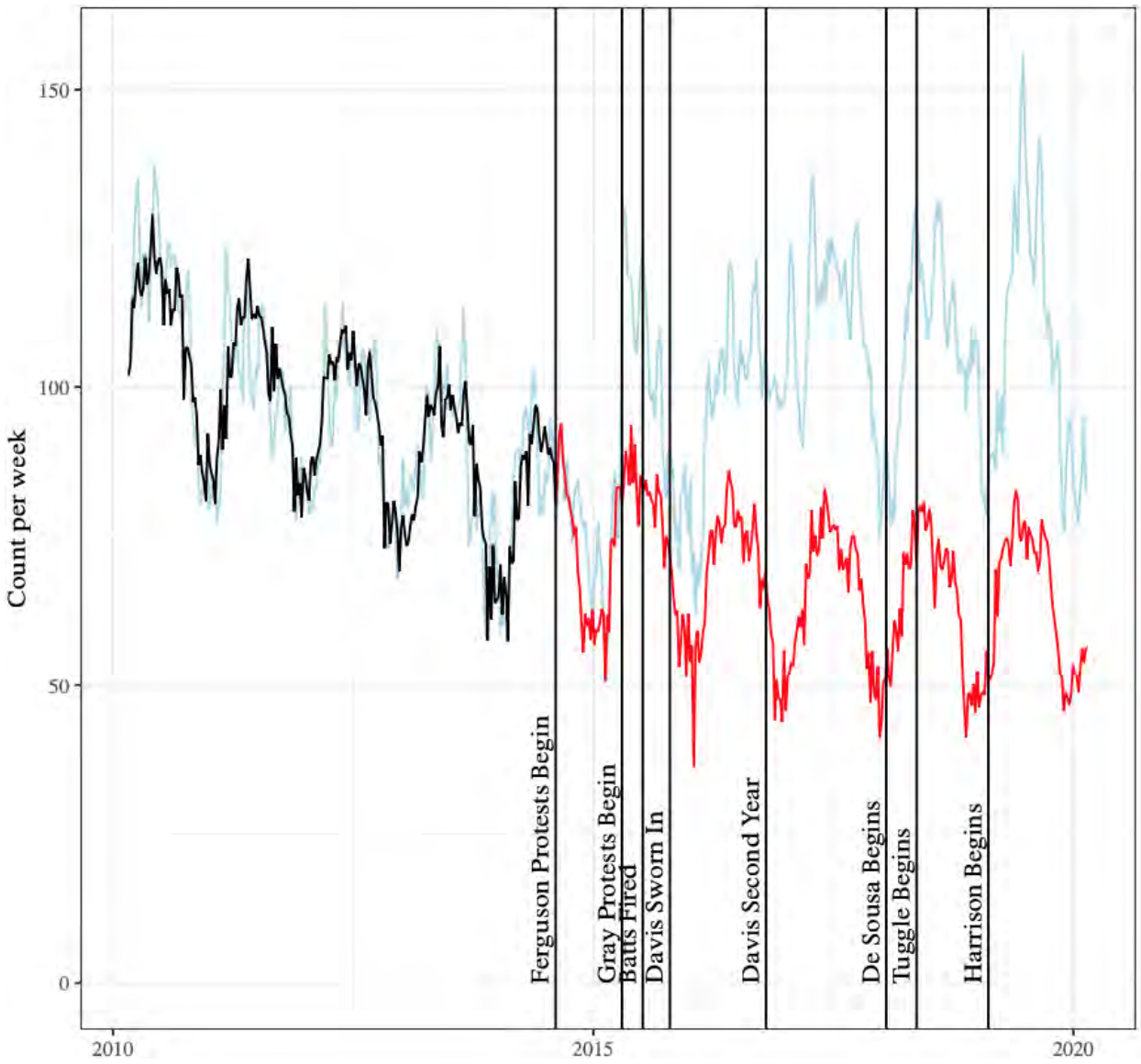


Figure 15. Total weekly aggravated assault count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

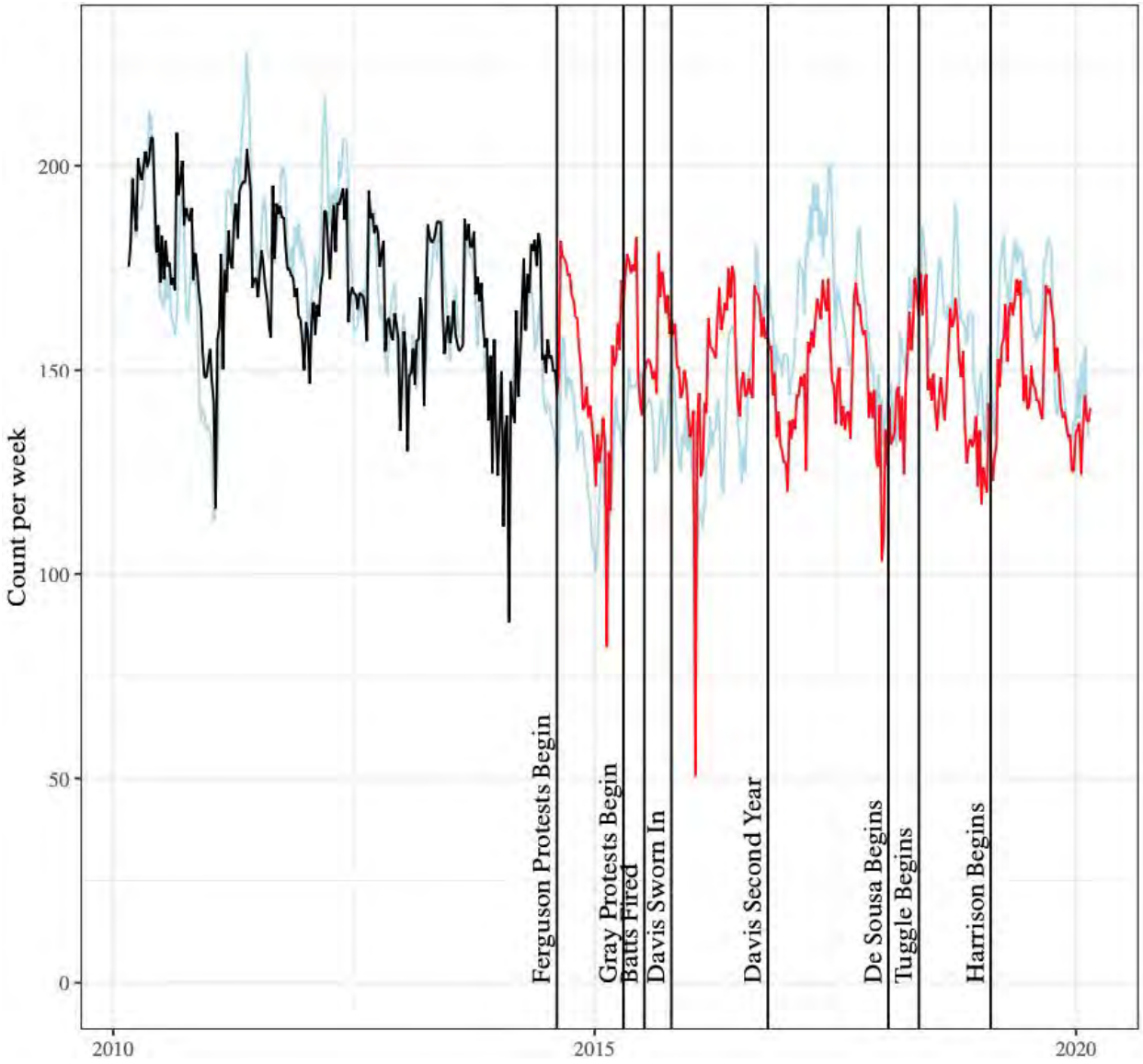


Figure 16. Total weekly common assault count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

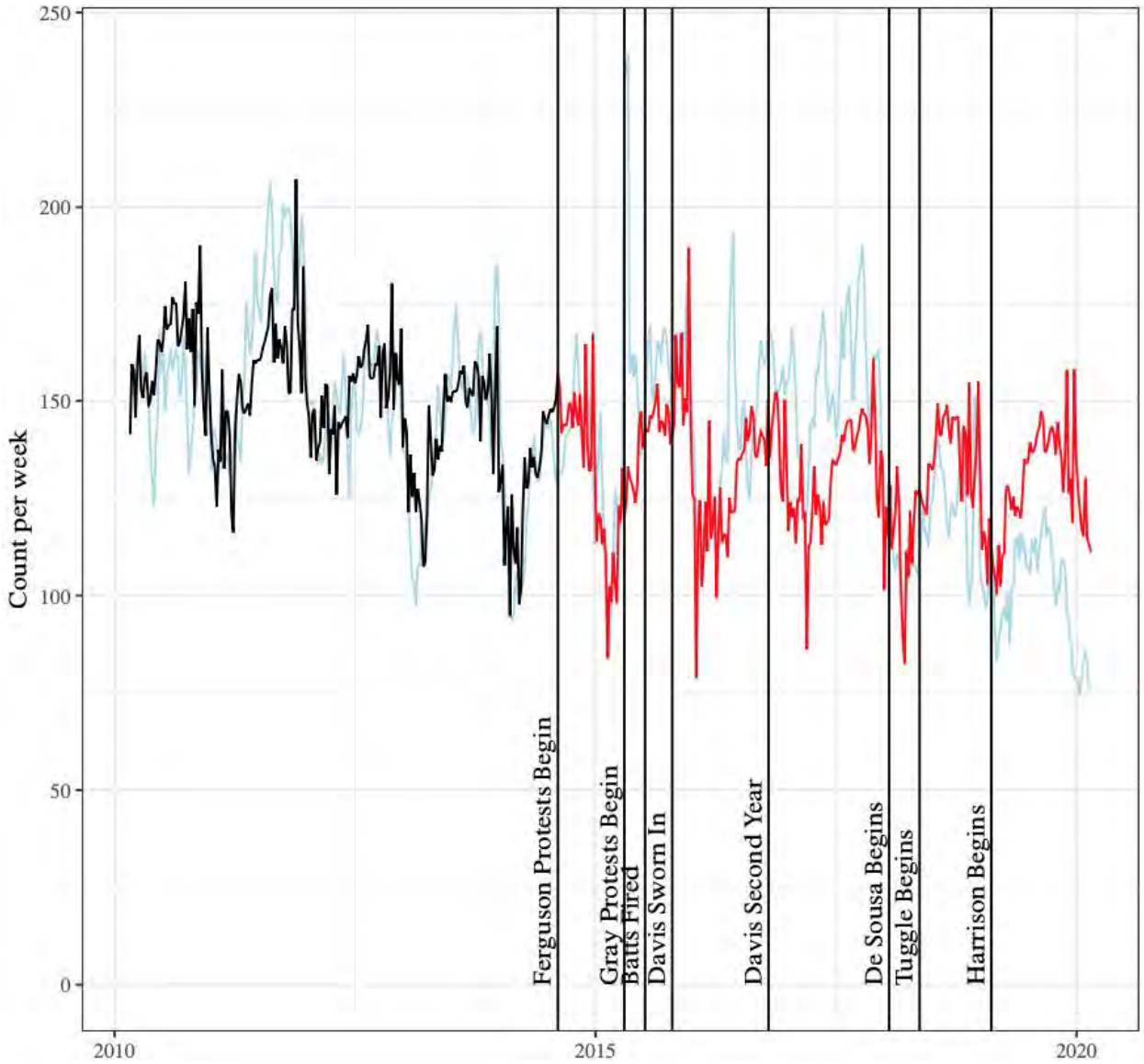


Figure 17. Total weekly burglary count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

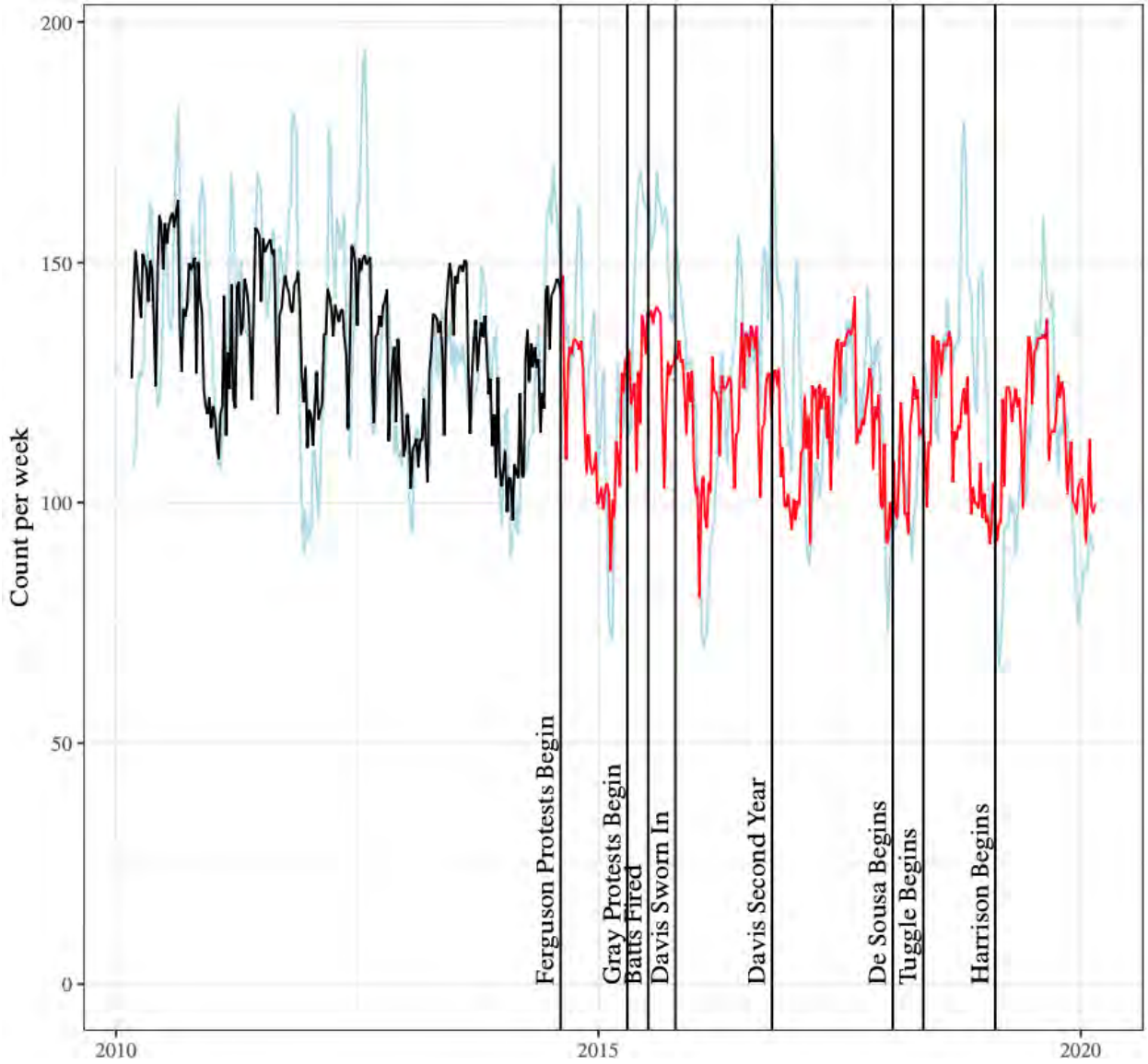


Figure 18. Total weekly larceny from automobiles count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

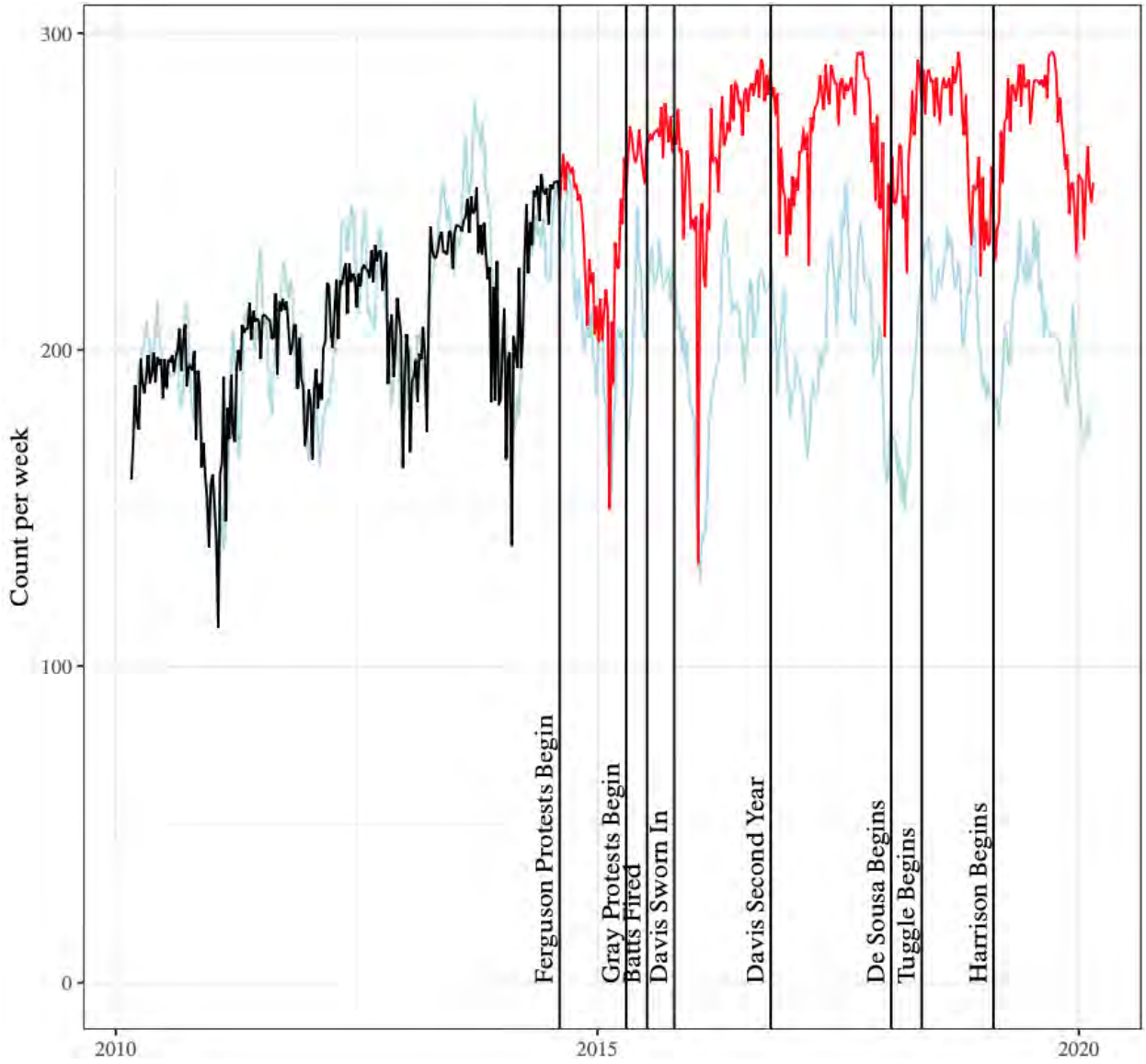


Figure 19. Total weekly larceny count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

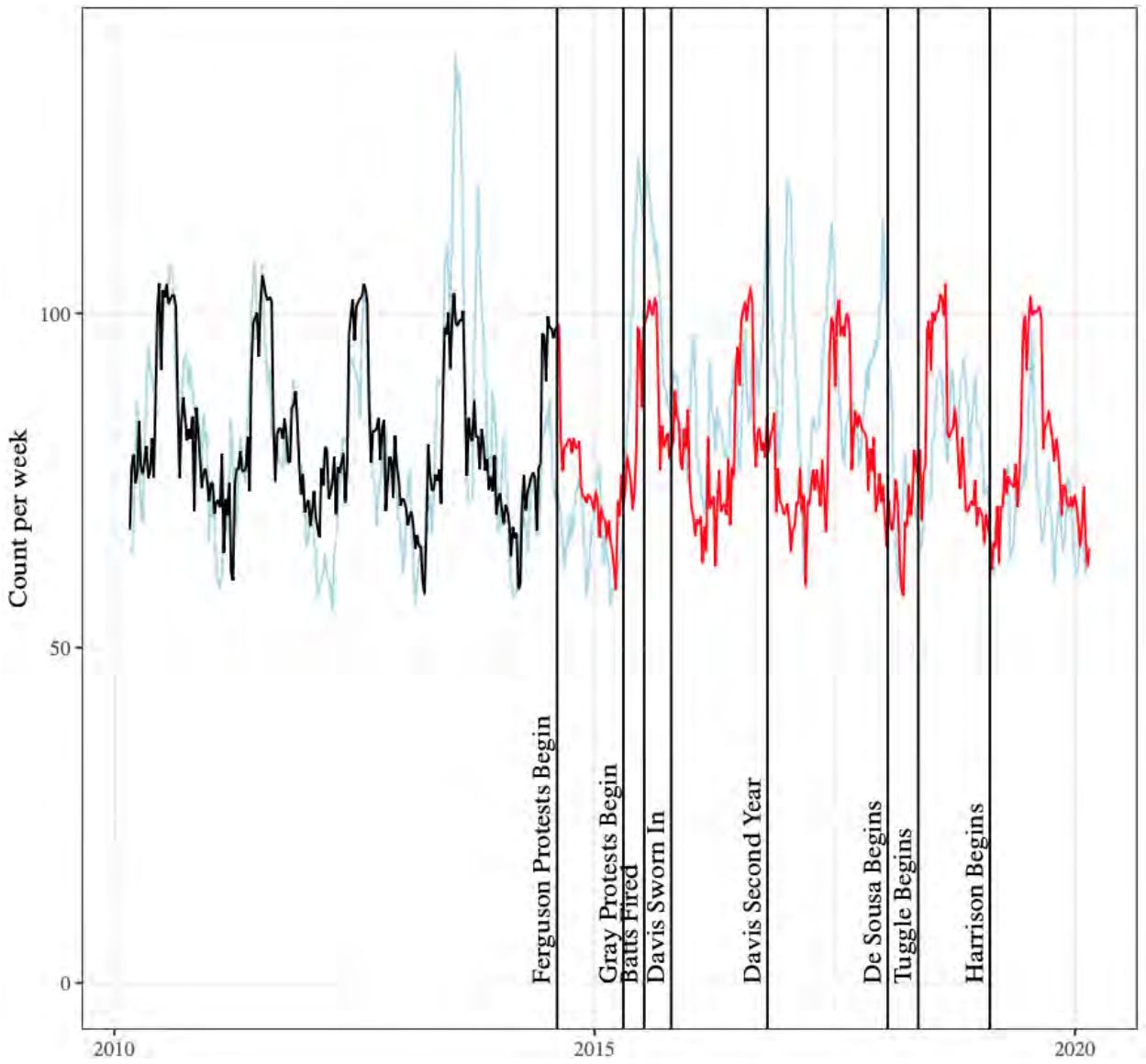


Figure 20. Total weekly automobile theft count (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

5.4. Percentage Changes in the Prevalence of Arrests, Disaggregated by Type

In this section, we provide parallel tabular summaries of period-specific estimates of change in the prevalence of arrests, again followed by graphical displays of types of arrests that are of particular interest. We follow the same order as was the case for our presentation of types of crime incidents. We will not repeat the guidance on how to interpret the percentage changes.

Changes in arrests through Davis' first year as police commissioner. Table 6 (see next page) presents period estimates for all types of arrests for the Ferguson period through the first Davis period. The first three columns of estimated change in Table 6 were estimated for the original report (see Table 5 in Morgan and Pally 2016), but with slightly different specifications, without BPD's edited data, and using a slightly different coding of arrests (explained above). These type-specific effects were not re-estimated for the updated report in 2016 (but see Tables 6 and 7 in Morgan 2016 for estimates of changes in arrest totals).

As with crime incidents, we regard the estimates in Table 6 of this final report as improved for the reasons discussed above. The improvements are small enough that the core conclusions from these periods do not require any meaningful revisions. See the prior section for these conclusions, which plug in values from Table 6 to demonstrate why we stand by the conclusions we formulated in 2016.

Table 6. Baseline and percentage change in the weekly count of arrests from the Ferguson period through Davis' first year

	Baseline count per week	Adjusted percentage change from prior period					Adjusted percentage of baseline during period			
		Ferguson period	Gray period	Unrest period	Davis transition	Davis first year	Ferguson period	Gray period	Davis transition	Davis first year
Murder (and attempt)	6.4	4.1	-28.0	-59.8	33.4	-12.7	104.1	76.1	109.5	96.8
Arson	1.3	-29.3	-22.2	62.0	53.6	-2.5	70.7	48.5	102.1	99.6
Robbery	24.7	41.5	-28.5	-44.6	44.3	-30.0	141.5	113.0	157.3	127.3
Aggravated assault	24.9	-9.6	-21.6	-31.2	9.3	-1.7	90.4	68.7	78.0	76.3
Deadly weapon	21.2	-18.6	-2.6	-28.0	46.9	-20.1	81.4	78.8	125.8	105.7
Common assault	90.9	-14.3	-6.9	-42.2	2.8	-0.5	85.7	78.8	81.6	81.1
Sex offense (and rape)	14.9	-11.7	-38.8	171.0	45.6	-31.4	88.3	49.5	95.1	63.8
Domestic	3.7	-46.7	17.4	-20.7	-26.9	20.2	53.3	70.7	43.8	64.0
Non-deadly weapon	1.2	2.9	-39.2	12.9	25.2	39.9	102.9	63.7	88.9	128.7
Burglary	14.2	-4.9	-19.3	266.0	11.0	-20.4	95.1	75.9	86.9	66.5
Larceny	41.8	-5.5	-40.8	2.6	17.4	-3.3	94.5	53.7	71.1	67.8
Court non-compliance	105.1	1.9	-35.2	-30.2	21.0	-11.2	101.9	66.8	87.8	76.5
Property destruction	6.4	-27.1	-4.8	48.6	12.2	-6.4	72.9	68.1	80.4	74.0
Forgery, fraud, extort.	2.0	17.7	-64.0	1.1	1.7	9.4	117.7	53.7	55.4	64.8
Police non-compliance	11.3	-38.0	-38.3	-13.6	-7.1	10.3	62.0	23.7	16.6	26.8
Driving violation	15.1	-5.9	-46.6	-42.2	36.6	-22.1	94.1	47.4	84.0	61.9
Trespassing	11.8	-7.0	-73.8	-31.0	15.5	5.2	93.0	19.2	34.6	39.8
Drug	294.6	-43.9	-35.5	-22.5	16.0	2.9	56.1	20.5	36.5	39.5
Loitering, vagabond	1.4	-58.8	-31.3	125.6	-19.3	28.8	41.2	9.9	0.0	19.4
Disorderly conduct	20.4	-21.1	-58.1	886.9	23.7	1.6	78.9	20.8	44.5	46.0
Prostitution	12.0	-33.5	-39.7	-36.7	-9.9	23.2	66.5	26.8	17.0	40.1
Temporarily detained	9.3	-7.6	-28.6	-48.4	-6.1	21.9	92.4	63.7	57.6	79.5
Unknown	49.1	-22.7	-23.3	200.2	5.4	-9.9	77.3	54.0	59.3	49.5
Ungrouped	7.7	18.2	-56.8	78.7	27.6	-6.0	118.2	61.5	89.1	83.0
Total	791.5	-21.5	-31.0	21.4	16.1	-3.3	78.5	47.5	63.6	60.3

Notes: The unrest period is modeled with a "spike" specification, and this modeling choice removes it from the calculation of cumulated change in the second panel.

Changes in arrests through Harrison's first year as police commissioner. Table 7 (see next page) offers analogous estimates for the final four time periods considered. As with crime incidents, much could be written on the patterns in Table 7. We will continue to hold our overall conclusions for the final section of this report. Nonetheless, it should be clear from the final four columns of Table 7 that arrests continue to decline progressively, with the rate of overall decline accelerating into Harrison's first year.

Some types of arrests, which used to be common, have fallen dramatically, such as for police non-compliance and disorderly conduct. They were only 12.5 and 19.2 percent, respectively, of the levels in the baseline reference year. It may be reasonable to conclude, as we have in prior reports, that these declines reflect a greater propensity for policing in Baltimore to adhere to constitutional standards. Other declines in arrests are the result of explicit policy change, such as lightening up on arrests for drug possession (and presumably inferring substantially less "intent" to distribute). Here, the very large number of arrests from the baseline reference year (294.6 per week!) has declined to only 18.2 percent of that level.

Two other factors should be noted. If crimes were being "solved," then in periods of rising crime arrests should also be rising. It is hard to see positive trends in this regard for violent crime, such as murder, attempted murder, robbery, and aggravated assault. Declines in the homicide clearance rate, which may reflect over-worked investigative units, could be a crucial factor for why arrests in our murder group declined (see Figure 2 above for the relevant FOP claim). It is also possible, as has been widely reported in the media, that these types of arrests have declined because police legitimacy has declined, reducing the willingness of witnesses to support the BPD's investigations.

Overall, it would be inappropriate to regard the decline in the total arrest count as either uniformly positive or uniformly negative. As with the distinction between violent crime incidents and property crime incidents in the last section, disaggregation is key to understanding the trends.

Graphical displays of change for selected types of arrests. Figures 21-33 (see subsequent pages) offer times series plots for types of arrests. These figures are drawn from Appendix 3, where arrest-specific analogs to Table 2 can be found. The types of arrests presented first are murder and attempted murder, robbery, aggravated assault, deadly weapon, common assault, burglary, larceny, and property destruction. These patterns, as implied by Table 6 and 7, are much less dramatic than those that follow for police non-compliance, driving violations, trespassing, non-violent drug-related arrests, and disorderly conduct. As with crime incidents, these figures are an alternative way to understand the changes that are summarized in a targeted fashion in Tables 6 and 7. And, again, both types of representations should not be over-interpreted: inherent variability is prominent, especially for low-prevalence types of arrests.

Table 7. Baseline and percentage change in the weekly count of arrests from Davis' second year through Harrison's first year

	Baseline count per Week	Adjusted percentage change from prior period				Adjusted percentage of baseline during period			
		Davis last 15 months	De Sousa spring	Tuggle interregnum	Harrison first year	Davis last 15 months	De Sousa spring	Tuggle interregnum	Harrison first year
Murder (and attempt)	6.4	8.2	-29.0	12.8	-11.4	105.0	75.9	88.7	77.3
Arson	1.3	-19.1	-13.0	16.5	-13.0	80.5	67.5	84.0	70.9
Robbery	24.7	-10.4	-19.5	10.3	-3.6	116.9	97.4	107.6	104.0
Aggravated assault	24.9	7.1	-2.0	-5.5	12.7	83.4	81.4	75.9	88.6
Deadly weapon	21.2	-17.3	16.4	-15.0	-6.4	88.3	104.7	89.8	83.4
Common assault	90.9	8.4	-0.3	-6.0	3.1	89.5	89.2	83.2	86.2
Sex offense (and rape)	14.9	1.8	-31.6	26.1	-12.2	65.6	34.0	60.1	48.0
Domestic	3.7	18.5	-9.9	-39.5	34.8	82.5	72.6	33.1	68.0
Non-deadly weapon	1.2	-34.6	-20.3	22.3	-31.2	94.1	73.8	96.1	64.8
Burglary	14.2	6.9	5.3	-6.6	-7.3	73.4	78.7	72.1	64.8
Larceny	41.8	-6.8	-0.5	-7.6	-4.9	61.0	60.5	52.9	47.9
Court non-compliance	105.1	-3.8	3.7	1.4	-1.4	72.7	76.5	77.9	76.5
Property destruction	6.4	-6.3	-15.6	19.9	-14.5	67.6	52.1	72.0	57.5
Forgery, fraud, extort.	2.0	-11.6	0.2	-13.5	-2.4	53.1	53.3	39.8	37.4
Police non-compliance	11.3	-12.7	9.3	-4.0	-7.0	14.2	23.5	19.5	12.5
Driving violation	15.1	-29.0	-16.4	12.9	-4.3	33.0	16.6	29.5	25.1
Trespassing	11.8	-10.1	-2.5	-17.0	3.7	29.7	27.3	10.2	14.0
Drug	294.6	-5.3	-5.0	-0.6	-10.4	34.2	29.1	28.6	18.2
Loitering, vagabond	1.4	-3.3	-0.1	-17.0	7.2	16.1	16.1	0.0	6.3
Disorderly conduct	20.4	-19.0	-6.8	0.4	-1.4	27.0	20.2	20.6	19.2
Prostitution	12.0	-10.2	67.2	-45.1	-11.7	29.9	97.1	52.0	40.3
Temporarily detained	9.3	-8.2	18.9	-30.5	-2.1	71.2	90.1	59.6	57.5
Unknown	49.1	-11.1	-13.1	1.6	-0.4	38.4	25.3	26.9	26.5
Ungrouped	7.7	-13.4	-5.7	-1.6	-0.4	69.7	63.9	62.3	61.9
Total	791.5	-4.7	-2.6	-1.9	-4.7	55.6	53.0	51.0	46.3

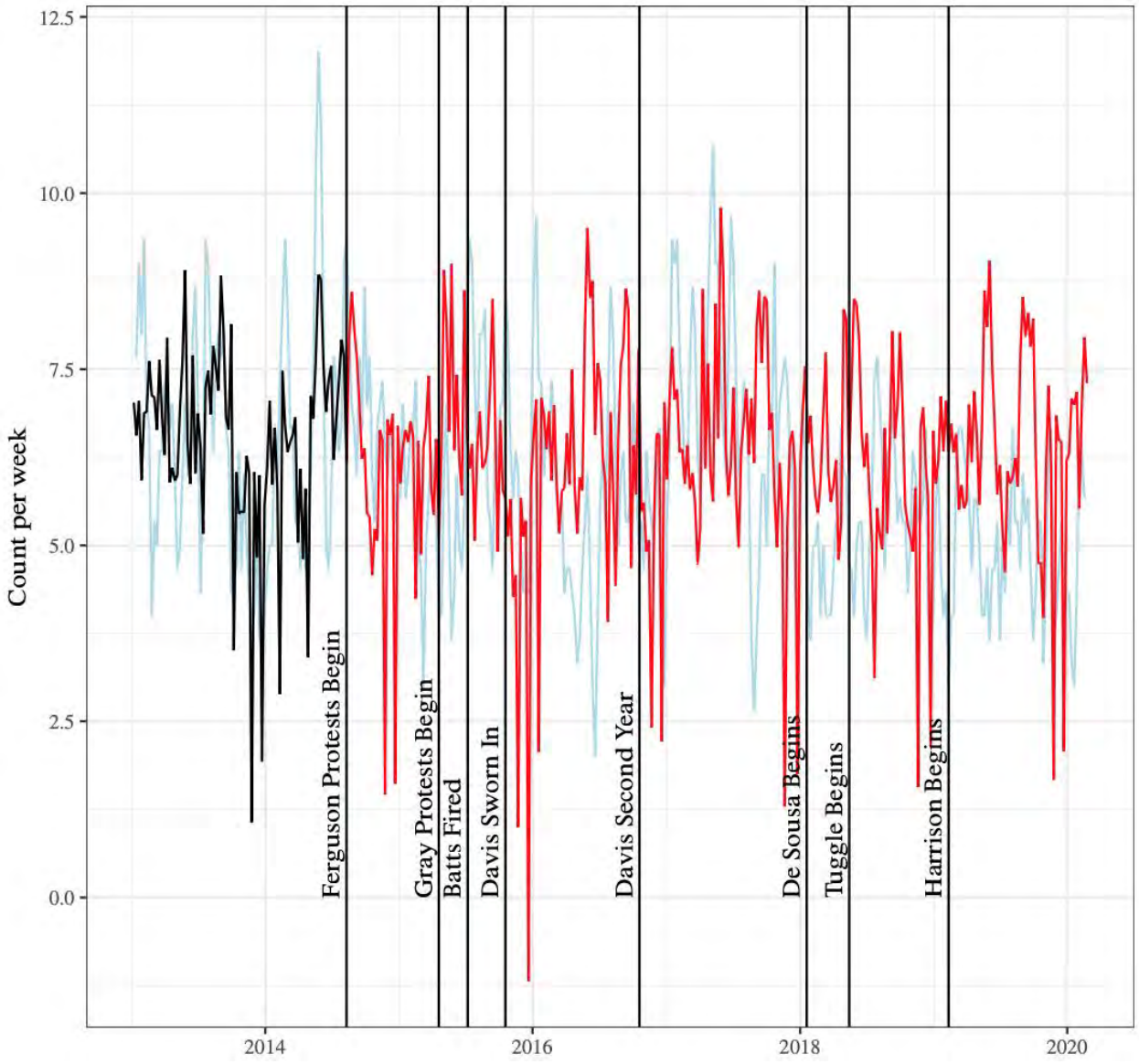


Figure 21. Total weekly arrest counts for murder and related charges (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

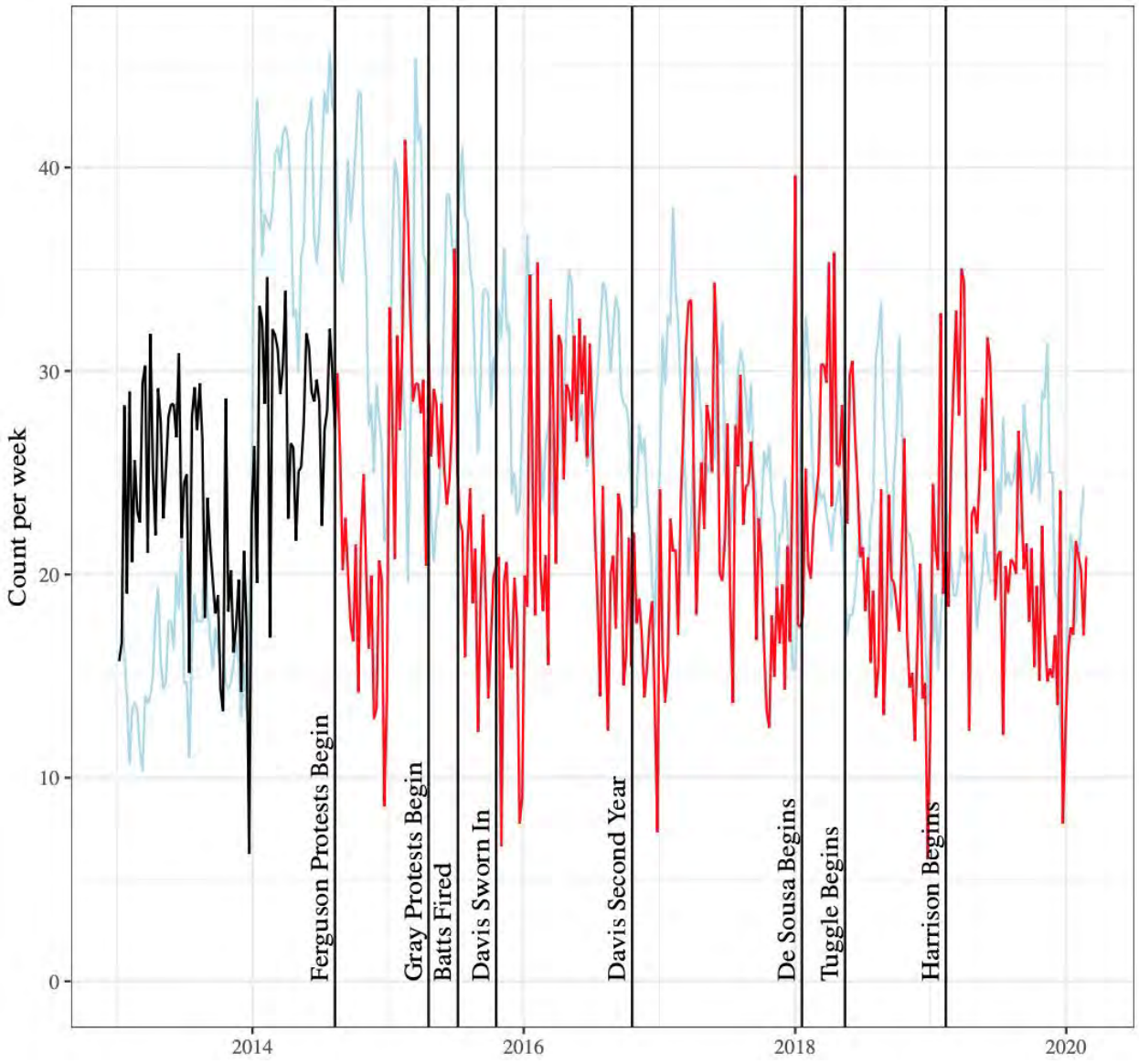


Figure 22. Total weekly arrest count for robbery (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

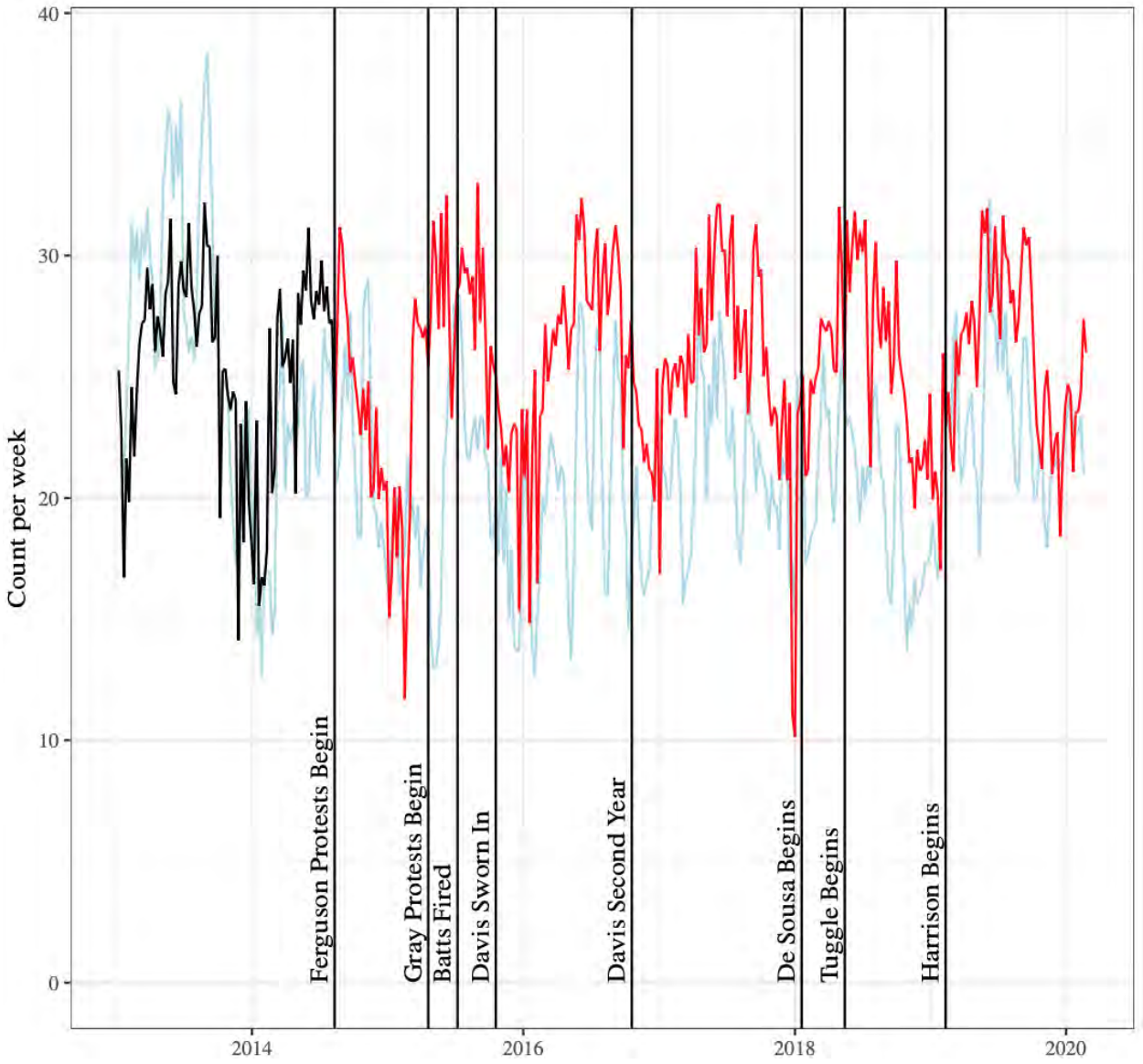


Figure 23. Total weekly arrest count for aggravated assault (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

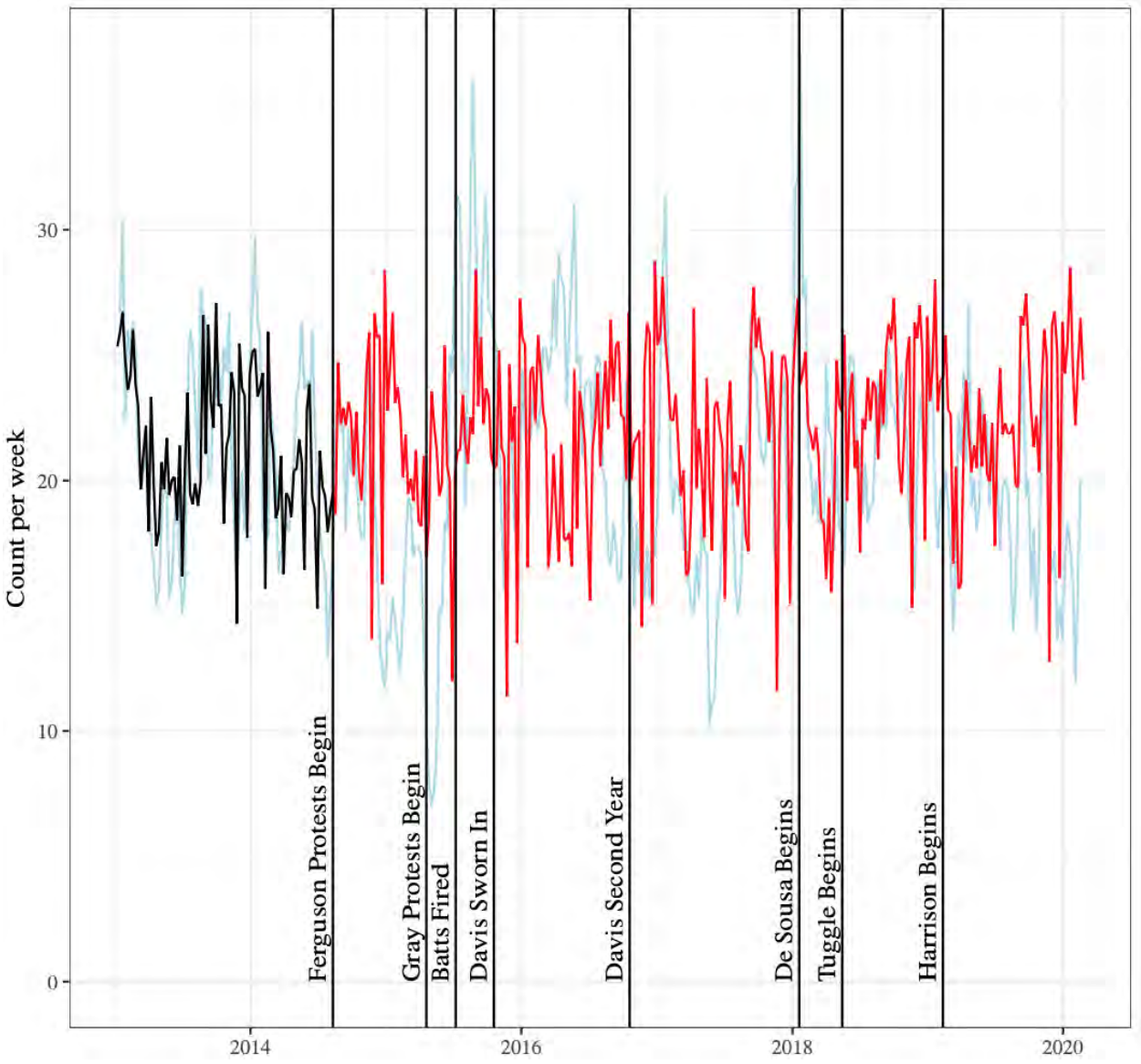


Figure 24. Total weekly arrest count for a deadly weapon charge (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

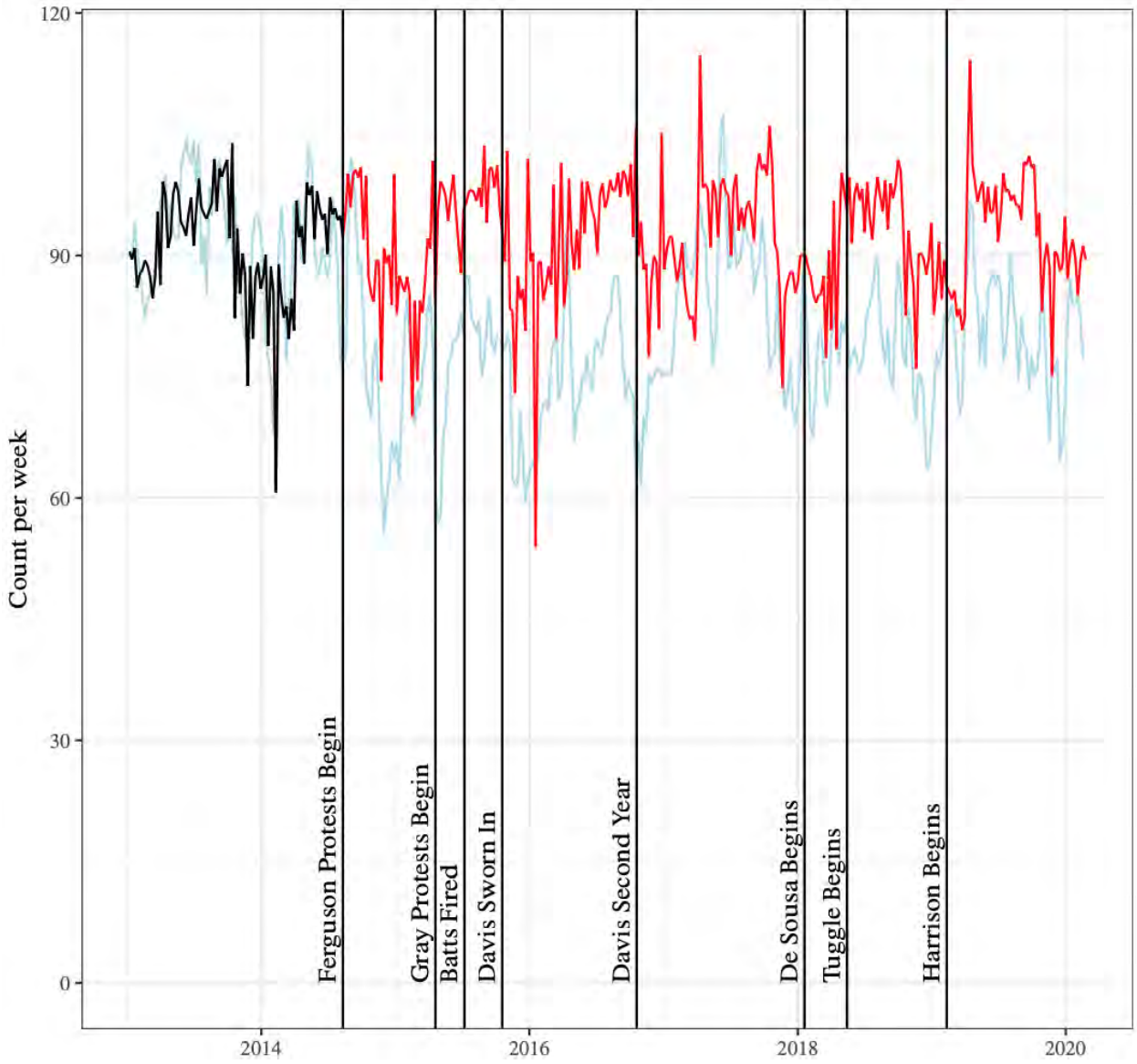


Figure 25. Total weekly arrest count for common assault (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

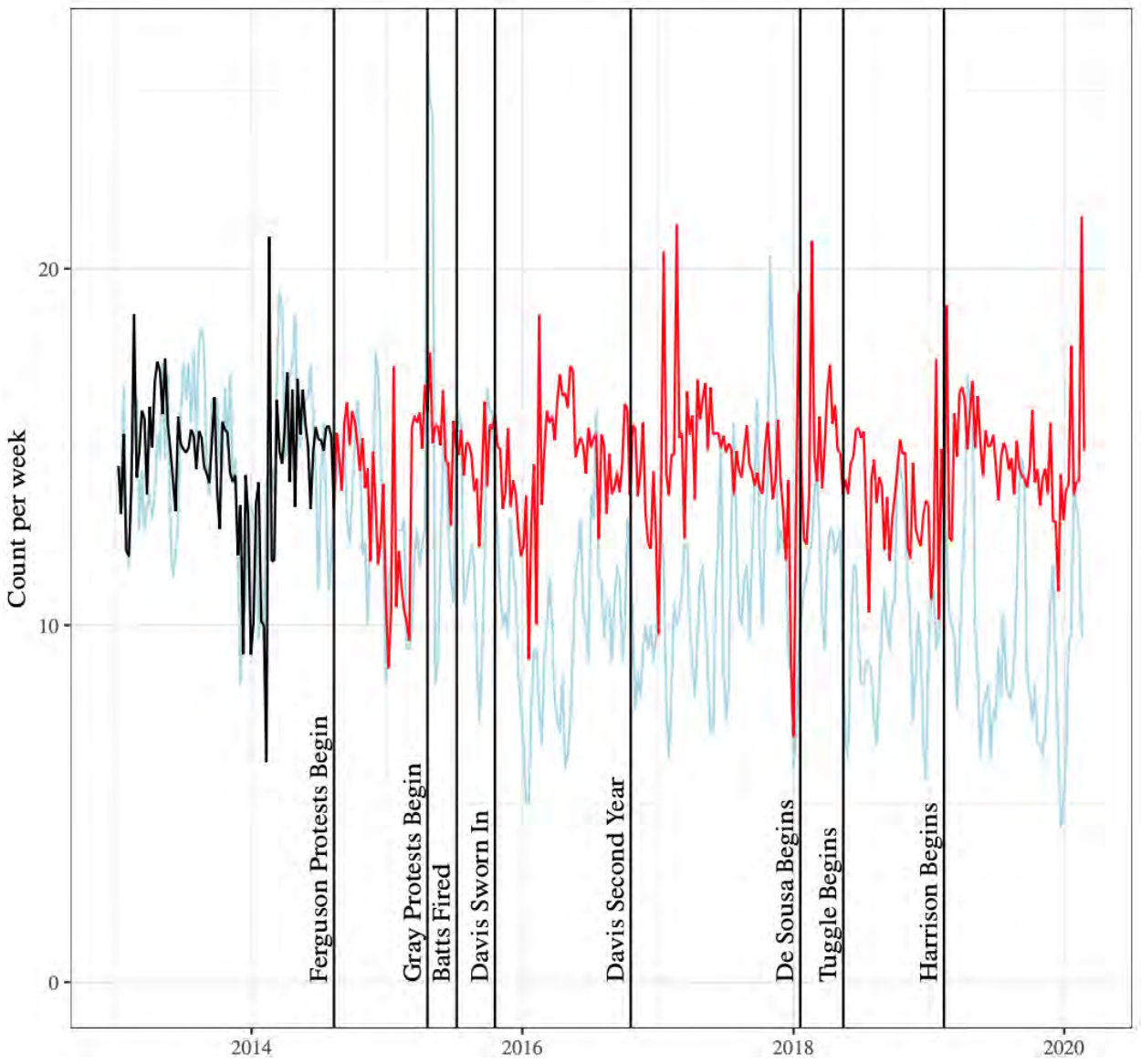


Figure 26. Total weekly arrest count for burglary (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

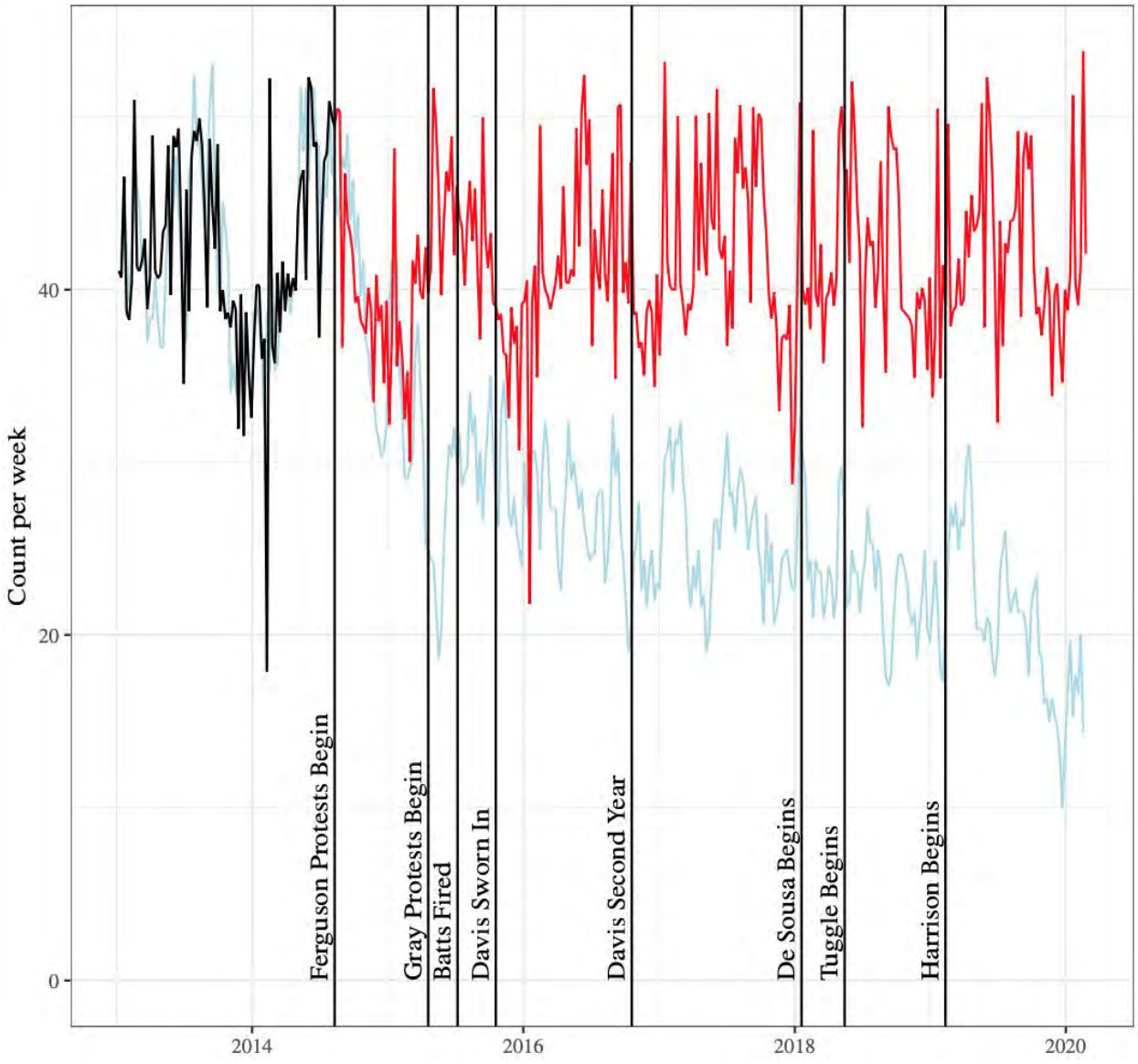


Figure 27. Total weekly arrest count for larceny (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

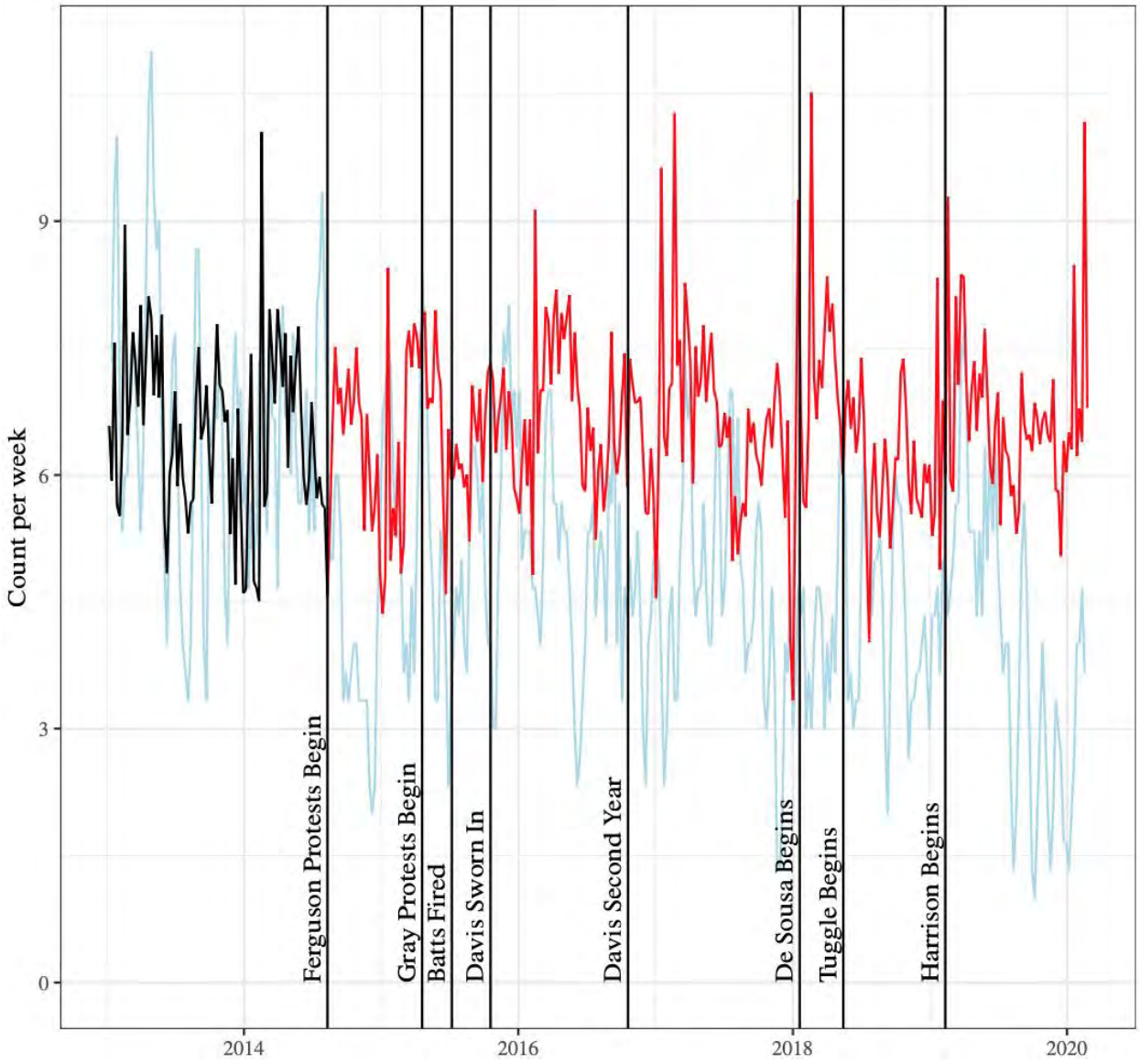


Figure 28. Total weekly arrest count for property destruction (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

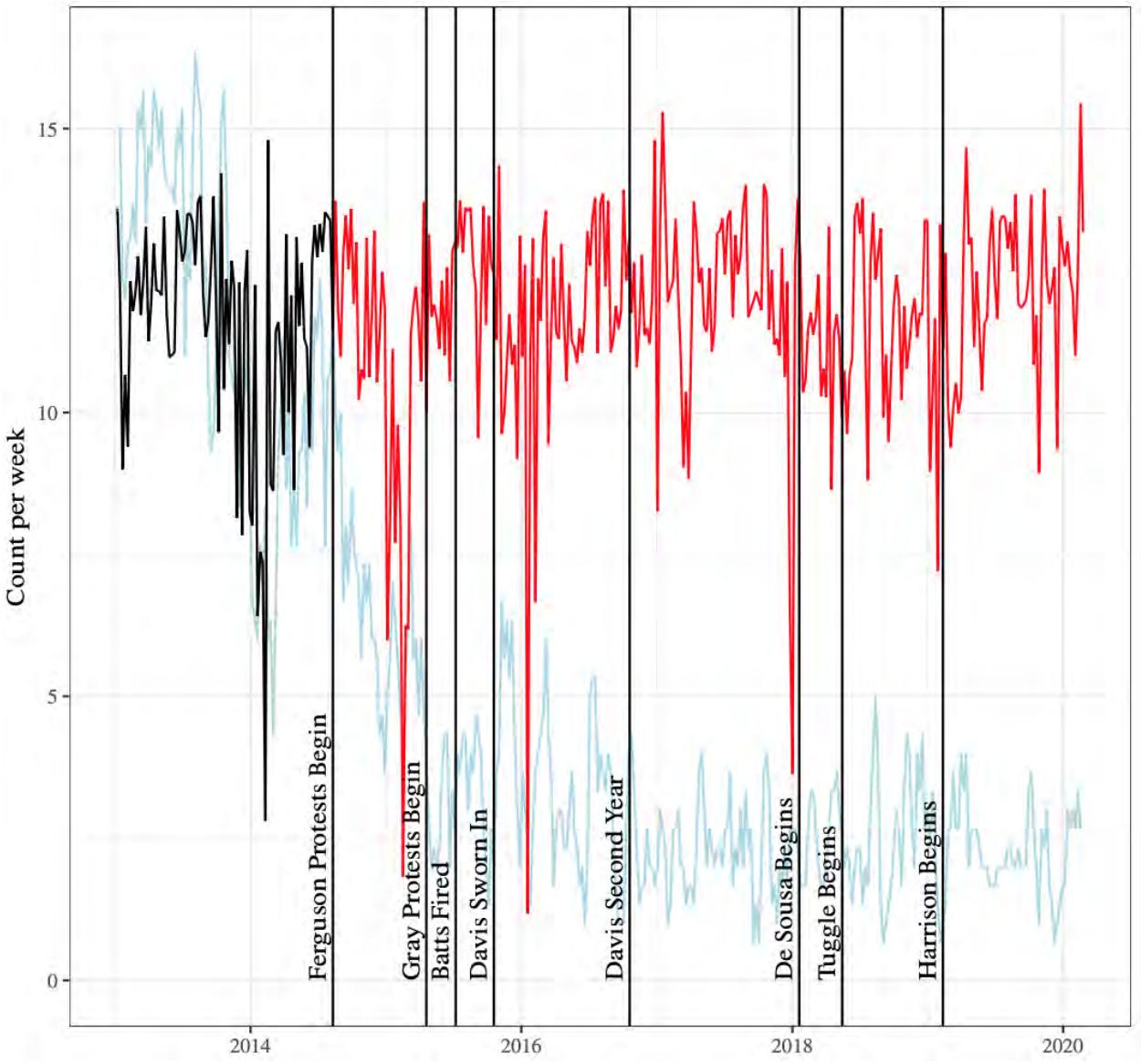


Figure 29. Total weekly arrest count for police non-compliance (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

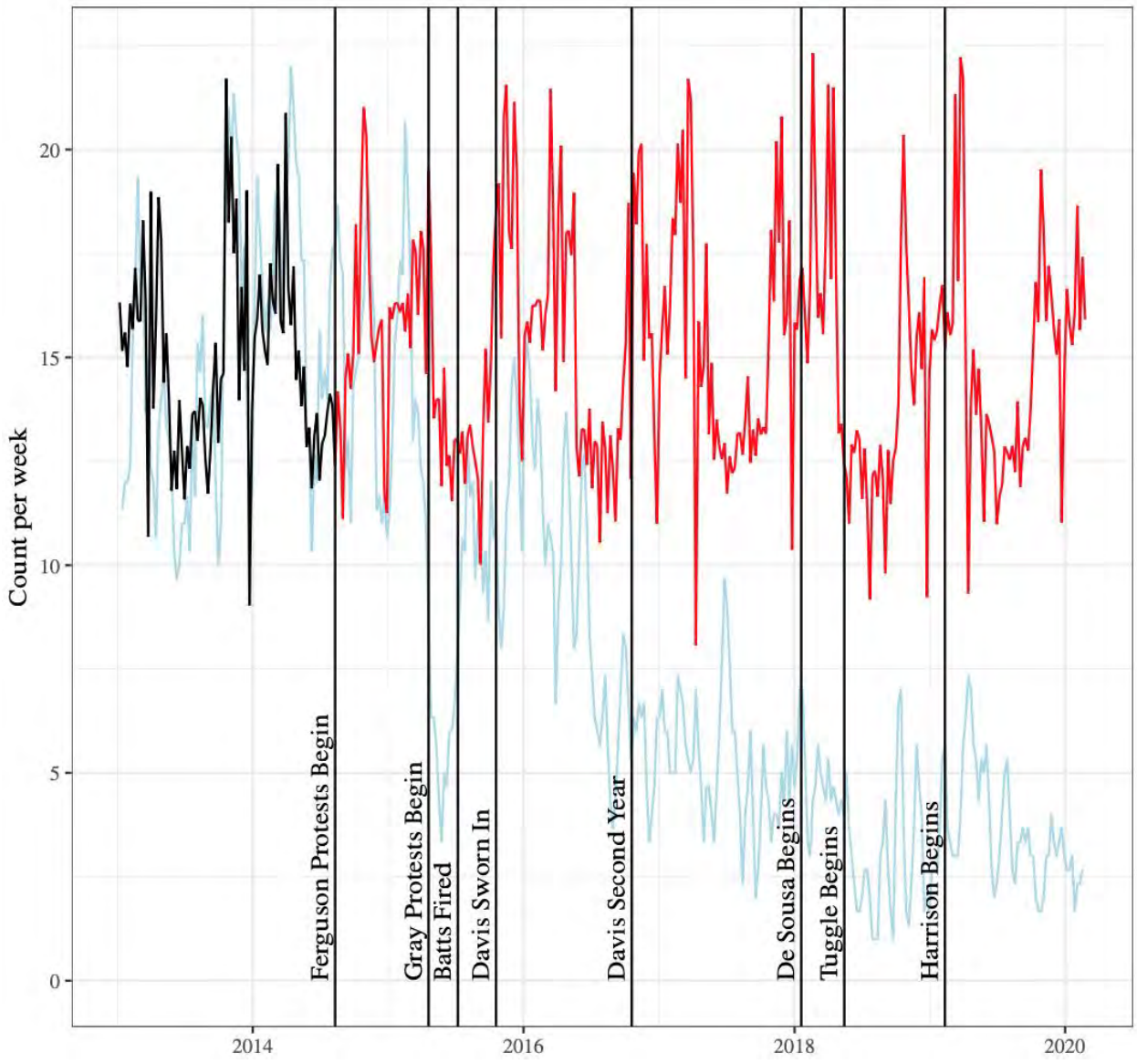


Figure 30. Total weekly arrest count for a driving violation (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

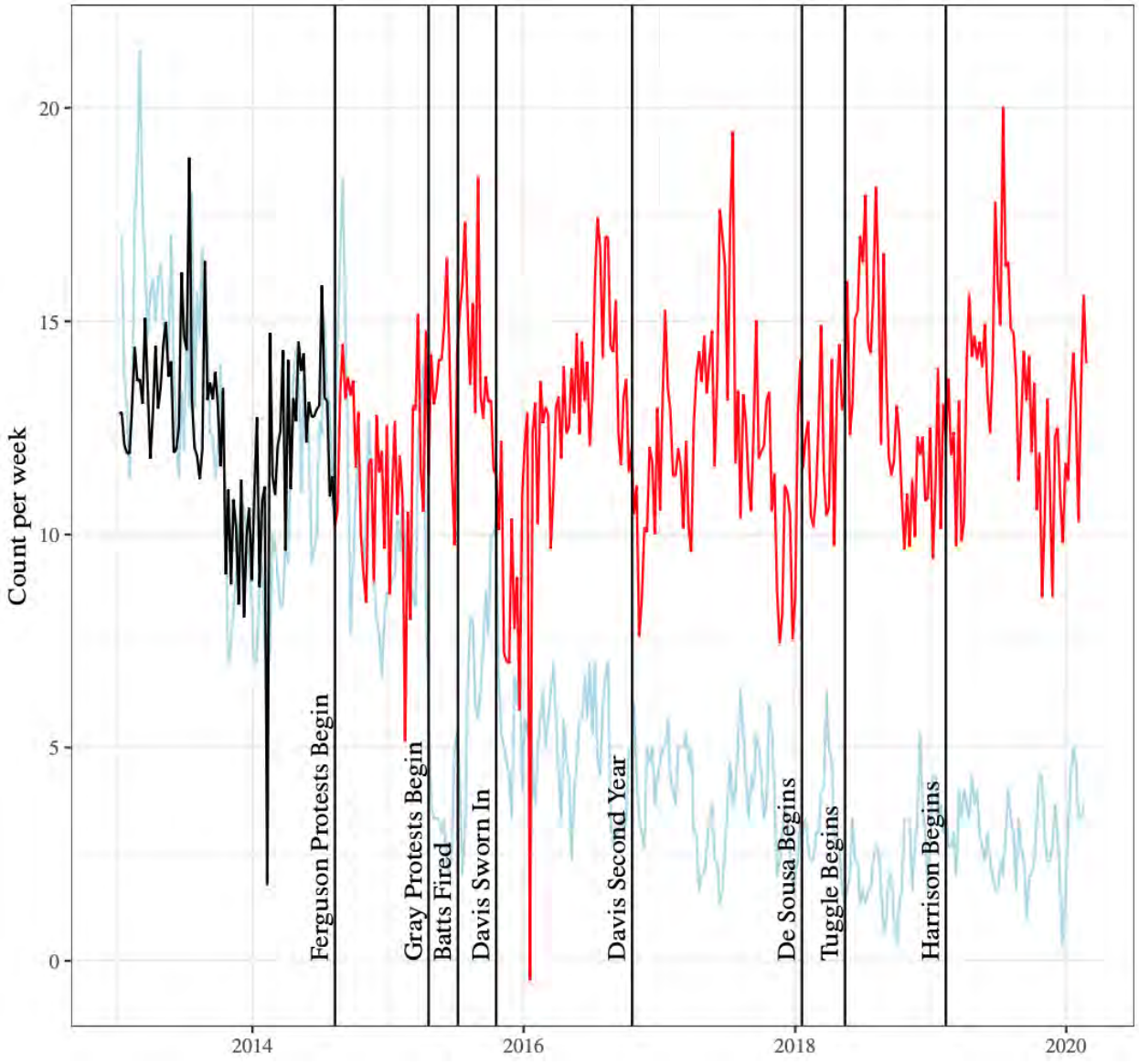


Figure 31. Total weekly arrest count for trespassing (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

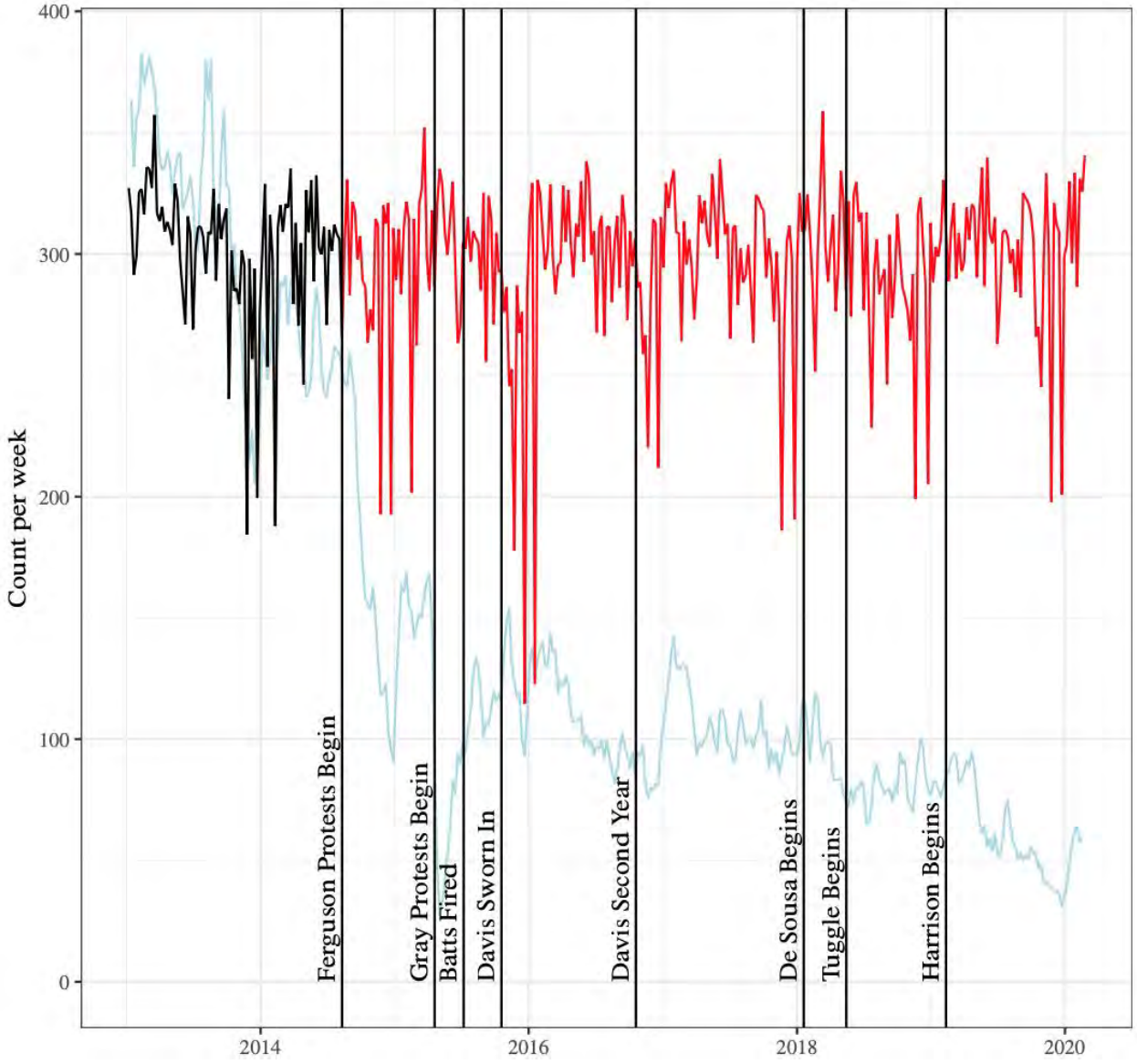


Figure 32. Total weekly arrest count for drug possession and possession with intent to distribute (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

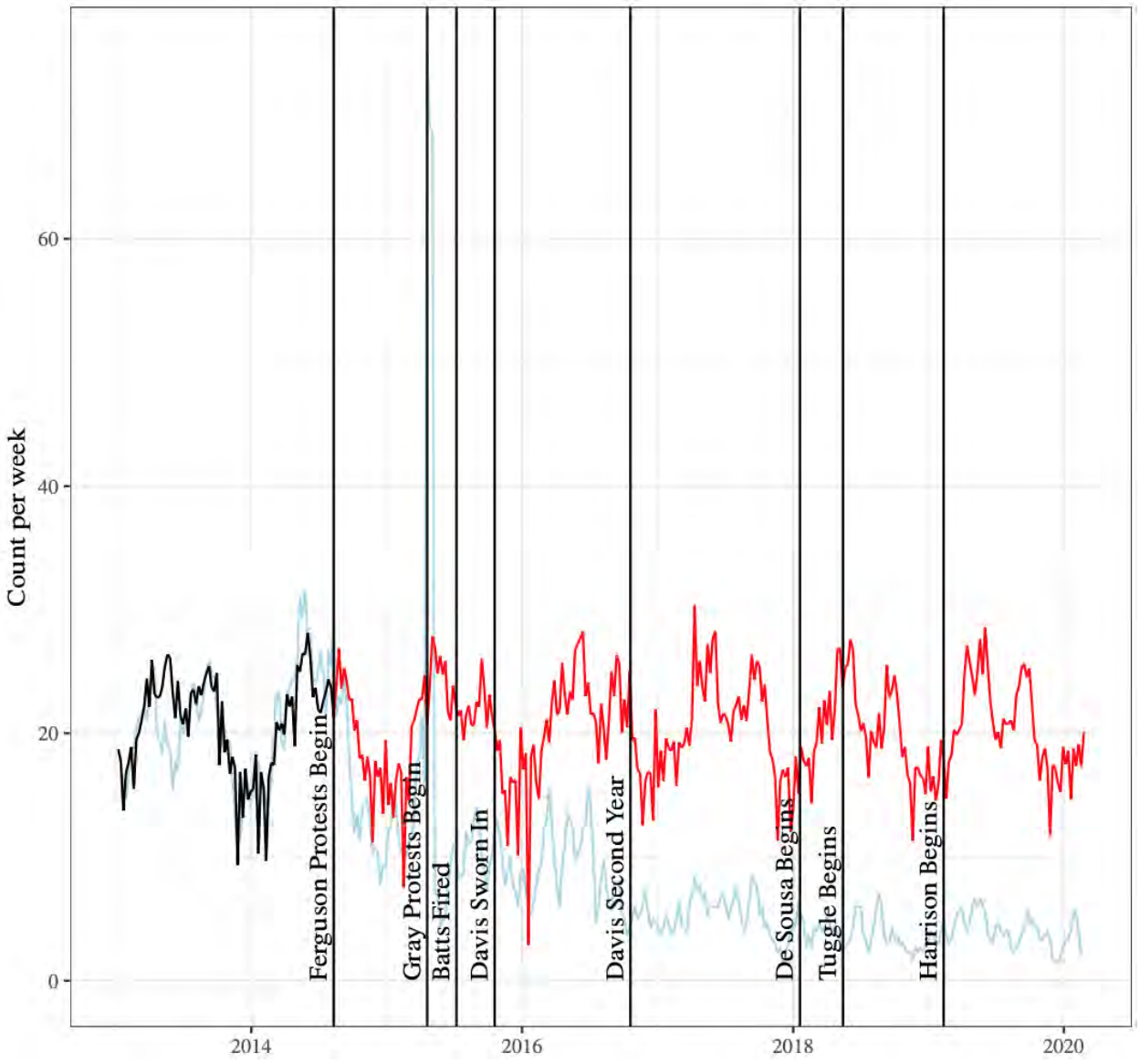


Figure 33. Total weekly arrest count for disorderly conduct (three-week moving average, blue line) with predicted values from the model before the Ferguson protests began (black line) and extrapolated counterfactual values after the Ferguson protests began (red line)

6. Conclusions

With the hindsight of 2016-2020, as well as a refined analysis of 2010-2016, it is possible to offer conclusions with greater clarity. What looked in the 2016 reports as a complex tapestry of subtle associations, punctuated by the dramatic months surrounding the Baltimore unrest, no longer looks as difficult to interpret.

6.1. The Ferguson and Gray Effects on Crime

Consider first the baseline period before the national dialogue on policing reached CNN viewers and roused opinion writers. In Baltimore between 2010 and 2014, the prevalence of different types of crime was either holding steady or falling consistently, net of a basic pattern of cyclicality that is attributable to seasonal effects, broadly construed. The two most heavily watched types of crime were not changing much at all, with homicides trending little from 2010 to 2014 and shootings declining only very slightly. Robbery was also mostly unchanged, across all four types categorized. Nonetheless, other types of less violent crime were declining noticeably, including aggravated and common assault. Property crimes, especially burglary, were also trending downward.[15] Altogether, levels of crime were declining, but the most violent types of crimes were not.

The Ferguson protests, and their coverage in the news media, did not change this pattern much at all. It is possible that, in Baltimore, the effects of the Ferguson protests on crime were gathering force before the arrest of Freddie Gray approximately eight months later. These months included only a few of the months when crime tends to be highest, and thus associational patterns in the city may have held any latent Ferguson effect on crime in abeyance. We can, however, rule out the possibility that the events in Ferguson led to a clearly noticeable, near-term effect on crime levels. Thus, as stated in the original report, adjusting for seasonality, evidence of a Ferguson effect on crime is very weak for the period before Freddie Gray was arrested.

After Freddie Gray died while in police custody, nearly all types of crime increased over the next three months, not just those that had been holding steady, but also those that were declining. Homicides and shootings received the most media attention, as they should, but the breadth of the crime increases in Baltimore was astounding.

How should we interpret the relationship between what would appear to be a small or nonexistent Ferguson effect on crime before Freddie Gray was arrested and a large and dramatic Gray effect on crime that emerged after Freddie Gray died while in police custody?

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[15] Only larceny was clearly increasing from 2010 to 2014, and this pattern might be complicated by off-setting categorizations of crime. At the same time larceny was increasing, larceny from automobiles and thefts of automobiles were both decreasing. In this regard, it is also noticeable that larceny was the only type of crime that fell during both our Ferguson period and Gray period (see Table 3), which again prompts us to wonder about the BPD's method of categorization. Unlike arrest records, where we have a lot of detail on the charges associated with each arrest, for the crime incidents of larceny we have almost no detail.

As noted above, and in the original report, we do not believe that a definitive answer can be provided that will satisfy all readers, beyond noting the connections that emerged in media commentaries. In this regard, the original report stated:

> It is undeniable that the unrest and its aftermath were deeply shaped by the media coverage of Freddie Gray's arrest, including the available cellphone video of it. These influential journalistic treatments drew connections to the ongoing nationwide focus on police conduct. As a result, the Gray effect is fundamentally entangled with the Ferguson effect narrative, and it is not surprising therefore that the debate on the Ferguson effect picked up momentum shortly after the unrest in Baltimore. (Morgan and Pally 2016, page 46)

These connections are still undeniable. And, with hindsight and four more years of perspective, we feel more comfortable in this final report discussing why we believe these connections were advanced by others, as well as disagreeing with the standard narrative of how they should be considered to be connected.

It has become much clearer in the last few years that dissatisfaction with the BPD was deep at the time Freddie Gray was arrested, that it had been so for years, and that many members of the public had good reason to feel that at least some BPD officers were crooked and abusive. As a result, we cannot rule out entirely the possibility that the Ferguson protests were irrelevant and, thus, that the Gray effect on crime would have emerged just as it did, even in the absence of the Ferguson protests and/or the national dialogue on policing that the Ferguson protests made more salient. However, as we will explain below, we do now see a stronger case for a type of Ferguson effect on crime after the Gray unrest subsided. Taken together, we are comfortable arguing that a Gray effect of some type would have occurred in the absence of the Ferguson protests, but the particular Gray effect on crime that Baltimore experienced was amplified by the Ferguson protests and the national dialogue on policing.

The crucial question for us is this: Did the protests in Ferguson, and their portrayal in the media, shape the arrest of Freddie Gray, then contribute to the unrest in Baltimore following Freddie Gray's arrest, and finally, by this indirect route, contribute to a Gray effect on crime? We see three matters to consider in providing an answer to this question.

First, it is sometimes argued that the threat of being recorded on cellphone video causes police officers to step back from both effective and ineffective policing. If such a dynamic had emerged in the BPD following the Ferguson protests, it was not a factor in Freddie Gray's arrest or death. His apprehension was recorded in broad daylight, in front of Baltimore residents who recorded the events while offering commentary on them, just as they had in the recent past for other incidents.[16] Likewise, the "rough ride" that Freddie Gray may have received while in the

[16] One video taken in full view of the officers restraining Gray before he was first placed in the van has a man remarking loudly, "We recordin' it. … I've been recording it," and then, after being asked to move back off the street by an officer, "I sure the fuck will. But that ain't gonna stop me from usin' this phone" (see URL here). And, from a

police van occurred in view of Baltimore's network of CCTV cameras. Thus, we conclude that the officers involved were surely aware that their actions were observed and recorded. They acted in the way that they did with this awareness.

Second, did the Ferguson protests play a role in generating the unrest? It is quite likely that the Ferguson protests, as well as the extensive media coverage that they received, further legitimized confrontational street-level protest among some residents of Baltimore (and, given the paramilitary equipment used so proudly, but ineffectively, by the Ferguson police, made it seem to be a valiant cause). Because no one has been able to document claims that the BPD provoked Baltimore residents and thus instigated street-level conflict on the most dramatic day of the unrest, we believe that it is reasonable to maintain that, in the absence of the national dialogue on policing, including the protests in Ferguson, the unrest that enveloped Baltimore may still have occurred, but, if so, it very likely would have been substantially diminished.[17]

Third, and in view of these first two conclusions, can any portion of the elevated crime in three months after the Baltimore unrest be attributed to the protests in Ferguson? Yes, we now think a case be made that this effect has support in Baltimore, but not by the mechanisms most often asserted by others who allege a Ferguson effect. The unrest itself grievously damaged the BPD's leadership and the authority of the city government. The mayor at the time did appear to encourage protests, even if her goal was only to encourage peaceful protests that could de-escalate tension and foster dialogue. Police officers had legitimate complaints that they did not have enough equipment or training to protect themselves in a riot, if that is what occurred. Then, when local prosecutors announced very quickly that all of the officers involved in Freddie Gray's arrest would be charged with very serious crimes, and with little or no additional evidence provided at the time to justify such serious charges, at least some police officers must have assumed that Baltimore's residents wanted them to police less and that it was in their interests to do so.

Altogether, therefore, we see the Gray effect that unfolded as harrowing elevated crime of all types as, at its core, a product of deliberate de-policing in an environment in which it was encouraged. Before the national dialogue on policing was underway, most observers believe that the BPD had relatively low legitimacy in the city, and that its low legitimacy was to a large extent grounded in its own ineffectiveness. The BPD was policing aggressively (indeed, by standards that were clear in 2013 and 2014, unconstitutionally), but the BPD had not truly brought violent crime under control while doing so. As a result, the BPD confronted the disorder that followed the unrest from a very weak position. And the approach taken appears

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video taken at a greater distance, a woman remarks, "They makin' me mad, y'all. That's how they been round here" and then later, yelling toward the officers, as they picked Gray up, "Hey, his leg look broke!" (see URL here).

[17] Small-scale protest activity has been fairly common in Baltimore in the last few decades, and these protests have sometimes followed episodes of contention between the police and community members. Only in the aftermath of Freddie Gray's death did a diverse array of residents join together for a full week of street activity, one day of which led to enough property destruction that it could be considered a riot. The deployment of the National Guard brought the property destruction under full control and then supported peaceful day-time protests that lowered tensions.

clearly to have been what most everyone wanted: police officers stepping back from proactive policing. Police Commissioner Anthony Batts saw the de-policing as a problem, and he tried to get his officers to re-engage, later offering interviews with the *Baltimore Sun* in which he said his officers "took a knee" just after the unrest and allowed the crime rate to rise.[18] Batts was fired within three months by a mayor who was in the process of destroying her own legitimacy.

To accept this conclusion requires accepting that de-policing occurred and that it was the product of decisions by the rank and file, not simply reduced capacity for policing in the aftermath of a period of unrest that taxed resources. We believe that our analysis of arrests is perhaps the best evidence that we have that de-policing really did occur.[19] And, here, the story is complex, but not unclear, as we show in the next section.

To conclude this section, we see little or no evidence that a Ferguson effect on crime emerged before Freddie Gray was arrested. However, a Gray effect on crime is strongly supported by our analysis, and we are willing to more strongly conclude in this final report that a type of Ferguson effect played a role in amplifying it.

6.2. The Ferguson and Gray Effects on Arrests

Our analysis of arrests provides substantial evidence of both Ferguson and Gray effects on policing, but the weight of the evidence is compromised by the more limited data on arrests that are available to analyze. While we have crime data from 2010 onwards, our arrest data begin only in 2013.

Although we do not have as much baseline information on arrest patterns, it is clear from a variety of sources that changes were occurring in how non-violent, drug-related crime was being policed. In the summer months before the Ferguson protests, arrests on drug charges without other charges related to violence were declining noticeably. As shown above, while arrests for police non-compliance and disorderly conduct all rose in spring through early August of 2014 in the expected cyclical pattern (see Figures 29 and 33), arrests on drug charges continued to decline from the levels observed for 2013 (see Figure 32).

After the Ferguson protests, this decline in drug-related arrests accelerated and widened, leading to an overall seasonally adjusted decline in all types of arrests of 21.5 percent in the eight months just before Freddie Gray was arrested (see Table 6). As noted in the original report, we see this decline as "consistent with" a Ferguson effect on police conduct, wherein Baltimore's police officers more frequently used discretionary alternatives to arrest because of a concern that the appropriateness of their conduct could become the subject of controversy. If

[18] "Anthony Batts says police 'took a knee' after Baltimore riots," Colin Campbell, *Baltimore Sun*, September 2, 2015. For additional context, see also "Arrests in Baltimore plummet, and residents are fearful," Doug Donovan and Colin Campbell, *Baltimore Sun*, June 13, 2015

[19] It would be preferable to be able to do a more complete analysis, considering how similar calls for police service, and patterns of on-view policing, changed for spring and early summer of 2015, in comparison to 2013 and 2014. A credible analysis at that level of detail is not possible, given the data that are available.

the decline in arrests had been more gradual, and there was more evidence that it took hold earlier in the summer of 2014, then we might have been tempted to conclude that a forward-looking policy change was responsible, possibly a reduction in other types of arrests accompanying changes in how drug crime was being policed. In other words, reducing the number of stops and investigative searches, with the explicit goal of no longer arresting Baltimore residents for minor drug possession, could have reduced all arrests that could follow stops and investigative searches. Our reading of the evidence, however, does not support this conclusion, particularly when consulting the patterns for police non-compliance and disorderly conduct. These types of arrests only declined appreciably at the end of the summer of 2014, unlike non-violent, drug-related charges that were already falling before the Ferguson protests took place.

Regardless of whether we are willing to move beyond a weak "consistent with" assertion about a Ferguson effect on arrests, it is difficult to argue that these changes were not positive for Baltimore. They were not accompanied by any substantial increases in crime, and thus we stand by the conclusion in the original report:

> The decline in arrests that is interpretable as a Ferguson effect in the period of time before the arrest of Freddie Gray can be considered a positive development for the Baltimore community. This conclusion would follow from the position that a decline in discretionary arrests is a desired goal, following a period in Baltimore during which many residents and their local leaders concluded that the robust policing of struggling communities is not helpful for their redevelopment. Moreover, this beneficial change may reflect a turn away from broken-windows policing and stop-and-frisk policing that would have occurred even in the absence of the national dialogue on police conduct that first captured headlines in the summer of 2014.
>
> However, this same decline can also be considered a negative outcome for the Baltimore community if the decline in discretionary arrests encouraged the subsequent crime spike that emerged after the unrest receded. This conclusion would follow from the position that (a) the unrest itself was made more likely because of the decline in discretionary arrests and/or (b) the crime spike represents opportunistic crime that would have emerged even if Freddie Gray had not been arrested and the resulting unrest had not occurred.
>
> On balance, we reason that the positive outcome scenario is more likely, although we concede that we are not immune from hopeful thinking. We believe that the composition of the crime spike that began in May 2015 is more likely attributable to the particular features of the unrest and how it was handled than by the decline in discretionary arrests that preceded it. (Morgan and Pally 2016, pages 68)

We continue to support this reasoning, although we wish we had even more direct evidence in support of it.

The Gray effect on arrests was even more dramatic, with an additional 31 percent decline overall, on top of the 21.5 percent decline that occurred in the preceding eight months. The decrease was again more substantial for arrests that have a discretionary element, such as police non-compliance and disorderly conduct, but arrests for both violent crime and property crime decreased as well. We continue to think that these declines provide evidence of genuine de-policing. In this regard, it is also notable that arrests increased by 16 percent during the transition period after Kevin Davis was hired as an interim to replace the fired police commissioner, Anthony Batts. Davis was able to boost the arrest rate, and crime fell from its highest levels. It did not come down enough, and thus we conclude that his initial efforts to mitigate de-policing did not eliminate the crime rise that de-policing facilitated only a few months prior.

6.3. From Davis Through Harrison, 2016-2020

We have interpreted the 31 percent decline in total arrests during the three months following the unrest in Baltimore as evidence of deliberate de-policing, primarily because it occurred abruptly and alongside dramatic increases in crime, and secondarily because the police commissioner at the time, Anthony Batts, later expressed to local media outlets that his officers "took a knee." As just noted above, when Kevin Davis was hired as interim police commissioner in July of 2015, he appears to have been able to reverse some of the de-policing that he inherited. In his three-month probationary period from mid-July through mid-October, arrests increased by 16 percent while most categories of violent crime declined meaningfully (see Table 4). Because Davis pulled back some of the sharp increase in crime, he won the support of the city council to become the 38th Police Commissioner of Baltimore.

Unfortunately, after being confirmed as commissioner, he was unable sustain the rate of improvement. During his first full year as commissioner, he reduced homicides further, but they still remained 41 percent above the baseline level observed for the year before August 2014. Other types of violent crime increased slightly, including the heavily reported crimes of street robbery and carjackings, but also the less heavily reported crime of aggravated assault. Then, in his second year on the job, almost all categories of crime increased further. Homicides crept upwards, and shootings remained 90 percent higher than the baseline year before August of 2014. Street robbery and carjackings soared to all-time highs. Davis was fired that winter.

Even the picture of arrests became muddled. While Davis had reversed some of the decline that we have argued above is evidence of de-policing, thereafter changes in arrests followed a complex pattern. Arrests for violent crimes bounced around. Arrests on deadly weapons charges (mostly hand-gun violations) fell substantially in both years. It seemed unlikely to most observers that unlawful hand-gun possession had actually decreased. At the same time, arrests for police non-compliance and disorderly conduct fell almost continuously, so that by the end of Davis' term, they stood at only 14 and 28 percent, respectively, of their

2014 levels. Finally, arrests for non-violent, drug-related charges resumed their decline in his second year, ending at only 34 percent of the 2014 level.

For members of the community whose primary goal was to eliminate unconstitutional policing, and who felt that the DOJ's investigation of the BPD had given evidence that it needed to be eliminated, the decline in arrests during Davis' first two years was a positive development. Still, the declines are not easily interpreted, and they may reflect a number of causes unrelated to standards of constitutional policing. Regardless of the complexity, Davis handed over a police department to his replacement, Darryl De Sousa, that was arresting many fewer people. The declines were largest in areas most responsive to the changes called for by the consent decree, and also the areas least likely to be related to shootings and homicides.

By the time of Davis' handover to De Sousa in early 2018, local attention to the Ferguson protests in 2014 and even the unrest that followed Freddie Gray's arrest in spring 2015 had almost disappeared. The elevated rates of homicides, shootings, street robberies, and carjackings were enough by themselves to sustain alarming news coverage. The federal interventions that led to the GTTF scandal and the signing of the consent decree in 2017 were the core of the narrative that justified the need for top-to-bottom reform of the BPD, not how the unrest was handled three years prior, or even more remotely, whether the national dialogue on policing had any special relevance for Baltimore.

Without much media coverage in 2018 and early 2019, arrest rates continued to fall gradually under the leadership of De Sousa, and then Tuggle as well. As we have shown in this report, the declines were still disproportionately in types of arrests where police discretion was an alternative. Thus, the decline in arrests continued to be patterned in a way that was consistent with calls for reform.

To the extent that the falling arrest levels were noticed and reported upon by local commentators, and without the sort of categorization that we have offered in this report, some alternative conclusions were offered. For some commentators, the BPD was not being proactive enough. For others, taking the lead of the FOP, the BPD was demoralized and losing officers, with the result that the department could not place enough officers in patrol to keep order. Either way, lower arrests seemed to be attributed to dysfunction within the BPD, especially failures of management, and not at all evidence that officers were already responding positively to calls for reformed police conduct. Contrary to these views, we would like to argue that some of the decline in arrests in this time period reflects at least some officers trying to meet what they understood to be new standards for police practice, but we do not have any direct evidence to offer. The truth likely falls somewhere in the middle of all of these interpretations.

Finally, a new commissioner was hired from the outside, Michael Harrison. He had prior experience managing department-wide reform in response to a consent decree with the DOJ. Supported by staffing and IT studies completed in cooperation with the consent-decree-monitoring team, he tackled management challenges and hired a new leadership team. Within

a few months, he introduced a crime plan, which the city's leadership had called for. The core strategy is presented in Figure 34 (see next page), and it is a variant on hotspot targeting that many others believe has been effective in other cities.

Harrison's first year has been surprising in many ways, not the least of which was the fierce opposition to his crime plan from the police union (see the letter in Figure 2 above). Most surprising, homicides, shootings, and carjackings all increased according to our models, even though street robbery, commercial robbery, and many types of property crime decreased. The temping conclusion is that hotspot targeting displaced the most violent crime, but it was effective in reducing at least some robberies and in protecting property. This mixed improvement was achieved while arrests continued to fall in almost all categories.

Overall, the pattern from 2016 through early 2020 is fairly clear. Homicides and shootings remain much higher than from 2010 to 2014, with only modest variation across the years. While robberies have declined somewhat in the last year, they still remain higher than they were in 2013 and 2014. Property crime has gradually been brought under better control, if one believes that property crime is reported and recorded at the same rate and with the same fidelity. Finally, arrests on charges that we consider more discretionary than other types of charges have continued to trend lower since 2016.

With the exception of the most violent crimes, an optimistic story can be pieced together for 2019 and the first part of 2020. The police are taking a lighter touch, arresting fewer Baltimore residents than they did in the past, and they have reduced property crime and robberies. If homicides, shootings, and carjackings can be reduced in the remainder of 2020 and then in 2021, then Baltimore will have turned a corner to a better future than seemed possible only one year ago.

STRATEGIC OBJECTIVES AND ROLES

For the BPD to efficiently and effectively achieve sustainable reductions in violent crime, we are leveraging research and data to develop a comprehensive and evolving strategy at discrete micro-geographies. Our goal is to create tailored solutions for each zone that respond to the needs of that specific target area.

Using crime history on all gun-related incidents (homicides, aggravated assaults, robberies, and non-fatal shootings) for the past five years, BPD has established new focused patrol areas and district action team (DAT) activity zones where the levels of these crimes have been highest.

BPD has assigned each sector patrol officer to cover specific deployment zones that cover no more than a four-square block area. In addition, there will be larger areas designated for DATs assigned to each police district. Overall, these zones comprise roughly 5% of the city's geography but account for approximately 33% of the all the city's gun violence in the past five years. A narrow and more structured focus by the DATs along with directed patrol enables BPD to be more agile, targeted, and efficient in our ability to reduce, deter, and prevent crime.

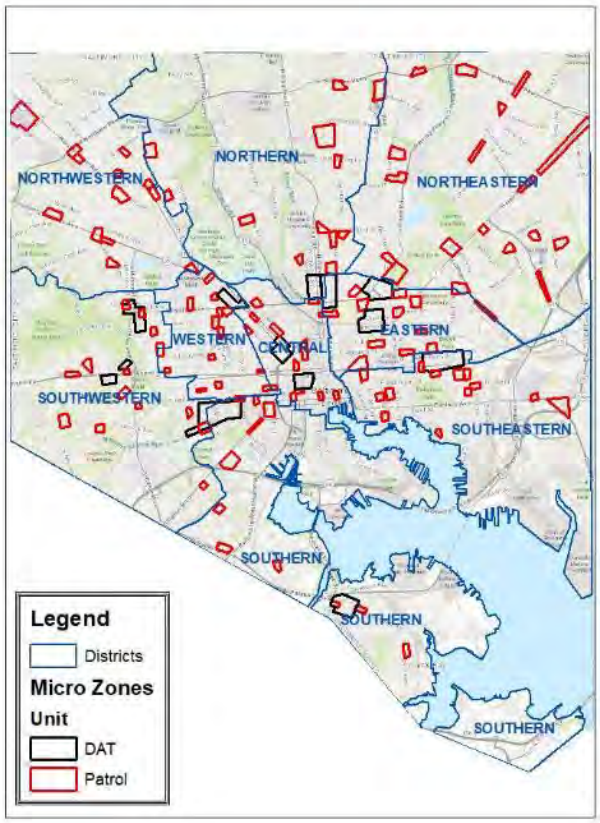

Figure 34. The hotspot design of Harrison's June 2019 crime reduction strategy (page 5 from the document)