

ESSAYS IN APPLIED MICROECONOMICS

By

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ABSTRACT

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This dissertation is composed of three chapters that explore how changing policies and events affect vulnerable groups.

Chapter one studies the effects of an expansion of body-worn camera programs on police interactions and court outcomes. I describe conceptually how the presence of body-worn cameras may change incentives for police and members of the public during police interactions, and how an influx of body-worn camera data into the courts can affect attorney time use and uncertainty in litigation. To test for these effects, I collect data from over 150 law enforcement agencies across Virginia on body-worn camera adoption. I combine these data with records of criminal court cases throughout Virginia and find evidence that body-worn cameras changed police interactions. However, the body-worn camera video data did not affect the prevalence of guilty verdicts, incarceration, or even the likelihood that cases resolved within a year of filing.

In the second chapter, I describe indigent defender labor markets and delve more deeply into the null results of the first chapter. Each year, Virginia compensates hundreds of criminal defense attorneys to provide legal representation to low-income criminal defendants on a case-by-case basis. Wages for these cases are fixed, but legal defense is guaranteed for qualifying defendants. Using administrative pay records from Virginia's Supreme Court, I show that this structure produces variability in indigent defender labor supply. Many attorneys represent defendants in a small number of cases annually, while a small subset of indigent defense vendors are highly active in the market. I then use certification records from the Virginia Indigent Defense Commission to test whether body-worn cameras drove attorneys to leave indigent defense.

The third chapter describes Venezuelan migrant movements through Ecuador during the Venezuelan diaspora of the 2010s. I use administrative data from Ecuador on recorded entries to and exits from the country by Venezuelans to quantify migrant flows. I document the emergence of a mi-

grant route connecting Colombia and Peru through Ecuador and variations in migrant flows along this route as entry requirements to Ecuador and Peru changed.

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CHAPTER 1

THE EFFECTS OF BODY-WORN CAMERAS ON POLICING AND COURT OUTCOMES: EVIDENCE FROM THE COURT SYSTEM IN VIRGINIA

1.1 Introduction

Defining and implementing effective policing remains one of the most salient political issues of the past decade. In the midst of sometimes contentious debate over policing policies in the United States, outfitting law enforcement with body-worn cameras (BWCs) has broad public support.¹ Between 2020 and mid-2021, six states mandated body-worn cameras for law enforcement (NCSL, 2021).

Although increasingly commonplace, body-worn cameras are a recent technological advancement for law enforcement in the United States. In 2010, less than 5 percent of law enforcement agencies used body-worn cameras (LEMAS-BWCS, 2016). This changed rapidly after a police officer killed eighteen-year-old Michael Brown in Ferguson, Missouri in August 2014 (Buchanan et al., 2015), leading Ferguson police to begin using body-worn cameras to increase transparency, accountability, and public trust (BBC News 2014). Across the nation, between 2013 and late 2016 the share of general purpose law enforcement agencies using body-worn cameras rose from approximately 12 percent to nearly half (LEMAS-BWCS, 2016).²

Body-worn camera advocates intend the technology to increase transparency and improve safety in police interactions, reducing police misconduct and some visible criminal activities. However, criminal justice practitioners warn of broader effects on policing and the courts. In addition to inducing behavioral changes amongst police and members of the public, body-worn cameras generate recorded data that may be relevant to criminal cases. While these data may allow for a more accurate resolution of criminal charges, accessing the evidentiary value of the data comes at a cost of attorney time. Across Virginia, attorneys report that the tension between attorney time constraints and the additional labor demands of cases with body-worn camera footage can be detrimental for vulnerable criminal defendants. As the Executive Director of the Virginia Indigent Defense Commission wrote, “. . . we have significant concerns that our attorneys will not be able to

¹One recent poll shows 85 percent of Republicans and 94 percent of Democrats favor body-worn camera mandates (Kull, 2020).

²In 2015 the Department of Justice announced a \$75 million national grant program intended to fund 50,000 cameras over a three-year period (Department of Justice Office of Public Affairs, 2015).

continue to meet their ethical and professional responsibilities” (Compensation Board, 2018).

In this paper, I extend the base of research on body-worn cameras as a *policing tool* to incorporate their effects on courts and defendant outcomes. Specifically, I use the timing of body-worn camera adoption by local law enforcement agencies across the Commonwealth of Virginia to study changes in criminal case filings, resolutions and court processes after law enforcement begin using body-worn cameras. In doing so, I discuss three channels through which body-worn cameras can affect the courts. First, body-worn cameras can induce civilization (behavioral) effects amongst law enforcement and the public, which can change the set of cases that are filed in the courts. Then, once cases are filed, body-worn camera footage can introduce evidentiary and attorney time use effects that change the outcomes of the case or the process by which these outcomes are realized.

My contributions to researchers’ understanding of body-worn camera effects in policing build upon work by criminologists (Ariel et al., 2015; Katz et al., 2014; Yokum et al., 2017) and contribute to an emerging literature in economics (Kim, 2020; Çubukçu et al., 2021). More broadly, by exploring civilization effects I contribute to literatures on police responses to oversight (Ba and Rivera, 2019), criminal responses to surveillance (Gómez, 2021; Piza et al., 2019; Gonzalez-Navarro, 2013), and criminal deterrence (Chalfin and McCrary, 2017). While previous body-worn camera studies often focus on changes in police use-of-force — an important but uncommon outcome — I test for civilization effects in more common interactions by measuring changes in the frequency and composition of charges that are filed in criminal courts.

Less is known about if and how body-worn cameras affect court processes and case resolutions once charges are filed. Two local impact evaluations provide contradicting evidence: Yokum et al. (2017) do not find effects of body-worn cameras on case outcomes in Washington D.C., whereas Katz et al. (2014) note some prosecutorial changes coincided with body-worn camera adoption in Phoenix. Outside of criminal courts, Çubukçu et al. (2021) find that body-worn camera footage evidence affects the resolution of citizen complaints against police. I provide some of the first empirical evidence around these court-based effects and the first evidence using data from multiple

court jurisdictions.

To advance the research on the effects of body-worn cameras on the courts, I collected a new data set detailing the timing of body-worn camera adoption across Virginia court jurisdictions. Existing data collections on body-worn camera adoption either suffered from poor data quality in key fields or employed sampling structures that encouraged agency-level analyses. Because multiple law enforcement agencies can operate within a single court jurisdiction, court-level analyses with a sampling of agency-level data would be limited to those courts for which key agencies in the court jurisdiction were sampled. These data constraints led to a high representation of urban areas in body-worn camera evaluations and less evidence from small and mid-sized localities. In contrast, my adoption data reflects the broadest coverage of Virginia law enforcement agencies to date, covering the major law enforcement agencies in 90 percent of Virginia court jurisdictions. I combine these new body-worn camera data with a second data set containing the near-universe of criminal court charges in Virginia from 2008-2020³ to create court-level panels covering 102 Virginia circuit courts and 107 Virginia district courts.

I analyze these data in a difference-in-differences framework. Because law enforcement began using body-worn cameras at different points in time, I implement both the traditional two-way fixed effects estimator and an alternative imputation estimator proposed by Borusyak, Jaravel, and Spiess (2021) to test for effects of body-worn cameras on case filings, processes, and resolutions. Although some studies (Goodman-Bacon, 2021; Sun and Abraham, 2021) show that the traditional two-way fixed effects estimator can produce biased estimates under staggered treatment timing and heterogeneous treatment effects, both estimators provide similar results in the case of body-worn cameras in Virginia.

Across two court levels and several outcomes measuring changes in case filings, processes, and resolutions, I find a strong pattern of results. Body-worn cameras reduced the prevalence of a subset of charges arising out of interactions with police including resisting arrest, assaulting an officer, and similar offenses. However, beyond this subset, they do not appear to have altered

³These years reflect those for which I have both district court and circuit court data. I additionally use circuit court-only data dating back to 2006.

police behaviors as a whole: the number of cases filed, the share of those cases involving multiple charges, and charge severity did not change after police began using body-worn cameras.

The cases that are filed within criminal courts also do not systematically proceed through the courts or resolve differently after body-worn camera adoption — despite practitioner reports of an indigent defense system buckling under the weight of new body-worn camera data. One potential explanation for these null results could be that the evidentiary effects of the videos offset attorney time use effects for a net zero effect. However, I show that there are no differential effects of body-worn cameras on cases more likely to have associated video. Because a common pool of attorneys litigate video and non-video cases, if attorneys substitute time across the cases they represent then the lack of a differential effect suggests that the offsetting-effects hypothesis does not hold. Finally, because the increase in body-worn camera programs across the U.S. was motivated in part by racial disparities in policing, I test for evidence of differential effects for Black and non-Black defendants. I do not find compelling evidence that body-worn cameras differentially helped or harmed Black defendants.

The paper proceeds as follows. Section 2 provides an institutional context for Virginia courts and body-worn camera adoption, and an economic context for understanding the consequences of court outcomes. Section 3 presents a conceptual framework for the three primary channels through which body-worn cameras may affect court cases: behavioral effects, evidentiary effects, and attorney time use effects. Section 4 contains a description of the court and body-worn camera adoption data that I use for my court-level analyses; Section 5 outlines the empirical strategies that I use to analyze these data. Section 6 presents results using both traditional two-way fixed effects and the new imputation method. Section 7 dissects the null result presented further and tests for heterogeneity in treatment effects for cases more and less likely to have body-worn camera footage as well as heterogeneity in effects by race. Section 8 concludes.

1.2 Background

1.2.1 Body-worn cameras

Nationally, body-worn cameras became a commonplace tool for U.S. law enforcement agencies in the latter half of the 2010s. A 2016 national survey of nearly 4,000 U.S. law enforcement agencies, the Law Enforcement Management and Administrative Statistics- Body-worn Camera Supplement (LEMAS-BWCS, 2016), documented this rapid expansion. By the end of 2016, the LEMAS-BWCS showed widespread adoption of body-worn cameras and high intentions amongst non-adopters to use the technology in the future: thirty-one percent of non-adopting agencies reported that they were likely or very likely to consider acquiring body-worn cameras in the next year. Even agencies that did not intend to imminently adopt body-worn cameras reported high rates of officer and community support for such programs.

The 85 LEMAS-BWCS respondents from Virginia demonstrated similar adoption trends to U.S. agencies overall.⁴ Sixty-two percent of Virginia agencies reported adopting body-worn cameras by the time of the survey and Figure 1.1 shows that these adoptions were clustered between 2014 and 2016, consistent with U.S. adoption trends. In both Virginia and the U.S., the plurality of adopting agencies did so in 2015, but new adoptions were also common in 2016. I collected an expanded data set encompassing more Virginia law enforcement agencies over a longer time frame to capture post-2016 adoptions.⁵ Using these new data, Figure 1.2 shows that the pace of adoptions tapered after the 2015 peak but Virginia departments continued to routinely adopt body-worn cameras through 2018. Figure 1.3 shows that not only did the number of jurisdictions using body-worn cameras increase rapidly between 2014 and 2018, but so did the population exposed to the cameras.

Respondents to the LEMAS-BWCS also clarified why and how their agencies implemented body-worn cameras. Adopting agencies most commonly cited expected benefits to policing in-

⁴Respondents for LEMAS surveys are drawn from the Department of Justice's Law Enforcement Agency Roster (2016) which shows 293 total agencies within Virginia.

⁵Section 4.1 describes these data in detail.

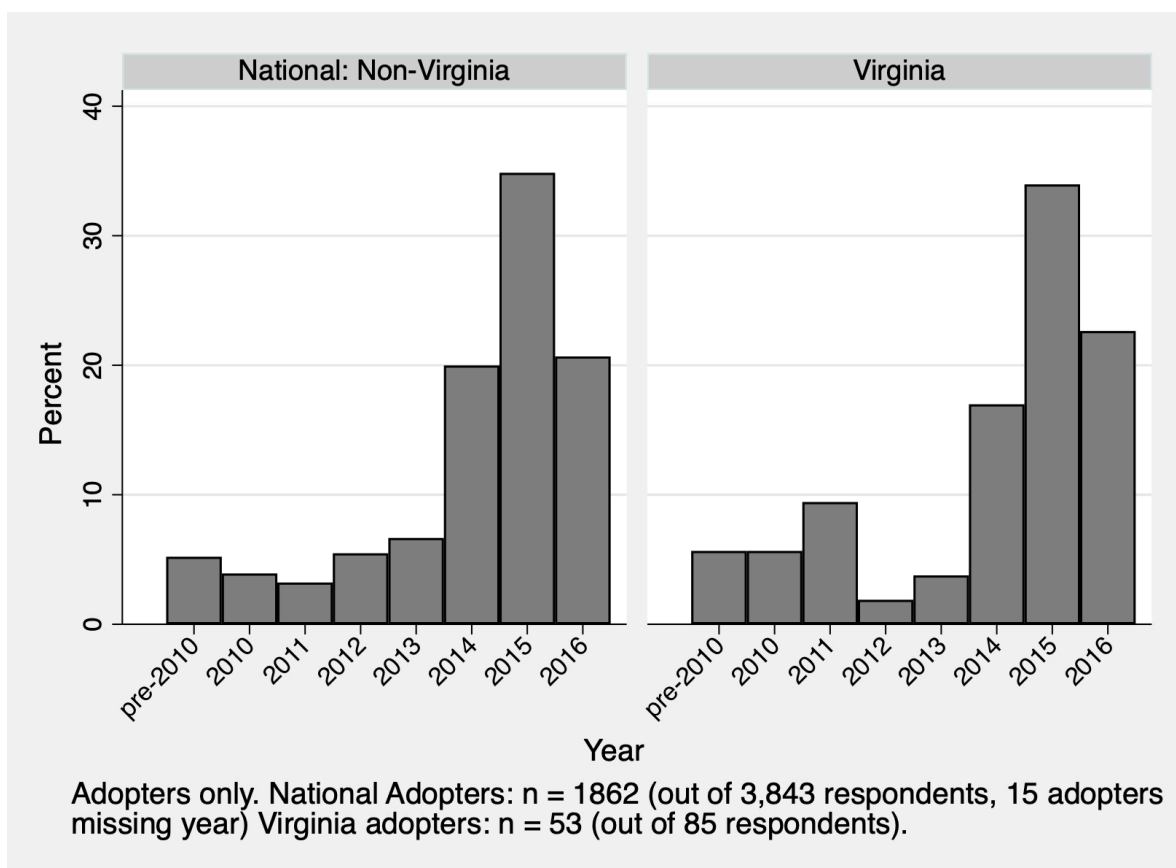


Figure 1.1: Year of BWC adoption for law enforcement agencies in LEMAS-BWCS

cluding improvements in officer safety (21 percent), accountability (19 percent), and a reduction in/faster resolution of citizen complaints (15 percent), as their primary reasons for adoption.⁶ Financial constraints drove the decision not to adopt for agencies without body-worn camera programs, an obstacle to implementation reported by many adopting agencies as well. To achieve the expected policing benefits, adopting agencies almost always established a formal policy outlining when body-worn cameras must be turned on. Policies typically dictate that cameras be activated for traffic stops (93 percent), and when executing arrest or search warrants, deploying firearms, and initiating contact with members of the public (nearly 85 percent each), and preserved for between one month and one year. These retention periods may be extended if pertinent to an ongoing matter, such as a use of force incident, citizen complaint, or if used as evidence in a legal proceeding.

Agencies were optimistic that body-worn camera recordings would make cases more prose-

⁶Percentages exclude respondents whose agency's primary purpose was to conduct a pilot program.

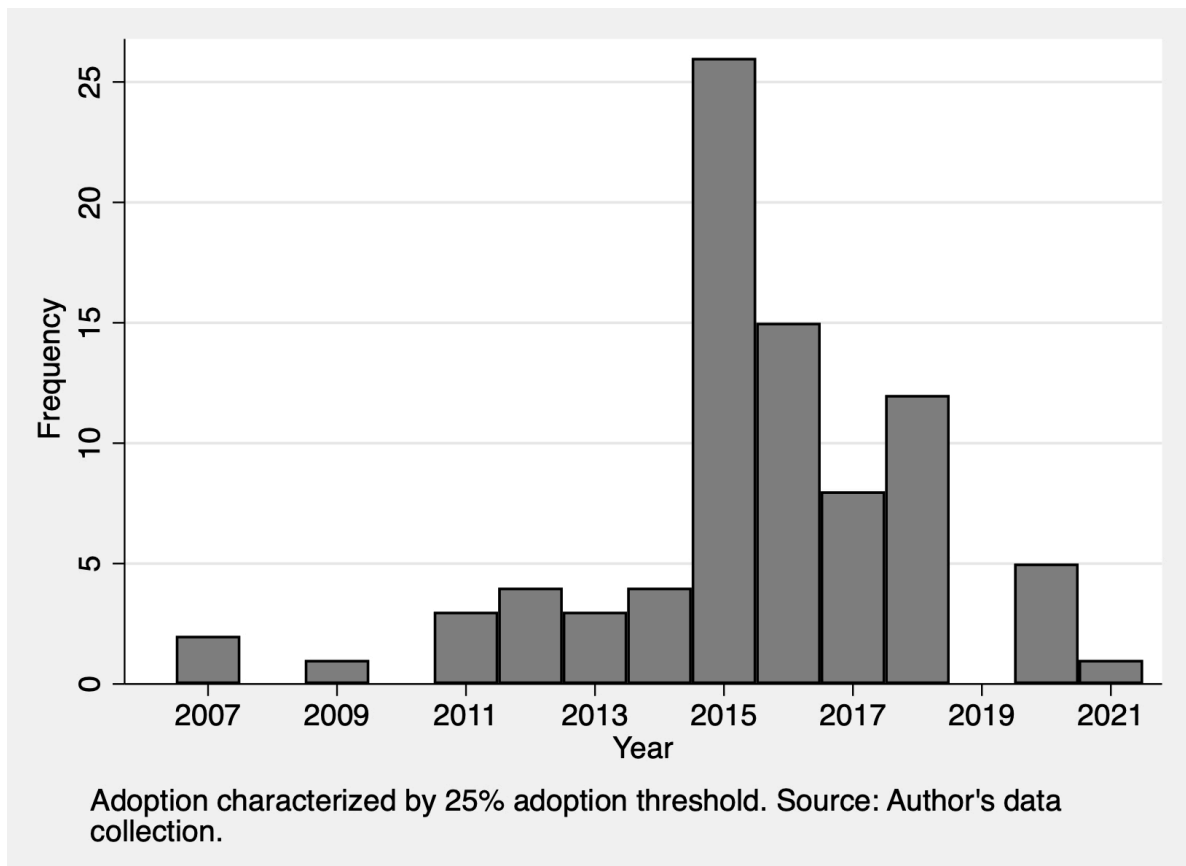


Figure 1.2: Year of BWC adoption by district court jurisdiction, Virginia

cutable (69.8 percent) and improve evidence quality (78.8 percent). However, these expected effects of body-worn cameras on the courts rarely drove adoption decisions; less than 10 percent of agencies cited improvements to evidence quality (9.5 percent) or making cases more prosecutable (7.6 percent) as the primary reason they adopted body-worn cameras.

1.2.2 Virginia Courts and Court Actors

Body-worn camera videos recorded during police-public interactions generate large volumes of video data in part because police interact with the public often. The Bureau of Justice Statistics estimates that in 2018, about 24 percent of the U.S. population (60 million people) interacted with the police (Harrell and Davis, 2020), although many of these contacts were resident-initiated and did not result in criminal charges. Even so, a substantial share of the U.S. population will find themselves in court during their lifetimes. In 2013, Virginia State General District Courts and

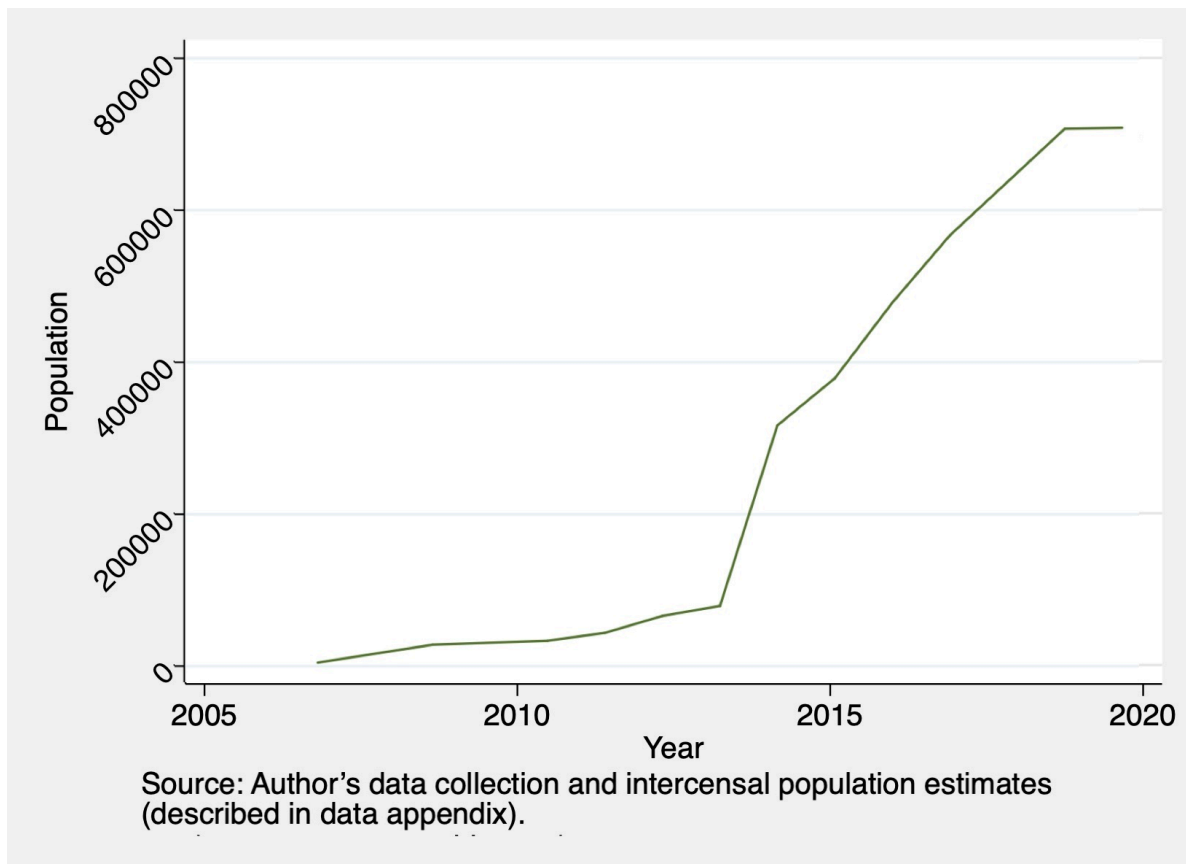


Figure 1.3: Population living in a BWC jurisdiction

Circuit Courts received a total of nearly 900,000 felony and misdemeanor filings (Office of the Executive Secretary, 2014a; Office of the Executive Secretary, 2014b).

These two sets of courts, district and circuit level, serve as the primary venues for criminal litigation across Virginia. The courts largely share geographic jurisdictions, with approximately one circuit court and one district court in each county or independent city across the state.⁷ However, they differ in the scope of the cases they hear: district courts hold jurisdiction over misdemeanor cases, whereas the circuit courts litigate felonies.⁸ Oftentimes geographic court boundaries contain multiple law enforcement jurisdictions. For example, both a county sheriff and a town police department may operate within a single county. Thus, courts can receive cases from multiple law

⁷In a few places, multiple district courts operate within a single circuit court jurisdiction.

⁸Misdemeanors and felonies differ in the severity of the crime and the severity of the punishments if convicted: while a defendant can be sentenced to life in prison for a severe felony, the most severe misdemeanors carry a 12 month sentence.

enforcement agencies.

Cases enter the courts through two primary mechanisms. Police officers can issue a Virginia Uniform Summons, which initiates a filing in the district court. These summonses are common for misdemeanors and do not require that a defendant be held in custody while awaiting court proceedings. Alternatively, police can arrest defendants. When this happens a local magistrate provides an intermediate step between law enforcement and the courts. Magistrates review sworn statements from a complainant (such as an arresting officer) to assess whether there is probable cause to proceed with a criminal charge. This standard of probable cause is much weaker than a standard to convict—the Virginia Magistrate Manual describes that the magistrate needs only to ascertain that “the charges are not capricious and are sufficiently supported to justify bringing into play the further steps of the criminal process” (Department of Magistrate Services, 2021).

After a summons is issued or the charges advance from the magistrate’s office, the outcomes of the charges can be influenced by three court actors: a judge, prosecutor, and defense attorney.⁹ I provide a basic case road map outlining the entities involved in various states of criminal litigation in Table 1.1. Broadly, the court actors can influence outcomes for the defendant ranging from the final set of charges to be ruled on in court to the outcomes of those charges, their sentencing, and even the pace at which the case resolves. More specifically, prosecutors can alter, drop, or add charges to a criminal case; judges dismiss or rule on charges and determine sentences;¹⁰ and both prosecuting and defense attorneys lobby for preferred dispositions and sentencing.¹¹

By design, both judges and prosecutors are always publicly funded government employees. In practice, defense attorneys often are too. A system of publicly funded attorneys (“indigent defenders”) represent low-income defendants in order to fulfill the Constitutional right to counsel.¹² In Virginia, these attorneys are either a) public defenders—salaried attorneys working in

⁹Statutorily, all three actors are involved in felony cases. Practically, all three actors are involved in many misdemeanor cases as well. However, for low-level misdemeanors and infractions a prosecutor and/or defense attorney may not be involved in the case.

¹⁰This is a simplification of the full role of judges: judges also rule on a variety of motions presented to the court and in some cases oversee jury trials wherein a jury rules on a case.

¹¹“Dispositions” are the rulings or resolutions to cases, for example “guilty”.

¹²Data on the precise share of defendants using indigent defenders vs. private counsel are hard to come by and indigency thresholds vary across states. However, estimates routinely place the share of indigent defendants in excess

<i>Table 1.1: Case roadmap</i>			
Stage	Case Activity	Entities Involved	Activity Summary, <i>Body-worn camera role</i>
1	(Alleged) Offense	Defendant Police	Defendant allegedly commits offense; may or may not be seen by police. <i>Video may be captured</i>
2	Summons issued/ Arrest and booking	Defendant Police	Officer may release defendant with summons for later court date or arrest defendant. <i>Video captured</i>
3	Warrant/ Charge issued	Defendant Police Magistrate	If arrested, defendant appears before a judicial officer to determine whether charges proceed. <i>None</i>
4	Court hearings, preparation	Defendant Judge Attorneys	Court hears evidence, disposes charges, pronounces sentences. Attorneys negotiate plea agreements, argue for preferred dispositions and sentences. <i>Video reviewable</i>

a state-funded law firm that represents indigent clients or b) assigned counsel—private attorneys compensated to represent indigent clients on a case-by-case basis.

A key motivation for this paper is the reports from indigent defenders warning that the marginal time required to review body-worn camera footage exceeds attorney time constraints. Even prior to body-worn camera adoption, full-time indigent defenders in Virginia were likely to face binding time constraints for their caseloads. In FY 07/08, before body-worn cameras became widespread, public defenders in Virginia managed on average 320 cases per attorney per year (Kleiman and Lee, 2010). Appendix Figure A.6 shows that these caseloads exceed the American Bar Association’s recommendation of a maximum of 150 felonies *or* 400 misdemeanors (American Bar Association, 2009) annually. While assigned counsel are employed on a case-by-case basis, they too face time constraints in the form of compensation caps. Assigned counsel are paid a fixed hourly rate for a maximum of approximately 1.3 hours of paid work on misdemeanor charges at the district court level, and less than 5 hours of paid work on a typical circuit court felony charge.¹³ Even before law

of 70% of state-court defendants (Harlowe, 2000; Butcher et al., 2017).

¹³Virginia Code §19.2-163

enforcement began using body-worn cameras, assigned counsel attorneys rarely reported working fewer than the maximum compensated hours.¹⁴

1.3 Literature and Conceptual Framework

Policing and the court system are the two most direct levers through which governments seek to improve social well-being by reducing crime. The negative effects of crime on victims and communities are pervasive, with studies showing detrimental effects on outcomes spanning housing prices and wealth accumulation, mental well-being, and youth academic performances (Linden and Rockoff, 2008; Cornaglia et al., 2014; Schwartz et al., 2016). However, the determinants of crime are also multifaceted. Empirically they have been shown to range from inequality and other socioeconomic factors (Kelly, 2000; İmrohoroglu et al. 2000; Fajnzylber et al., 2002(a); Fajnzylber et al., 2002(b); Grogger, 1998; Buonanno and Montolio, 2008), to alcohol access (Heaton, 2012; Groönqvist and Niknami, 2014), social networks (Damm and Dustman, 2014; Billings et al. 2019), family background or adverse childhood experiences (Doyle, 2008; Currie and Tekin, 2012; Eriksson et al., 2016) and more. Even schooling and entertainment can affect crime by incapacitating would-be offenders (Dahl and DellaVigna, 2009; Jacob and Lefgren, 2003).

Police reduce crime both by serving as monitors who can disrupt criminal activities and also by increasing the costs of criminality by bringing defendants into the courts. Convicted defendants incur immediate costs of liberty or finances, and incarceration and criminal records further diminish post-release economic self-sufficiency by increasing barriers to formal employment (Agan and Starr, 2017; Dobbie et al., 2018). These effects grow for longer periods of incarceration (Mueller-Smith, 2015). Numerous studies affirm that police deter and reduce criminal activity (Evans and Owens, 2007; Draca et al., 2011; Vollaard and Hamed, 2012 ; Chalfin and McCrary, 2018; Weisburd, 2021), and that incarceration can incapacitate would-be offenders (Barbarino and Mastrobuoni, 2014; Mastrobuoni, 2019).

¹⁴There are some opportunities for fee waivers that would increase the maximum compensation. However, using compensation data provided by the Virginia Supreme Court, I calculate fee waivers to be rarely granted, given for only about 3.3% of charges. Annually aggregated versions of these data form the basis of many analyses in Chapter 2 of this dissertation.

However, policing and the criminal justice system also carry numerous costs. Fiscally, in 2018 states spent \$119 billion on police (Urban Institute, 2021) and an average of over \$30,000 per prison inmate each year (Mai and Subramanian, 2017).¹⁵ Incarceration can spur post-release criminal activity and increased use of public assistance programs (Bayer et al., 2009; Mueller-Smith, 2015). And, the manner in which police pursue crime reduction goals affects the public more generally. Instances of police misconduct are costly to budgets, trust in criminal justice institutions, and social well-being. In 2019 the City of Chicago paid nearly \$47 million in settlements and court awards stemming from police misconduct (City of Chicago, 2020).¹⁶ Even indirect exposure to police use-of-force can reduce academic attainment for high school students, particularly Black and Hispanic students (Ang, 2021).

New police technologies affect both costs and benefits in the criminal justice system. Body-worn cameras may enhance officer’s ability to deter crimes and may also deter police from engaging in socially costly actions. Simultaneously, body-worn cameras generate evidence that can increase accuracy in convictions and improve targeting of sentences. However, the technology has fiscal costs to implementation and alters the workloads of other public service employees. In the following subsections I detail these three prospective channels through which body-worn cameras can affect policing and the courts, present the existing evidence of their roles, and describe their sometimes conflicting predicted effects on criminal court cases.

1.3.1 Behavioral/Civilization Effects

“That’s the beauty of these devices . . . everybody gets politer when the cameras are on.”

Norfolk Police Chief Michael Goldsmith¹⁷

As Becker (1968) noted, the “supply” of crimes should be inversely related to the likelihood a criminal is discovered and convicted. As an evidence-generating technology, body-worn cam-

¹⁵Calculated using data available from 45 states.

¹⁶For context, this is approximately equal to the City’s budget for senior service programs through the Department of Family and Support Services in the same year (City of Chicago, 2019).

¹⁷(King, 2015)

eras reduce some of the noise around allegations of criminal behavior or professional misconduct — thereby increasing the likelihood, *ceteris paribus*, of conviction for offenses caught on camera. The most publicized instances of this occur with excessive force cases for police. For example, 2018 a jury convicted an officer of murder after body-worn camera footage contradicted the officer’s allegation that he shot into a car because it moved “aggressive(ly)” toward law enforcement (McCullough, 2018). However, offenses committed by members of the public that are caught on camera may also be easier to prosecute.

Because of this, it is possible that the mere presence of a body-worn camera is enough to alter court outcomes by bringing police and public behavior into alignment with legal and social standards.¹⁸ Advocates and practitioners posit that these “civilization effects” can reduce the prevalence of criminal behaviors in the sight of body-worn cameras and generally foster milder police-public interactions overall.

A few studies, primarily in criminology, test this theory of body-worn camera civilization effects for police. Yet, while body-worn cameras are a new tool, research on other technologies that increase the probability that a defendant is caught or convicted of a crime can help predict the public’s response. For police, research on police responses to oversight can supplement the existing evaluations of body-worn camera programs to characterize the accountability effects of body-worn cameras.

Empirically, numerous studies find that criminals respond to innovations that increase their expected costs to criminal behavior. These innovations include DNA databases for convicted felons (Doleac, 2017), electronic monitoring (Di Tella and Schargrodsky, 2013), and Lojack stolen car recovery devices (Ayres and Levitt, 1998; Gonzalez-Navarro, 2013). Even so, the mechanisms through which these technologies reduce crime vary. Lojack has limited ability to link an individual to an offense, but it reduces the expected value of the stolen goods by increasing the likelihood that a stolen vehicle is recovered. In contrast, DNA databases and electronic monitoring are highly targeted for prior offenders and can directly link a specific offender with a specific offense.

¹⁸Body-worn cameras are worn on the outside of an officer’s uniform, typically affixed to clothing, equipment, or accessories. Because of this, they are observable to members of the public when interacting with police.

Closed-circuit television (CCTV) may reside in a middle ground; these surveillance cameras target locations rather than individuals, but also provide video evidence that can help link specific individuals to specific crimes. In this way, CCTV is similar to body-worn cameras, and both increase the likelihood that a criminal is caught and convicted if their offense is committed in view of a camera. In a meta-analysis of 76 criminology studies of CCTV, Piza et al. (2019) found an estimated 13 percent reduction in crime in CCTV areas compared to controls.

However, body-worn cameras also differ from these deterrence technologies in key ways that may alter their effectiveness in deterring unwanted behaviors. CCTV surveillance cameras constantly transmit from a fixed, pre-determined vantage point, while body-worn cameras must be activated in order to preserve video and record an officer's regularly changing viewpoint. Body-worn cameras also differ from Lojack, electronic monitoring, and CCTV in that they provide no monitoring benefits.¹⁹ Electronic monitoring technologies alert law enforcement if an individual violates boundaries established by the court. Lojack, once activated, notifies law enforcement of the real-time location of a stolen vehicle. And, in heterogeneity analyses, Piza et al. (2019) found that effect magnitudes across evaluations were larger when CCTV was actively monitored. But, because officers inherently serve as monitors, body-worn camera adoption is unlikely to induce deterrent effects through this channel. Even so, CCTV crime reductions are not wholly attributable to increased monitoring, suggesting that recorded video from body-worn cameras may nonetheless have a deterrent effect; Gómez et al. (2021) show that CCTV expansions in Medellín, Colombia that were not accompanied by expansions to monitoring capacities decreased reported crimes and arrests.

For police, body-worn cameras enable additional oversight, which may improve conduct amongst officers and sort out low-quality officers from the ranks. A less desired potential outcome of heightened oversight is *de-policing*, when police reduce their interactions with the public. Existing body-worn camera studies typically test for evidence of civilization effects in use of force and citizen complaint data, finding mixed results.

¹⁹Monitoring deters crime by enabling a real-time response to criminal activities (Gonzalez and Komisarow, 2020).

Summarizing a set of ten randomized controlled trials (RCT) in a meta-analysis, Ariel et al. (2016) found no significant change in police use-of-force for body-worn camera users across the interventions on average. This finding contradicted the RCT published in the prior year by an overlapping set of authors, which found that the rates of use-of-force incidents and officer complaints both declined for police assigned to use body-worn cameras (Ariel et al., 2015). The null results of the meta-analysis were subsequently supported by a randomized controlled trial in Washington D.C. which showed no differences in either use of force or complaints between adopters and non-adopters (Yokum et al., 2017).

Notably, the interventions studied in these evaluations consisted of partial adoptions within single departments; it is possible that the estimates are attenuated due to spillovers into the interactions of non-BWC assigned police. For example, members of the public may be aware that police are using body-worn cameras but unsure of whether the specific officers they interact with are using them. Additionally, officers may learn from their peer networks (Ouellett et al., 2019) — which do not necessarily directly coincide with their body-worn camera assignment groups. These concerns were also present in a non-randomized intervention that demonstrated a reduction in complaints against body-worn camera-wearing officers in Phoenix (Katz et al., 2014).

To bypass these limitations, Kim (2020) used a difference-in-differences strategy with a national sample of law enforcement agencies and found evidence that body-worn cameras *do* reduce police use-of-force. While this result suggests a civilizing effect on officers, he does not find any reductions in assaults targeting a police officer.²⁰ Together these findings suggest that officers—but not the public—are “civilized” by body-worn cameras and further may be indicative of null or limited changes in police use of discretion in charging.

While use of force is a salient and influential outcome to study, these events are relatively rare in policing. Complaints of excessive use of force are even more so: using data from Chicago police, Chalfin and Kaplan (2021) found that 84 percent of officers generated no use-of-force complaints over a 5-year period. But, we can also expect to find broader changes in the charges that

²⁰The global meta-analysis of local body-worn camera impact evaluations (Ariel et al., 2016) actually showed higher rates of assaults on police after adoption.

reach the courts if the “better behavior” caused by civilization effects reduces the likelihood that an interaction escalates either physically or verbally. More deferential defendants and officers may reduce the frequency of charges of officer-oriented offenses such as resisting arrest. And officers, who have a degree of discretion in issuing citations and making arrests, may be less likely to overcharge criminal defendants — however, they also may be disincentivized from displaying leniency if they anticipate that their footage will be reviewed. These alterations could affect defendants on both the intensive and extensive margins — in other words, civilization effects may reduce the probability an individual is accused of a first offense or that they are charged with multiple offenses. This may be particularly pronounced if officers engage in de-policing.²¹

When Katz et al. (2014) conducted an impact evaluation of a body-worn camera program for the Phoenix Police Department they tested aspects of this broader view of civilization effects. The authors first surveyed police about how they expected body-worn cameras to affect officer discretion and the frequency of contacts with the public. In both cases, before adoption respondents expected body-worn cameras to reduce discretion and contacts. However, these concerns lessened after the cameras were in use. While the authors acknowledge some shortcomings that limit the strength of causal claims within the study— including substantial officer turnover in the pre-adoption period — they find in practice adopting squads actually significantly increased their daily arrests and the frequency of resisting arrest charges was not significantly changed implementing the program.²² However, further study is needed to validate these findings outside of the Phoenix context.

²¹Outside of the body-worn camera context there is a theoretical basis for de-policing (Prat, 2004), and some empirical evidence showing de-policing under heightened oversight (Ba and Rivera, 2019). However, while Ba and Rivera (2019) do find evidence of de-policing following oversight generated by public outcry, they do not find evidence for it when the oversight is generated within a policing organization as would be more similar to routine internal review of body-worn camera videos.

²²Resisting arrest charges here were tested as a frequency instead of a share of arrests so this does not rule out evidence of a civilization effect in this outcome.

1.3.2 Evidentiary Effects

When a police interaction ends with charges filed in the criminal courts, body-worn camera video can affect the resolution of the charges. Body-worn camera recordings can provide evidentiary value in court proceedings, affecting how judges and juries perceive the events that unfolded during a police interaction. Influentially, court actors resolve many cases outside of the courts through plea negotiations in which prosecutors and defendants (through their legal representation) agree upon a set of terms under which a defendant will admit culpability to the court— sometimes trading more lenient sentences or dropping charges in exchange for resolving the case without an uncertain and resource-intensive trial. Guilty pleas are common and accounted for 88 percent of case resolutions in U.S. district courts in 2009 (Sourcebook, 2009).²³ Rational plea negotiations will take into account the probability of conviction and the expected severity of sentencing if convicted (Butcher et al., 2021). Additional evidence can influence these plea negotiations by improving the bargaining position of one side. In the case of body-worn cameras, footage may reveal law enforcement error or abuse or may corroborate/undermine defendant or law enforcement accounts of events.

While exposure of law enforcement error or abuse clearly benefits defendants, other evidentiary effects are theoretically ambiguous in direction. We may anticipate that they lean against defendants on average if the typical police stop is merited and/or the core components of a typical police report align with body-worn camera footage.²⁴ Ultimately, the balance of these elements determines whether additional evidence benefits or harms defendants on average— which is itself an empirical question.²⁵

²³I too find a preponderance of cases that end with a guilty plea: within my sample, which I detail in section 4, 65 percent of cases at the circuit court level conclude with at least one guilty plea.

²⁴We can consider this in a signaling framework: when footage confirms some details of a party's account of events this may strengthen the signal of the party's reliability and thus lends credence to the elements of the party's account that are not visible in the footage. Anecdotal attorneys report experiences consistent with this signaling. This signal may disproportionately advantage police accounts, particularly in those jurisdictions where law enforcement can review body-worn camera footage prior to writing an arrest report (NACDL, 2018). In the Katz et al. (2014) evaluation, the authors report that Phoenix police specifically required that their cameras have the capacity for in-field footage review.

²⁵An additional evidentiary consideration for body-worn cameras is the effect of not having body-worn camera footage of an incident when body-worn cameras are ubiquitous in an area and an officer is present. An officer may

Just how often body-worn camera footage provides evidentiary value for a case is unclear due to scarce data. Katz et al. (2014) show that officers *believe* body-worn cameras provide evidentiary value and make cases more prosecutable. These beliefs are qualitatively consistent with the LEMAS-BWCS. However, a concurrent staffing intervention within the department contaminated tests of the accuracy of this perception. Although adjudication of complaints against officers falls outside of the criminal justice system, a recent working paper finds that body-worn camera adoption in Chicago significantly reduced complaint dismissals for insufficient evidence while increasing disciplinary actions due to substantiated complaints Çubukçu et al. (2021).

1.3.3 Time Use

“It’s a razor thin wire, because you’re looking to be sure your client’s due process rights are preserved. On the other hand, I have 120 other clients. I have to preserve their due process rights too.”
-Newport News Public Defender Robert Moody²⁶

Ascertaining whether body-worn camera video provides evidentiary value to a case requires that someone review available footage, of which there can be large quantities. The Katz et al. (2014) evaluation commented on low compliance amongst Phoenix officers, but also reported that footage was available for as high as 42 percent of calls in a month. In Virginia, between 2016 and 2018 the Henrico County Commonwealth’s Attorney’s office reportedly annually viewed one hour of video for each of over 2,000 cases on average (Compensation Board, 2018). This is approximately equivalent to the workload of a full-time employee.²⁷ Similarly, three Virginia public defender offices reported spending between 160 and nearly 3000 hours per month on body-worn camera related tasks, the workload of between 1 and 16 additional full-time employees over base-

neglect to record an interaction intentionally for their own expected benefit or to preserve the privacy of a member of the public, or unintentionally due to equipment malfunction or surprise.

²⁶(Albigen, 2019)

²⁷A broader October 2018 Commonwealth Attorney (CA) survey showed that 51 prosecutor offices reported receiving an estimated 180,000 hours of body-worn camera footage over a 12 month period (Compensation Board, 2018). This amounts to an average of about 300 hours per month per office.

lines of six to nine attorneys (Gaub et al., 2019).²⁸ However, staffing levels for publicly provided attorneys are sticky, and assigned counsel compensation caps depend only on case types — not on the workload or available evidence. For cases with video, assigned counsel would use over 20 percent of their compensated time for a typical felony charge just reviewing body-worn camera video if they spent the same amount of time on this task as the Henrico County CA’s office reported spending on average.

Some of the time, body-worn camera video review may substitute for other case tasks. Other times, attorney time constraints may cause this review to crowd out non-body-worn camera activities. The extent to which each takes place remains ambiguous due to limited data. However the dominant narrative supported by practitioners is one of crowd-out. The Executive Director of the Virginia Indigent Defense Commission raised an alarm about attorney workloads due to body-worn camera adoptions, writing, “it is not hard to imagine that court-appointed attorneys will be faced with terrible choices, which will hurt their clients, hurt their practice, or potentially undermine both. Court-appointed attorneys will likely have to stop taking court-appointed cases; not watch all the body-worn camera footage, in violation of their ethical duties; or basically be forced to work for free” (Compensation Board, 2018). The Ethics Counsel for the Virginia State Bar echoed this sentiment on the prosecutorial side, stating “Existing prosecutors’ workloads will be significantly increased by the time taken to review footage derived from body-worn cameras. To comply with legal and ethical standards, Commonwealth’s Attorneys must staff more lawyers or decline handling cases. Breaching the legal and ethical standards is obviously not an option” (Compensation Board, 2018). These practitioner concerns are now leading to policy changes in Virginia aimed at ameliorating some attorney time use effects (VACO, 2019).

²⁸The offices also employ non-attorney personnel.

1.4 Data

Existing data on body-worn cameras are scarce and have limited coverage of law enforcement agencies and court jurisdictions.²⁹ I fill this data gap by collecting a more comprehensive set of law enforcement body-worn camera adoption data, which I aggregate to a quarterly court-level adoption indicator. Observing body-worn camera adoption at the court-level rather than the case-level allows me to take a broad view of direct and spillover effects of body-worn cameras on cases with and without footage. I combine these body-worn camera data with charge-level data from Virginia courts to form quarterly court-level panels that I use to explore changes in charging, case processes, and case resolutions.

1.4.1 Body-worn Camera Data

I measure body-worn camera adoption at the geographic court jurisdiction level and define a court as “treated” when the first major law enforcement agency operating in its jurisdiction implements a body-worn camera program. Multiple law enforcement agencies of varying sizes may operate within a single jurisdiction, so I use the “major” designation to focus on those agencies likely to contribute influentially to court caseloads. Using the 2016 Law Enforcement Agency Roster (Department of Justice, 2017), I identified a set of agencies that each employed at least 25 percent of the total officers or served at least 25 percent of the population in their court jurisdiction.³⁰ I excluded agencies without policing duties and omitted some sheriff’s offices that primarily handled jail and court security. From the remaining agencies I sought information about body-worn camera adoption through Freedom of Information Act (FOIA) requests. I extended FOIA requests to 157 qualifying agencies and obtained information from an additional 32 agencies through direct contact, departmental websites, and local media.³¹

²⁹The LEMAS-BWCS data included a sample of 85 local law enforcement agencies in Virginia. A survey of Virginia Commonwealth’s Attorneys often generated missing or incomplete responses on questions pertaining to the timing of body-worn camera adoption. None of these data are linked to specific cases.

³⁰I detail this designation more thoroughly in Appendix A.1 and describe an alternative 50 percent threshold and the robustness of my results to this threshold in Appendix A.3.

³¹I include a thorough discussion of the FOIA requests and adoption dataset in Appendix A.1. I am grateful to Nathan Fedorchak for his invaluable assistance navigating the Virginia FOIA process and to the numerous members

Ultimately I obtained complete body-worn camera adoption data for 111 district court jurisdictions including 78 that adopted body-worn cameras by 2019 and 106 circuit court jurisdictions, 76 of which adopted by 2019. These comprise nearly 90 percent of state district and circuit courts in Virginia. A map of adopting jurisdictions is available in Appendix A.1.

1.4.2 Criminal Case Data

Next, I use charge-level data for criminal cases filed in Virginia district courts between January 2009 and March 2019 and Virginia circuit courts between January 2005 and March 2019 obtained from the Virginia Court Data repository (Schoenfeld, 2021). All courts report defendant demographic information including race and sex, the filing date for each charge, the charge disposition, a series of sentencing outcomes, and text variables containing information about the charge itself and the section of the Virginia Code that encompasses the charge. Defendants most often receive dispositions of guilty, charge dropped by the prosecutor, or charge dismissed by a judge. Sentencing information can include the amount of time that someone is sentenced to serve in jail or prison as well as fines incurred. I also observe whether a charge is amended (superceded by an alternative charge) after filing. For example, I observe multiple instances in which an initial charge of assault on a police officer is replaced with the lesser offense of obstructing justice. Amendments can correct inaccurate initial charges or may reflect plea negotiations.

Each individual charge represents an allegation of a single offense, however it is common for defendants to be charged with multiple offenses at the same time. These charges can operate as alternatives — that is, providing a jury the opportunity to convict a defendant of either manslaughter or second degree murder (or neither, but not both), or can come out of related allegations, like multiple instances of embezzlement activities discovered jointly or a domestic violence incident that ended in an altercation with a responding police officer. When a defendant faces multiple charges at the same time it is likely that charge characteristics, court processes, and outcomes of the individual charges are related to one another. To address this, within each court type I aggre-

of law enforcement agencies throughout Virginia and Michigan who shared their body-worn camera experiences with me.

gate charges up to a case-level using a grouping algorithm described in Appendix A.1. I use these case-level data to apply sample selection criteria, define outcome variables, and then subsequently aggregate up to a court-level quarterly panel.

Once charges are aggregated into cases, they may carry multiple dispositions and multiple sentences. For example, a three-charge case could end with one charge dropped by the prosecutor and two five-year prison sentences for the remaining two charges. I define disposition variables for cases by whether any of the charges in the case received a certain disposition. In this example, the case would be recorded as having both a “dropped” and “guilty” disposition. Overall for analyses, I focus on these two dispositions of “guilty”, and “dropped”. I also show a simple binary measure of whether an individual was sentenced to serve a nonzero amount of time in a jail or prison.³²

1.4.3 Sample and Outcome Variables

The three channels through which body-worn cameras can affect criminal defendants and the courts occur at two different stages in the criminal justice process. To capture the effects of body-worn cameras at these distinct stages, I use different sample selection criteria for analyses of policing-based and court-based effects at the district and circuit court levels. I detail these criteria in the following section and present baseline descriptive statistics for each sample in Table 1.2.

1.4.3.1 Case Filing Samples

To test for civilization effects in routine police interactions, I create a quarterly court-level panel encompassing all district court filings for cases involving infractions, misdemeanors, and felony offenses. By including all of these case types, I capture police interactions that involve the courts

³²I discuss the sentencing data in more detail and show results for additional sentencing outcomes in Appendix A.2. Some defendants who are sentenced to serve time according to this measure actually forgo incarceration by adhering to certain requirements set by the judge in their case. I ignore this in the main definition of this variable, but include supplementary results showing the use of suspended sentences after body-worn camera introduction in Appendix A.3

<i>Table 1.2: Comparison of treated and untreated localities at early-sample baseline</i>						
<i>Panel A: Case Filings</i>	District		Circuit			
	Untreated	Treated	Untreated	Treated		
Cases	4,424.8	3,986.1	80.2	184.4		
Civilization Effect Cases	27.6	42.1	3.6	9.0		
Multi-charge Cases	17.2%	19.2%	49.1%	46.4%		
Count Localities	33	70	28	68		
<i>Panel B: Case Processes & Outcomes</i>	District		District		Circuit	
	Misdemeanors		Felonies		Felonies	
	Untreated	Treated	Untreated	Treated	Untreated	Treated
Female	28	29	22	24	21	22
Black	21	34	26	43	27	45
Multi-charge	17	18	57	54	47	43
% Public Defender	33	44	33	43	25	46
% Cases with amended charge	9	9	4	4	2	2
Avg Sentence Time (days)	21.7	28.0	67.1	81.8	2404.2	2518.9
% Sentenced to time	18	22	27	28	66	71
% Received fine	65	65	13	13	11	12
% Cases with charge dismissed	19	17	10	10	7	4
% Cases with charge dropped	11	11	38	40	21	24
% Cases with guilty charge	73	75	34	33	72	72
Avg Num. Cases	999.7	1182.0	91.7	136.1	53.7	124.3
Count Localities	33	70	33	70	28	68
<i>Note: 2009 District court case characteristics, 2006 Circuit court case characteristics from unweighted locality-level panel. The treated group are localities that adopted by Q2, 2018. Case filing panels are not case-type specific.</i>						

without drawing distinctions across the severity of the cases. I measure changes in these filings across both extensive and intensive margin outcomes.

On the extensive margin, I calculate the total number of cases filed within the courts as well as the prevalence of a subset of cases that include charges for which body-worn cameras are particularly salient. This subset of “civilization effect charges” includes the charges that I expect to be most responsive to civilization effects. These charges all originate or escalate in the presence of a police officer and include disorderly conduct, eluding police, resisting arrest, and assault or

other offenses specifically directed toward law enforcement.³³ Civilization effects should reduce the total number of cases entering the courts by either of these measures, although the total case count will only show reductions if civilization effects are widespread.

I measure intensive margin changes using two share variables: the share of cases consisting of multiple charges and the share of misdemeanor cases. When measuring the share of misdemeanor cases I specifically look at the share of misdemeanors relative to the total number of felony and misdemeanor cases. Here civilization effects should reduce the share of multi-charge cases and shift felonies toward misdemeanors on average.³⁴

Because court actors typically only influence district court charges after they are filed, changes in these outcomes reflect changes in the policing stage of the criminal justice system. In contrast, since circuit court filings typically follow district court proceedings, changes in this set of filings will reflect all three channels of body-worn camera influence. Although the interpretations of analyses of these two panels will differ, I create a parallel panel for circuit court case filings to test for changes in the quantity and composition of circuit court cases. At the circuit court level, I include variables for the quantity of cases filed, the quantity of civilization effect cases, and the share of multi-charge cases. I omit the misdemeanor share variable because criminal circuit court filings are institutionally set up to be dominated by felony cases.

I restrict the sample frame for main analyses to only those cases filed by Q1, 2019 to mirror

³³I identify these charges using both the code section and charge fields within my data. These two pieces of information typically complement one another: the code section describes which specific provision of the Virginia legal code the defendant is accused of violating, while the charge field provides a textual, and sometimes finer, description of the offense. For example, assault and battery is listed under 18.2-57 in the Virginia code, but the corresponding charge field might contain something like “A/B - LEO”, which designates that the defendant is specifically charged with assault and battery against a law enforcement officer. It is possible that there are times when an offense is directed at a law enforcement officer but this element of the charge is not indicated in either the code section or charge fields. If such misclassifications represent classical measurement error, my estimates will be less precise than they would be with perfect charge classifications but the measurement error does not introduce bias.

³⁴These predictions rely on distributional assumptions about the effects of body worn cameras across case severities and as such observed intensive margin results should be interpreted in the context of observed extensive margin results. For example, if body-worn cameras “civilize” all cases, then intensive margin outcomes will show fewer multi-charge cases and a higher share of misdemeanors relative to felonies. If, however, body-worn cameras simply truncate the distribution by removing less severe cases from the courts then we could find the opposite effects. My prediction assumes that more severe case types, such as felonies, are civilized. This is consistent with existing literature that shows body-worn cameras affect police behavior in severe situations (such as use of force).

the time frame of the court process and resolutions samples.³⁵ Law enforcement began using body-worn cameras recently³⁶ so in order to preserve one year of post-adoption data for included localities I drop mid-late 2018 adopters from all samples. At the other end, the earliest adopters began using body-worn cameras in 2007. My district court data begins in 2009, so I omit localities that adopted before 2011 from all district court analyses to allow for two years of pre-adoption data for all adopters. Such early adoptions are rare, comprising less than 4 percent of the localities that adopted body-worn cameras by 2019.

1.4.3.2 Court Process and Resolution Samples

After cases enter the courts, I am interested in how evidentiary and time use effects may affect cases. To test for these court-based effects, I construct quarterly district and circuit court case process and resolution panels. I partition the district court sample by case type, creating separate panels for misdemeanor and felony cases to account for differences in the potential outcomes and case processes across these case types. The circuit court panel only includes cases with at least one felony charge.³⁷ For all three samples I drop charges such as probation violations and bond violations that arise as a result of previous engagement with the criminal justice system. I also restrict my sample to cases for which all charges were filed by March 12, 2019 to allow at least one year for cases to resolve before the onset of the coronavirus pandemic.³⁸ Within these samples I construct a series of outcome variables that measure meaningful changes in case resolutions and the process by which these resolutions come to pass.

The resolution outcomes of interest include the share of cases for which the defendant is de-

³⁵The outcome variables of interest in the court process and resolutions sample will not be realized or observable immediately upon filing, and so I shorten the sample to allow adequate time to observe case resolutions. I discuss my selection of the March, 2019 end date in the next section and show robustness to this choice in Appendix A.3.

³⁶15 percent of adoptions before 2019 took place in 2018.

³⁷Stand-alone circuit court misdemeanors consist of appeals from the district court and are excluded from this sample. I omit infraction cases from circuit and district samples since infractions rarely entail litigation, will not qualify for an indigent defender, and often are resolved by pre-paying a set fine without ever interacting with the court or court actors.

³⁸The Governor of Virginia declared a state of emergency on March 12, 2020. Courts and attorneys suspended and/or substantially modified their operations due to Covid, so cases after this time did not have a “normal” year to be resolved.

clared guilty and the share that are sentenced to incarceration. The alternative to a guilty case under this definition is that a defendant is acquitted of all charges that are not already dropped by the prosecutor's office or dismissed by a judge. Charges can be dropped through plea negotiations, a lack of evidence, or demonstrated error. I use the share of cases for which any charges are dropped as the first case processes outcome.

For district court misdemeanors and circuit court felonies, cases conclude when all charges reach one of these final resolutions.³⁹ However, while felonies can be resolved in the district court, more commonly they go through a certification process to advance to the circuit court for further litigation. I use the share of cases that are certified to the circuit court as my second court process outcome. Finally, ongoing criminal litigation is disruptive for defendants, and so I use the amount of time a case is active within the courts as my third process outcome of interest. Specifically, for circuit court cases I use the share of cases that received a disposition within 1 year of filing. This precise disposition date variable is not available at the district court level so I substitute the most recent hearing date for district court cases instead.⁴⁰

In addition to measuring changes in case duration, this disposition timing variable fulfills a second key role in the circuit court analyses. I selected the sample window to allow cases a full year to resolve, but some will take longer. Circuit court cases encompass more severe charges and often more intense litigation, so longer and more complex circuit court cases would systematically drop from the sample in later periods without correction. To mitigate the effects of this attrition, I condition circuit court outcome variables on having been observed within 1 year of the filing date.⁴¹ The case length variable will alert me to compositional changes in my sample stemming from this timing criteria.

The predicted effect of body-worn cameras on each of these outcomes is conceptually am-

³⁹A small number are transferred to alternate jurisdictions, but these are exceptions. Cases can also be appealed after reaching a (guilty) resolution.

⁴⁰This will cause an overestimate of the time to case resolution, particularly for cases for which a defendant was sentenced to probation, but should serve as an effective proxy.

⁴¹For example, rather than examining the share of guilty cases, I use the share of cases for with a guilty outcome for at least one charge that is observed *within 1 year of filing*. In base year 2006, 83 percent of circuit court cases in my sample were resolved within 1 year of filing. District court cases tend to be simpler and faster-moving than circuit court cases and do not suffer the same issue. I discuss this in more depth in Appendix A.3.

biguous: attorney time use effects are expected to worsen outcomes for defendants by forcing a reallocation of attorney time from higher marginal value activities to lower (on average), which would correspond to an increase in both guilty and incarceration shares. However, it is unclear who benefits from evidentiary effects on average. If body-worn camera footage typically supports defendant narratives, then the evidentiary channel may partially or fully offset the time use effects. This tension across effects is also present in the dropped charges outcome; prosecutors may be eager to speed cases along in plea negotiations by offering to drop charges, or may find their negotiation position strengthened by the new video evidence and do so less often. According to attorney advocates, dominant time use effects should lengthen the amount of time between case filings and resolutions.

1.5 Methods

1.5.1 Two-way Fixed Effects

I test for the effects of body-worn cameras on policing and the courts using a difference-in-differences strategy based on the rollout of body-worn cameras across law enforcement agencies in Virginia. In my first specification, I use OLS with two-way fixed effects (TWFE) to estimate the ATT of body-worn cameras under the following model:

$$Y_{lt} = \alpha + \tau D_{lt} + \delta X_{lt} + \gamma_t + \lambda_l + \varepsilon_{lt}$$

Here, $D_{lt} = 1[t \geq T_l]$ is an indicator that takes the value of one for adopting localities during or after the quarter of adoption. The vectors γ_t and λ_l account for quarter and locality-specific fixed effects, while X_{lt} contains covariates that vary across locality (l) and quarter (t). The key parameter of interest is τ , the effect of body-worn camera adoption on the outcome of interest.

1.5.2 BJS Imputation Estimator

With staggered treatment timing, this TWFE estimator implicitly requires the assumption that τ is time and treatment cohort invariant. However, oftentimes treatment effects will exhibit heterogeneity in these dimensions, introducing bias in the estimates. Goodman-Bacon (2021) and Sun and Abraham (2021) show how estimates of τ or even more flexible estimates of τ_{lt} calculated with conventional event studies are not always reliable and reflect weighted averages of many comparisons across groups. These weighted comparisons may not reflect the intentions of the researcher.⁴² Multiple new and modified estimators emerged in recent years to address these shortcomings (Borusyak, Jaravel, and Spiess, 2021; Callaway and Sant’Anna, 2020; Sant’Anna and Zhao, 2020; Chaisemartin and D’Haultfoeuille 2020 ; Wooldridge, 2021).

In my context, law enforcement adopt body-worn cameras at different points in time, and heterogeneity in effects is theoretically plausible due to changes in salience at the policing stage and attorney adaptation within the courts. In light of this, I also implement the modified event study framework developed by Borusyak, Jaravel, and Spiess (2021). This imputation estimator (BJS) uses untreated observations to estimate locality and quarter fixed effects, which are then used to impute counterfactual untreated outcomes for treated observations. The difference between the observed outcomes and their imputed counterfactuals gives a locality and quarter specific treatment effect which can then be aggregated into the desired estimand. That is, using only control observations, I estimate

$$Y(0)_{lt} = \lambda_l + X'_{lt}\delta + \varepsilon_{lt}$$

I then use the estimates of $\hat{\lambda}_l$ and $\hat{\delta}$ to calculate $\hat{\tau}_{lt} = Y_{lt} - Y(\hat{0})_{lt}$ for each locality in each quarter.^{43,44} I aggregate these in two ways: one showing an overall ATT across all treated locality-

⁴²For example, the aggregated treatment effect does not exclude the “forbidden comparison” of newly treated to previously-treated groups, and treatment effects for units treated in the middle of the sample will receive greater weights than earlier or later treated units. With heterogeneous treatment effects over time, including forbidden comparisons can even cause estimates to be mis-signed.

⁴³ $X'_{lt}\delta$ nests the time fixed effects but also includes time-varying controls, such as defendant race and sex shares and the prevalence of different case types. A similar generalization can be made for the locality fixed effects term to nest both these fixed effects and unit -specific trends in $A'_{lt}\lambda_l$ however I use only the fixed effects in my specification.

⁴⁴Wooldridge (2021) describes the BJS estimator with unit-specific and time dummies as identical to his extended TWFE estimator.

quarters, which will be interpreted like the ATT from a constant effect TWFE model, and one showing estimated average treatment effects for each of the four quarters following implementation. In doing so, I can discuss short term treatment dynamics.

1.5.3 Identifying Assumption

The key underlying assumption for the difference-in-differences strategy employed by both of the above methods is that of parallel trends.⁴⁵ I provide empirical support for this assumption using the test proposed by BJS (2020), wherein I estimate an expanded version of the previous model using OLS on only untreated observations.

$$Y(0)_{it} = \lambda_i + X'_{it}\delta + W'_{it}\gamma + \tilde{\epsilon}_{it}$$

In contrast to the model used to estimate body-worn camera treatment effects, this includes a vector W_{it} of indicator variables for quarters leading up to adoption. I then conduct a joint significance test of the coefficients on these leads.⁴⁶ Using this procedure, I show results in Appendix Table A.1 for all of the main case filing, process, and resolution models using indicators for the (a) four and (b) eight periods prior to body-worn camera adoption. Across the 22 pre-trends tests for my primary results, none show statistically significant evidence of pre-trend violations at the ten percent significance level when using a four-period lead. When using the eight-period lead, I found two such violations. There does not appear to be evidence of systematic violations of the parallel trends assumption.

One possibility that this test cannot fully account for is that the mechanism for treatment assignment introduces an undetected violation of the parallel trends assumption. Body-worn camera adoption is not random by design or in practice; police departments must choose to implement a

⁴⁵A distinct but related assumption is that of no anticipatory effects, however the same methods used to test for parallel trends can reveal violations of the no anticipatory effects assumption.

⁴⁶This method differs from other commonly used pre-treatment trend tests primarily in that it uses only untreated observations. This restriction on usable observations comes from the same concerns about treatment effect heterogeneity established in the new DiD literature. This test also sidesteps the issues raised in Roth (2021) regarding survivor bias for estimates that pass common pre-trends tests. See Wooldridge (2021) for equivalence between this method and a common pre-trends test in a fully saturated model.

body-worn camera program. The resulting set of treated courts, shown in Table 1.2, are more likely to be in populous areas with more cases, a higher share of Black defendants, and are more likely to be served by a public defender's office. This nonrandom assignment alone does not necessarily violate the parallel trends assumption, but Kahn-Lang and Lang (2018) argue that it does require further justification that the assumption is valid.⁴⁷

To this point, I argue that body-worn camera adoption decisions are plausibly exogenous to court processes and resolutions. The LEMAS-BWCS survey shows that law enforcement adopted the technology in pursuit of improvements to police interactions rather than desired changes in the courts. Fifty of the 53 adopting agencies surveyed in Virginia cited non-court motivations as the primary reasons for using the cameras. Within my samples, the baseline differences between treated and untreated courts shown in Table 1.2 are largely related to community characteristics rather than court processes or resolutions. The shares of cases with a guilty disposition, dropped, or amended charges are all similar between treated and untreated courts.

Body-worn camera adoption may not be exogeneous to the police behaviors I study with the case filing panel. As a result, I provide supplementary analyses that directly mitigate the selection concern by using only not-yet treated localities as controls. To do so, I end the sample period at the fourth quarter of 2017 and use the 2018 adopters as “never treated” controls.⁴⁸ By using only adopters I weaken the criteria for exogeneity of treatment: now adoption itself can be endogenous but the timing of adoption for this group should not be. Deshpandi and Li (2019) use this strategy in their study of the effects of social security office closings on disability program participation, as does Kim (2020) in his national study of the effects of body-worn cameras on policing. Intuitively, the earliest adopters could break this assumption. For example, they may be more innovative or motivated than the typical department. To mitigate this concern, I use only courts treated during the surge in adoptions from 2014-2017 for this supplementary analysis. For this group, factors such as administrative hurdles, as Kim (2020) demonstrated and exploited, can stagger the timing

⁴⁷Commonly this justification invokes plausible exogeneity in treatment assignment or timing (Rambachan and Roth, 2020).

⁴⁸This step enables me to calculate treatment effects for the 2017 adopters with BJS.

of body-worn camera adoption amongst an otherwise similarly selected group.

1.6 Baseline Results

1.6.1 District Court

1.6.1.1 Case Filing Effects

I test for effects of body-worn cameras on policing by evaluating changes in the set of cases that enter district courts. I begin by looking narrowly at the subset of cases most likely to show body-worn camera effects, and then broaden the scope of the analyses to evaluate changes in the average filing. I test for changes in the prevalence of “civilization effect cases” using a log-transformed count variable, $Y_{it} = \ln(\text{civ_case_counts}_{it} + 1)$.⁴⁹ Civilization effect cases are relatively uncommon: there are 33.1 such filings per court-quarter in the sample. In some court-quarters there are no such cases, so to include these zero-counts I add one to all counts before applying the transformation.⁵⁰ I apply a similar transformation to the second outcome of interest, the overall number of cases filed in each quarter after adoption. However I do not observe zero-counts in this outcome and thus do not shift the variable to accommodate the log transformation. I define this overall case count variable as $Y_{it} = \ln(\text{case_counts}_{it})$. I then transition to testing for evidence of changes in the average characteristics of the cases that enter the courts by evaluating changes in the share of cases with multiple charges and the share of misdemeanors.

I provide estimates of the overall ATT for each outcome in Table 1.3a using the traditional TWFE estimator, the new BJS imputation estimator, and the BJS estimator on the restricted sample of only 2014-2017 adopters. Results are stable across all three estimation samples and methods, showing similar point estimates and significance levels.

⁴⁹This definition allows me to interpret estimates in approximate percent change terms.

⁵⁰At times, particularly when there are many zeros, results can be sensitive to the selection of the added constant when shifting the outcome variable before applying a natural log transformation. I conduct sensitivity tests by varying the constant and using an alternative inverse hyperbolic sine transformation to verify that this selection does not drive my results. The results are similar across sensitivity tests: for example, using 0.1 as the added constant yields a point estimate of -0.110, statistically significant at the 5% level using the BJS method while the inverse hyperbolic sine transformation yields an estimate of -0.109, statistically significant at the 1% level.

Table 1.3a: BWC adoption effect estimates, district court case filings

VARIABLES	TWFE	BJS	BJS 2014-2017 Adopters	Mean Value
Ln(Cases)	-0.006 (0.029)	0.015 (0.030)	0.007 (0.035)	3,578.8
Ln(Civilization Cases + 1)	-0.106** (0.035)	-0.115** (0.037)	-0.081† (0.049)	33.1
Share Multi-charge	-0.004 (0.004)	-0.004 (0.005)	-0.001 (0.005)	0.188
Share Misdemeanor	-0.003 (0.003)	-0.002 (0.003)	-0.003 (0.004)	0.924
Observations	4,141	4,141	2,340	

Cluster-robust standard errors in parentheses

** p<0.01, * p<0.05, † p<0.10

Note: Means of rows 1 and 2 reflect the average counts for the underlying variable across the full sample, but the outcomes used to calculate estimates are ln(count) and ln(count + 1) respectively.

The results in Table 1.3a provide evidence that body-worn cameras induce civilization effects in the narrower set of “civilization effect cases”. All three specifications show economically and statistically significant reductions in these cases, ranging from an 8.1 percent to an 11.5 percent decline. The average of these estimates, 10.2 percent, would be equivalent to a reduction of 3.3 such cases per quarter from the mean across courts.

In Figure 1.4 I show this result decomposed into the BJS quarterly ATT estimates in event time. The plot shows the estimated treatment effect in each of the first four quarters following body-worn camera adoption as well as the estimates on the lead variables under the pre-trends test described in section 5.3. In quarter 0, the quarter in which courts become treated, there is an immediate decline in civilization effect cases compared to the pre-adoption periods. This decline reflects a level shift in the outcome at the time of adoption that persists throughout the following year.⁵¹

However, while these results show that body-worn cameras affected police interactions, it does not appear that the effects are widespread: the typical case filing did not change after police began using body-worn cameras. I do not find evidence that body-worn cameras reduced the overall

⁵¹This event study does not show heterogeneity in treatment effects over time, which could drive bias under a traditional TWFE model. This, coupled with the relatively short window in which most adoptions took place, could explain why the choice of BJS or TWFE appears to be inconsequential for my context.

Table 1.3b: BJS estimates, case processes and resolutions

VARIABLES	Prosecutor Dropped Charge	Case Certified	Guilty	Sentenced to Time	Disposition: 1 year ^o
Treatment Effect District Court (Fel.)	-0.004 (0.014)	0.007 (0.016)	.005 (0.15)	-.006 (.014)	-0.010 (0.006)
Mean	0.401	0.593	0.296	0.246	0.964
Observations	4,047	4,047	4,047	4,047	4,047
Treatment Effect District Court (Misd.)	-0.002 (0.005)	–	-0.001 (0.008)	-0.011 (0.007)	-0.001 (0.005)
Mean	0.116		0.739	0.199	0.956
Observations	4,100		4,100	4,100	4,100

Cluster-robust standard errors in parentheses

**p<0.01, * p<0.05, † p<0.1

^oTime to disposition is approximated using time to latest hearing in district court.

Controls included in regressions include share female, black, and of case classes.

number of case filings, nor that case characteristics changed. These results are not only statistically indistinguishable from zero, but are economically insignificant as well. The TWFE estimate for the transformed overall case count variable amounts to a 0.6 percent reduction in case filings, and the BJS estimate shows a statistically insignificant increase of only 1.5 percent. The intensive margin outcomes are precisely estimated null results which show minimal variability in the estimates across specifications. The estimated reduction in the share of cases with multiple charges ranged from 0.1 to 0.4 percentage points while the estimated reduction in the misdemeanor share ranged from 0.2 to 0.3 percentage points.

In total, while body-worn cameras induce policing effects, the “politeness” that cameras may engender does not measurably affect the typical case filing.

1.6.1.2 Case Processes and Resolutions

Although I found evidence of civilization effects at the policing stage, these changes were restricted to a small subset of charges representing only about 0.1 percent of case filings in the sample. Outside of this subset, the case filings did not systematically change and so results at

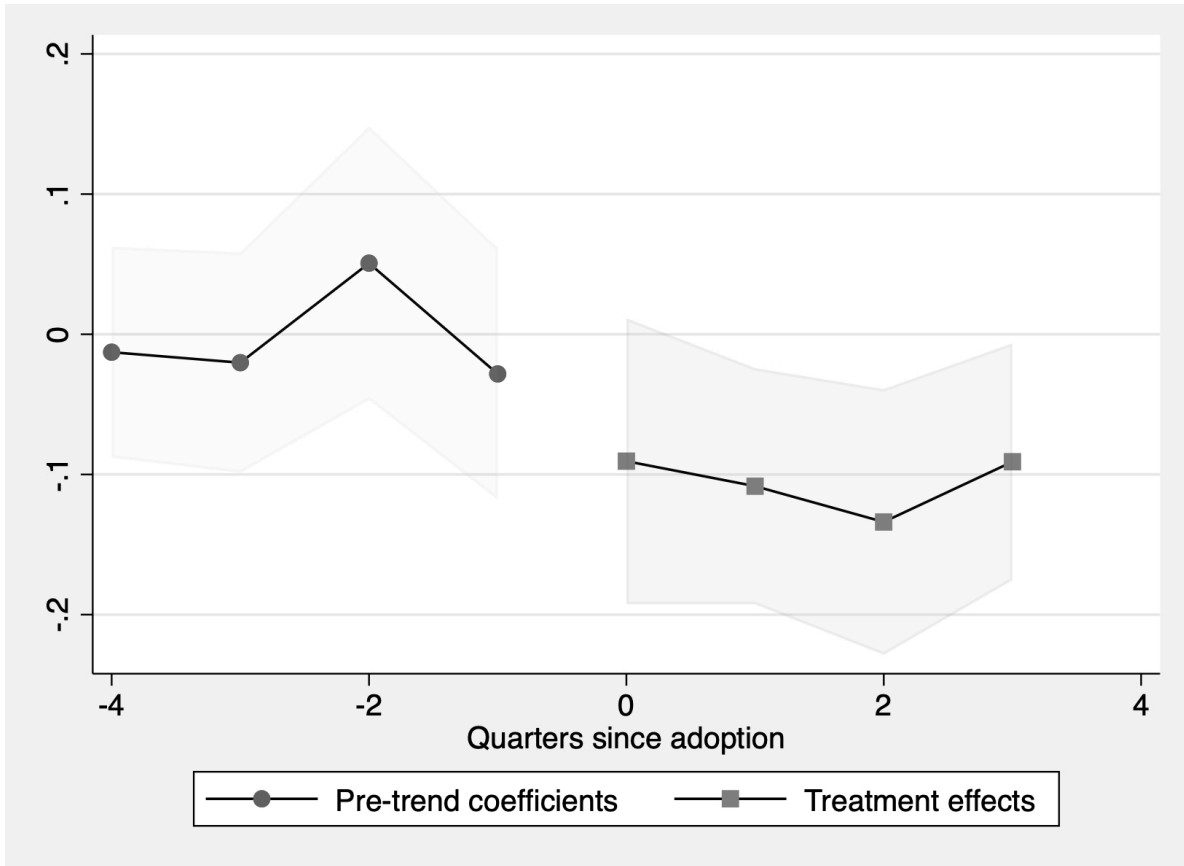


Figure 1.4: District court civilization effect charge quarterly estimates, BJS estimator

the court-based outcomes stage are unlikely to reflect selection arising from policing effects.⁵² Because of this, effects of body-worn cameras on court-based outcomes reflect only the evidentiary and attorney time use channels.

I show three case process results of interest (the share of cases in which a prosecutor drops a charge, the share of felony cases that are certified to the circuit court from the district court, and the share of cases disposed within 1 year) as well as two case resolution outcomes of interest (whether the defendant is found guilty and whether they are sentenced to time) in Table 1.3b.⁵³ Given the parity across BJS and TWFE estimates, I present only the BJS estimates in this and subsequent

⁵²If the cases entering the courts appreciably change after body-worn camera adoption due to policing changes, then estimates of body-worn camera effects on case outcomes may reflect not only the court-based evidentiary and time use effects but also these policing-based case changes. For example, if police make fewer marginal arrests after body-worn camera adoption then we could erroneously attribute higher conviction rates to evidentiary or time use channels when in reality the cases that entered the courts were stronger simply on the basis of police forgoing the weaker arrests. However, in practice, the cases are not observably changing.

⁵³I provide supplementary results for an extended set of outcomes in Appendix A.2.

tables, but include TWFE results in Appendix A.3.

Across both the felony and misdemeanor samples and five outcomes, I do not find any statistically significant effects of body-worn cameras on case processes and resolutions. The magnitudes of the point estimates on treatment effects are also small. In felony cases, I estimate that prosecutors dropped charges in 0.4 percentage points fewer cases, while this share declined by 0.2 percentage points for misdemeanors. Felonies advanced to the circuit court at practically the same rate after body-worn cameras as before; this share increased by only 0.7 percentage points, again not statistically distinguishable from zero. And, cases were no less likely to move through the courts within one year after body worn cameras were introduced: the shares of cases resolving in a year were estimated to decline by 1 percent and 0.1 percent for felony and misdemeanor cases, respectively. The resolutions of these cases were also unchanged: I estimate that body-worn cameras reduced the share of district court misdemeanor cases that concluded with a guilty disposition by 0.1 percentage points and increased the share of guilty felony cases by 0.5 percentage points, statistically no distinguishable from zero. For felony cases, the point estimates of the share that resulted in incarceration was estimated to decline by 0.6 percentage points while this share reduced by 1.1 percentage points at the misdemeanor level.

1.6.2 Circuit Court

By the time a case advances to the circuit courts both police and court actors will have interacted with the case. Although the circuit court has jurisdiction over felonies, preliminary hearings for these cases take place at the district court level and so evidence, negotiations, and pleas routinely result in charges being dropped, dismissed, or otherwise disposed before reaching the circuit courts. Because of this, circuit court filings are a selected set of cases that persisted past district court-level off-ramps and changes to these filings can reflect a combination of all three prospective channels for body-worn camera effects. Yet while the mechanisms for any changes are difficult to disentangle at this level, the aggregate changes themselves are valuable to characterize. Felony convictions carry sentences of at least a year of imprisonment, and the average sentence length

in my sample was six years.⁵⁴ Felony convictions can restrict labor market opportunities post-release, and until recently caused permanent disenfranchisement of convicted offenders in Virginia (Brennan Center, 2018).

I use a similar set of case filing outcomes at the circuit court level as at the district, including measures for the overall number of new cases, number of new civilization effect cases, and the share of cases that include multiple charges.⁵⁵

Estimates of the effect of body-worn cameras on these filings are more volatile than the district court estimates and also more sensitive to the selection of the control group. Under my primary BJS specification I find some evidence for short-term reductions in both civilization effect cases and the overall number of cases entering the circuit courts after police begin using body-worn cameras. In the adopters-only sample, however, which covers a slightly truncated time period compared to the full sample, the point estimate for the reduction in civilization effect cases diminishes from -9.6 percent to a statistically insignificant -3.9 percent.⁵⁶ Similarly, the estimated 6.5 percent reduction in circuit court cases — a sizeable reduction amounting to 9.4 fewer cases per quarter compared to the mean— appears to be driven by a small number of late-adopting localities and disappears when restricting analyses to the adopters samples. Given the district court results, the precise mechanisms for these potential reductions are not entirely clear: across specifications I did not find evidence of civilization, time use, or evidentiary effects at the district court level that would cause cases to differentially attrit from the courts before reaching the circuit court sample.

Despite the incongruity in case filing results across specifications at the circuit court level, the case process and resolutions results are stable and confirm the district court narrative of no effects.

⁵⁴See Appendix A.2 for a more thorough discussion of this measure of sentence length.

⁵⁵As before, I use a natural log transformation for case counts. Because there are fewer cases in circuit courts, I define both overall cases and civilization case outcomes as $Y_{it} = \ln(count_{it} + 1)$. The estimates for the overall case count outcome variable are not sensitive to my choice of shift constant or to selection of transformation: the point estimates differ from my primary specification by only 0.001 and 0.0002 when using a shift constant of 0.1 and the inverse hyperbolic sine transformation, respectively. For civilization effect charges, which present with more court-quarters with no qualifying cases, this choice becomes more influential but the overall result is still the same; I find a statistically significant reduction of -0.091 (significant at $\alpha = 0.05$) under my primary specification, -0.114 ($\alpha = 0.10$) with the alternative shift constant, or -0.101 ($\alpha = 0.05$) with the inverse hyperbolic sine transformation.

⁵⁶If I include all adopters, not just the 2014-2017 cohorts, the effect disappears entirely, with a point estimate of 0.2 percent.

<i>Table 1.4: BJS estimates, circuit court outcomes</i>					
Case filings					
	Ln(Cases + 1)	Ln(Civilization Cases + 1)	Share Multicharge Cases		
Treatment Effect	-0.065 [†] (0.033)	-0.091* (0.037)	-0.007 0.009		
Mean	145.3	6.9	0.486		
Observations	5,472	5,472	5,463		
Case processes and resolutions					
	Prosecutor Dropped Charge	Case Certified	Guilty	Sentenced to Time	Disposition: 1 year [°]
Treatment Effect	-0.030* (0.012)	–	-0.006 (0.011)	-0.018 (0.014)	-0.006 (0.011)
Mean	0.258		0.720	0.708	0.825
Observations	5,439		5,439	5,439	5,439
Cluster-robust standard errors in parentheses					
**p<0.01, * p<0.05, † p<0.1					
[°] Time to disposition is approximated using time to latest hearing in district court. Means of count variables reflect the average counts of the underlying variable, while outcome variable used in regression is ln(count + 1). Controls included in case process/resolutions regressions include share female, black, and of case classes.					

As in the district court analyses, I use the share of cases in which a prosecutor drops a charge and the share of cases disposed within one year as measures of court processes and the share of cases with a guilty disposition and positive sentence time as measures of case outcomes.

Table 1.4 shows that cases do not show evidence of slowing down to an economically or statistically significant degree; the share of cases which resolved fully within one year declined by only 0.6 percentage points after body-worn camera adoption, which is not statistically distinguished from zero. Because at the circuit court level I add a one-year timing condition to my case process and resolution outcomes, this result also affirms that the timing condition does not cause influential compositional changes in the sample after body-worn camera adoption.

I do find a statistically and economically significant reduction in the the other case process outcome, the share of cases in which the prosecutor dropped a charge. However, I am cautious in

interpreting this result too strongly; this is the only statistically significant effect from 13 regressions across two court levels intended to capture changes in court processes and resolutions and does not correspond to changes in related outcomes. For example, the estimated three percentage point reduction in cases with dropped charges does not coincide with any increase in guilty dispositions or the share of defendants sentenced to time. On the contrary, these point estimates were both negative. This could be explained if prosecutors dropped individual charges less frequently after body-worn camera adoption but did so in cases with alternative charges for which defendants were still found guilty, maintaining stable case-level conviction rates. Taken in total, the results do not provide convincing evidence that body-worn cameras altered case processes or dispositions.

1.7 Key Heterogeneity Analyses

The preceding null results in a variety of case outcomes calculated across multiple case types and courts are both robust and surprising: practitioners report and data support the narrative that inputs to the criminal justice system changed when police began using body-worn cameras. An influx of camera footage added data to the courts and an additional job responsibility for attorneys. Virginia created a committee to document these court changes, and even introduced legislation limiting the number of cameras per prosecutor. And yet, I find no aggregate effects of body-worn cameras on the courts. This disconnect raises additional questions about how these null results came to be.

It could be that body-worn cameras are simply a smaller shock to the system than practitioners and advocates perceive them to be: case processes and resolutions could be sticky and unresponsive to changes in attorney time use or the noise reduction produced by body-worn cameras. Relatedly, body-worn cameras could be strongly influential only in a small subset of cases that do not change aggregate processes and resolutions. An alternative explanation for the null result is that various channels of body-worn camera effects could offset one another.

In this section I delve deeper into two subsets of the data to further shed light on these null results. First, I use variations in the likelihood an offense is captured on body-worn camera video

to test the offsetting effects hypothesis. Then, I test for heterogeneity in effects based on a key defendant demographic characteristic: race. Body-worn camera adoption in the U.S. is tightly linked to broader concerns with racial disparities in policing and the criminal justice system. I test whether the subset of Black defendants experienced differential changes to case filings, processes, or resolutions due to body-worn camera adoption.

1.7.1 Revisiting Evidentiary and Time Use Channels

In the primary results, case filing outcomes suggest that body-worn camera civilization effects do not induce widespread changes in caseloads or characteristics. The subsequent case process and resolution outcomes also show no effect, this time from the combined influence of evidentiary and attorney time use channels. One driver of the null result could be that these two channels offset one another: evidentiary benefits cancel attorney time costs in the aggregate. I test this counteracting effects hypothesis using variation in the likelihood that footage is available for a case. While I cannot observe whether body-worn camera footage was available for or used in a specific case, I can identify a subset of charges more likely to take place in front of an officer. These cases should be more likely to have body-worn camera video, and thus experience both evidentiary and time use effects. However, this does not mean that these are the only cases affected by body-worn cameras. Attorneys often work multiple cases at a time. If attorneys substitute their hours across cases to the case activities with the highest marginal benefit⁵⁷ then at times they will substitute their work hours from cases without body-worn camera footage toward a case with footage. If this happens systematically, then after law enforcement begin using body-worn cameras the outcome paths of cases with and without body-worn camera footage should diverge. This divergence would be dominated by the evidentiary effect.

I classify a subset of charges as “more likely treated” (MLT) if they are likely to take place

⁵⁷It’s important to keep in mind the attorney will be optimizing her time use in a way that incorporates both her defendant’s well-being and her own professional and personal well-being. Some activities which yield lower returns to defendant outcomes may nonetheless have higher returns in this framework. For example, even if the defender is convinced that, no matter what they do, a defendant will be convicted and sentenced harshly she must nonetheless complete certain tasks in order adhere to professional standards.

in view of an officer. Such charges include the civilization effect charges from before, but also DUI/DWI, concealed weapons, and possession of weapons or drugs. I include DUI/DWI based off of the input of numerous law enforcement officers throughout Virginia who independently volunteered this as an example of a charge that is likely to be affected by body-worn camera footage. An individual receives a concealed weapon or possession charge because an item was observed in the presence of an officer, and thus if the officer is wearing a camera it is likely there will be footage associated with the charge. Such charges differ from the subset I called “civilization effect charges” because the alleged offense can also be initiated prior to interaction with an officer.⁵⁸ Under this partitioning, localities have an average of 40.6 MLT and 50.8 non-MLT cases per quarter in the circuit court; 49.9 MLT and 64.4 non-MLT felony cases in the district court; and 157.6 MLT and 824.2 non-MLT misdemeanor cases in the district courts.

I calculate for each locality-quarter YD , the differences in the shares of each outcome across MLT and non-MLT cases. For example, if in court A in quarter 1 MLT cases received guilty dispositions 50 percent of the time and non-MLT received guilty dispositions 45 percent of the time, the differenced guilty outcome would be equal to 5 percentage points, expressed 0.05. I then estimate the model

$$YD_{lt} = \alpha + \tau D_{lt} + \delta X_{ltg} + \gamma_t + \lambda_l + \varepsilon_{lt}$$

When including control variables for the share of Black and female defendants, case types, and multi-charge cases, I include separate share variables for the MLT and non-MLT cases. The interpretation of the treatment effect estimates under the differenced-outcome are intuitive in that a statistically and economically significant point estimate would indicate a divergence in the outcomes across case types that is attributable to body-worn camera implementation.⁵⁹ Using the

⁵⁸For example, one can refrain from pushing a police officer, forgoing a civilization effect offense. However, one cannot choose to not be in possession of an illicit substance after an interaction with an officer has begun.

⁵⁹The underlying model when using this outcome is similar to implementing a fully interacted model in a typical difference-in-differences framework i.e. including an interaction term of $MLT * variable$ for all right hand side variables for a regression on the earlier used, non-differenced outcome variables, $Y_{ltg} = \alpha + \tau D_{lt} + \delta_1 X_{ltg} + \delta_2 MLT * X_{ltg} + \gamma_{gt} + \lambda_{gl} + \varepsilon_{glt}$. However, in using differenced outcomes I place different restrictions on the relationship between the outcome of interest and covariates across MLT and non-MLT groups. Intuitively, because a fully partitioned specification is equivalent to differencing the treatment effects from separate regressions for each group, covariates are only used within-group for estimation. In contrast, in the differenced model, the full set of information is used simultane-

differenced outcomes, I apply the same imputation estimator and model from the main results to these new panels and show results in Table 1.5. While some differenced outcomes are noisy, leading to large error bands around point estimates, overall I do not find compelling evidence that case processes or resolutions for cases that were more likely to have body-worn camera footage diverged from those less likely to have footage. It is unlikely that the counteracting effects hypothesis holds in the aggregate; body-worn camera footage appears to have minimal effects on the case processes and resolutions as a whole.

1.7.2 BWCs and Race

Body-worn cameras in the U.S. are tightly linked to a broader national discussion around race and the criminal justice system. Public advocacy for body-worn cameras grew against the backdrop of a police shooting in Ferguson, Missouri that ignited large-scale protests centered on racial disparities in policing (BBC News, 2014). Black adults in the U.S. persistently express less confidence in the police than do white adults, and polls show that this gap grew throughout the 2010s (AP-NORC, 2015; Jones, 2020).

The U.S. Department of Justice investigated and released a report on Ferguson police practices in 2015, finding that “African Americans experience disparate impact in nearly every aspect of Ferguson’s law enforcement system”, and evidence of “intentional discrimination” (Department of Justice Civil Rights Division, 2015). Outside of Ferguson, numerous studies document racial discrepancies and discrimination in the criminal justice system, including in policing (Antonovics and Knight, 2009; Fryer, 2019; Horrace and Rohlin, 2016; Luh, 2020), pretrial release (Arnold et al., 2018), convictions and jury deliberations (Abrams et al., 2012; Anwar et al., 2012; Bjerk and Helland, 2020; Flanagan, 2018), and sentencing (Alesina and Ferrara, 2014). Additional research shows that some policies intended to ameliorate these disparities and their effects can unintentionally exacerbate them (Doleac and Hansen, 2020).

ously. Results are similar across specifications when using fully interacted and differenced outcomes: I show fully interacted TWFE results in Appendix A.3. Also in Appendix A.3, I show the robustness of my results to the exclusion of small localities, since the differenced outcome cannot be calculated if either no MLT or MLT cases are observed in a given court-quarter.

Table 1.5: BJS estimates, case processes and resolutions; MLT

VARIABLES	Prosecutor Dropped Charge	Case Certified	Guilty	Sentenced to Time	Disposition: 1 year ^o
Treatment Effect Circuit Court	0.006 (0.011)	–	0.013 (0.013)	0.014 (0.013)	0.011 (0.010)
Mean	0.012		-0.034	-0.031	-0.079
Observations	5,330		5,330	5,330	5,330
Pre-test p-value	0.019		0.334	0.300	0.842
Treatment Effect District Court (Fel.)	-0.001 (0.014)	-0.001 (0.015)	0.002 (0.016)	-0.004 (0.015)	0.002 (0.006)
Mean	0.111	0.126	0.054	0.024	-0.009
Observations	3,976	3,976	3,976	3,976	3,976
Pre-test p-value	0.957	0.752	0.903	0.800	0.764
Treatment Effect District Court (Misd.)	0.006 (0.007)	–	0.007 (0.012)	0.011 (0.012)	-0.004 (0.009)
Mean	0.214		-0.008	0.398	-0.074
Observations	4,098		4,098	4,098	4,098
Pre-test p-value	0.435		0.556	0.379	0.704

Cluster-robust standard errors in parentheses

**p<0.01, * p<0.05, † p<0.1

^oTime to disposition is approximated using time to latest hearing in district court. Controls included in regressions include share female, black, and of case classes. Outcome variables are expressed here in differences, and so a point estimate of 0.01 would be interpreted as a 1 percentage point increase in the outcome gap between MLT and non-MLT cases. Pre-trend p-values are for tests of the 8 quarters prior to BWC adoption.

Because body-worn cameras are intended by many to especially improve police interactions for Black members of the public, I test for differential effects of body-worn cameras on Black defendants. At the policing stage, civilization effects may be more pronounced for Black defendants. At the courts stage, if court actors are biased against Black defendants, body-worn camera evidence may differentially reinforce the testimonies of Black defendants.

I employ the same techniques used in the previous section of this paper to test for differential effects, but apply them to a modified panel where cases are aggregated to the quarterly court level

within two racial groups: Black and non-Black defendants.⁶⁰ That is, for court A in quarter 1 if Black defendants received guilty dispositions 50 percent of the time and non-Black defendants received guilty dispositions 45 percent of the time, the guilty outcome would equal 5 percentage points. I also introduce a new outcome variable representing the share of case filings with Black defendants to the case filing analysis.

First, I note that the unconditional mean differences across the two racial groups are small within this sample. For most outcomes, the difference between average Black and non-Black defendant outcomes across courts are less than one percent. One notable exception to this rule is the difference in the share of defendants sentenced to serve time for misdemeanors at the district court level, where across the sample courts Black defendants are sentenced to time 3.5 percentage points less often than non-Black defendants. This difference diminished after police began using body-worn cameras: Table 1.6 shows that the difference in the share of cases concluding with a positive sentence time declined by 1.2 percentage points after body-worn camera implementation. Apart from this decline, outcomes between Black and non-Black defendants were overall stable after law enforcement began using body-worn cameras. The share of cases filed that listed a Black defendant did not significantly change, and the processes and resolutions of these cases did not diverge for Black defendants compared to non-Black defendants.

1.8 Conclusion

Body-worn cameras have become a key tool in a public push for transparency and accountability for police officers. However, while law enforcement agencies equipped their officers with this recording technology, attorneys and other court actors grew concerned about unintended consequences of the data influx from body-worn cameras. The results of this study may ameliorate these concerns. Using a rich data set containing detailed charge-level information for criminal charges filed in Virginia courts between 2006 and 2020 and accounting for the selection of police into

⁶⁰A challenge for this analysis with my data structure stems from the racial homogeneity within many rural localities. For example, at the circuit court level, Black defendants make up 45% of cases while white defendants comprise 53%. However, less populous localities routinely show in excess of 90% non-Black defendants (sometimes over 99%) making within locality decompositions difficult.

<i>Table 1.6: BJS estimates, racial heterogeneity</i>						
VARIABLES	Share of Filings (Black)	Prosecutor Dropped Charge	Case Certified	Guilty	Sentenced to Time	Disposition: 1 year ^o
Treatment Effect Circuit Court	0.005 (0.007)	0.005 (0.012)	–	-0.014 (0.012)	-0.011 (0.012)	0.005 (0.011)
Mean	0.365	0.011		0.006	0.006	0.018
Observations	5,463	5,072		5,072	5,072	5,072
Pre-trends p-value	0.333	0.143		0.277	0.170	0.397
Treatment Effect District Court (A)	-0.000 (0.003)	0.023 [†] (0.013)	0.007 (0.017)	-0.010 (0.013)	-0.009 (0.011)	0.010 (0.006)
Mean	0.257	-0.002	0.002	-0.006	-0.000	0.004
Observations	4,141	3,751	3,751	3,751	3,751	3,751
Pre-trends p-value	0.638	0.087	0.147	0.052	0.033	0.220
Treatment Effect District Court (B)	–	0.004 (0.004)	–	-0.003 (0.008)	-0.012 [†] (0.006)	-0.003 (0.003)
Mean		0.005		0.016	0.035	0.001
Observations		4,045		4,045	4,045	4,045
Pre-trends p-value		0.643		0.588	0.679	0.522
Cluster-robust standard errors in parentheses						
**p<0.01, * p<0.05, † p<0.1						
^o Time to disposition is approximated using time to latest hearing in district court.						
Controls included in regressions include share female, black, and of case classes. No controls are used in the first column. Case filing panels were not separated based on case type, so District (A) includes results for the share of black defendants for all district court filings. For case processes and outcomes, District (A) shows results for the misdemeanor sample and District (B) shows results for the felony sample. Pre-trends p-values are given for a joint significance test using the 8 quarters prior to adoption.						

body-worn camera programs, it appears that body-worn cameras have an overall limited civilizing effect on police interactions as measured by district court filings. While a subset of charges that are initiated in the presence of a police officer— such as assault on an officer or eluding police— become less prevalent after police begin using body-worn cameras, cases overall do not change in quantity or composition, measured by the share of district court cases including a misdemeanor and the share of cases at both court levels which include multiple charges.

At the next stage in the criminal justice process, I find that body-worn camera adoption does not

adversely affect criminal defendants. Defendants are found guilty and sentenced to incarceration at similar rates after police start to use body-worn cameras. This finding cannot be attributed to compositional changes in cases stemming from changing case characteristics, and is robust to the inclusion of various charge characteristic controls. This result is surprising: body-worn cameras generate hours of evidence and attorneys in Virginia report that they view this footage at substantial time costs. However, neither the evidentiary value of the footage nor the reallocation of attorney time within and across cases to enable attorneys to view the footage appear to affect criminal cases on average. While concerns over racial disparities in policing have been an integral part of the public discourse around body-worn camera adoption, I also do not find convincing evidence of differential policing or court effects for Black defendants, although body-worn cameras might reduce the share of Black defendants in misdemeanor cases who are sentenced to serve time in jail relative to non-Black defendants.

Overall my results suggest that body-worn camera effects on policing and the courts are exceptions rather than the norm. Existing research shows that the benefits, such as reduced use of force, in these exceptional cases can nonetheless exceed the costs of obtaining and maintaining cameras (Williams Jr. et al., 2021). Combining this prior result with my own findings that body-worn cameras do not substantially alter outcomes in the courts, it appears that expanded body-worn camera adoption will produce net benefits to the criminal justice system with both the costs and benefits accruing primarily to law enforcement and law enforcement interactions.

Although I use rich criminal case data, there are two considerations necessary to place this paper in its proper context. Just as I find body-worn cameras affect only a small subset of police interactions, it is possible that body-worn cameras are deeply influential in a small subset of criminal cases that I cannot pick up in my aggregated analyses. Additionally, even the richest criminal case data provide merely a snapshot of the broader costs and benefits borne by actors in the criminal justice system. In Chapter 2, I explore the attorney time use channel from an alternative angle, that of attorney labor market responses. However, additional outcomes such as public perceptions of fairness in the justice system would also provide valuable insight into the

holistic effects of body-worn cameras on the criminal justice system. Such outcomes can be influential; the attorney concerns described in this paper eventually culminated in legislative efforts to increase funding for Commonwealth's Attorney offices in Virginia. Where implemented, this will exacerbate funding differentials between indigent defenders and prosecutors in the years to come. My counter-intuitive finding of null effects illustrates that engaging researchers and a broad base of community stakeholders in criminal justice policy decisions may mitigate the unintended consequences of seemingly simple policy changes.

CHAPTER 2

INDIGENT DEFENSE LABOR MARKETS IN VIRGINIA: TRENDS AND BODY-WORN CAMERA RESPONSES

You have the right to an attorney. If you cannot afford an attorney, one will be provided for you. -Miranda Warning

2.1 Introduction

Each year in the United States, state-funded attorneys represent millions of low-income clients against criminal charges. The manner in which the state funds these attorneys varies; some work in specialized, salaried, state-funded legal firms (*public defender offices*), while others are employed as private attorneys compensated to represent indigent clients on a contract (*contract counsel*) or case-by-case basis (*assigned counsel*). Although the mechanisms for indigent defense provision and pay vary, a common complaint across systems is that of low wages for indigent defenders. In Virginia, an entry-level public defender can expect to make 15-20 percent less than the tenth percentile of attorneys nationally, and the highest ranking public defender in the state earns less than the median attorney overall (Bureau of Labor Statistics, 2021; Virginia OAG, 2017). Full-time assigned counsel in Virginia fare even worse: to earn the entry level public defender's salary on assigned counsel cases only, an attorney would have to represent defendants in the district courts against over 400 misdemeanor charges.

The result of a low-wage indigent defense system is a peculiar industry: qualifying defendants are guaranteed legal representation, but wages are often low and inflexible. In Virginia, attorney compensation caps have been unchanged for two decades. Nonetheless, nearly 2000 attorneys provided indigent defense services in Virginia in 2019. Given the magnitude and import of the indigent defense systems across Virginia and the United States, this peculiarity drives critical questions for policy-makers: Why do attorneys provide labor at these rates? How sensitive is the indigent defense labor supply to changes in wages, workloads, or other job amenities?

Many report that the pro-social nature of the work drives a negative compensating differential. As Virginia Public Defender Adam Pouilliard articulated, “(indigent defense) draws people who are passionate about the work, who believe in the work, into a place where you are choosing between having substantially less, and maybe doing something that you believe in less” (Greene,

2020). However, the non-pecuniary compensation of doing meaningful work likely only adequately substitutes for financial compensation after surpassing some financial threshold or reservation wage. Inadequate compensation is considered a major contributing factor for the public defender offices' difficulties retaining attorneys. In 2006, Virginia's public defender offices recorded a vacancy and turnover rate of 27 percent (VIDC, 2007).

While compensation rates are slow to change, the tasks required to represent a criminal defendant in court have evolved over time. One substantial change to criminal litigation in recent years is the proliferation of audio and video recording technologies that introduce new evidence into criminal cases that would not have existed a decade prior. One major source of this change is law enforcement adoption of body-worn cameras (BWCs) for officers. BWC footage has the potential to provide evidence relevant to criminal court cases, but requires additional time to review. Because BWCs can change the job amenities for indigent defenders, I use the expansion of this technology across local law enforcement agencies in Virginia to extend the literature on intrinsic and pro-social motivations in public service to the special case of indigent defenders. In doing so, I add to existing work on indigent defender effort and performance by Agan, Freedman, and Owens (2021) and Shem-Tov (2020).

The paper proceeds as follows: in Section 2 I describe the institutional structure of indigent defense in Virginia. In Section 3, I detail attorney pay and certification data sets, which I then use to describe the quantity, intensity, duration, and distribution of indigent defender labor supply throughout Virginia. In Section 4, I describe how body-worn camera induced changes to job characteristics for indigent defenders could conceptually affect indigent defender labor supply, but in practice do not appear to. Section 5 concludes.

2.2 Background

2.2.1 Virginia Courts

When police or prosecutors file criminal charges, the trajectory of the resulting case depends on the severity of the charges. For adult defendants, criminal charges are primarily resolved in

the state’s district and circuit courts – two levels of courts that overlap geographically but hold jurisdiction over different case types. District courts adjudicate the less-severe misdemeanors, charges that carry a maximum penalty of one year incarceration and a \$2,500 fine if convicted. District courts also often hold preliminary hearings for the more severe felonies, which can be punished with up to lifetime incarceration and a \$100,000 fine (Code of Virginia Title 18.2).¹ Circuit courts, in contrast, resolve felony cases, hold trials, and hear appeals of misdemeanor cases previously resolved by the local district court. There is approximately one court of each type in each city and county across Virginia.

A third type of court operates in some, but not all localities. Juvenile cases, while statutorily distinct, can be combined into the district court processes or resolved through parallel Juvenile and Domestic Relations (JDR) courts.²

2.2.2 Indigent Defense

When facing a criminal charge, the United States guarantees defendants the right to defense counsel. Because the typical defendant does not have the resources to hire an attorney of their own at market rates,³ states establish processes to provide this legal counsel for poor defendants. States compensate attorneys for indigent defendants using three primary mechanisms: contracts with private firms (*contract counsel*), hiring private attorneys on a case-by-cases basis (*assigned counsel system*), or by forming their own state-funded law firms specializing in indigent defense (*public defender systems*).⁴ The Commonwealth of Virginia relies on the latter two options to provide criminal defense to low-income defendants.

¹Virginia abolished the death penalty in 2021; since 2000 this penalty was rarely prescribed or implemented (Lavoie, 2021).

²Use of these two systems has been dynamic over time. In the data I describe in section 4, I record 53 district courts using a combined model at some point between 2000 and 2020, and 83 courts using a separate JDR designation. Thirteen of these courts used both at various times.

³For example, one study based in Miami-Dade and Philadelphia counties reported that defendants typically earned less than \$7,000 in the year prior to their arrest (Dobbie et al, 2018).

⁴Surprisingly, there is very limited literature within economics pertaining to these various provision mechanisms. Notably, Shem-Tov (2020) found that public defender offices outperform assigned counsel in San Francisco, although further study is needed to demonstrate the generalizability of these results nationally.

<i>Table 2.1: Virginia assigned counsel pay caps</i>		
Case Type	Cap	Max Hours
Juvenile and Domestic Relations	\$120	1.3
Misdemeanor (District)	\$120	1.3
Misdemeanor (Circuit)	\$158	1.8
Felony <20 Year Sentence	\$445	4.9
Felony 20+ Years	\$1,235	13.7
<i>Author's summary of the Supreme Court of Virginia's Chart of Allowances (2020). Max Hours is calculated as the total paid hours of work under the state's \$90 hourly rate.</i>		

Across Virginia, 25 public defender offices provide services to nearly 100,000 indigent clients per year (VIDC, 2017). The remainder of indigent clients, facing approximately 200,000 adult charges annually, are represented on a case-by-case basis by assigned counsel (Office of the Executive Secretary, 2016).⁵ Assigned counsel are the primary legal defense for low-income defendants in court jurisdictions without a public defender office, but also supplement public defender offices by taking on cases public defenders cannot due to ethical conflicts or excessive caseloads.⁶ While public defenders can expect to earn between \$50,000 and \$100,000 per year, commensurate with experience, assigned counsel earn \$90 per hour with total compensation per charge capped at levels shown in Table 2.1.⁷ These pay rates and caps have been stable since the implementation of a 2000 law.⁸

Generally, attorney labor markets entail a high cost to entry, with labor suppliers undergoing years of advanced education and comprehensive testing before entering the market. For an attorney to specifically engage in indigent defense requires additional, but less extensive, training that can be completed in a matter of weeks from the time the supplier decides to enter the market. Both assigned counsel and public defenders are subject to additional Virginia Indigent Defense Commis-

⁵Differences in reporting of assigned counsel and public defender caseload statistics preclude a direct comparison of these values. It is common for cases to carry multiple charges, and so the number of indigent clients is less than the 200,000 charge value.

⁶A key source of ethical conflicts are cases with multiple defendants, where the interests of the defendants may be at odds. In these cases, to pursue the best outcome for one client (for example, accepting a generous plea deal in exchange for testifying against another defendant) may be deleterious to the other client.

⁷Counsel may apply for a cap waiver (more precisely, a cap extension), but in practice this is uncommon. In Virginia in 2016, 3.3% of charges –disproportionately felonies with >20 year potential sentences–received a waiver.

⁸Virginia Code 19.2-163 cc. 436, 448

sion (VIDC)-approved training and oversight beyond the professional requirements set by the State Bar. Created by the state in 2004, the VIDC establishes professional standards for indigent defense and certifies indigent defenders. The VIDC certified the first cohort of 1,559 indigent defense attorneys in 2005 (VIDC, 2005). Attorneys must renew these indigent defense certifications on a biannual basis and participate in qualifying training and specialized continuing education coursework to be in good standing as an indigent defender. The VIDC maintains state-level records of qualified attorneys on behalf of the Supreme Court of Virginia, and prospective assigned counsel also notify their local courts of their availability in order to be assigned indigent defense cases by local judges.

2.3 Indigent Defense Labor Market Characteristics

2.3.1 Eligible Attorneys

In 2020, the VIDC website advertised 1,771 attorneys providing indigent defense services for non-capital offenses across the state. Approximately 45 percent of these attorneys were listed as qualified counsel for all three major case types: felony, misdemeanor, and juvenile, while the remainder largely specialized in either misdemeanors or misdemeanors and felonies.

Over time, the quantity and composition of this defender pool varies. From the VIDC, I obtained records of expired indigent defense certifications, including the names, certification types (misdemeanor, felony, juvenile, capital), and dates of certification expiration for all attorneys who exited the indigent defense pool between 2007 and 2019.⁹ During this time, 3,194 attorneys' certifications expired for at least one type of case, marking these attorneys exits from the pool of eligible defenders.

Although these data are not originally geo-coded, I linked these records to location of practice data pulled from web searches to illustrate the geographic dispersion of exiting attorneys. Through this process I was able to assign 90 percent, or 2,885 attorneys, to their geographically nearest

⁹While I received records from 2020, I use only 2007-2019 because certifications may have been delayed due to COVID-related disruptions.

district court. I show the spatial distribution of courts and exiting attorneys in Figure 2.1. Although there are active public defender offices in populous metro areas such as Richmond, Fairfax, and Norfolk, these areas also show high levels of assigned counsel attorney exits, indicative of substantial stocks of certified assigned counsel in these areas.

Attorney certifications can expire for any combination of case types for which they were previously certified. Misdemeanors are the most common criminal case type that may receive an indigent defender, and are also the case type with the highest levels of attrition from the indigent defender pool annually. Because certifications are renewed on a biannual basis and the first certifications took place in an odd year, attorney exits demonstrate biannual seasonality. Figure 2.2 shows the frequency of expired certifications for misdemeanors and felonies over time, and shows that the strength of this biannual seasonality waned in later years. Expirations in 2016 particularly defied the seasonality, differing from 2017 by only two certifications. Broadly, this is consistent with the stock of defenders who were certified as part of the initial cohort declining over time.

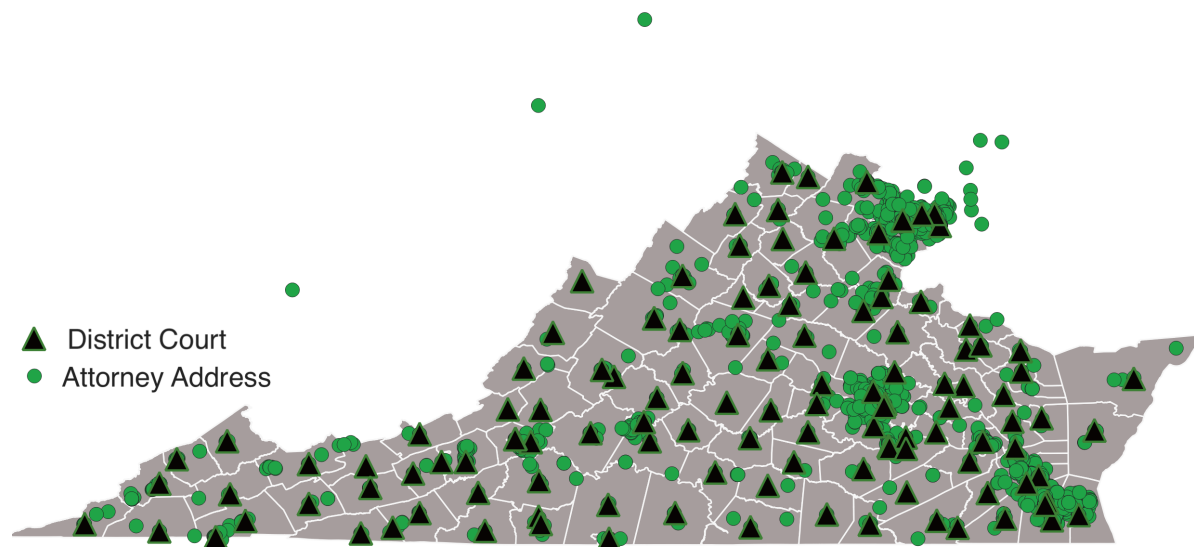


Figure 2.1: Geographic distribution of attorneys whose Virginia misdemeanor indigent defense certifications expired 2007-2020

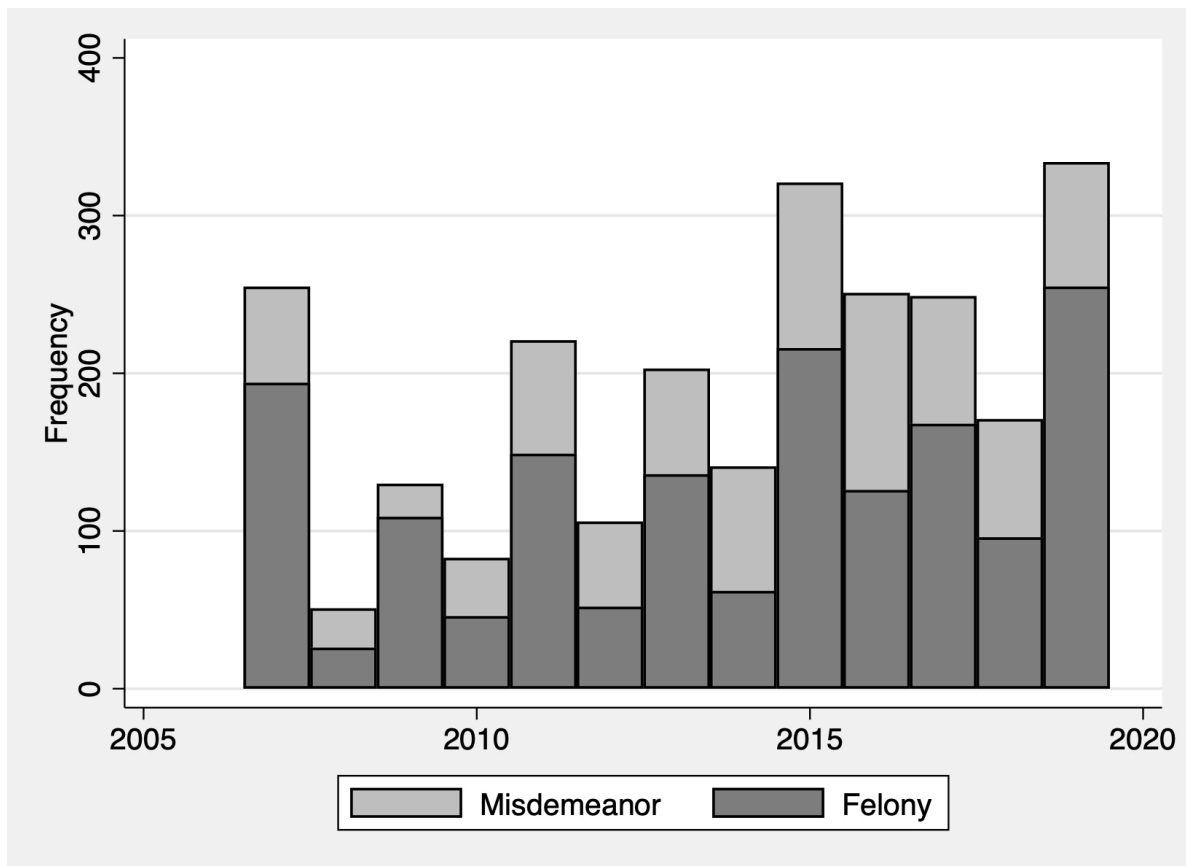


Figure 2.2: Year certification expired

2.3.2 Active Attorneys and the Geography of Indigent Defense

While eligibility to represent indigent clients is necessary to supply labor to indigent defense markets, it does not tell the full story of functional indigent defender labor supply; assigned counsel attorneys demonstrate a wide range in the intensity of their indigent defense practice, and do not always practice in the court nearest their office. To explore activity in the labor market, I obtained annual records of payments made to assigned counsel between 2000 and 2019 from the Virginia Supreme Court’s Office of the Executive Secretary (OES). OES constructed these records by taking annual sums of the reimbursement vouchers submitted by attorneys to each local court. Because pay vouchers may be submitted for a firm rather than individual attorney, the resulting data include nearly 200,000 court-vendor-fiscal year observations, where a single vendor could include multiple attorneys. I further describe nuances of these data in Appendix B, including the text matching

algorithm by which I linked vendors across courts and years. By this algorithm, the data include records of payments to approximately 6,700 distinct vendors between fiscal year 2000 and 2019, and 4,750 since 2007. Table 2.2 summarizes basic pay, tenure, and geographic characteristics from these data both within vendors and across vendor-years.

Using the OES data, I find that the top one percent of assigned counsel vendors – typically firms rather than solo practitioners – are recorded earning over \$200,000 in a fiscal year. Still others exhibit marginal attachment to indigent defense, representing indigent clients only occasionally – perhaps once per year. Between 2000 and 2019, eight percent of vendors earned less than or equal to the statutory cap for litigating a single Class III/IV felony charge (felonies carrying less than a 20 year potential sentence) in a year. Figure 2.3 shows that the distribution of annual earnings for assigned counsel vendors is strongly right-skewed, and the median vendor earns less than \$18,000 from assigned counsel work annually. This median value is approximately equal to the expected earnings from litigating 39 Class III/IV felonies and suggests that the typical assigned counsel attorney is unlikely to rely on indigent defense as their sole or even primary source of income.

Figures 2.4a and 2.4b further illustrate the distribution of earnings across the pool of defenders for each fiscal year from 2000 through 2019. Figure 2.4a shows that the overall payments made to assigned counsel by the courts increased between 2000 and 2015, but the distribution of payments across vendor deciles largely remained stable. Figure 2.4b shows that each year the top ten percent of earners received approximately 40 percent of all assigned counsel income from Virginia state courts, whereas the share of earnings held by the lowest decile was miniscule in all years, never exceeding 0.15 percent of annual assigned counsel earnings. Because attorney pay rates and caps remained stable for assigned counsel during the sample period, this suggests that a reduction in attorneys litigating a single “simple” case drives the increasing earnings amongst the lower decile.¹⁰ As Figure 2.5 shows, the share of earners receiving pay equivalent to a single Class III/IV felony charge or a case with both one felony and one misdemeanor declined substantially throughout the sample period. The single felony earner share declined from approximately 15 percent in 2000 to

¹⁰Other indigent defense reforms took place in the early to mid-2000’s including creation of new public defender offices, the creation of the VIDC, and policies allowing for extended compensation caps with special approvals.

Table 2.2: Vendor descriptive statistics

	Overall	Ever Bottom Decile	Ever Top Decile
	Mean (sd)	Mean (sd)	Mean (sd)
Tenure (years)	6.3 (5.8)	5.5 (5.0)	12.5 (5.9)
Number of courts	4.1 (4.2)	3.0 (3.2)	9.9 (5.7)
Number of public defender courts	2.1 (2.2)	1.6 (1.7)	4.5 (3.0)
Number of vendors	6,697	2,820	935
Pay standard deviation*	14,669.10 (18,254.31)	9,052.44 (14,763.35)	41,961.70 (24,416.15)
Pay range*	41,275.24 (53,095.65)	24,573.42 (40,775.70)	125,949.83 (66,356.29)
Pctile range*	37.90 (23.78)	40.15 (27.27)	56.43 (26.08)
Number of vendors appearing in multiple years	5,214	2,119	927
Vendor-Year Descriptive Statistics			
Annual Pay	34,701.40 (45,773.81)	15,181.50 (29,631.44)	79,374.15 (60,879.09)
Number of Courts	2.5 (1.9)	1.9 (1.5)	3.6 (2.4)
Number of vendor-years	42,345	15,430	11,651
Share of income from primary court**	0.69 (0.20)	0.71 (0.19)	0.68 (0.22)
Number of vendor-years, only multi-court vendors	26,641	7,056	10,018

Virginia assigned counsel vendor pay descriptive statistics, FY 2000-2019.

*“Ever bottom decile” and “Ever top decile” groupings are formed by taking the set of vendors who, in any year, appeared in the top or bottom decile of earners respectively. Tenure indicates the number of years a vendor appears in the pay data. Data provided by OES. *Within-vendor variability statistics are calculated only for vendors who are present in at least 2 years of data.*

***Calculated at attorney-year level for vendors who worked in multiple courts.*

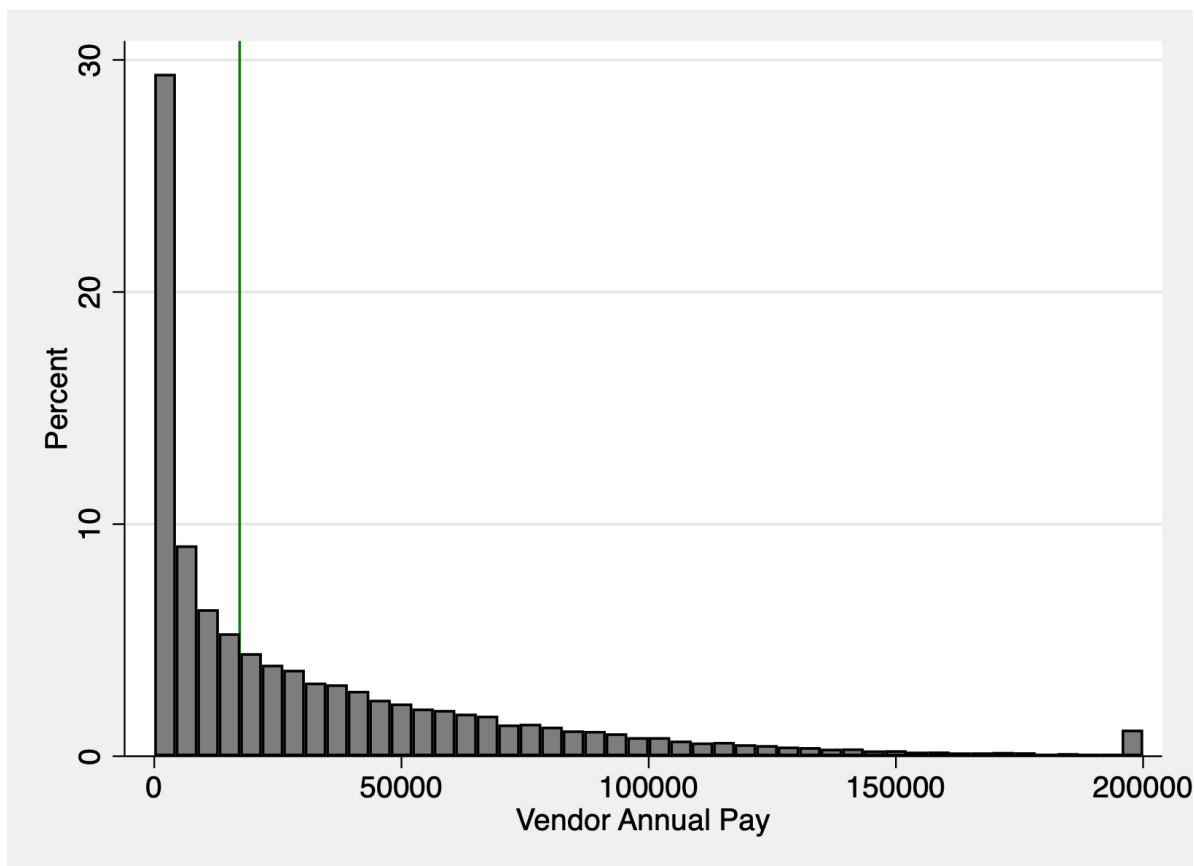


Figure 2.3: Assigned counsel annual earnings, FY 2000-2019

less than 5 percent in 2019.

Vendors often supplied indigent defense labor in multiple years (78 percent of vendors showed up in at least two years of data) but with variable intensity across years. The within-vendor standard deviation of assigned counsel earnings across years was \$14,669.¹¹ This variable intensity reflects not only differences in nominal pay, but also the extent of vendors engagement in the market relative to their peers: Table 2.2 shows a 38 point gap on average between vendors highest and lowest annual earnings percentiles, where I construct percentiles for each year 2000-2019.

Because of the skew of the earnings distribution, we might expect this variability in the relative earnings rankings to be most concentrated in low-intensity vendors. For example, in 2000, seven

¹¹ Attorneys may enter or exit indigent defense mid-fiscal year, which would inflate estimates of pay variability. To account for this, I also calculated the within-vendor standard deviation of earnings excluding the year of entry and exit from the calculation. Doing so changes the vendors studied to only those working in at least four fiscal years, but does not suggest that the entry and exit years inflate this variability measure: the standard deviation is \$427 larger by this measure.

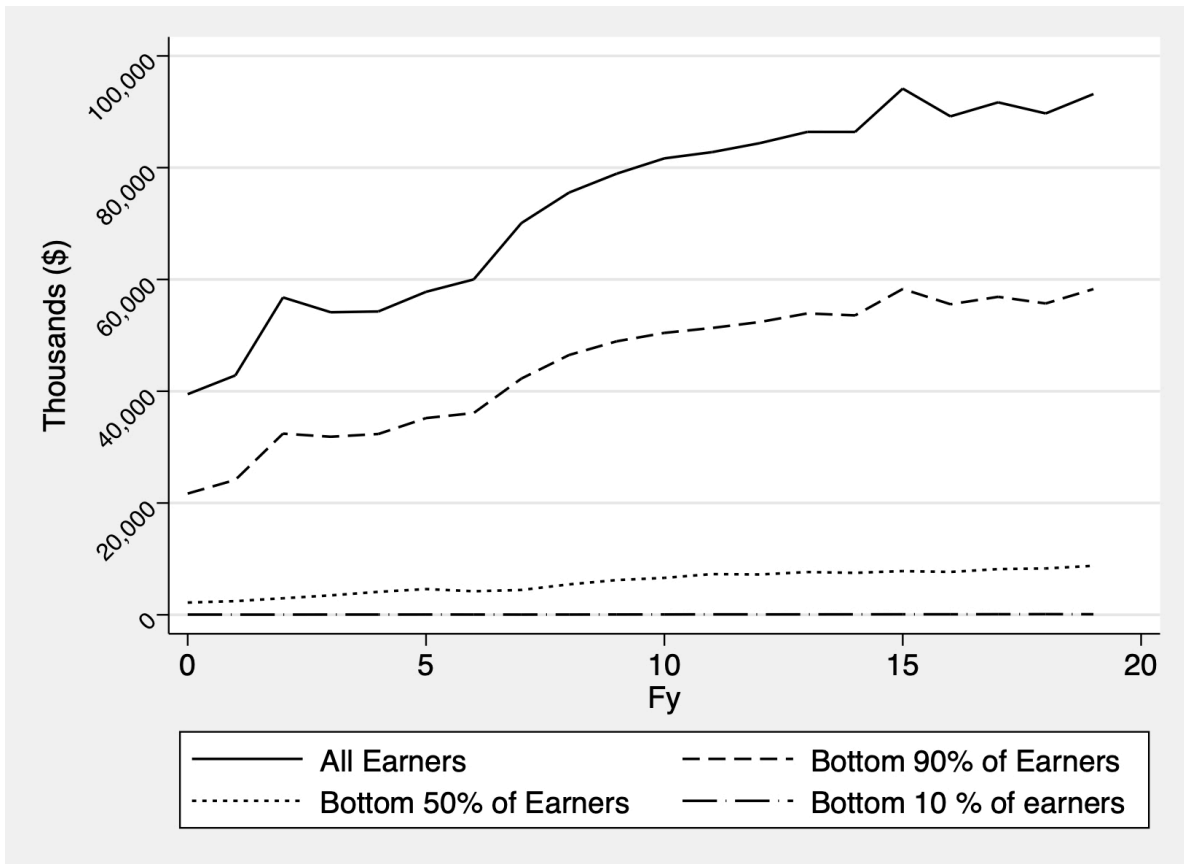


Figure 2.4a: Distribution of earnings across vendor deciles: nominal payments

percent of vendors earned between \$445 and \$890, the compensation caps for one and two Class III/IV felonies, respectively. If a vendor litigating one of these felonies in a year added a second, she would increase her earnings percentile by seven points. However, in practice, vendors across the distribution demonstrate high mobility across earner groups and the highest earners show more mobility than the lowest. The earnings percentile range for vendors who ever appeared in the lowest ten percentiles, 40 points, was slightly higher than the average across vendors whereas those who ever appeared in the top decile of earners recorded a 56 point range. The variability in intensity across years is also evident in that approximately 18 percent of the ever-top earner group also were in lowest decile at some point, although this often took place in the last years of market involvement for vendors with long tenures in indigent defense. The large variability in indigent defense pay within vendors supports a narrative in which the typical assigned counsel attorney in Virginia does not rely on this as their primary income source.

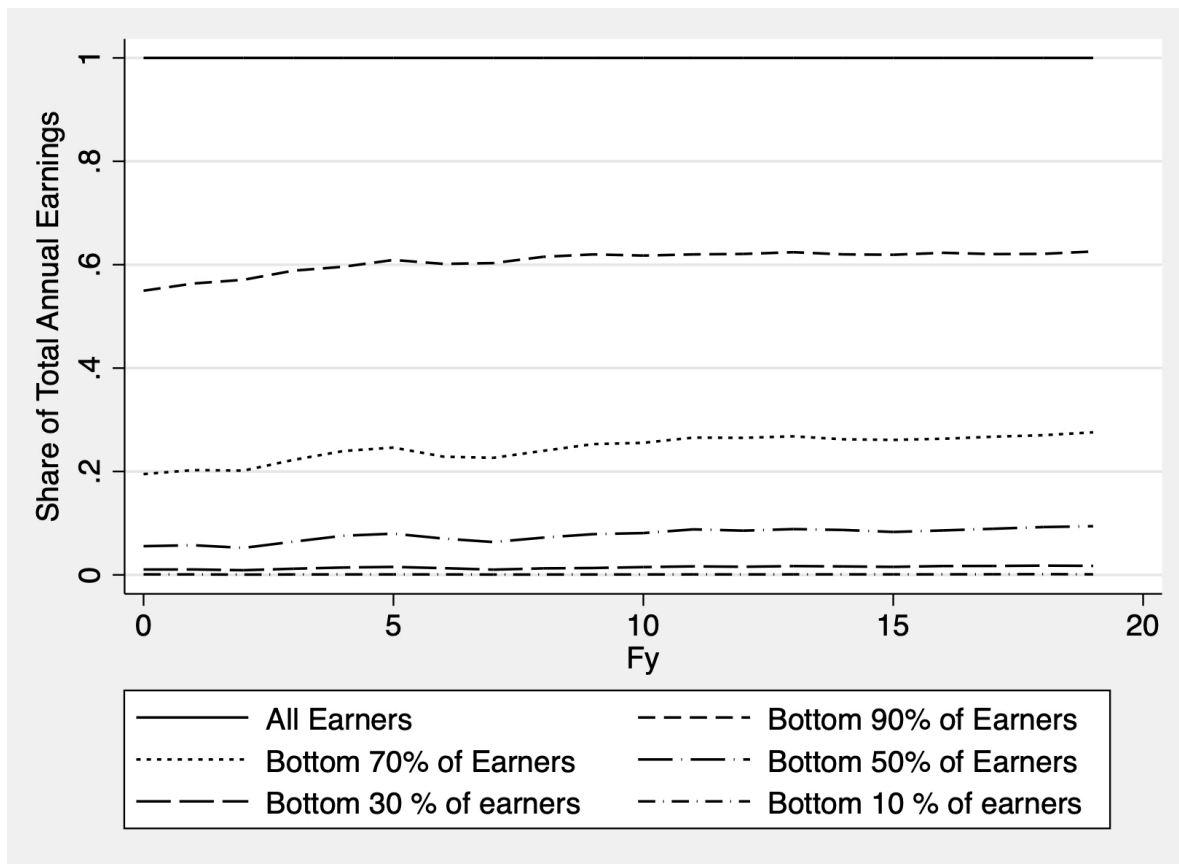


Figure 2.4b: Distribution of earnings across vendor deciles: shares

2.3.3 Indigent Defender Tenure

In addition to indigent defense vendors' variable (and typically limited) financial reliance on the industry, defenders also show variability in their tenure in indigent defense, with the higher earning vendors also supplying labor in more years. On average, assigned counsel vendors provided indigent defense services in 6.3 years between 2000 and 2019, however this underestimates vendors' true tenure in indigent defense in Virginia because of the censoring induced by the limited time frame for the data collection. I cannot observe when the earliest vendors began working in indigent defense, or when attorneys active in 2019 will exit the market.

In 2000, the first year of the data, I observe 2,373 vendors for the first time. These vendors appeared in an average of 9 years of the Virginia assigned counsel pay data. In subsequent years, I typically observe a few hundred new entrants to the market annually. Figure 2.6a shows the

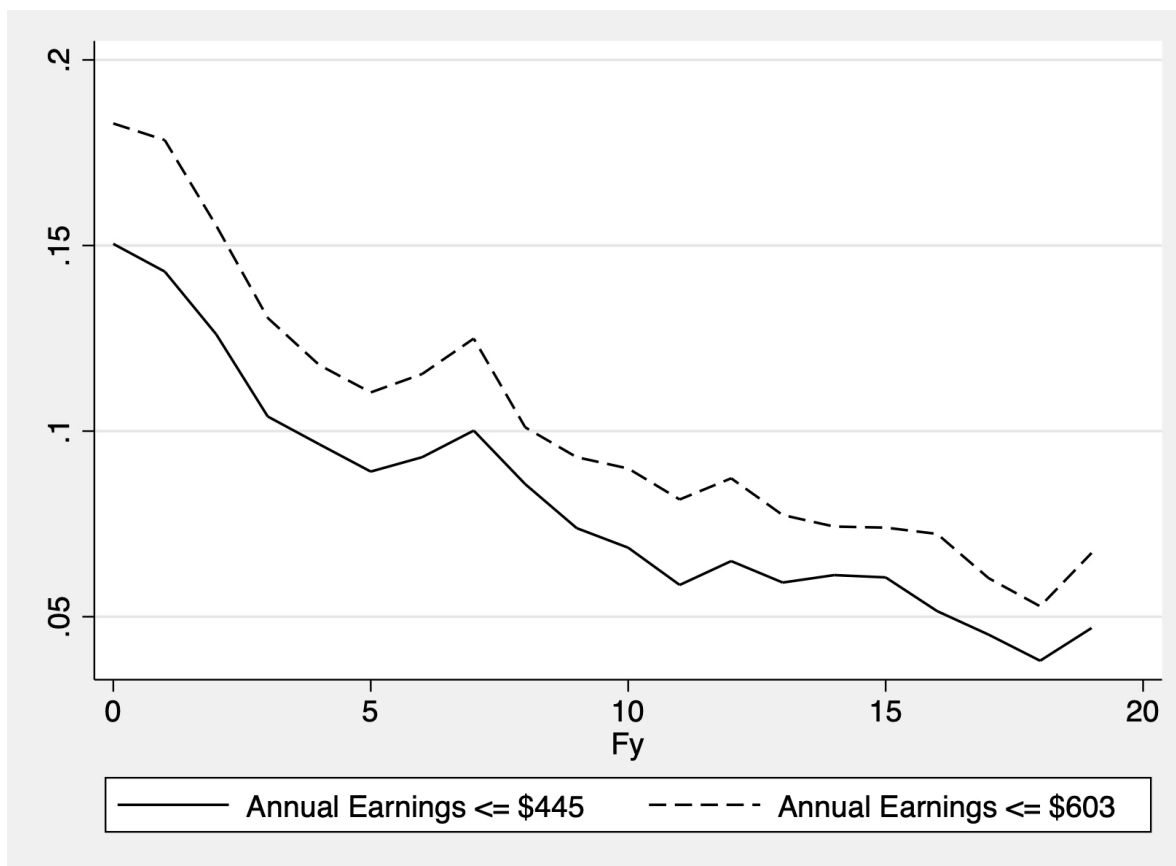


Figure 2.5: Share of single simple felony earners

number of years vendors supplied indigent defense services by year of initial entry into the market. Mechanically, these averages decrease in later fiscal years, and so Figure 2.6b expresses these tenures in a different way, demonstrating the share of data years after vendors' market entry in which they supply labor. From 2000-2018, vendors appeared on average in 48 percent of the remaining data years between their market entry and 2019.¹²

Attachment to the indigent defense labor market over time was stronger for those vendors who ever appeared in the top decile of earners: these vendors appeared in an mean of 80 percent of the years after their recorded entry. In contrast, those who were ever in the bottom decile of earners showed weaker attachment, appearing in only 39 percent of the years after their entry. Nearly half of vendors who appeared only once in the data (excluding those whose first appearance was in

¹²Also mechanically, those who first appear in fiscal year 2019 are in 100 percent of their eligible years, so I omit them from this calculation.

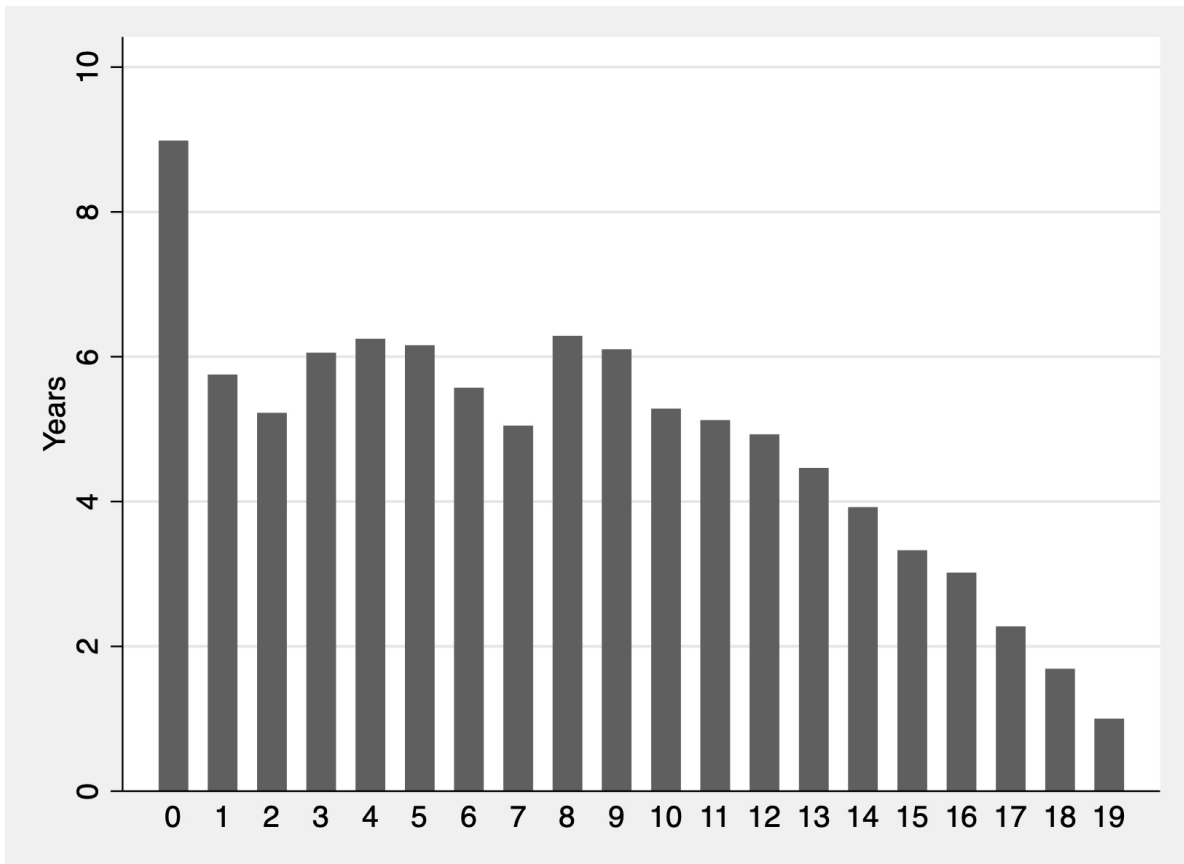


Figure 2.6a: Average years assigned counsel vendors active by year of entry

fiscal year 2019) were in the bottom decile of earners in the year of their participation. Figure 2.7 shows that vendors who supplied labor in multiple years typically did so consecutively, showing clear and singular entries to and exits from the market. On average, vendors appear in 92 percent of the years between their entry into the market and last recorded year of participation. This reiterates that while attorneys may take cases on an ad-hoc basis on the intensive margin, they show stability in indigent defense involvement on the extensive margin.

2.3.4 The Geography of Indigent Defense

There are approximately 1 district and circuit court in each city or county across Virginia, amounting to 120 geographically distinct court areas.¹³ Throughout their careers, assigned counsel

¹³There are more district courts than circuit courts. To construct geographic groupings I group district courts by the geographic boundaries of the circuit courts they feed into.

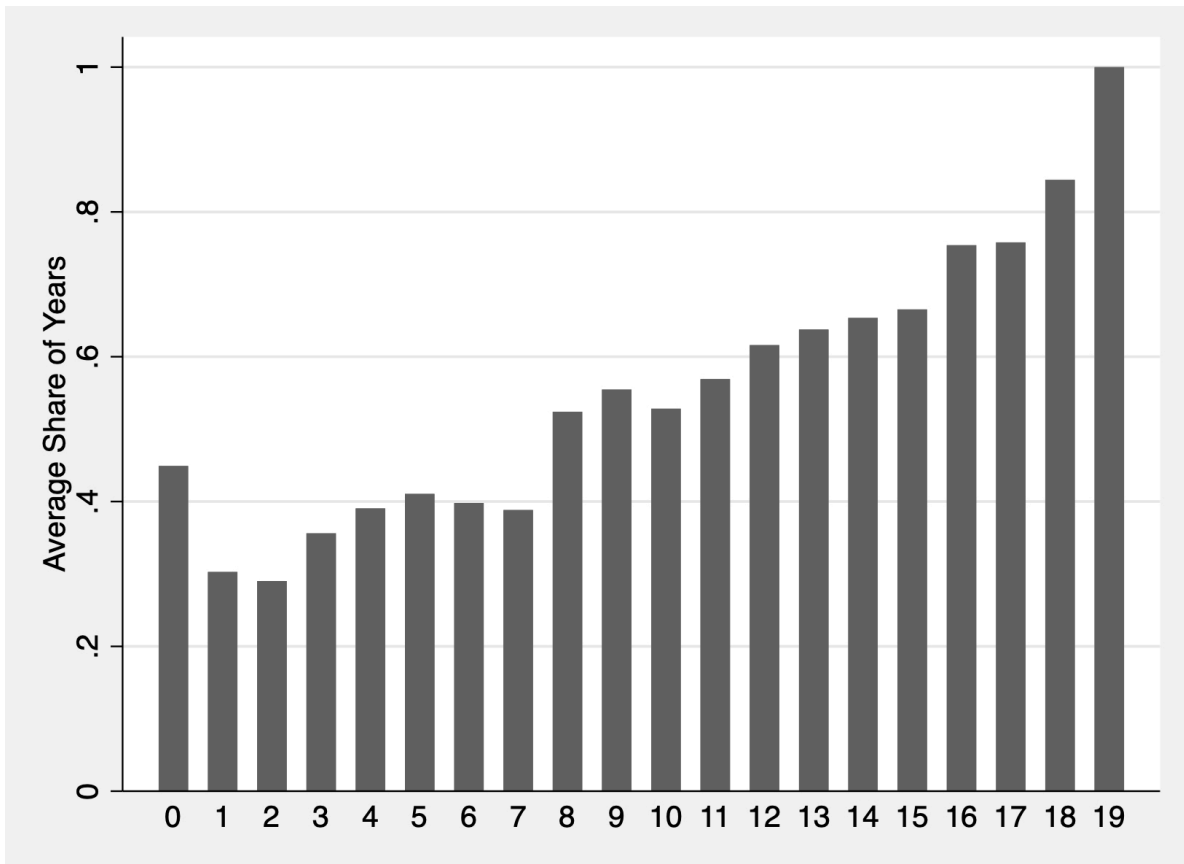


Figure 2.6b: Share of years observed after entry

demonstrate limited mobility across these geographies. Table 2.2 shows that assigned counsel vendors worked on average in only 4.1 court areas throughout their recorded careers. In a single year, the median vendor worked in only two and the modal vendor worked in one. However, some vendors spread their labor widely; 145 vendors worked in 10 or more courts in at least one year. In those years, these wide-reaching vendors were highly active in the assigned counsel labor market, averaging pay of over \$136,000 – over four times the average earnings of those working in fewer courts.

The share of vendors working concurrently in multiple courts varied substantially by geography. Overall, across courts, those with more vendors had lower shares of multi-court vendors on average. Figure 2.8 shows a statistically significant negative correlation between the number of vendors in a court and the share of those vendors working in multiple courts. A 10 vendor increase in the number of active assigned counsel is associated with a 1.3 percentage point reduction in the

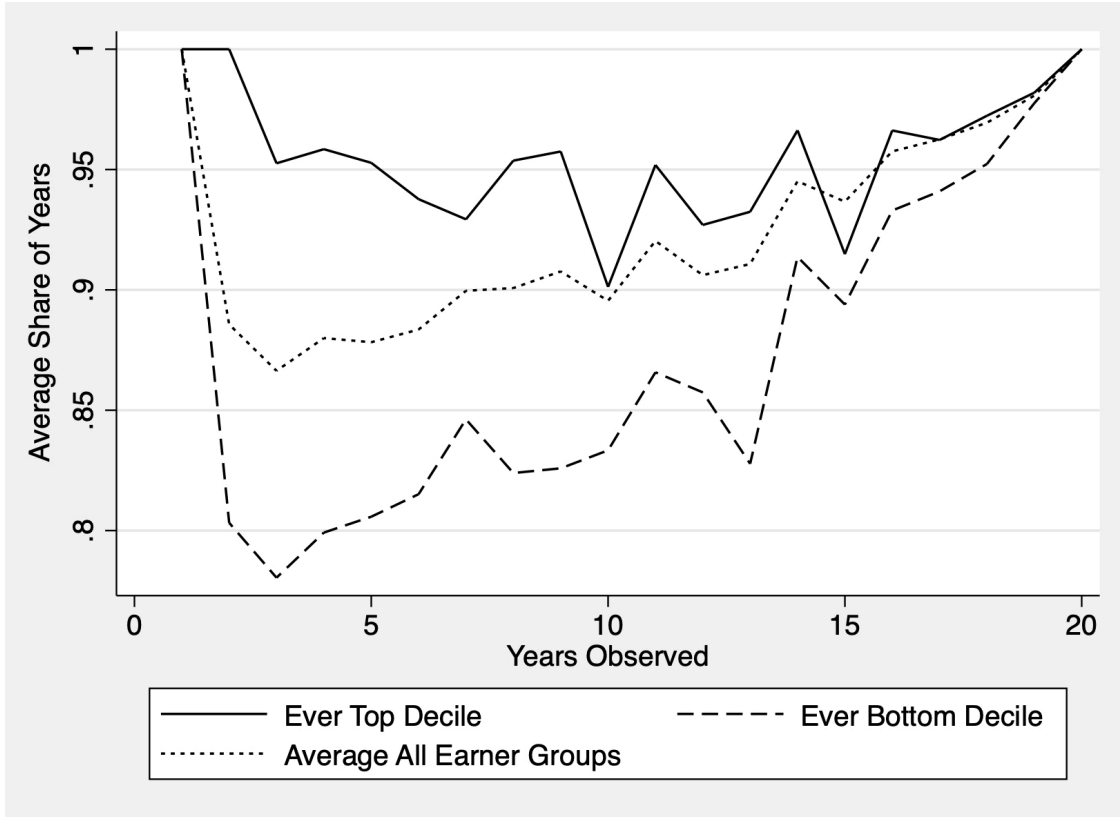


Figure 2.7: Share of years observed between entry and exit

multi-court vendor share.

However, *within* courts there is a positive correlation between the number of vendors and the share of vendors working in multiple courts. Figure 2.9 shows the estimated coefficients from a series of regressions of multi-court shares on annual vendor counts. To construct Figure 2.9, I estimate the following model for each geographic court jurisdiction i , using annual data from FY2000-2019.

$$Share_{i,t} = \beta_{0,i} + \beta_{1,i}Count_{i,t} + \epsilon_{i,t}$$

Here $Share_{i,t}$ represents the share of vendors working within court i in year t who also worked in another court during the same year. $Count_{i,t}$ represents the total number of assigned counsel vendors working in court i in year t . I graph the resulting estimates of $\beta_{1,i}$, ordered from smallest to largest. Seventy-four percent of these estimates of the within-court relationship between number of vendors and multi-court share are greater than zero (although not necessarily statistically

differentiated from zero), and average to an estimated coefficient of 0.0027. This average coefficient would indicate that within a court, adding 10 assigned counsel vendors is associated with a 2.7 percentage point increase in the share of vendors working in multiple courts, on average. This provides suggestive evidence of attorney mobility increasing with increased competition in the indigent defense labor market, however further analyses are necessary to confirm this finding.

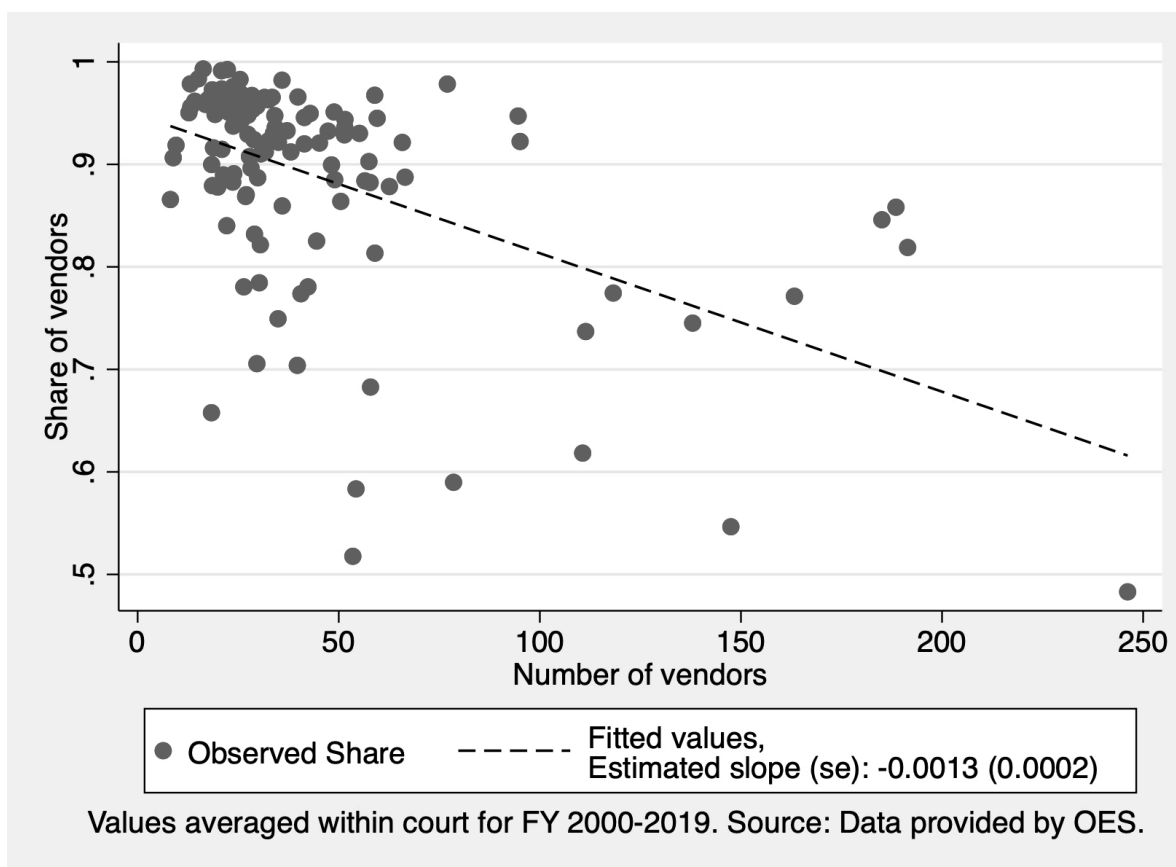


Figure 2.8: Share of vendors working in multiple courts by size of court

One intuitive potential confounding factor when discussing competition within assigned counsel labor markets is the presence of public defenders in a court's jurisdiction. In some courts, assigned counsel are the primary or even the only providers of indigent defense services, whereas in other localities they supplement the indigent defense services provided by a dedicated public defender's office. Because public defender offices on average serve more active courts, there are also many assigned counsel working in these courts. Some public defender offices were established during the first decade of the 2000s, but when restricting the window of observation to FY 2010

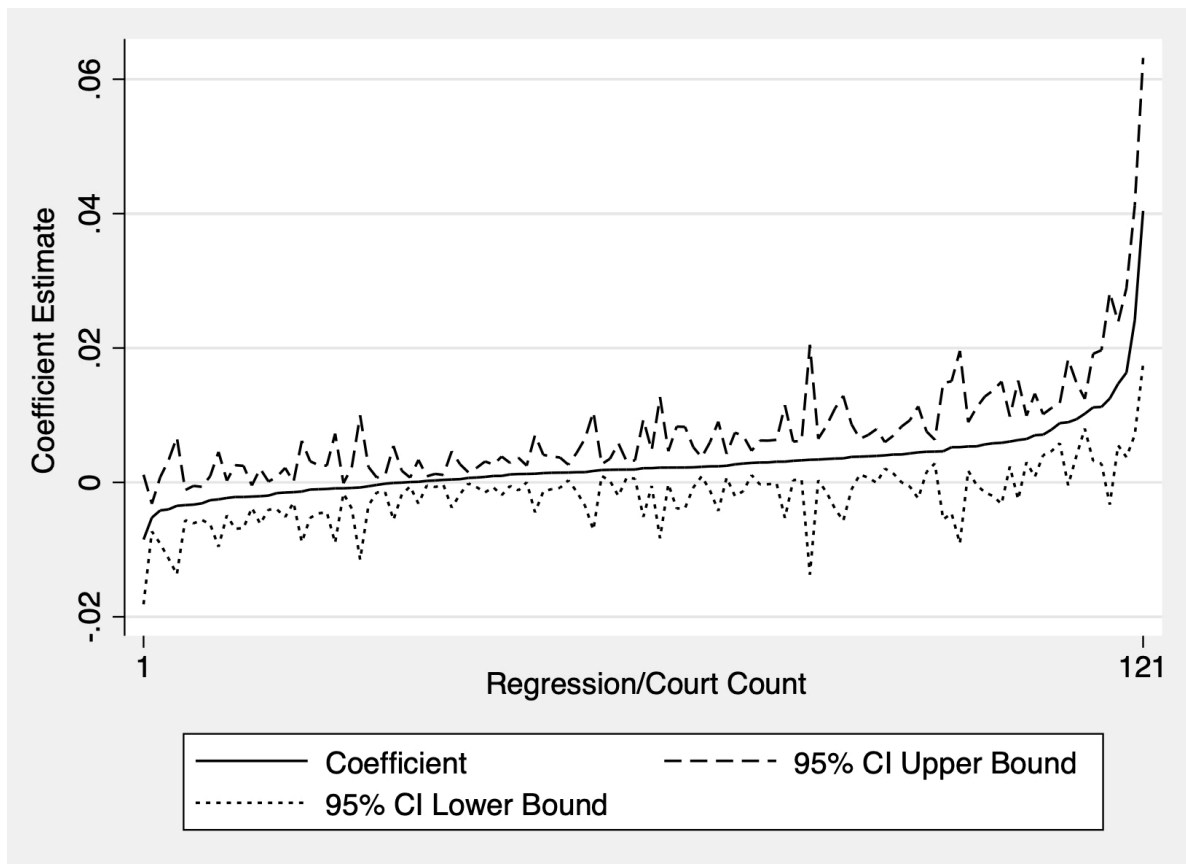


Figure 2.9: Coefficients and 95% confidence interval for regression of share of vendors in multiple courts

through 2019, public defender localities averaged 19 more assigned counsel vendors and \$127,000 more in pay to assigned counsel than assigned counsel-only jurisdictions annually. Vendors in the public defender localities during this time were about four percentage points less likely to work in multiple courts. However, the correlations between the vendor count and multi-court share ranks persists even when controlling for the presence of a local public defender both for the within-court and cross-court models.

The average correlations between multi-court share and the number of vendors calculated within-court for courts with and without public defender offices (a subgroup analogue of Figure 2.9, calculated using only post-2009 data) differed by only 0.00005. This means an additional 10 vendors in an assigned counsel locality correlates to only 0.05 percentage points more multi-court vendors than the same vendor increase in a public defender locality. Across courts, the relation-

ship between the multi-court vendor share and number of assigned counsel attorneys also remains negative when controlling for the presence of a public defender office: public defender courts with 10 more vendors tend to have a 1.7 percentage point lower multi-court share, while non-public defender courts have a 0.9 percentage point lower multi-court share.

Finally, while attorneys often worked in multiple courts, they typically showed a clear preference for a primary court each year. This was true for vendors across the earnings distribution. Annually, attorneys working in multiple courts received approximately 70 percent of their income from their primary court, a share that was nearly identical for earners who ever appeared in the top or bottom deciles. Together, these results suggest that some mobility is common for assigned counsel in Virginia, but entails costs as indicated by the limited extent of this mobility demonstrated in earnings and the breadth of courts attorneys work in.

2.4 Indigent Defenders and Body-Worn Cameras

2.4.1 Background

The mixed intensities and characteristics of indigent defense provision across providers raise questions about the responsiveness of these actors to changes in indigent defense job amenities. VIDC standards obligate indigent defenders to obtain and review evidence relevant to their client's case. Increasingly, this evidence includes audio and video recordings, including those collected by police body-worn cameras (BWC). While the public praises BWCs for their benefits to police accountability and the clarity they can bring to contested interactions, indigent defenders across Virginia note that the volume of the footage they produce can be overwhelming for time constrained attorneys.

Virtually unused in the United States until the past decade, BWCs rapidly expanded after the highly publicized death of an unarmed black teenager in Ferguson, MO, in 2014. Nationally, nearly half of law enforcement agencies adopted BWCs by the end of 2016, a marked increase from the one in twenty departments that adopted by 2010 (LEMAS-BWCS, 2016). In a more comprehensive sampling of Virginia law enforcement agencies described in Chapter 1 of this dissertation, I

find that BWC adoption in Virginia continued regularly into 2018. I show the pace of adoptions aggregated to court jurisdiction in Figure 1.2 of Chapter 1.

While law enforcement adopted BWCs as a policing tool, they generate evidence that may affect criminal litigation following an interaction with police. Perhaps most saliently, BWCs can provide evidence in cases such as an alleged assault on a police officer. More broadly, footage of any action that takes place in the camera's frame while the camera is recording may be useful for subsequent litigation by clarifying the circumstances around the interaction. For this reason, indigent defense attorneys are expected to review available footage as part of their legal obligation to "conduct a fact investigation as promptly as practicable" (VIDC, 2018). However, attorneys report that this obligation conflicts with the time constraints induced by heavy attorney workloads. The director of the Virginia Indigent Defense Commission, David Johnson, reported in 2019 that a survey of public defenders across the state revealed that 93 percent of public defenders and 85 percent of assigned counsel had difficulty meeting the obligation to review footage due to binding time constraints. As he summarized, "What they are basically saying is, 'Something needs to give here. There aren't enough hours in the day' " (Albices, 2019).

2.4.2 Conceptual Framework

The point at which "something gives" is determined by attorney's preferences over income and leisure, but also non-pecuniary benefits including work satisfaction. There is some evidence to suggest that public sector employees like indigent defenders select into organizations because of pro-social motivations that would entail a higher value than the typical worker for certain non-pecuniary benefits (Fehler & Kosfeld, 2014; Buurmana et al., 2012; Gregg et al., 2011).¹⁴ Pro-socially motivated workers may gain a sense of identity from their work, inducing high effort even in the midst of low levels of compensation (Akerloff & Kranton, 2005).

However, this does not mean that we should expect indigent defender labor supply to be per-

¹⁴A line of research suggests that in certain cases extrinsic benefits can even undermine intrinsic benefits, reducing worker effort (Mellström & Johannesson, 2008; Akerloff & Kranton, 2005; Benabou & Tirole, 2003; Benabou & Tirole, 2006; Kreps, 1997; Frey & Oberholzer-Gee, 1997).

fectly inelastic. Firstly, prior research shows both financial and non-financial rewards can positively affect the involvement (Bó et al., 2013) and performance of pro-socially motivated workers in public service fields (Ashraf et al., 2014). Teachers, a well-studied group who we may similarly intuit to be pro-socially motivated, have been shown to alter their effort in response to performance-pay incentives (Loyalka et al., 2019; Imberman & Lovenheim, 2015).

Secondly, indigent defense differs from many other public service fields in that workers can choose not only whether to enter the field, but also with what intensity. For assigned counsel, indigent defense work can be a variable portion of a broader professional portfolio. Assigned counsel can supply low levels of labor due to pro-social motivations, to gain experience, to supplement income, or for other professional or personal reasons. Attorneys supplying high levels of labor to indigent defense markets may have stronger preferences for prosocial work, higher productivities in this field, or lower opportunity costs to engaging in the work.

With this in mind, indigent defenders have four primary potential responses to an increased workload from BWC footage. Outlined in Table 2.3, attorneys first can adjust by increasing their hours per case. Since attorney pay caps are nearly universally binding, this increase in working hours has the effect of reducing attorneys effective hourly wages. Secondly, attorneys may choose to forgo certain case tasks or reduce the amount of time on case tasks to reduce the effect of BWC video on their total work hours. This may include substituting time across cases and/or providing lower quality representation. Thirdly, attorneys may exit the indigent defense labor market. Finally, although public defenders have limited ability to reduce the number or reorganize the composition of their caseloads, because assigned counsel are paid on a case-by-case basis they may adjust on this margin. For example, an attorney may decline misdemeanor cases in favor of felonies (which pay more per charge and allow more work time per case than misdemeanors), or may take cases in a neighboring court without body-worn cameras instead. Altering the number or type of cases can change assigned counsel pay, but within case type pay rates across courts are equal.

The incentives for indigent defenders to respond in each of these ways are likely to depend on their characteristics, which may be correlated with the amount of labor they supply to the indigent

<i>Table 2.3: Potential indigent defense responses to BWC time costs</i>		
	Public Defender	Assigned Counsel
Accept a reduced effective wage rate	x	x
Forgo case tasks	x	x
Exit the indigent defense pool	x	x
Accept fewer or a different composition of cases		x
<i>A summary of the conceptual framework provided by the author.</i>		

defender markets before BWC adoption. In particular, we may anticipate observing changes in market concentration across firms if attorneys respond to BWC workload changes. We may observe increased concentration in the market if low-volume attorneys are dissuaded from taking the cases likely to have BWC video or high-volume high-efficiency attorneys are more easily able to adapt to the new BWC tasks. A similar increased concentration could also result if the high-volume pro-socially motivated attorneys shoulder greater loads. Alternatively, if high-volume attorneys forgo cases likely to have BWC footage, we may see reduced concentration in BWC-adopting locales.

2.4.3 Methods and Results

I provide the first test of assigned counsel responses to police BWC adoption, focusing on the extensive margin outcome of full exits from the indigent defender pool. I preserve intensive margin outcomes for future study. Because misdemeanors are the most common certification for indigent defenders, I use the VIDC expired misdemeanor certification records to test for evidence of changes in attorney labor supply around the time of police BWC adoption. The modal year of BWC was 2015, and Figure 2.1 shows an uptick in misdemeanor expirations in both 2015 and 2016. However, Figure 2.1 cannot demonstrate whether this uptick is driven by attrition from BWC localities.

To test for changes in the pool of eligible attorneys around BWC adoption, I estimate the model

$$Y_{ilt} = \alpha + \beta' (Post_{ilt} * Treated_{lt}) + \delta X_i + \gamma_t + \zeta_l + \varepsilon_{ilt}$$

using the Borusyak, Jaravel, and Spiess (2021) imputation estimator and pre-trends tests as well

as a pooled two-way fixed effects estimator. I use an inverse-hyperbolic sine transformation of the expired attorney certifications variable as my dependant variable. The number of fully attriting attorneys for a given court-year tends to be quite low: in the median court-year, 0 attorneys allow their misdemeanor certifications to expire, although as many as 35 were observed leaving at one time. Accordingly, I also show results of a simple Poisson regression of attriting attorney counts on the time-varying treatment indicator, year, and locality fixed effects.

The above model enables me to describe deviations from the expected attorney attrition that coincide with BWC adoption in local courts. Here, an attorney is considered “treated” if BWCs enter the geographic jurisdiction of the court nearest their practice. Because attorneys are re-certified on a two year cycle, short-term outcomes might take up to two years to manifest in the data. For example, if police began using BWCs the week after an attorney submitted her recertification and she immediately left indigent defense upon BWC adoption, this would not register as an exit until her certification expired in two years. Results shown in Table 2.4 and, visually, in Figure 2.10, are lacking precision but suggest that BWCs did not induce short-term attrition from the eligible pool. Using the BJS methodology, I find an increase in expirations of effect percent following BWC adoption. This point estimate is not statistically distinguishable from no effect, and is economically small: one additional attorney’s certification expires for ten adopting courts.

2.5 Conclusion

In this paper I provide the first empirical descriptions of the unique attorney labor markets that provide legal services to low-income criminal defendants across Virginia. I find considerable heterogeneity in indigent defense engagement: a small share of firms provide the bulk of indigent defense services, but many firms provide some indigent defense in any year. These firms are unlikely to specialize in indigent defense, given the low revenues they generate, but tend to supply assigned counsel labor for multiple years. Attorneys show present but limited geographic mobility: many attorneys work in multiple court areas concurrently, but show preference for a single primary court in which they receive most of their income. Annual indigent defense earnings are low and

<i>Table 2.4: Regression estimates for BWC introduction</i>			
	Misdemeanor Certification Expirations (BJS)	Misdemeanor Certification Expirations (BJS)	Misdemeanor Certification Expirations (Poisson)
Pooled BWC estimate	0.061 (0.054)	0.048 (0.059)	0.070 (0.158)
N	1,287	1,313	1,313
Mean Dep. Variable (Untransformed)	1.71	1.69	1.69
Mean Dep. Variable (Arcsin transformed)	0.77	0.76	N/A
<i>Estimates of the relationship between BWC adoption and attorney misdemeanor certification expirations using BJS, TWFE, and Poisson estimators. Using BJS method, the p-value from a pre-trends test of the joint significance of event study estimates of the four years prior to adoption was calculated as 0.376. Outcome variable is arcsin transformed for BJS and TWFE. Average marginal effects are reported for Poisson specification. BJS estimator excludes observations from units treated in 2007. Standard errors clustered at the locality level.</i>			

highly variable from year to year for the typical assigned counsel attorney. Practically, these data suggest that it is likely uncommon for attorneys to enter assigned counsel labor markets as their primary wage earning activity.

These characteristics may shed light on the resilience of indigent defense labor supply in the midst of uncompensated changes to the work environment. Although attorneys vocalized concerns about BWCs flooding courts with a time consuming new source of evidence for criminal cases, in practice I do not find evidence that attorneys systematically leave the indigent defense labor force in response to BWC adoption. This suggests that the supplemental income indigent defense work provides as well as desirable non-pecuniary benefits and amenities, such as job satisfaction or work experience, are sufficient to offset BWC workload increases at the extensive margin. However, further study is needed to explore intensive margin responses.

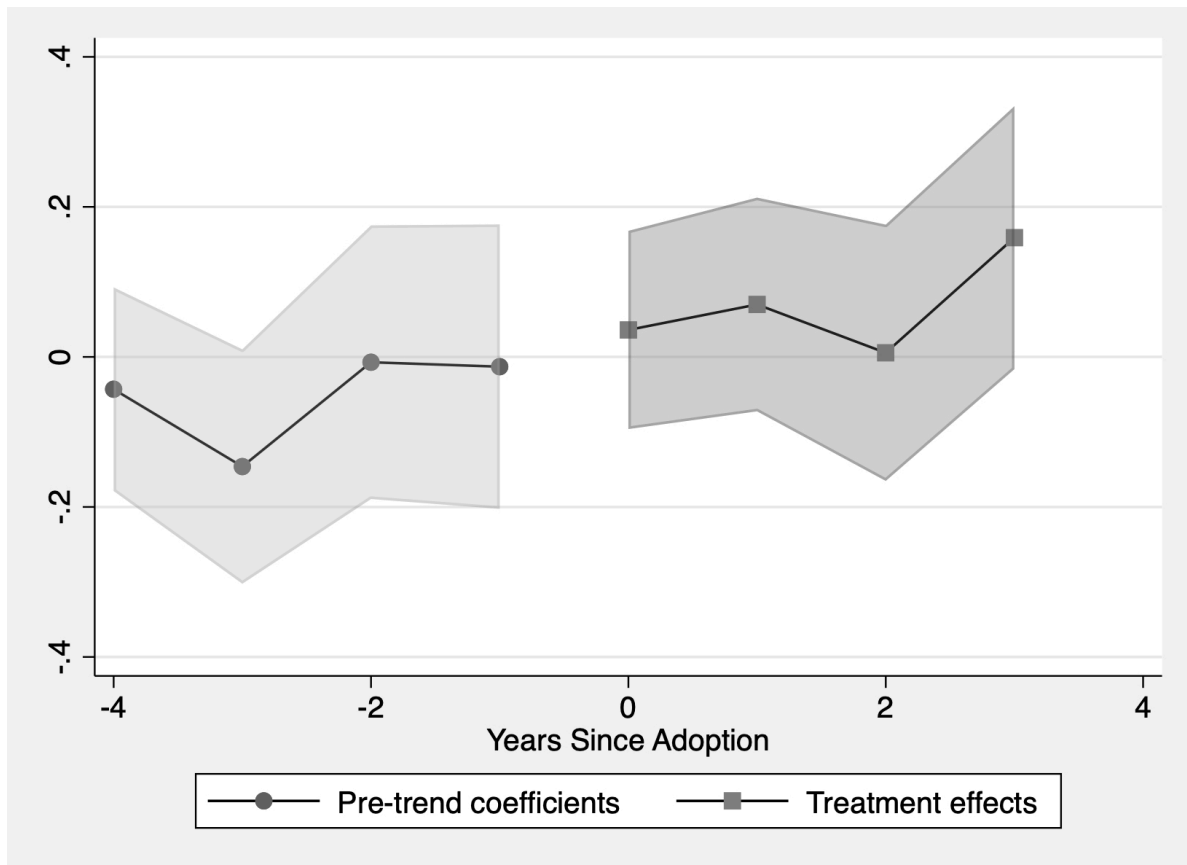


Figure 2.10: BJS event time estimates of the effect of BWCs on attorney certification expirations

CHAPTER 3

VENEZUELAN MIGRATION IN ECUADOR

3.1 Introduction

Economists have long studied the causes and effects of migration, including using large-scale migration events to learn about labor market dynamics in recipient countries. Such studies famously include those of the employment and wage effects of the Mariel Boatlift (Card, 1990), French repatriation following Algerian independence (Hunt, 1992), and mass migrations from the Soviet Union to Israel (Friedberg, 2001). More recently, Tumen (2016) studied the effects of Syrian resettlement in refugee camps in Turkey on wage, employment, consumer prices, and housing outcomes.

In the past decade, hardships within Venezuelan spurred a new large-scale migration in South America. Between 2014 and 2018, three million Venezuelans left their home country in the midst of a contracting economy, hyperinflation, insecurity, and widespread shortages of basic goods. Most (an estimated 2.4 million) remained within South America and the Caribbean (UNHCR, 2018). As migrant flows increased, host countries debated and implemented policies to manage the migrants within country and also to limit the number of new entrants. These policies included new visas and programs to regularize migrants (UNGRD, 2018), and increased funding for social services (Al Jazeera, 2019a). Emerging research tests for the effects of Venezuelan migrants on electoral outcomes (Rozo and Vargas. 2019), wages (Caruso et al., 2021), and health (Ibàñez and Rozo, 2020) in places with high levels of resettlement. However, before resettling, migrants must reach their intended destinations.

Here, too, countries grappled with challenges stemming from displaced Venezuelans moving by land across international borders. Ecuador (Ministerio de Relaciones, 2018a) and Peru (Gestión, 2018a) each declared a state of emergency in 2018 for provinces heavily affected by the Venezuelan migration and some migrants were subject to violence at the hands of disgruntled host communities (Cabrera, 2019). These events are reminiscent of recent land-based migrations of Syrian refugees in Europe and Central American migrants through Mexico, which generated similar backlash amongst hosts. The 2022 Ukrainian refugee crisis further underscores the ongoing necessity of research on displaced persons. Yet, despite the political and economic relevance of

migrants in transit, at this time only a very limited quantitative literature studies through-migrants.

This paper expands the literature on migrants in transit by describing the increasing and changing movements and demographic characteristics of Venezuelans in Ecuador between 2010 and 2020. I quantify migrant flows using registered border crossings by Venezuelans and present evidence of the emergence and eventual dissolution of a migrant route connecting Colombia and Peru through Ecuador. I show the evolving demographics of Venezuelans traveling this route, and the responsiveness of migrant flows to changing policies in both Ecuador and destination country Peru. The paper proceeds as follows: Section 2 provides background and institutional context around the decisions of Venezuelans to migrate. Section 3 presents the data I use to describe Venezuelans' movements in Ecuador, and some descriptive analyses of these data. Section 4 provides further analyses of migration patterns around the time of substantial policy changes concerning entry and visa requirements for Venezuelans. Section 5 concludes.

3.2 Background and Institutional Details

The Venezuelan exodus of the 2010s is commonly measured as beginning in 2014 in conjunction with a deteriorating economic situation in Venezuela. In this year, Venezuela's real GDP shrunk by 3.9 percent, marking a reversal from a 2011- 2013 period of economic growth. Over the next five years, the economy contracted further, reflected in GDP growth rates of -17 percent in 2016 and -35 percent in 2019. As GDP declined, inflation increased, rising from an annual rate of 68.5 percent in 2014 to a peak of 130 *thousand* percent in 2018 (IMF, 2022).¹ At the same time, residents dealt with shortages of basic goods including food and medicine, as well as widespread violence (Observatorio Venezolano de Violencia, 2018) and a volatile political environment. In a 2017 survey, 79 percent of respondents in Venezuela reported eating less because they could not find food to buy. Researchers further reported that 64.3 percent of respondents lost weight the prior year, at an average loss of 11 kg (Landaeta-Jimaénez et al., 2018).

This turbulent environment prompted millions of Venezuelans to leave their country, primarily

¹I report the inflation rate using the annual percent change in end of period consumer prices.

moving into other Latin American or Caribbean countries. Figure 3.1 shows the distribution of Venezuelan migrants across South America. With an estimated 1 million migrants at the end of 2018, Colombia hosted the plurality of displaced Venezuelans, followed by Peru with 500,000 migrants. Between these countries lies Ecuador, which hosted 220,000 migrants² at the end of 2018.

A high prevalence of through-migration further magnified Venezuelan migrant's influence in Ecuador during this time period. Positioned between Colombia and Peru, Ecuador is smaller than its neighbors geographically, economically, and by population (U.S. Census Bureau, 2019; World Bank, 2019). However, at less than 500 miles in length with established north-south transit infrastructure, Ecuador lays out a path for migrants leaving Colombia to reach Peru without incurring the costs of air travel. Rather than stopping in Ecuador, Venezuelans in the country were only a bus ride away from a larger and more varied selection of jobs, established migrant networks, and – in peak migration years – more generous legal residency policies in Peru (Greenwood, 2016; Beine et al., 2011; Bertoli, 2010).

Beginning in February 2017, Peru introduced a new visa, the Temporary Permit of Permanence (PTP), to extend legal stay to those Venezuelan migrants who had legally entered the country by late 2016 (Supreme Decree 002-2017-IN). The PTP regularized recipients' migration status for one year, including granting the ability to formally work. PTP applicants were exempt from most immigration fees with the exception of a 41.9 sol (\approx \$12.61 USD) processing fee. In contrast, although initial entry into Ecuador was relatively simple (Venezuelans could legally stay in coun-

²Throughout this paper I refer to the displaced Venezuelans as “migrants.” Although definitions vary from country to country (Raymer, 2017), the United Nations (1998) recommends that the term “long-term migrant” be applied to individuals who alter their primary country of residence for at least 12 months while the term “short term migrant” refers to those who alter their primary country of residence for 3 to 12 months. An underlying simplifying assumption in the migrant classification framework is that migrants travel directly from their countries of origin to their new countries of residence. To my knowledge there is no universally accepted term for an individual who is en route to a new place of residence unless this person falls under a protected group, such as a refugee. Whether Venezuelans should be classified as refugees has been debated (Bahar, 2018) and is more than an issue of semantics since neighboring countries are more obligated to accept and integrate refugees than general migrants. There is precedent for such a designation in the 1984 Cartagena Declaration on Refugees (UNHCR, 1984), which includes: “...persons who have fled their country because their lives, safety or freedom have been threatened by generalized violence, foreign aggression, internal conflicts, massive violation of human rights or other circumstances which have seriously disturbed public order”. However, many Venezuelans have not been legally classified as refugees within their host countries, and so I use broader terms such as “migrant”, “migrant in transit”, and “through-migrant.”



Figure 3.1: UNHCR map of Venezuelan migrant locations across South America, Dec. 2018

try for 180 days by showing a national ID card (Peru Ministerio del Interior, 2019a; 2019b)), obtaining permission to stay beyond this time frame was more arduous, further drawing migrants through Ecuador and into Peru. One temporary resident visa designed specifically for Venezuelans, the EMEV, entailed \$250 in fees, proof of economic solvency, and a passport, a difficult document for Venezuelans to acquire. However, as migrant flows continued to grow, both Ecuador and Peru introduced new restrictions on Venezuelan through- and resettling migrants. Peru eventually restricted PTP eligibility to migrants entering the country by October 31, 2018 (Supreme Decree 007-2018-IN) and both Ecuador and Peru experimented with passport requirements for Venezuelans.

The presence of through-migration in Ecuador is particularly notable because of the concen-

trated geography of migrant paths through Ecuador. A limited set of viable land routes connecting Colombia and Peru means that the hundreds of thousands of through-migrants recorded entering the country largely passed through the same relatively small communities. Using OpenStreetMap data, in Figure 3.2 I show Ecuador's most established roadways.³ Migrants entering the country by plane typically enter through airports in the major cities of Quito and Guayaquil within the provinces of Pichincha and Guayas, respectively. But migrants traveling by land overwhelmingly enter through the northern province of Carchi and, specifically, border city Tulcán. At the time of the 2010 census, Carchi was home to fewer than 165,000 residents, half of whom lived in Tulcán. Through-migrants then exit through the southern province of El Oro, often from the city Huaquillas. Only approximately 500 miles of road separate Tulcán and Huaquillas, and migrants may cover this distance by car, bus, or even on foot. I highlight these four provinces in Figure 3.3.

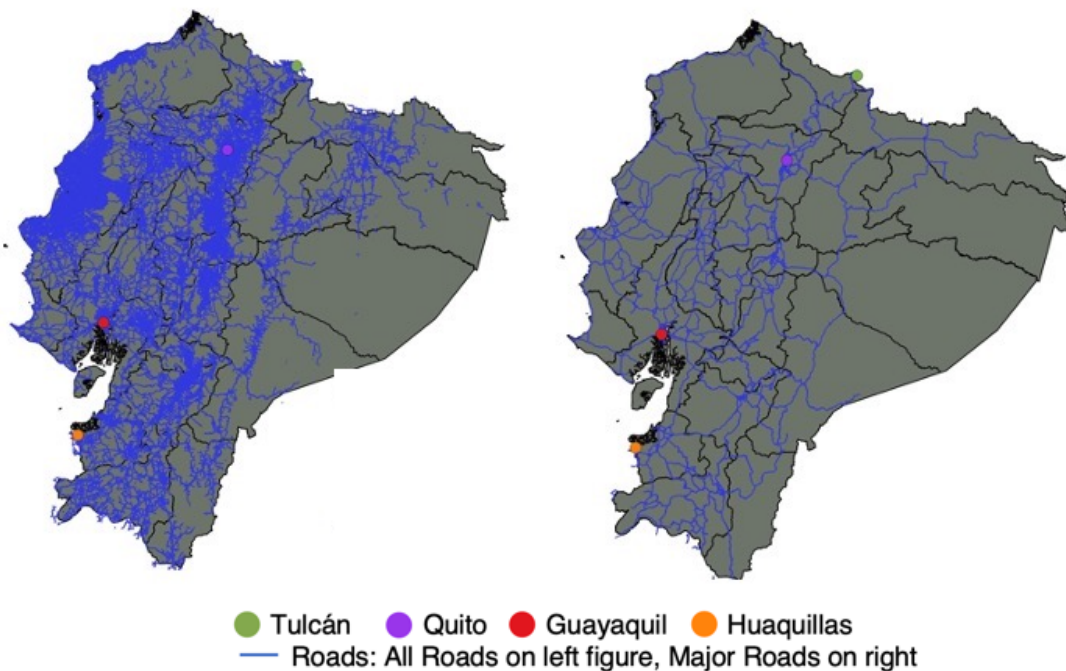


Figure 3.2: Roadways in Ecuador

³Specifically, including only motorways, trunks, primary, and secondary roadways, where primary and secondary roadways are those that link medium and large towns and trunks are a subset of highways that do not fully comply with the requirements to be classified as a “motorway”.

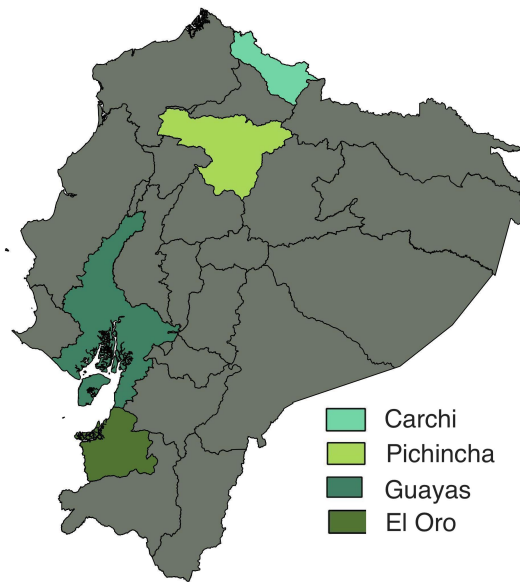


Figure 3.3: Map of Ecuador with key provinces highlighted

3.3 Data and Analysis

3.3.1 Data

To characterize Venezuelan migration in Ecuador and the emergence of the through-migration route, I use the 2010-2020 records of the Registro Estadístico de Entradas y Salidas (ESI) from Ecuador's Instituto Nacional de Estadística y Censos (INEC). The ESI records the date, province, method of transport (air, sea, land, river), reason for trip (tourism, business, events, studies, residence,⁴ other), and various demographic characteristics including age, sex, nationality, and occupation for each entrance to or exit from Ecuador as recorded by each of 29 migration headquarters. Notably, these are *recorded* entries. While registries of air and sea movements in these data should be complete, registries of land and river movements may underestimate true migratory flows due to the potential for irregular (undocumented) migration.⁵

⁴Residence was created as a category for the reason for trip variable in 2016, so it is difficult to compare this variable across time.

⁵Under-reporting may be more prominent in the ZIF (Border Integration Zone) provinces, in which Ecuador, Colombia, and Peru collaborate to promote economic development and, to do so, simplify migration processes.

3.3.2 Migrant Movements: National

Two key questions regarding migration in Ecuador are “how many people enter?” and “how many people stay?”, each with different implications for migration policies. While I cannot link individuals across ESI records, at a national level I calculate *net migration* by differencing the recorded exits from entrances and *aggregate movements* as the sum of all entrances to and exits from the country by Venezuelans.

In the past decade both aggregate movements and net migrations for Venezuelans increased substantially, although not always proportionally. Figure 3.4 shows Venezuelan’s monthly entries to and exits from Ecuador between 2010 and early 2020. Both movement types notably increased during 2013, more than doubling the aggregate movements from approximately 90,000 in 2012 to 203,000 in 2013. Apart from seasonal fluctuations, these heightened entry and exit numbers remained generally stable until 2017, when they more than doubled again to over half million movements, and then tripled to 1.7 million combined recorded entries and exits in 2018. While both entries to and exits from Ecuador by Venezuelans increased over this time period, indicative of the through-migration route, a smaller but nonetheless substantial number of Venezuelans are recorded entering Ecuador with no offsetting exit. Figure 3.4 also shows the widening gap between entries and exits that emerged as migrant flows grew.

Figure 3.5 details this gap, showing that net migration increased annually from 2014 through 2018, even in the period in which aggregate movements were stable/slightly declined. In 2017, over 60,000 entrances were not offset by an exit in the same year and net migration increased by over 150,000 Venezuelan migrants in 2018. Figure 3.6 shows the corresponding exponential increase in the number of Venezuelans in Ecuador during the 2010’s.

Notably, these trends are unique to Venezuelans and do not reflect broader changes in migration patterns throughout Ecuador. During the 2010s, Ecuador recorded increasing entries and exits both for non-Venezuelan foreigners and Ecuadorians, but where Venezuelans’ entries and exits in 2019 were over 1300 percent greater than the 2010 values, for non-Venezuelan foreigners and Ecuadorians these movements grew by only 55 percent and 71 percent, respectively. Non-Venezuelan

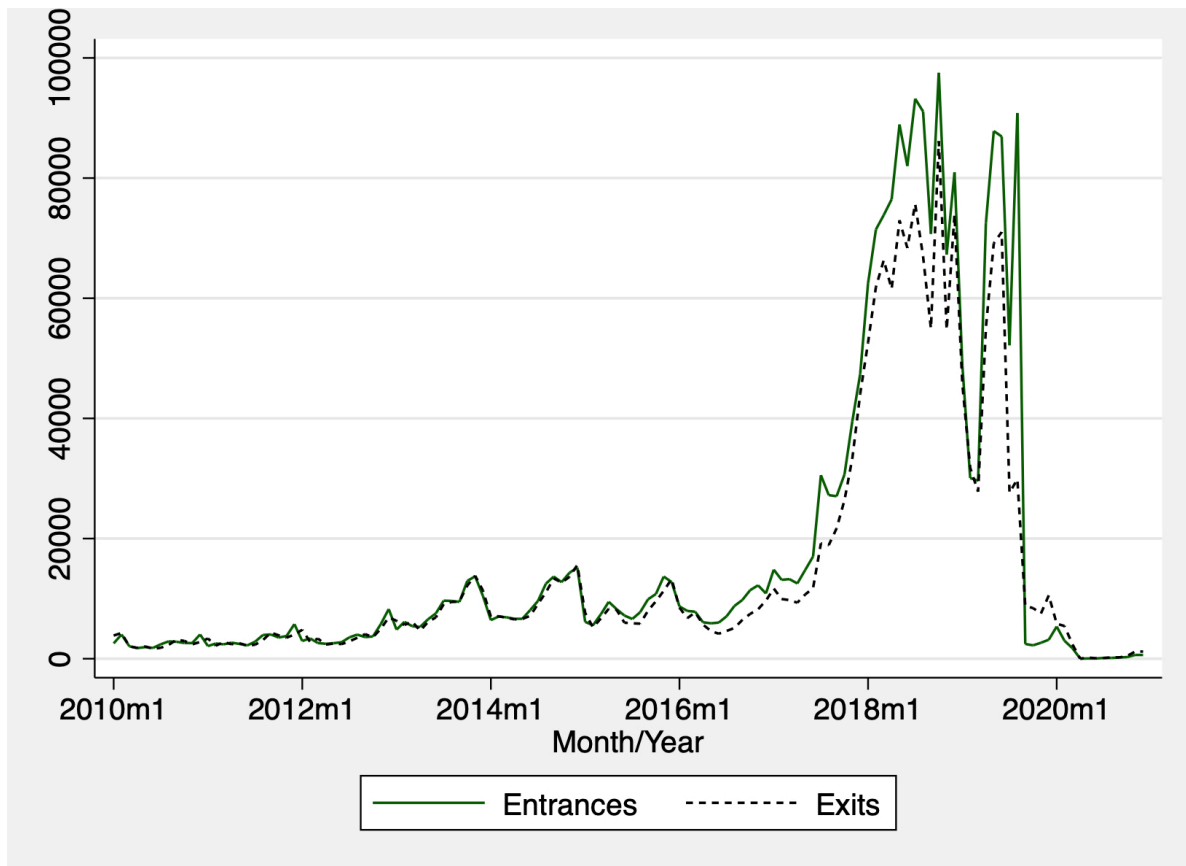


Figure 3.4: Monthly recorded entries to and exits from Ecuador by Venezuelans

foreigners also did not demonstrate substantive changes in net-migration to Ecuador between 2010 and 2019. Non-Venezuelan foreigners recorded approximately 40,000 net entries in 2010, which gradually declined to nearly 13,000 net exits in 2019.

3.3.3 Migrant Movements: Location, Characteristics, and the Emergence of a Land Route

The increased travel into and out of Ecuador by Venezuelans coincided with changing locations and methods of these movements. While the provinces of Pichincha and Guayas registered 95% of aggregate movements by Venezuelans in 2013, Figure 3.7 shows that their share diminished over time, offset by increases in traffic through Carchi and El Oro. Unsurprisingly, this corresponded to a shift in method of travel, as land crossings through border provinces overtook air travel through the major cities of Quito and Guayaquil. Consistent with a strengthening migrant route moving Venezuelans through Ecuador from Colombia to Peru, over time the Carchi movements came to be

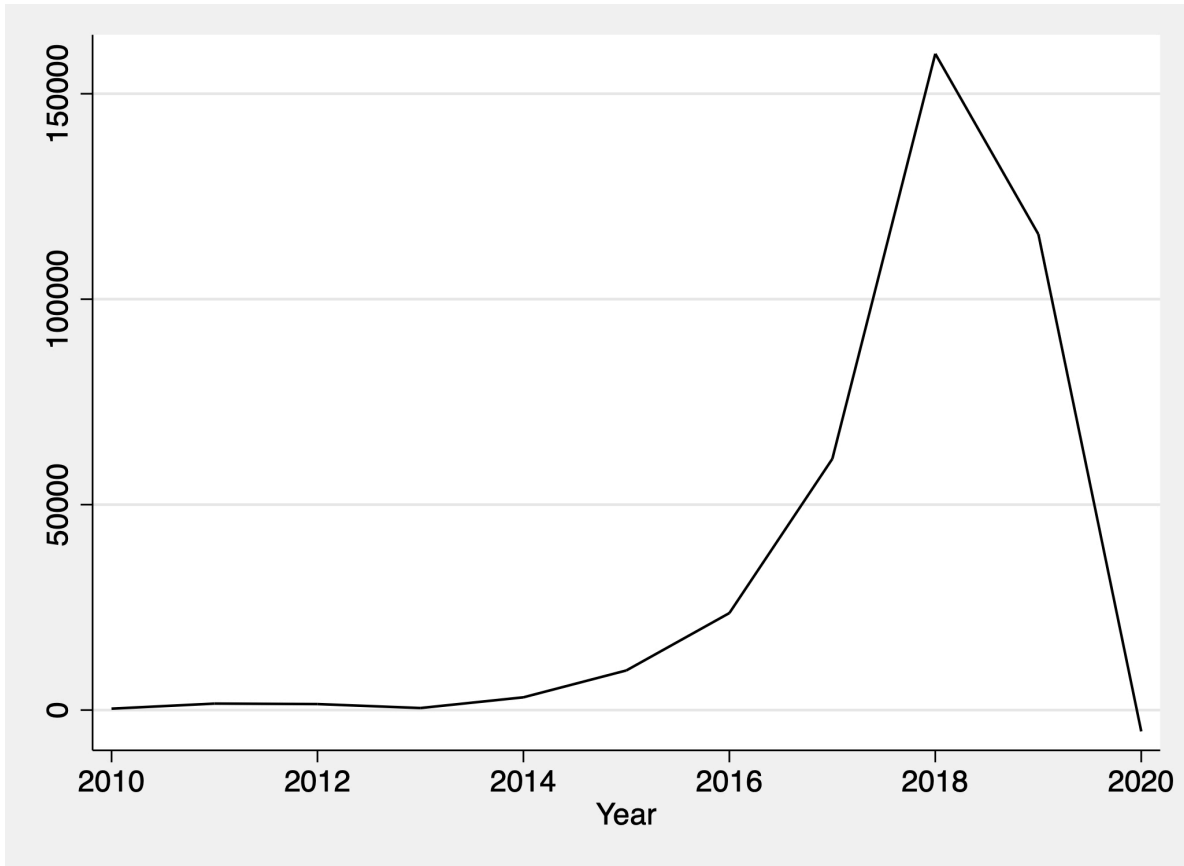


Figure 3.5: Annual net migration of Venezuelans in Ecuador

dominated by entries to Ecuador while El Oro movements increasingly reflected exits, illustrated in Figure 3.8. In 2017, entrances to Carchi by Venezuelans exceeded exits from the province by 200,000, whereas exits from El Oro surpassed entrances by approximately 150,000. Although I cannot link individuals across ESI records, the magnitudes of these migrant flows necessitate a north-to-south through-migrant route; only an estimated 13,000 (UN-DESA, 2014) Venezuelans lived in Ecuador prior to the onset of the diaspora, precluding the possibility that El Oro exits are driven by resident out-migration.

3.3.4 Migrant Characteristics

As migrant flows increased and the north-south transit route strengthened, Venezuelan entrants through Carchi and exiters through El Oro converged in age characteristics and migrants through

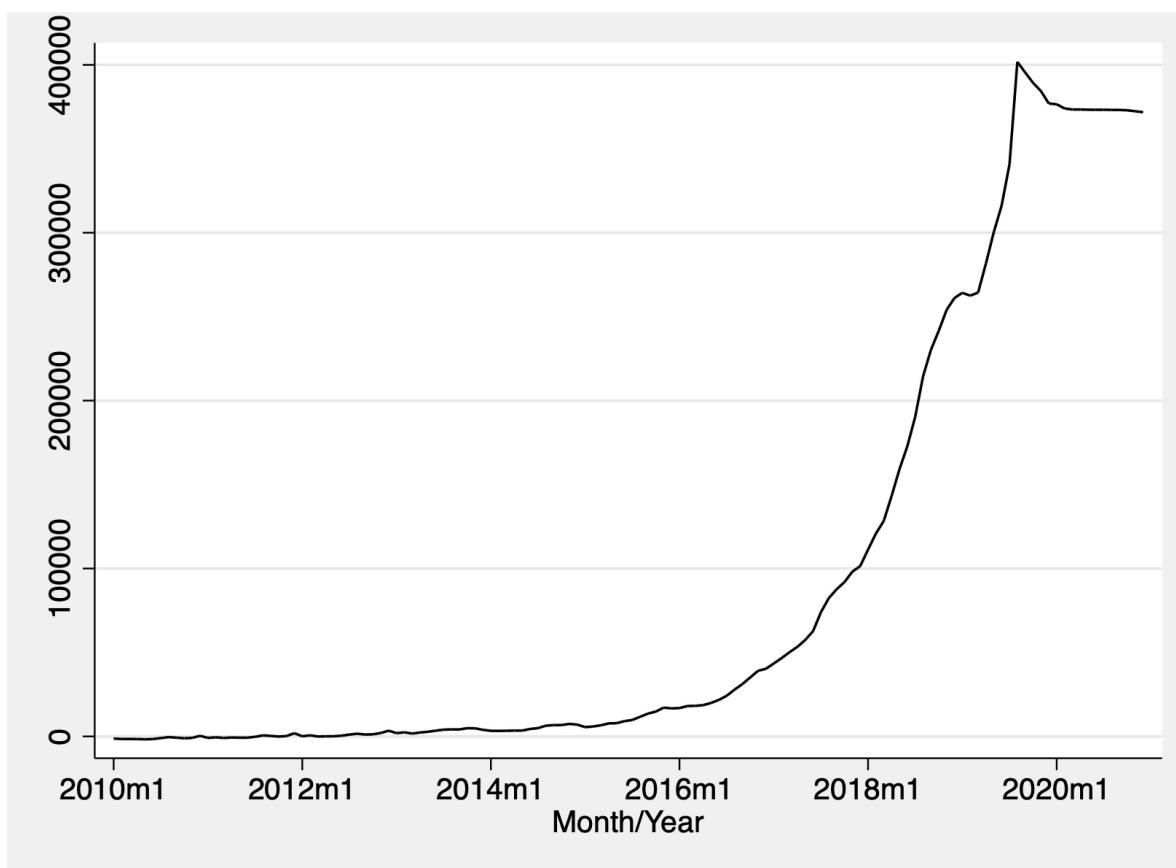


Figure 3.6: Change in number of Venezuelans in Ecuador since EOY 2009

each location became younger on average, shown in Figure 3.9. From 2011⁶ through 2015, El Oro exiters were on average 3.3 years older than Carchi entrants. But, in 2016 the ages equalized, differing by only 0.6 years.⁷ Figures 3.10a and 3.10b show that the declining average age came about as young adults (18-34) overtook adults 35-64 as the plurality of movers at both border provinces.

Early in the decade, migrants into Carchi were also slightly more likely (4 percentage points) to be women than the exiters in El Oro. These proportions generally equalized from 2013-2019, with 2017 as an exception. In this year, women comprised a share of Carchi entrants 1.7 percentage points higher than their share of El Oro exiters, amounting to approximately 2800 fewer women

⁶The ESI data reported birth year, rather than age, in 2010. I omit the estimated ages of migrants based on birth year from these analyses.

⁷Because of the large samples, all age differences within years are statistically significantly different. However, across post- 2015 years, Carchi entrants were on average only 0.12 years older than El Oro exiters– a practically negligible difference.

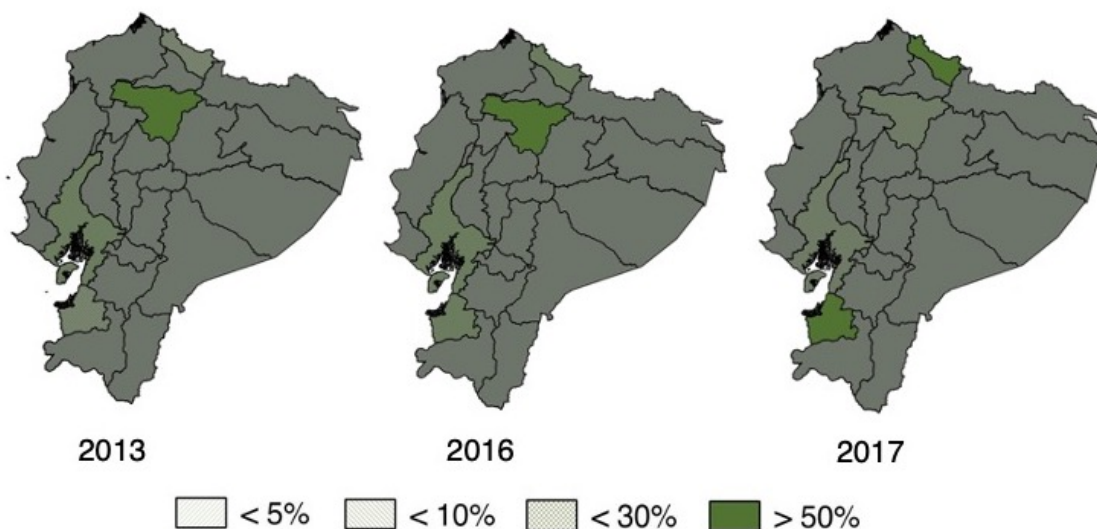


Figure 3.7: Share of total Venezuelan international movements to/from Ecuador recorded in Carchi, Guayas, Pichincha, and El Oro provinces

exiting. The convergence in genders occurred earlier than the convergence in ages, but an additional equalization took place later in the time period: for much of the 2010's women both entered Carchi and exited El Oro at rates lower than men. However, from 2017-2019, the within-province proportions of women rose from approximately 40 percent to over 50 percent in both provinces.

3.3.5 Occupation

As through-migration became more common and young working age adults comprised a greater share of migrants, workers' skill levels declined. This is consistent with worsening conditions in Venezuela progressively inducing poorer and less skilled migrants to leave the country. To examine changes in worker skill levels, I use the occupation classifications in the ESI data. Because of a 2014 change in the classification system used, I compare migrant occupations only for 2014-2019. I also note that the share of migrants with no occupation listed was substantial and dynamic, ranging from a low of approximately 5 percent of Venezuelan Carchi entrants and El Oro exiters in 2016 to over 40 percent of this group in 2018.

Because of the potential for misclassifications or inconsistent classifications of specific occupations across years, I focus on skill categories rather than the finer occupational codes available

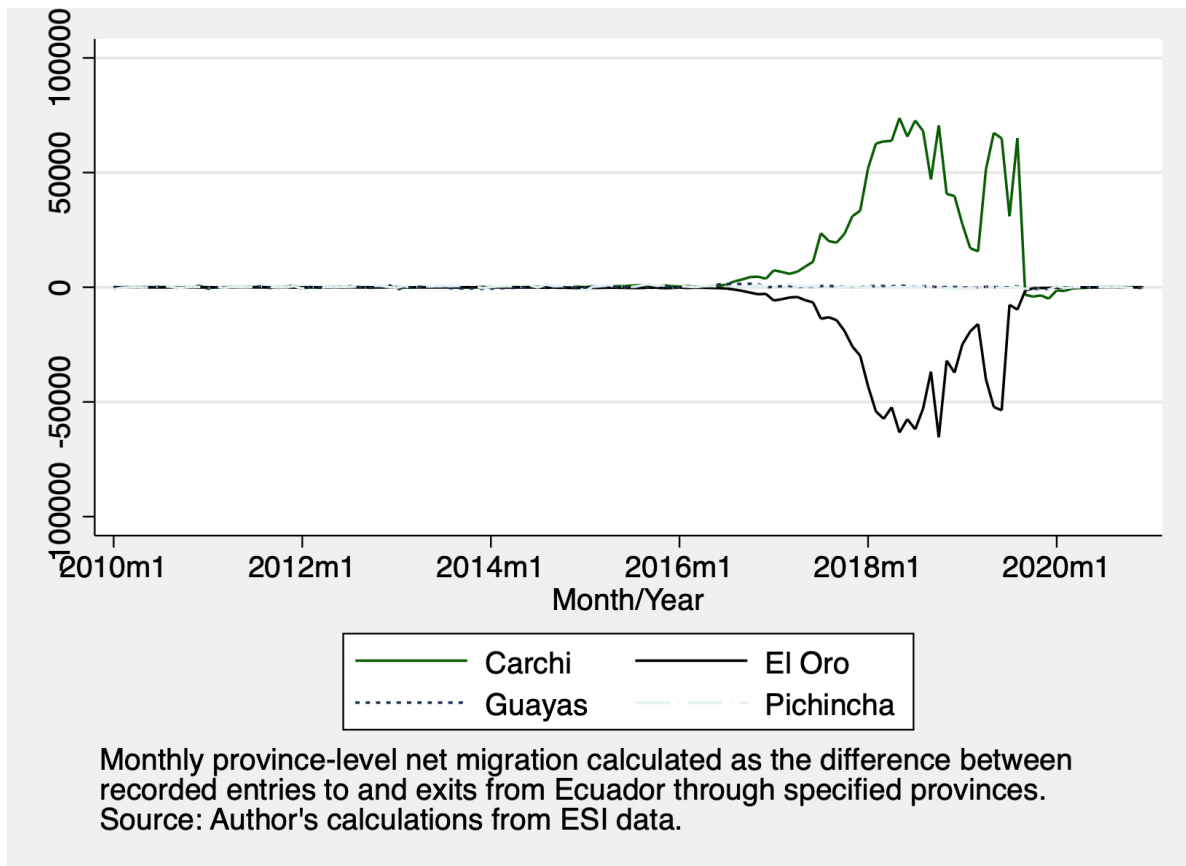


Figure 3.8: Net migration through key provinces

in the data. The 2008 International Standard Classification of Occupations (ISCO-08) assigns occupations to one of four skill levels. Skill level one, the lowest skill classification, is used for occupations that involve “simple and routine physical or manual tasks” and may require no school or primary education. Skill level two may involve machinery, electronic equipment, or use and storage of information. These occupations require at least some secondary school. Skill level 3 includes occupations that require the worker to perform more complex tasks in specialized fields, often requiring 1-3 years of post-secondary education. Lastly, skill level 4 is reserved for specialized occupations that require complex decision-making and creativity, generally requiring 3-6 years of post-secondary education. Using these skill categories, I find that the highest skilled Venezuelan workers comprised a smaller proportion of entries to and exits from Ecuador in later migration years than at the start of the exodus from Venezuela. From 2014-2016, level 4 workers comprised approximately 37 percent of classified workers entering or exiting the country, com-

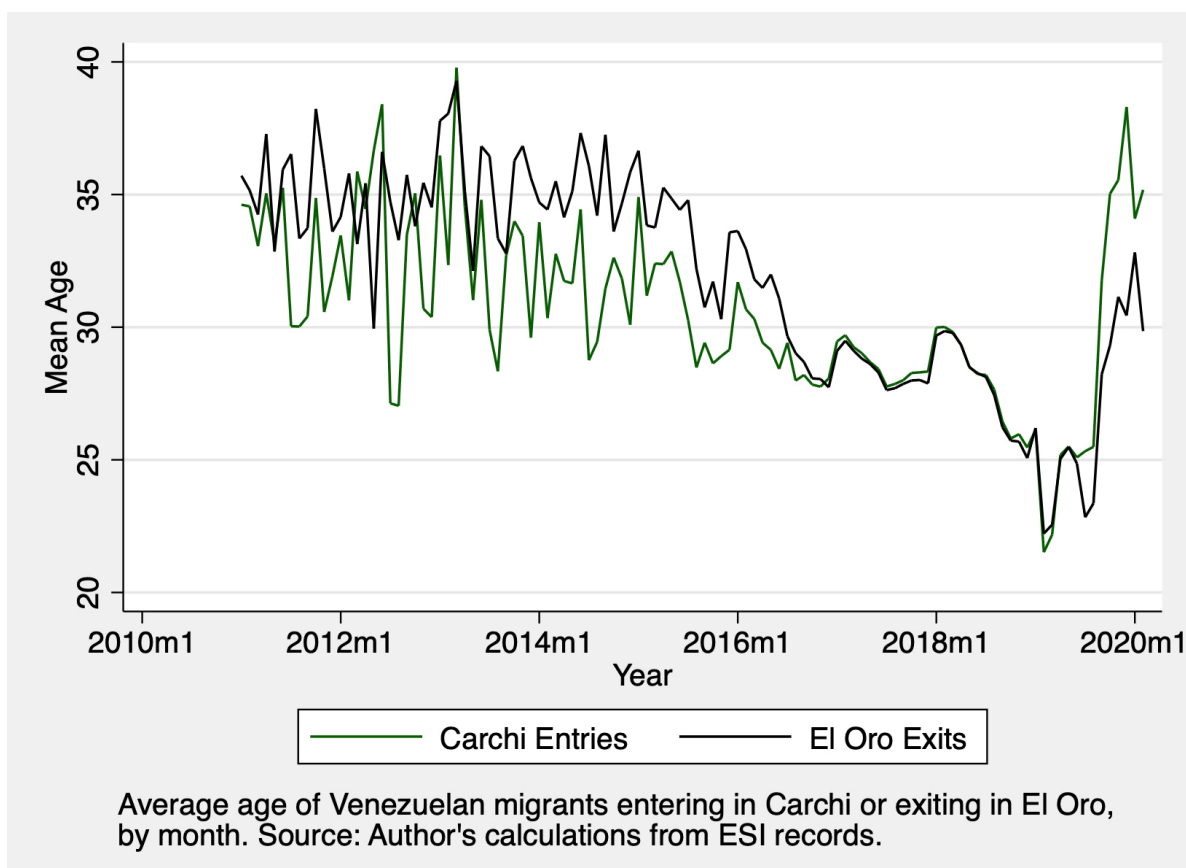


Figure 3.9: Average age, Venezuelan migrants

pared to only 15 percent in 2018-2019. When I include individuals with unclassified occupations – that is, including students, retirees, homemakers, and those for whom occupation information was not provided– the level 4 skill share reduction is even more pronounced, declining from 24 percent of movers 2014-2016 to less than 5 percent in 2018-2019.

This change is driven by both an increase in the share of land-based entrances as well as a decrease in the average skill level of through-migrants. Unsurprisingly, migrants who travelled by air were on average higher skilled than those who entered and exited by land in any year. But, whereas Table 3.1 shows that the proportions of high-skill Venezuelans flying into and out of Ecuador remained stable between 2014 and 2019, land-based movements showed decreases in the share of high skilled movers. Decreases in the high skilled proportions happened both for Carchi entrants and El Oro exiters, suggesting that stayers did not substantially differ from through-migrants by this metric. Figure 3.11 underscores the similarities in the migrant skill characteristics

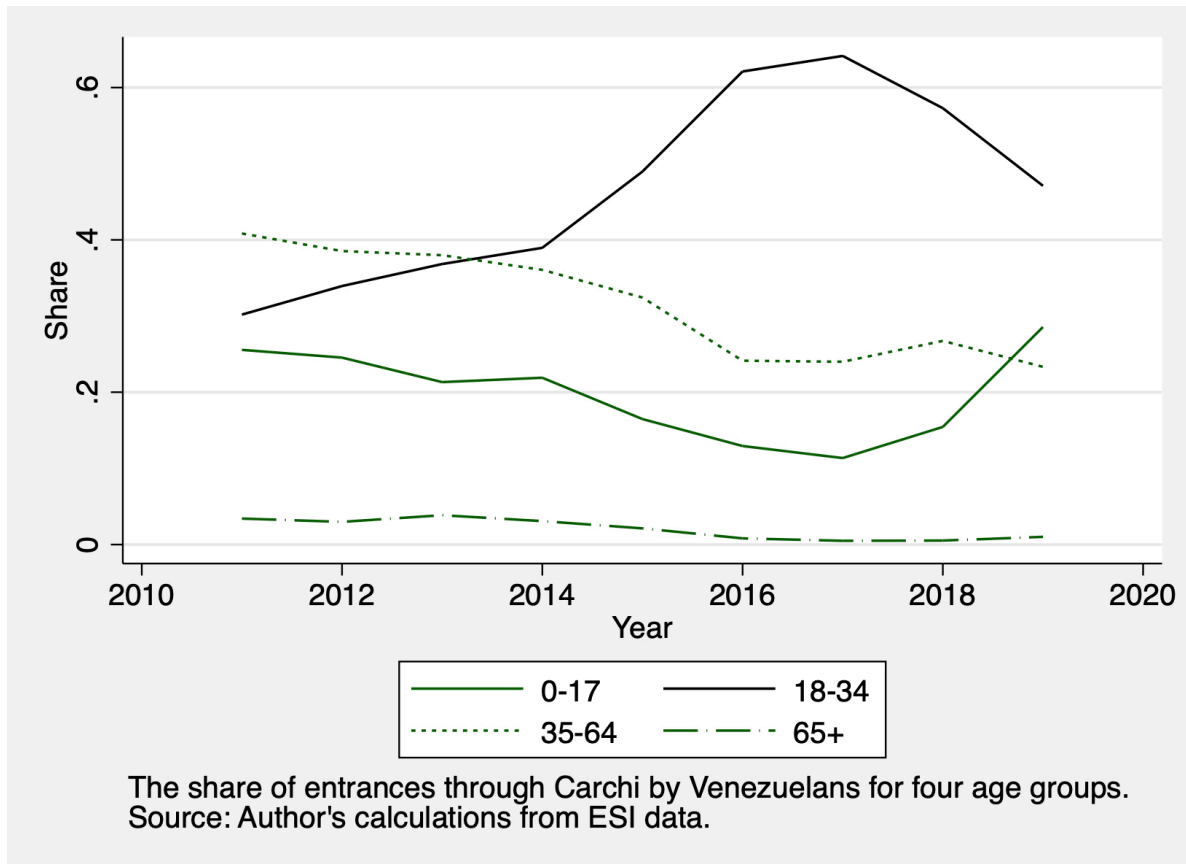


Figure 3.10a: Carchi entries: age category shares, Venezuelan

between Carchi entrants and El Oro exiters. This figure also demonstrates the rise in migrants without a listed occupation.

3.4 Duration of Stay and Entry/Visa Changes

Throughout section 3, I described the development and use of a land route through Ecuador for Venezuelan migrants attempting to reach Peru. As the Venezuelan exodus grew in magnitude, Ecuador and other countries struggled to navigate their obligations to these migrants and domestic concerns over the effects of the migrants on Ecuadorian's well-being. These effects may depend on migrant flows, characteristics, and the duration of migrant stay. The final element is of particular relevance to the Ecuadorian context, where hundreds of thousands more migrants travelled through the country than resettled within it.

Duration of stay is informative as to whether an influx of migrants acts as a labor supply shock,

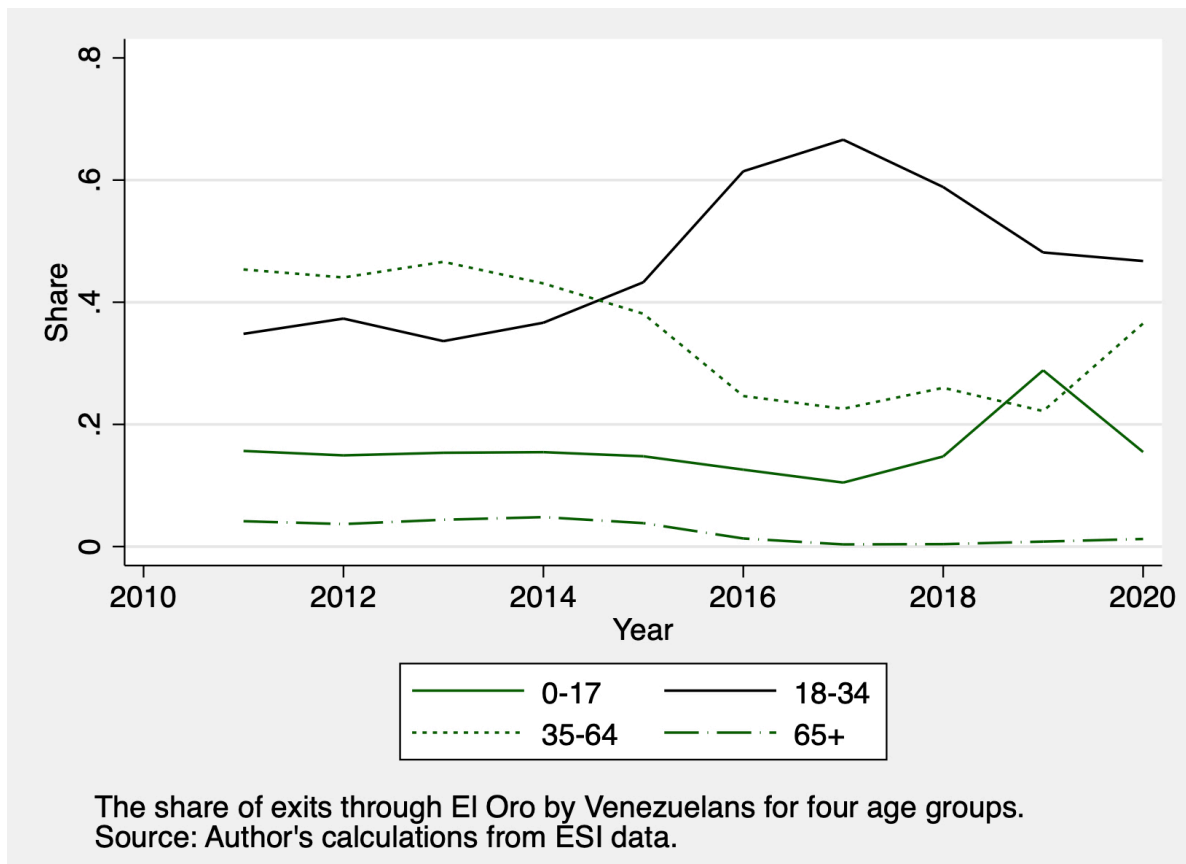


Figure 3.10b: El Oro exits: age category shares, Venezuelan

a demand shock, or both. Longer-term migrants may enter the labor force, and an extensive literature examines the effects of such settling. In particular, in the U.S. context there is some evidence that immigrants may displace some low-skill workers, causing reduced wages and employment among locals (Card, 2001; Borjas et al., 1996), although this likely depends on whether immigrant labor acts as a substitute or complement for native labor (Ottaviano and Peri, 2012).

The line between a settled and through-migrant may be muddled if migrants take substantial time to move through Ecuador. For example, stays of months rather than days may affect whether migrants supply labor in informal markets, providing a labor supply shock, or act as consumers, a demand shock, throughout their travels. In Appendix C, I provide evidence to suggest that through-migrants move quickly, likely typically leaving El Oro about one day after their entry in Carchi.

This through-migration route was enabled in part by the visa policies in place in both Ecuador and Peru. For much of the relevant time period, Venezuelans could enter each country using a

<i>Table 3.1: Skill level 4 movement shares</i>					
Year	Air	Land	Carchi Enter	El Oro Exit	Overall
2014	38.16	23.67	21.23	23.01	37.12
2015	40.54	21.84	20.02	20.80	38.11
2016	41.03	27.61	26.59	28.20	36.67
2017	41.98	16.29	15.41	16.49	21.95
2018	43.05	11.22	10.33	11.07	14.43
2019	43.65	8.43	6.16	7.90	15.00

Percent of movements made by occupation skill level 4, shown for selected methods and locations of travel 2014-2019. Calculated excluding unclassified occupations.

Source: Author's calculations using ESI data.

national ID instead of a passport, and the PTP visa in Peru – established in early 2017 in response to rising migrant inflows – created pathways to regularization for many migrants.

However, as the migration accelerated, both Ecuador and Peru implemented policies to restrict and manage migrant flows. On August 8, 2018, Ecuador declared a state of emergency (Ministerio de Relaciones Exteriores y Movilidad Humana, 2018a) and on August 18, 2018 implemented a short-lived passport requirement for new entrants (Ministerio de Relaciones Exteriores y Movilidad Humana, 2018b; Valencia and Taj 2018).⁸ Immediately after the Ecuador passport requirement was suspended, Peru implemented its own passport requirement on August 25, 2018, which was temporarily suspended on October 5, 2018 (Gestión, 2018b; RPP, 2018). Figure 3.12a shows the changes in border movements amongst Venezuelans during the 2018 passport requirements. The declared state of emergency on August 8 coincided with a rapid decline in registered migrant flows, which continued through the period in which the passport requirement was in place in Ecuador. Both entrances through Carchi and exits through El Oro remained diminished after the suspension of Ecuador's requirement, gradually rising toward their July 2018 levels.

The following year, both Ecuador and Peru again implemented more stringent entry requirements for Venezuelan migrants. On June 15, 2019, Peru restricted entry to only those Venezuelans possessing a humanitarian visa and passport (Quispe, 2019). Ecuador introduced similar require-

⁸This passport requirement was suspended by the courts less than a week later (Defensoría del Pueblo, 2018).

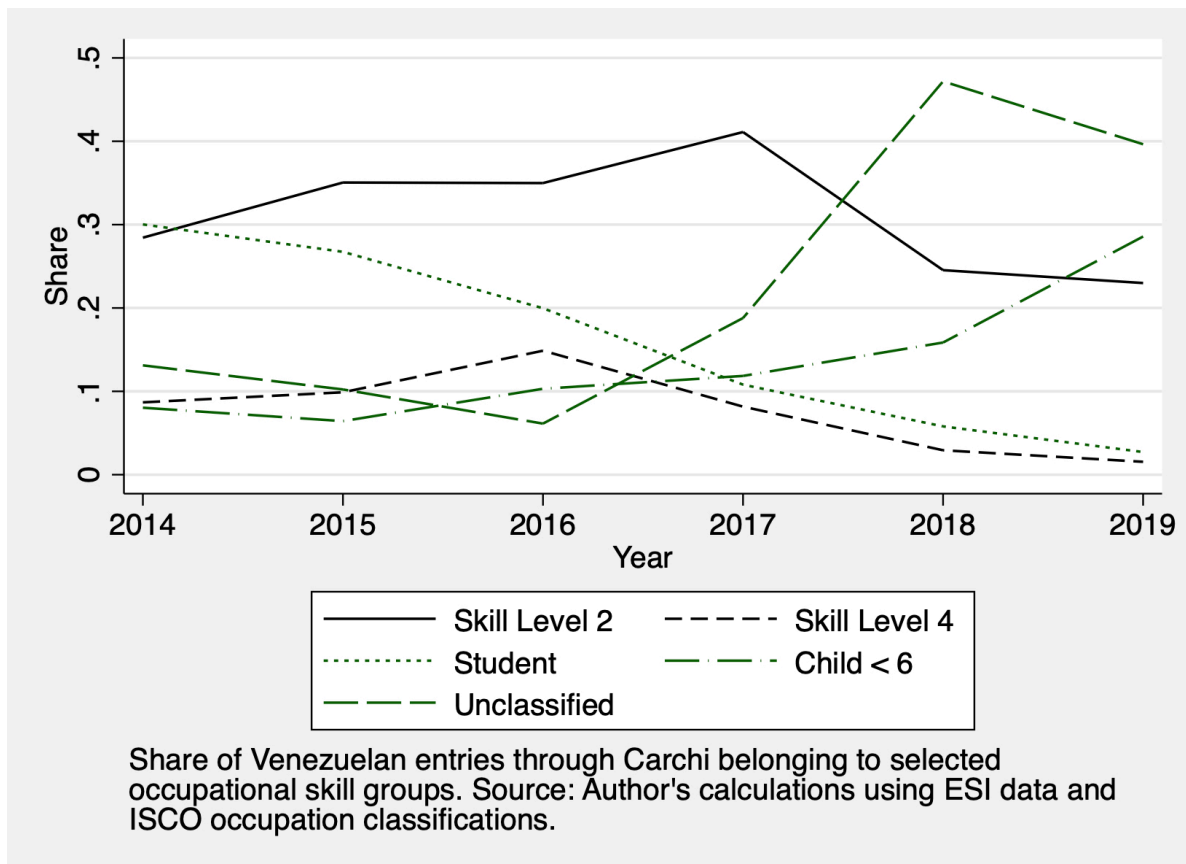


Figure 3.11a: Carchi entrant skill shares (selected groups)

ments on August 25, 2019 (Al Jazeera, 2019b). Figure 3.12b illustrates the sharp increases in migrants crossing into Ecuador through Carchi and out of Ecuador to Peru in El Oro immediately prior to entry requirement cutoff dates. These entry requirements appear to dissolve the migrant route through Ecuador; the timing gap between policy changes in Peru and Ecuador led to a two month period in which Carchi entrance and El Oro exit trends diverged, before cross-border movements amongst Venezuelans became nearly obsolete under Ecuador's policy. The effects of the bunching of and then reduction in migrant flows around these timing cutoffs on migrant well-being and Ecuadorian health and economic outcomes are an area for future study.

While changing passport requirements introduced a barrier to regular migration through Ecuador, increasing the costs to migration, the changing visa landscape altered the expected benefits for migrants who made the journey. In early 2017, Peru introduced the PTP visa for Venezuelan migrants. After repeatedly extending the initial coverage period for new entrants to qualify for the visa, Peru

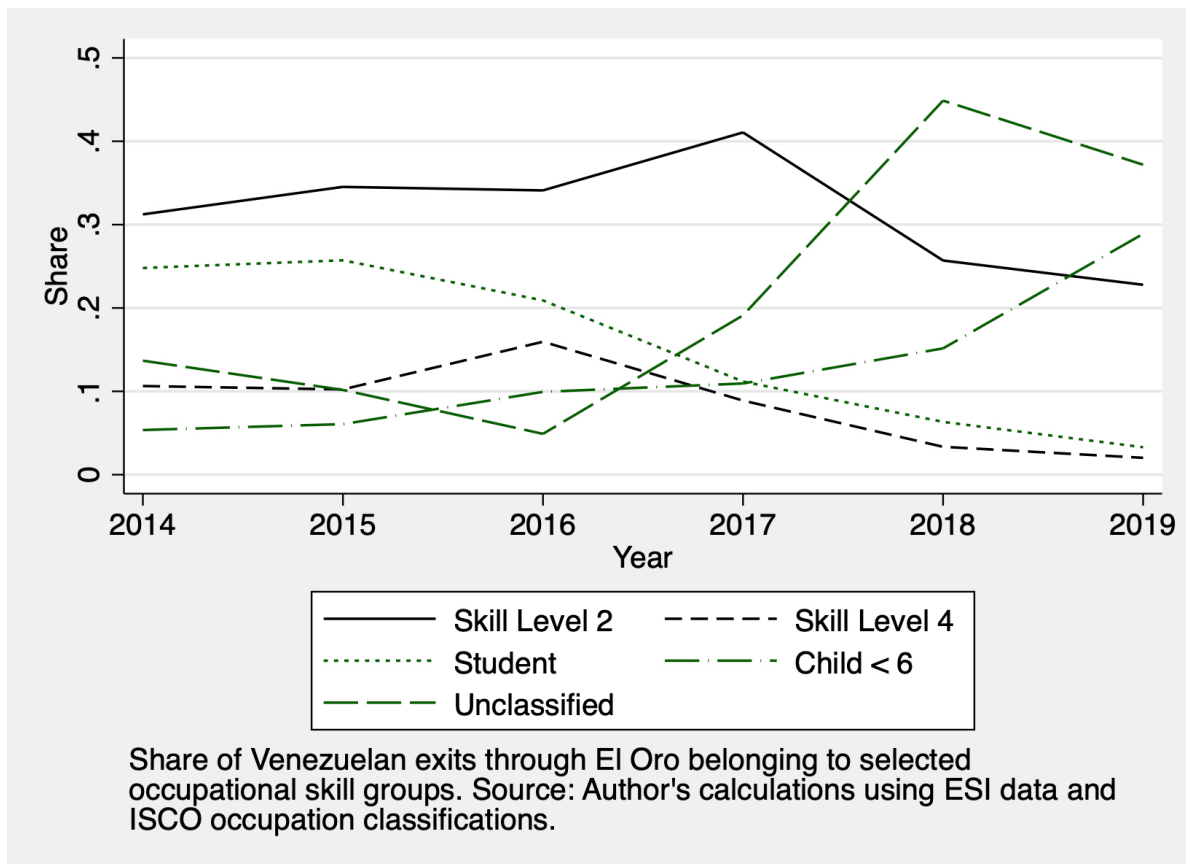


Figure 3.11b: El Oro exiter skill shares (selected groups)

announced in 2018 that the final round of PTP visas for Venezuelans would be issued to migrants entering the country by October 31, 2018. Figure 3.13 shows a sharp increase in entries to Carchi and exits from El Oro in the days leading up to the PTP deadline. However, unlike the 2019 entry requirement changes, after the deadline passed, the migration route appeared less-used but nonetheless intact: Carchi entrances and El Oro exits remained common and highly correlated.

3.5 Conclusion

When Venezuelans fled their home country during and after 2014, they largely settled in other South American nations— especially neighboring Colombia and non-neighbor Peru. However, the process of resettling is not instantaneous: in pursuit of opportunities in Peru and elsewhere, hundreds of thousands of Venezuelans travelled quickly through the small country of Ecuador. I show evidence of the geography, existence, and extent of these migrant routes, and provide descriptive

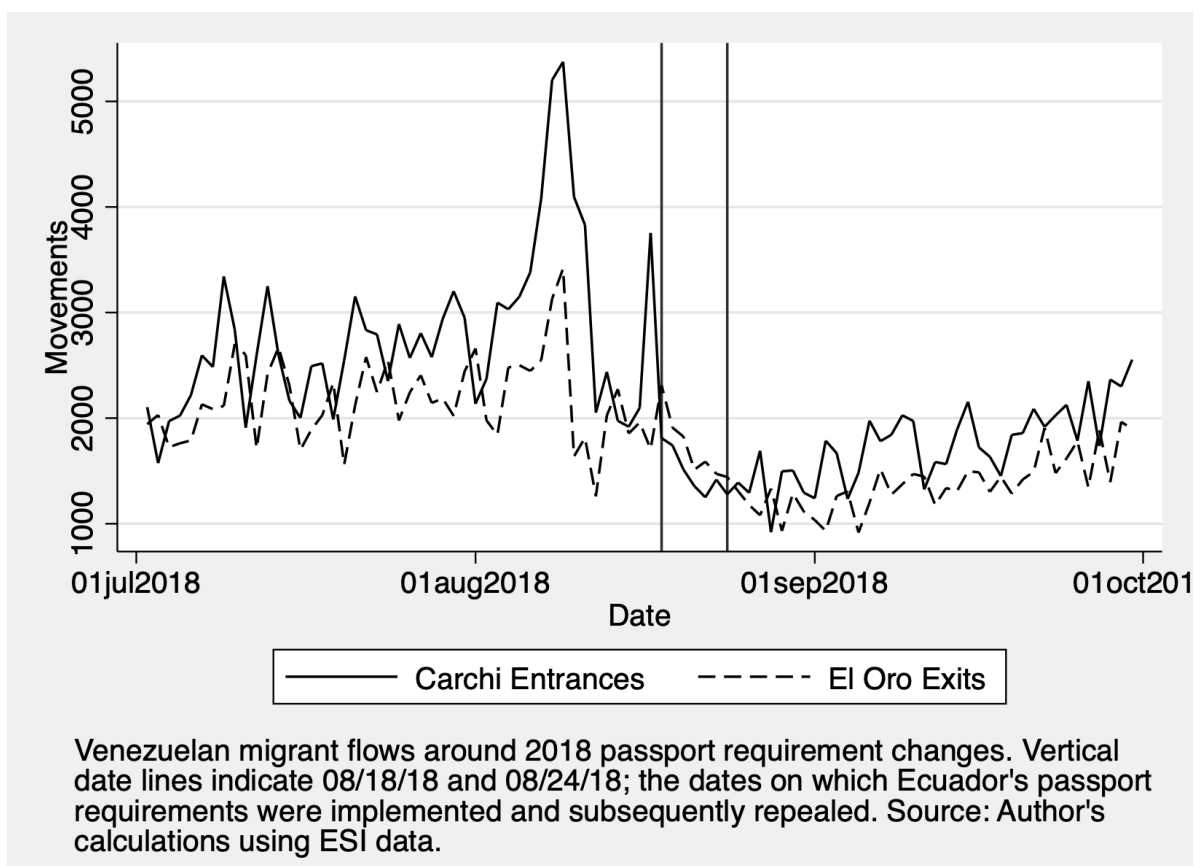


Figure 3.12a: Migrant flows and passport requirements

evidence of the changing characteristics of migrants throughout the migration. Notably, through-migration increased rapidly in 2017, coinciding with a reduction in the age and skill level of migrants. This is consistent with both movements away from tourism-related travel toward migration, and deteriorating conditions in Venezuela that may have reduced the opportunity cost of migration for lower income Venezuelans.

Because of the short stays of these through-migrants, it is unlikely that they meaningfully contributed to a labor supply shock, but additional study is needed to examine whether these rapidly increasing migrant flows affected immediate term outcomes such as business revenues, health, and crime outcomes when traveling through.

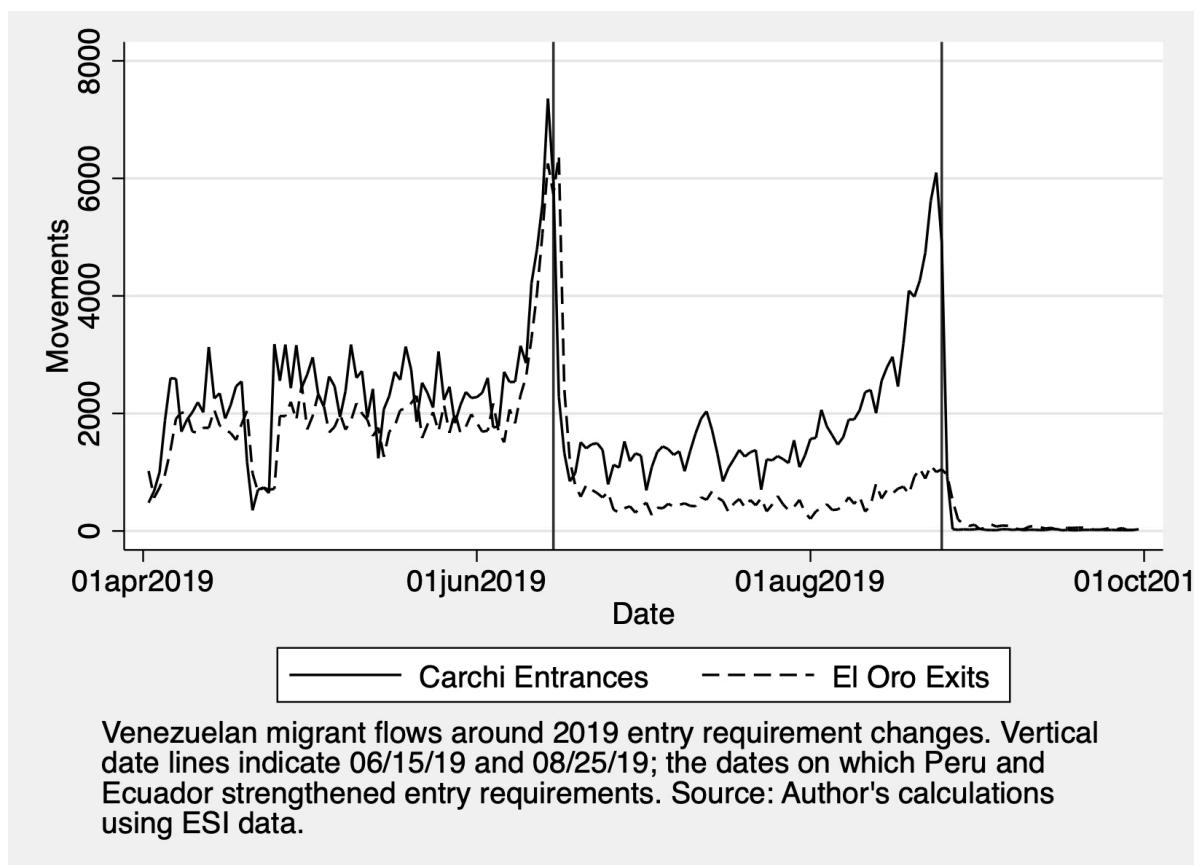


Figure 3.12b: Migrant flows and entry restrictions

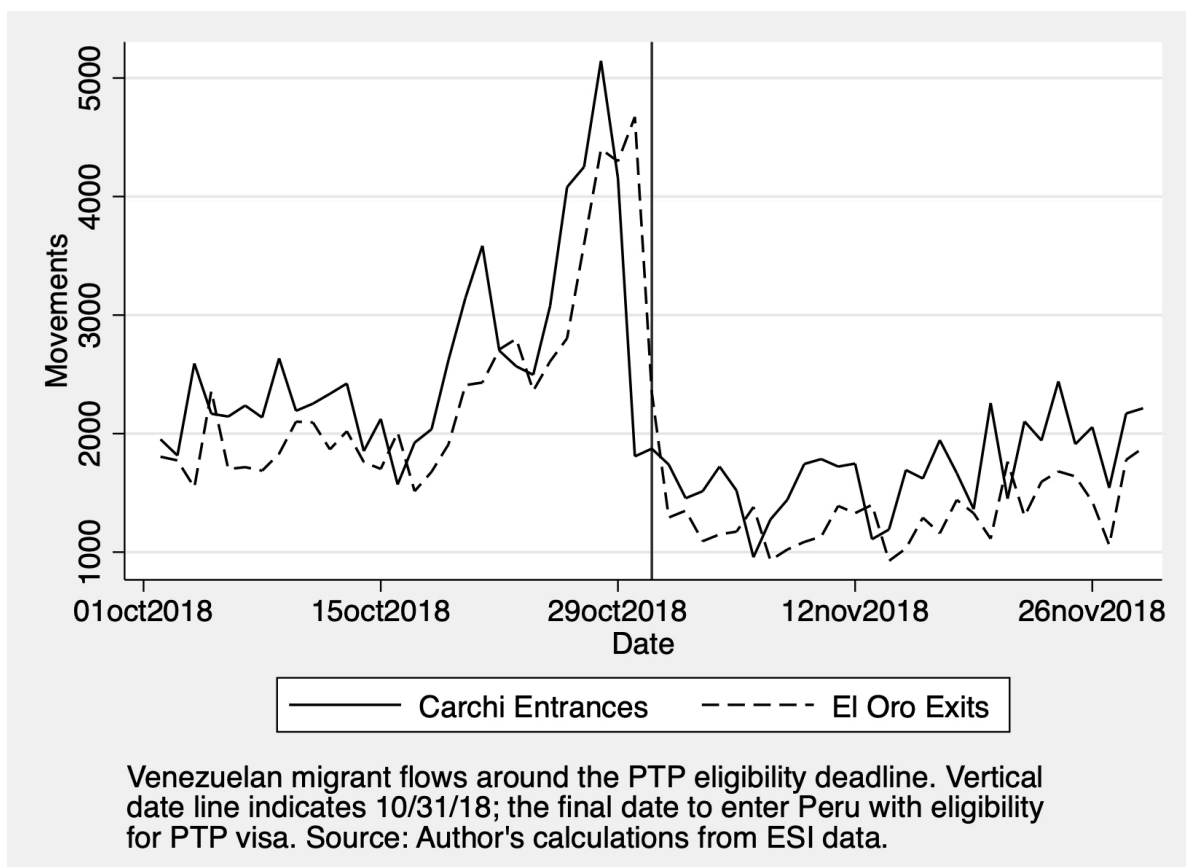


Figure 3.13: Migrant flows and PTP deadline

APPENDICES

APPENDIX A

CHAPTER 1 APPENDIX

A.1 Data

In this appendix I further describe the data sources used in this paper as well as the decision rules I applied in preparing the data for analysis.

A.1.1 BWC Data

I constructed a body-worn camera adoption dataset using multiple sources of information on the timing of body-worn camera adoption by local law enforcement throughout Virginia. The three primary sources I used to construct this dataset were, 1) FOIA requests 2) Local news and agency websites 3) Non-FOIA personal contact with departments. Data collected through personal contact were typically collected in the exploratory stages of the project. Within the FOIA requests I asked for separate information for pilot programs, if applicable. Departments commonly use a testing or pilot phase in which a limited number of officers are given body-worn camera to use for a short time period to provide feedback to a department considering or planning to adopt body-worn camera on a larger scale. For example, one large department of over 200 officers piloted the technology with eight officers who had temporary use of the cameras. Other departments do not formalize this as a “pilot program” but begin by outfitting very few officers with cameras before establishing a department program. I do not treat these pilot and preliminary programs as adoptions.

From these sources I obtained information about body-worn camera implementation for 166 agencies throughout Virginia, reflecting complete body-worn camera adoption data for the major law enforcement agencies in 111 district court jurisdictions including 78 that adopted body-worn cameras by 2019 and 106 circuit court jurisdictions, 76 of which adopted by 2019. These comprise nearly 90 percent of state district and circuit courts in Virginia. A map of adopting jurisdictions

is available in Appendix Figure A.1. In the remaining 10 percent of localities, at least one major agency either failed to respond to the FOIA request or had incomplete records.

This set of 166 agencies is not exhaustive: there are hundreds of local law enforcement agencies throughout Virginia. Oftentimes multiple agencies operate within a single court jurisdiction. Because these agencies typically vary in force size and the size of the populations they serve, their individual influence on local courts also varies. For example, according to the 2008 Census of State and Local Law Enforcement Agencies, 15 Virginia departments had only one full time sworn officer while 35 departments had over 100. As such I defined a court jurisdiction to be treated when the first “major” local law enforcement agency operating in the court jurisdiction began using body-worn cameras, excluding small scale pilot adoptions.

My primary specification used throughout the paper considers a law enforcement agency “major” within its locality if it is a policing organization that has jurisdiction over at least 25% of the locality’s population *or* employs at least 25% of the locality’s full time sworn officers amongst agencies with policing mandates. However, in Appendix C.2 I show a comparison of treatment classifications when using an alternative, 50% threshold. I used two sources of information to determine which agencies would meet these criteria, detailed subsequently.

Law Enforcement Force Size and Characteristics: I use policing role indicators and force size measures from the 2016 Law Enforcement Agency Roster (LEAR). The LEAR itself includes variables pulled from other sources. Thus the LEAR 2016 officer counts I use are counts from the 2008 Census of State and Local Law Enforcement Agencies (CSLLEA 2008). The population served by an agency is pulled from the 2014 UCR Population as listed in the FBI Police Employee Data from the same year.

The LEAR variable indicating policing activities is not always fully reflective of the mandate of an agency. Particularly in large and medium sized cities, it is common for both a police and sheriff’s department to operate within city limits. However, the sheriff’s department may be tasked with court security, civil processes, and jail security in contrast to the police department which engages in patrol and investigations. In many of these cases the LEAR population variable is missing, and

the officer count may be substantially greater than the true number of officers engaging in policing activities. I omitted such agencies.

Locality Population Size: I use intercensal population estimates from the Weldon Cooper Center for Public Service, Demographics Research Group for estimates of the 2014 locality level population size. I developed crosswalks matching the counties and cities in these population estimates to the courts with jurisdiction over them. One city in my sample is split across two circuit court jurisdictions, so in this case I applied half of the estimated population of the city to each relevant court jurisdiction.

I used intercensal population estimates rather than a sum of LEAR population estimates to head off potential issues with double counting in shared jurisdictions as well as missing data issues which could respectively inflate and deflate the denominators of the calculated shares. However, as a data check I compared the population shares calculated using a sum of LEAR populations to my primary share measure (using intercensal estimates). The departments classified as “major” were unchanged.

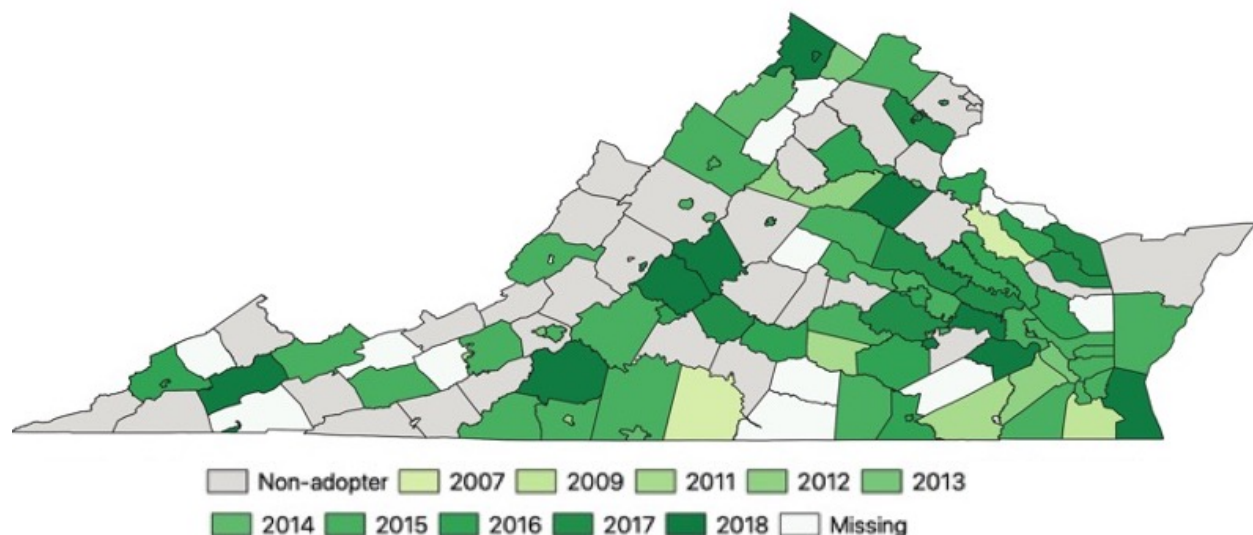


Figure A.1: Body-worn camera adoption in Virginia court jurisdictions

A.1.2 Case Data

As described in the body of the paper, I obtained charge data from VirginiaCourtData.com. To provide more clarity on the form this data takes, I include here an example of the web-based case information that the owner of this repository scrapes (Schoenfeld, 2017) in Figure A.2. To maintain the privacy of the defendant, I redacted information that could be used to identify this specific record online.

Case Number: CR08[REDACTED]	Filed: [REDACTED]	Commenced by: Reinstatement	Locality: COMMONWEALTH OF VA
Defendant: G[REDACTED]	Sex: Male	Race: Black (Non-Hispanic)	DOB: 10/01/****
Address: ARLINGTON, VA 22207			
Charge: VIOL PROBATION ON FEL OFF	Code Section: 19.2-306	Charge Type: Felony	Class: U
Offense Date: [REDACTED]	Arrest Date: [REDACTED]		

Final Disposition

Disposition Code: Sentence/Probation Revoked	Disposition Date: [REDACTED]	Concluded By: Revoked
Amended Charge:	Amended Code Section:	Amended Charge Type:

Jail/Penitentiary: Penitentiary	Concurrent/Consecutive: Sentence Is Run Consecutively With Another	Life/Death:
Sentence Time: 3 Year(s)	Sentence Suspended:	Operator License Suspension Time:
Fine Amount:	Costs: \$658.00	Fines/Cost Paid:
Program Type:	Probation Type:	Probation Time:
Probation Starts:	Court/DMV Surrender:	Driver Improvement Clinic:
Driving Restrictions:	Restriction Effective Date:	
VA Alcohol Safety Action:	Restitution Paid:	Restitution Amount:
Military:	Traffic Fatality:	

Appealed Date:

Figure A.2: Example fields for Virginia Court Data

I aggregated this charge-level data to a case level before forming the court-level panel. To identify which charges were associated with a common case, I began by using the “case number” defined by the court. In reality, these should be considered charge numbers, because the values provided for each charge in a given case are generally speaking related but unique. While the

District Court Clerk’s Manual (Department of Judicial Services, 2021) recommends a common method for assigning case numbers ((case type)+year+(sequential number)+suffix), the Circuit Court Clerk’s Manual (Department of Judicial Services, 2022) acknowledges variations in numbering conventions across courts. For charges within each court, I first group charges into cases based on the criteria that charges are treated as a single case if they belong to the same defendant and the last 4 non-suffix digits of the case number are either identical or sequential. I then expand those groupings to include any additional charges that were filed against the same person on that same date— even if the case numbers appear unrelated.

In the included example, all six entries represent charges against the same individual. However, they are grouped as four distinct cases. The first three would be grouped together on either the case number or filing date criteria: because 4309, 4310, and 4311 are sequential these are treated as one case and they also were all filed on the same date. In contrast, none of the remaining charges show related case numbers or identical filing dates, so they are treated as separate— even though two of the charges were filed only two weeks apart.

casenumber	fileddate	person_id	case_id_ba~s
4310-00	21138	1000000000000005	11
4311-00	21138	1000000000000005	11
4309-00	21138	1000000000000005	11
8756-00	21319	1000000000000005	13
2897-00	21404	1000000000000005	14
3327-00	21418	1000000000000005	15

Figure A.3: Example of case grouping algorithm

For the analyses in which I omit probation violations and similar offenses, I exclude these charges before grouping the cases. For example, if an individual was sentenced to probation due to a charge on Jan 1, 2015 and then on Jan 1, 2016 was charged with violating that probation and another offense, they would appear in the data as having two separate cases, one stemming from the 2015 event and the other from the 2016 event.

<i>Table A.1: BJS estimates, parallel trends tests</i>						
	District (A)		District (B)		Circuit	
Number of pre-periods	4	8	4	8	4	8
Cases	0.291	0.352			0.455	0.510
Civilization Effect Cases	0.318	0.162			0.164	0.039
Multi-charge Cases	0.433	0.782			0.287	0.304
Share Misdemeanor	0.337	0.519			–	–
Prosecutor Dropped Charge	0.586	0.328	0.201	0.067	0.500	0.668
Case Certified	–	–	0.907	0.437	–	–
Guilty	0.363	0.487	0.399	0.158	0.512	0.829
Sentenced to Time	0.556	0.917	0.502	0.500	0.270	0.581
Disposition: 1 year	0.497	0.572	0.951	0.986	0.711	0.897
<i>Note: Values shown are the p-values for a test of parallel trends in the 4 and 8 periods prior to BWC implementation. The test used is described in Borusyak, Jaravel, and Spiess (2021). Case filing panels were not separated based on case type, and so District (A) includes p-values for the tests on all district court filings. For case processes and outcomes, District (A) shows results for the misdemeanor sample and District (B) shows results for the felony sample.</i>						

A.2 Supplementary Analyses for Main Tables

In the main body of the paper I show overall ATTs for all outcomes, and intermittently show event study plots for outcomes in which I wanted to highlight some aspect of the heterogeneity of results over time. In this appendix I show additional event study plots and results from tests that indicate the plausibility of the parallel trends assumption. I also show results from restricting the analysis to only those courts that adopted body-worn cameras during the sample period, with the 2018 cohort serving as a control. Lastly, the sentencing outcome that I use in my main results is a coarse measurement: I only look at whether someone was sentenced to serve a positive amount of time or not. I show here additional results under various sentencing outcome measures. I first show parallel trends test results for the main tables are available Table A.1.

A.2.1 Adopter Only Results

As discussed in section 5.3 of Chapter 1, we may be concerned that the untreated group systematically differs from the treated group in ways that will bias the estimates presented in the main results. The descriptive statistics presented in Table 1.2 show some level differences across these

<i>Table A.2: BJS estimates, case processes and resolutions; treated sample</i>					
VARIABLES	Prosecutor Dropped Charge	Case Certified	Guilty	Sentenced to Time	Disposition: 1 year ^o
Treatment Effect Circuit Court	-0.020 (0.014)	–	-0.005 (0.019)	-0.012 (0.021)	-0.002 (0.015)
Mean	0.261		0.719	0.706	0.833
Observations	3,952		3,952	3,952	3,952
Treatment Effect District Court (Fel.)	0.008 (0.016)	0.002 (0.016)	0.003 (0.15)	-.003 (.015)	-0.005 (0.007)
Mean	0.405	0.587	0.295	0.252	0.969
Observations	2,667	2,667	2,667	2,667	2,667
Treatment Effect District Court (Misd.)	-0.007 (0.006)	–	0.003 (0.009)	-0.006 (0.007)	-0.004 (0.004)
Mean	0.115		0.746	0.212	0.959
Observations	2,700		2,700	2,700	2,700
Cluster-robust standard errors in parentheses					
**p<0.01, * p<0.05, † p<0.1					
^o Time to disposition is approximated using time to latest hearing in district court.					
Controls included in regressions include share female, black, and of case classes.					

two groups. At the circuit court level, treated courts saw over twice as many cases filed than did untreated courts. Additionally, treated courts were more likely to have a salaried public defender office to represent indigent clients, and defendants received longer sentences. At the same time, the courts showed numerous similarities including in the rates at which fines were imposed and case dispositions. While it appears that the communities in which the courts are situated differed between adopters and non-adopters, the cases within the courts appeared to proceed similarly regardless of whether the court was in a treated jurisdiction or not. In Table A.2 I show court-stage results using an adopter-only sample to demonstrate the robustness of my results to using an exclusively not-yet-treated control group.

A.2.2 Selected Event Study and Quarterly Plots

The following are supplemental plots to illustrate treatment effect dynamics and pre-treatment outcome trends for a set of district court felony outcomes.

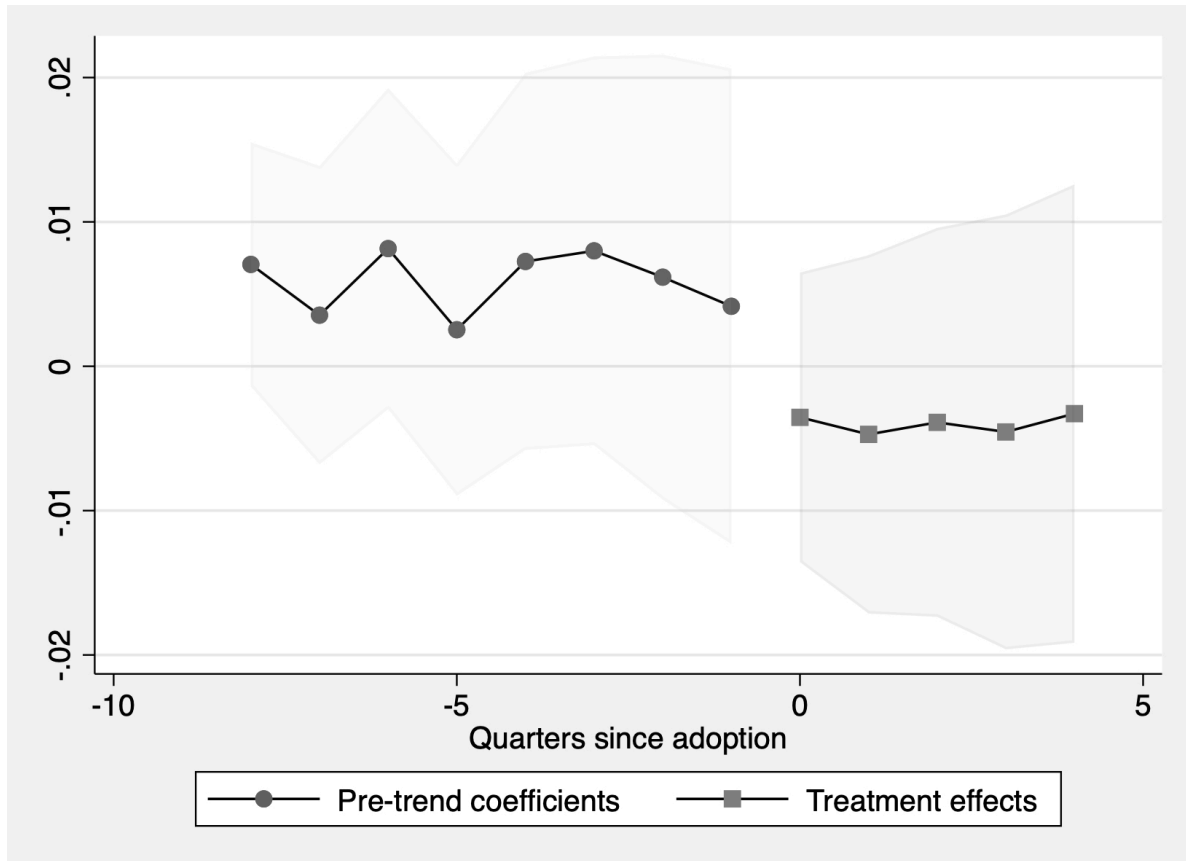


Figure A.4a: Quarterly estimates and pre-trend, share cases resolved in 6 months

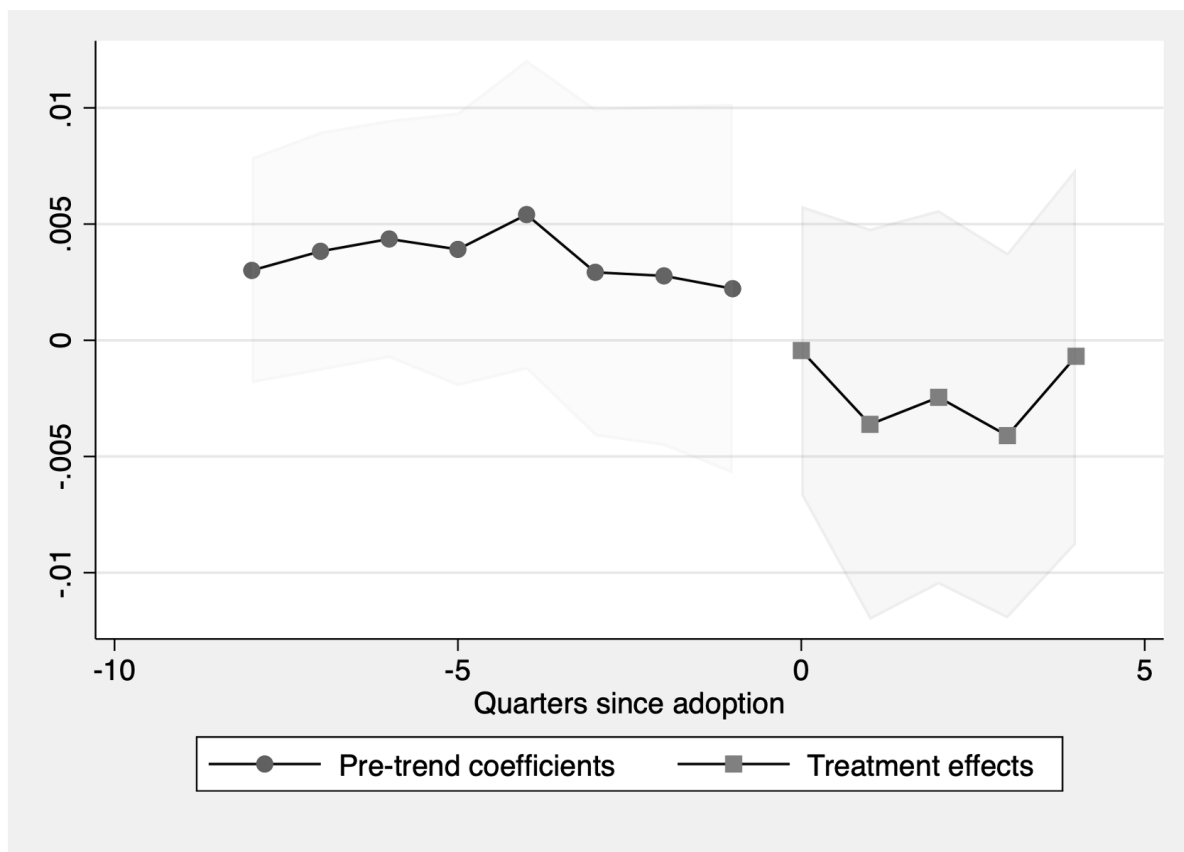


Figure A.4b: Quarterly estimates and pre-trend, share cases resolved in 1 year

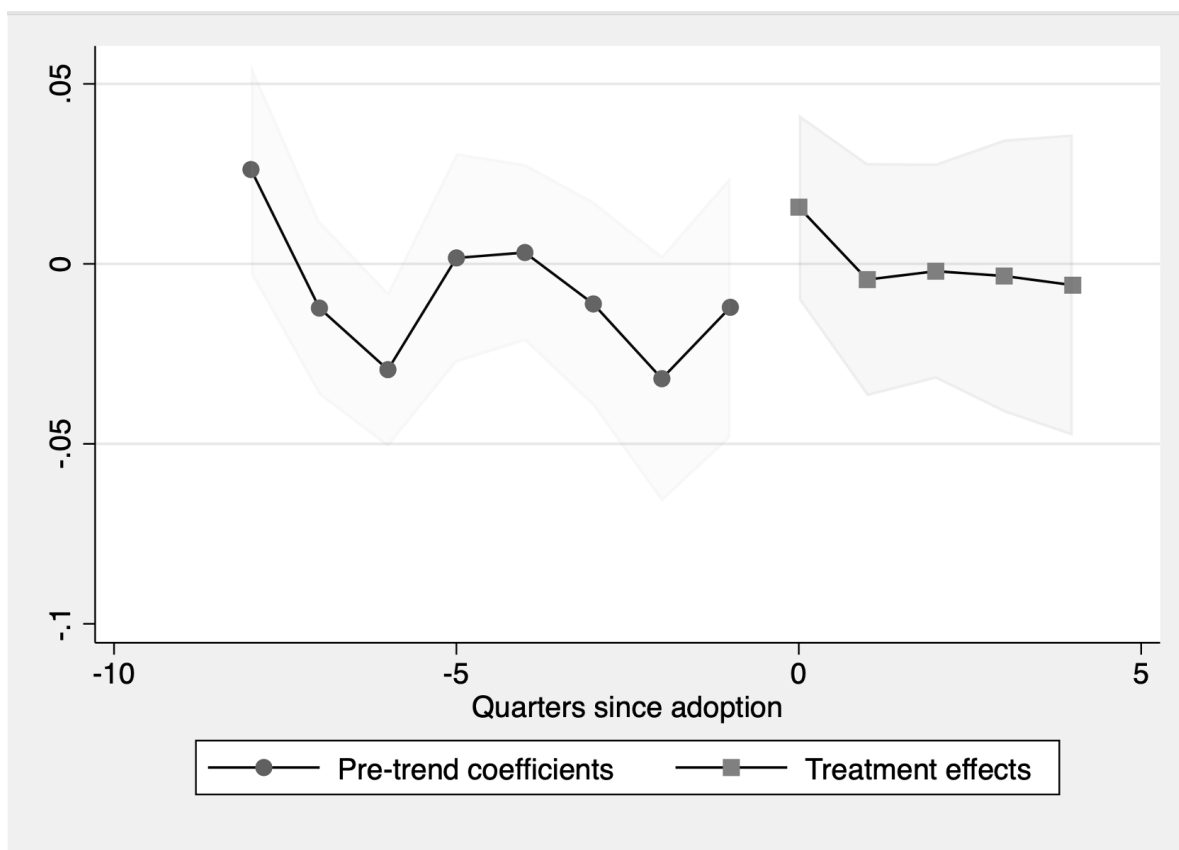


Figure A.4c: Quarterly estimates and pre-trend, guilty share

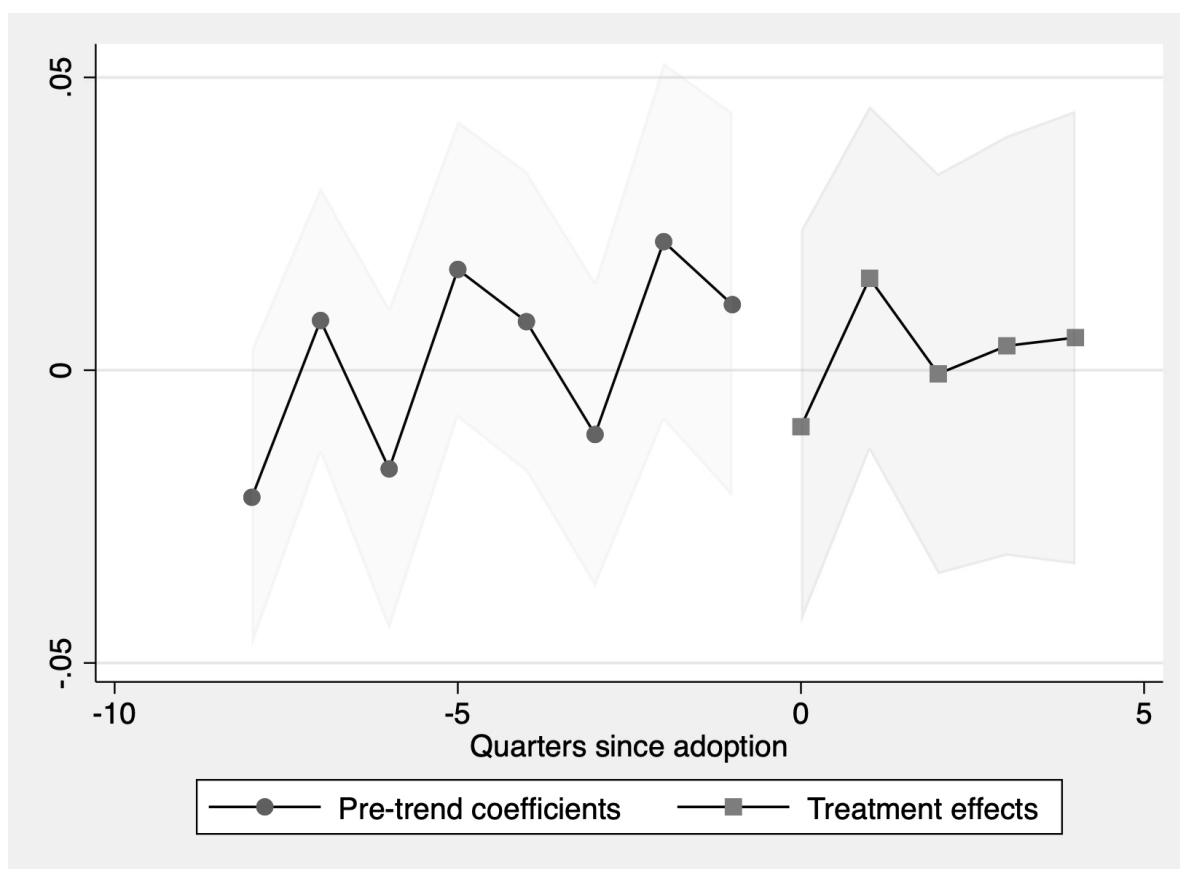


Figure A.4d: Quarterly estimates and pre-trend, prosecutor dropped charge

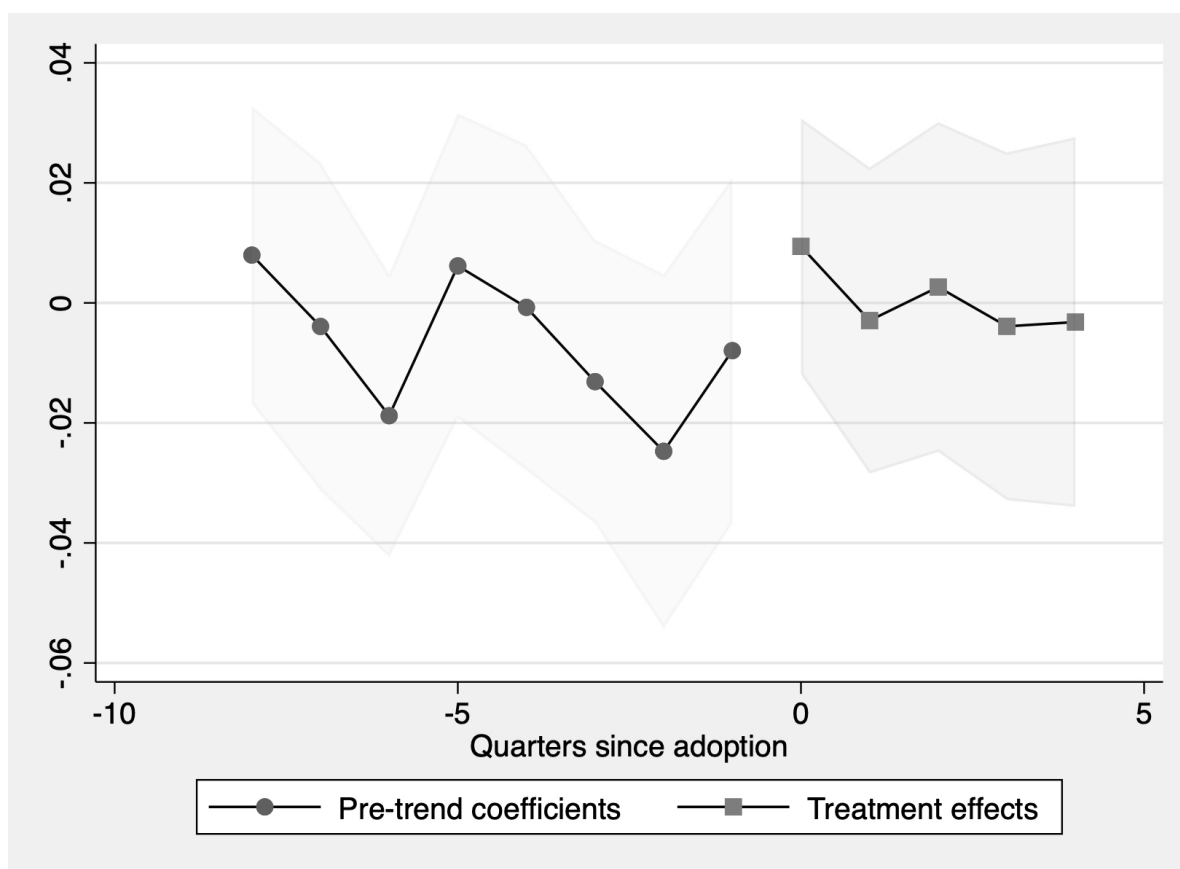


Figure A.4e: Quarterly estimates and pre-trend, sentenced to time

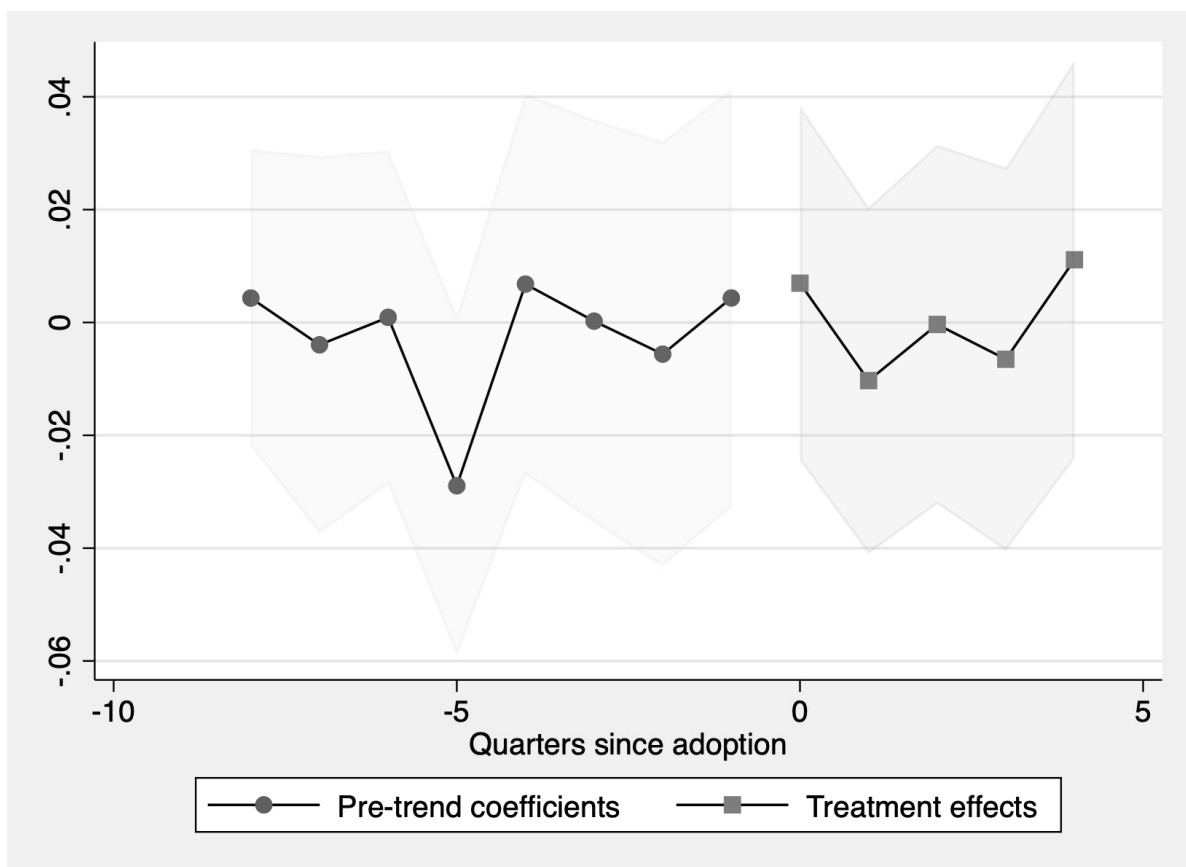


Figure A.4f: Quarterly estimates and pre-trend, share case certified

A.2.3 Additional Sentencing Outcomes

In addition to a binary measure of whether someone was sentenced to serve time, we may be interested in the sentence length. In Table A.3 I show results for various binned sentence length variables as well as the average sentence length. Additionally, I show an indicator for whether any of this sentence was suspended: some defendants are given an option to forgo jail or prison as long as they meet some conditions established by the court. Should these defendants fail to meet the conditions, the suspended portion of the sentence comes into full effect. These supplementary sentence length variables are constructed using both regular and suspended sentences, so a separate suspended sentence variable provides additional clarity to the actual impact on defendants. Another key issue to note with the sentence length variables is that I treat the lengths as additive. In other words, for this analysis I assume all sentences are served consecutively. While my data set does include a variable describing whether sentences are concurrent or consecutive, it is often ($\approx 60\%$ of cases with multiple positive sentence times) missing, and this missingness is not uniformly distributed across localities. When reported, sentences were consecutively assessed rather than concurrently twice as often.

Table A.3: Pooled difference-in-differences estimates, supplementary sentence length

VARIABLES	Sentenced to					Sentence Time	Sentence Suspended
	30 days	6 months	1 year	3 years	5 years		
Treatment Effect Circuit Court	–	–	-0.020 (0.012)	-0.016 (0.012)	-0.001 (0.012)	137.4 (88.9)	-0.025† (0.013)
Mean Observations			0.664 5,439	0.491 5,439	0.392 5,439	2177.2 5,439	0.677 5,439
Treatment Effect District Court (Felony)	-0.005 (0.012)	-0.009 (0.008)	-0.012† (0.007)	–	–	-5.5 (4.3)	-0.007 (0.011)
Mean Observations	0.241 4,129	0.136 4,129	0.119 4,129			73.8 4,129	.228 4,129
Treatment Effect District Court (Misdemeanor)	-0.011* (0.006)	-0.003 (0.002)	–	–	–	-1.9† (1.1)	-0.012† (0.006)
Mean Observations	.183 4,182	0.036 4,182				27.4 4,182	0.190 4,182
Race, sex covariates	x	x	x	x	x	x	x
Offense year, quarter FE	x	x	x	x	x	x	x
Locality FE	x	x	x	x	x	x	x
Cluster-robust standard errors in parentheses							
**p<0.01, * p<0.05, † p<0.1							

A.3 Extended Analyses for Main Tables

Here I discuss the robustness of my results to varying a) sample selection criteria b) treatment status/threshold c) the outcomes measured and d) the estimators used. In particular, I include results from alternative estimators proposed in the emerging staggered difference-in differences literature.

A.3.1 Sample Restrictions

In the body of the paper I use data only from those localities for which I observe at least 8 quarters of pre-adoption case data and at least 4 quarters of post-adoption data. I additionally restrict my case data to allow adequate time for cases to be disposed. As a result, my choice of the final period for case data affects which courts are included when I calculate the effects previously presented. In particular, district court cases conclude more quickly than circuit court cases and it is possible that my decision to use only cases filed by Q1 2019 is overly conservative for the district courts.

In this section I show district court results under a less conservative timing threshold, using cases filed by the end of 2019. For the misdemeanor subsample, 0.38 percent of cases filed in Q1 2019 are missing disposition information for at least one charge. In contrast, by Q4 2019, this grows exponentially to 3 percent. For felonies, the shares are 0.76 percent and 5.5 percent, respectively. The growth in disposition missingness is shown in Figures A.5a and A.5b. In Table A.4, I show regression results including all 2019 quarters. The district court regression results here are closely aligned with the results in the primary specification, alleviating concerns that the selection of the final period was influential.

A.3.2 Treatment Status/Threshold

In the primary analyses for this paper I use a 25 percent population or officer threshold to determine which local law enforcement agencies, if they implement a body-worn camera program,

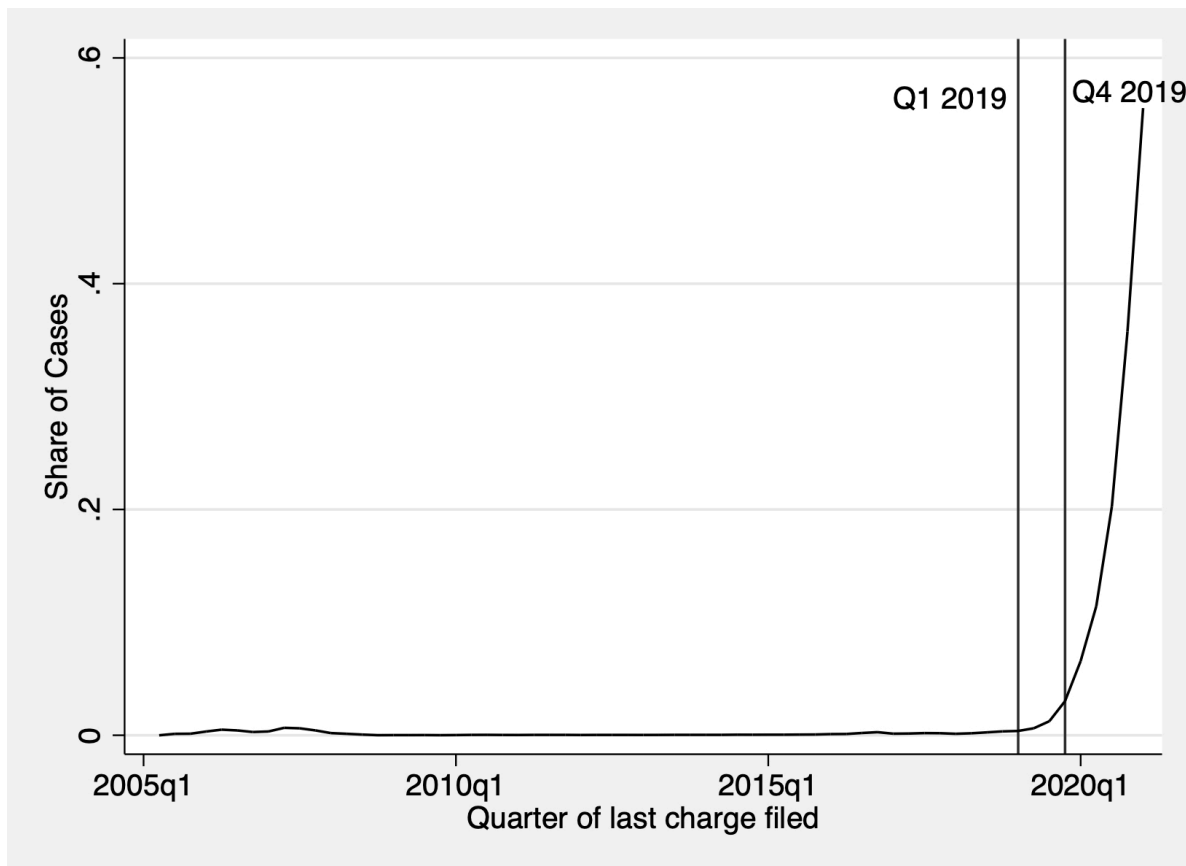


Figure A.5a: Share of cases not completely disposed, district court misd

would qualify their local court jurisdiction to be classified as “treated”. However, one may think that this threshold is too low and so to check the robustness of my results to this selection, I additionally apply a 50% threshold.

In practice, whether I apply the 50% or the 25% threshold infrequently changes whether and when a locality is classified as treated. Most court localities are served by only one major law enforcement agency—like a city police department or county sheriff—which satisfies both threshold criteria. However, in approximately 1/3 of localities there is another candidate department. At both the circuit and district court levels, the treatment status is the same regardless of which threshold I use for more than 96 percent of the localities for which I observe treatment status under both thresholds. Additionally, there are a few localities for which I know treatment status under the 50 percent threshold but do not have information for all of the law enforcement agencies between the 25 and 50 percent thresholds. Similarly, amongst adopters, the timing of adoption is largely

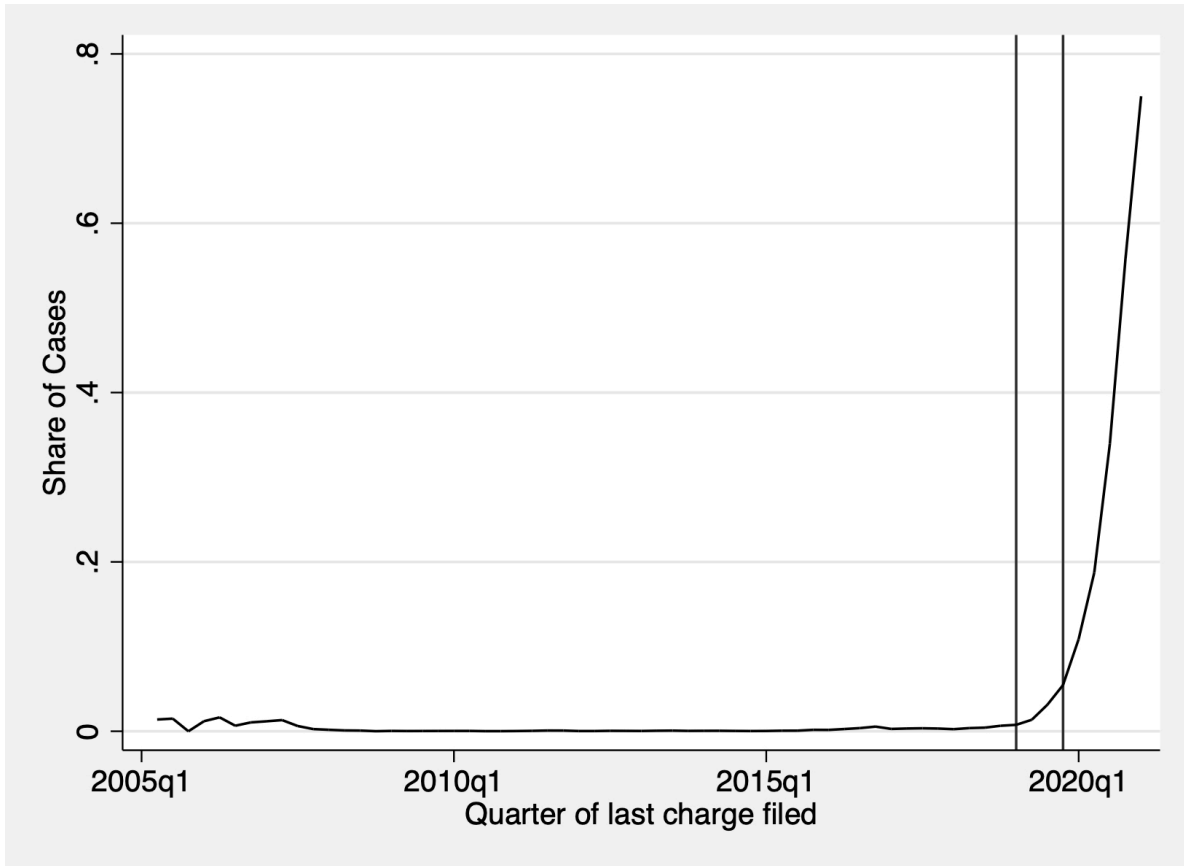


Figure A.5b: Share of cases not completely disposed, district court felony

unchanged when I adjust the threshold; only 5 localities change treatment quarter. However, these 5 show substantial timing differences with the smaller adopting agencies initiating their programs at least 2 years earlier.

I show results in table A.5a for modified case filing when the 50% threshold is used instead of my primary specification, and the alignment of the treatment classifications using the different thresholds in table A.5b. Overall I find that these results tell the same story as that contained in the main body of the paper; body-worn cameras have a limited effect on case filings. In similar analyses for case processes and outcomes I also find aggregate case outcomes and case processes appear unchanged. Results using both thresholds show no effects on the share of multi-charge cases, but a moderate reduction in civilization effect cases at both the district and circuit court levels.

Table A.4: BJS estimates, case filing effects, through 2019

VARIABLES	Case Count	Civilization Case Count	Share Multicharge Cases
Treatment Effect	-0.074*	-0.096*	-0.008
Circuit Court	.032	0.039	0.009
Mean	148.8	7.2	0.486
Observations	6,240	6,240	6,230
Treatment Effect	0.010	-0.115**	-0.001
District Court	(0.029)	(0.036)	(0.004)
Mean	3,548.6	34.3	0.188
Observations	4,796	4,796	4,796

Cluster-robust standard errors in parentheses

**p<0.01, * p<0.05, † p<0.1

Note: Means of columns 1 and 2 reflect the average counts for the variable but the outcome used is $\ln(\text{count}+1)$ for civilization case counts in both courts and case counts in the circuit court, and $\ln(\text{count})$ for the remainder.

Table A.5a: BJS estimates, case effects 50% threshold

VARIABLES	Case Count	Civilization Case Count	Share Multicharge Cases
Treatment Effect	-0.064†	-0.110**	-0.007
Circuit Court	(0.033)	(0.039)	(0.009)
Mean	147.4	7.1	0.487
Observations	6,420	6,420	6,420
Treatment Effect	-0.017	-0.097**	0.003
District Court	(0.030)	(0.036)	(0.004)
Mean	3,513.6	33.7	0.187
Observations	4,972	4,972	4,972

Cluster-robust standard errors in parentheses

**p<0.01, * p<0.05, † p<0.1

Note: Means of columns 1 and 2 reflect the average counts for the variable but the outcome used is $\ln(\text{count}+1)$ for civilization case counts in both courts and case counts in the circuit court, and $\ln(\text{count})$ for the remainder.

		<i>Table A.5b: Comparison of treatment status by threshold</i>					
		50% threshold					
		District Court			Circuit Court		
		Untreated	Treated	Unclass.	Untreated	Treated	Unclass.
25% Threshold	Untreated	33	0	0	30	0	0
	Treated	4	70	0	4	68	0
	Unclassified	2	1	15	3	1	14

Author's data collection. The threshold percent is applied at the agency level for assigning treatment status: at a 50% threshold, only those agencies with at least 50% of the officers or holding jurisdiction over at least 50% of the population count toward assigning treatment status.

<i>Table A.6: Pooled difference-in-differences estimates, court-based effects</i>					
VARIABLES	Charge Dropped	Case Certified	Guilty	Sentenced to Time	Disposition: 1 year ^o
Treatment Effect Circuit Court	-0.016 (0.013)	–	-0.009 (0.011)	-0.016 (0.013)	-0.009 (0.009)
Mean	0.258		0.721	0.709	0.825
Observations	5,439		5,609	5,609	5,439
Treatment Effect District Court (Fel.)	-0.004 (0.012)	0.005 (0.013)	0.003 (0.013)	-0.001 (0.011)	-0.008 (0.006)
Mean	0.402	0.592	0.294	0.245	0.964
Observations	4,129	4,129	4,211	4,211	4,129
Treatment Effect District Court (Misd.)	0.002 (0.004)	–	-0.004 (0.006)	-0.008 (0.006)	-0.002 (0.004)
Mean	0.115		0.735	0.196	0.956
Observations	4,182		4,264	4,264	4,182
Race, sex covariates	x		x	x	x
Offense year, quarter FE	x		x	x	x
Locality FE	x		x	x	x
Cluster-robust standard errors in parentheses					
**p<0.01, * p<0.05, † p<0.1					
^o Time to disposition is approximated using time to latest hearing in district court.					

A.3.3 Alternative Estimators

In the body of the paper I use the BJS imputation estimator to estimate the effects of law enforcement body-worn camera implementation on criminal courts. I discuss the benefits of this estimator over the traditional TWFE estimator, and also list alternative estimators that have emerged in recent years to fill similar econometric gaps. Here I show alternative results using the standard TWFE.

<i>Table A.7: MLT heterogeneity: Robustness</i>					
		Fully interacted TWFE	Differenced TWFE	Differenced BJS	BJS Dropping Small Localities
Circuit	Prosecutor Dropped Charge	-0.001 (0.011)	0.004 0.010	0.006 (0.011)	—
	Guilty	-0.001 (0.012)	-0.002 0.012	0.013 (0.013)	—
	Sentenced to Time	-0.001 (0.012)	-0.001 0.012	0.014 (0.013)	—
	Disposition: 1 year	0.003 (0.010)	-0.001 0.009	0.011 (0.010)	—
	Prosecutor Dropped Charge	0.006 (0.013)	0.005 (0.013)	-0.001 (0.014)	0.007 (0.014)
	Guilty	0.015 (0.016)	0.008 (0.015)	0.002 (0.016)	-0.010 (0.013)
District Felony	Certified	-0.001 (0.014)	-0.004 (0.014)	-.001 (.015)	0.005 (0.014)
	Sentenced to Time	0.005 (0.014)	0.001 (0.014)	-0.004 (0.015)	-0.010 (0.012)
	Disposition: 1 year	0.003 (0.006)	0.003 (0.006)	0.002 (0.006)	-0.003 (0.005)
	Prosecutor Dropped Charge	0.005 (0.007)	0.007 (0.007)	0.006 (0.007)	—
	Guilty	0.003 (0.010)	0.001 (0.010)	0.007 (0.012)	—
	Sentenced to Time	0.009 (0.011)	0.004 (0.011)	0.011 (0.012)	—
District Misd.	Disposition: 1 year	-0.003 (0.008)	-0.004 (0.009)	-0.004 (0.009)	—
<i>This table shows the robustness of likelihood of footage heterogeneity estimates to alternative specifications. The localities included in analysis for the “dropping small localities” sample omits all localities that recorded zero MLT or non-MLT cases in a given quarter year. This substantially changes the circuit court sample and introduces pre-trends violations in all outcomes and so I do not report these results here.</i>					

A.4 Back of Envelope Caseload Calculations

In the body of the paper I reference a data point showing the average caseload for Virginia indigent defenders before body-worn camera adoption was 320 cases and cite this as evidence toward attorneys facing binding time constraints. A simple back-of-the-envelope calculation shows why this is the case. I show in Figure A.6 that an attorney's production possibilities frontier under ABA guidelines, as well as the possible combinations of felony and misdemeanor cases that an attorney can take to total 320. Attorneys representing 320 cases can do so while adhering to ABA guidelines if their case combination lies on or under the ABA Guidelines curve (shown in green). This will only happen if they represent 48 or fewer felonies (15 percent of their caseload). However, the same report shows that felonies comprise over 30 percent of the cases overall, and a 3:4 ratio of felonies to misdemeanors when case types such as parole violations are excluded. Thus, it is reasonable to conclude that the caseloads faced by public defenders in Virginia before body-worn camera adoption lie outside the ABA production possibilities frontier and so indicate a binding time constraint under the ABA guidelines.

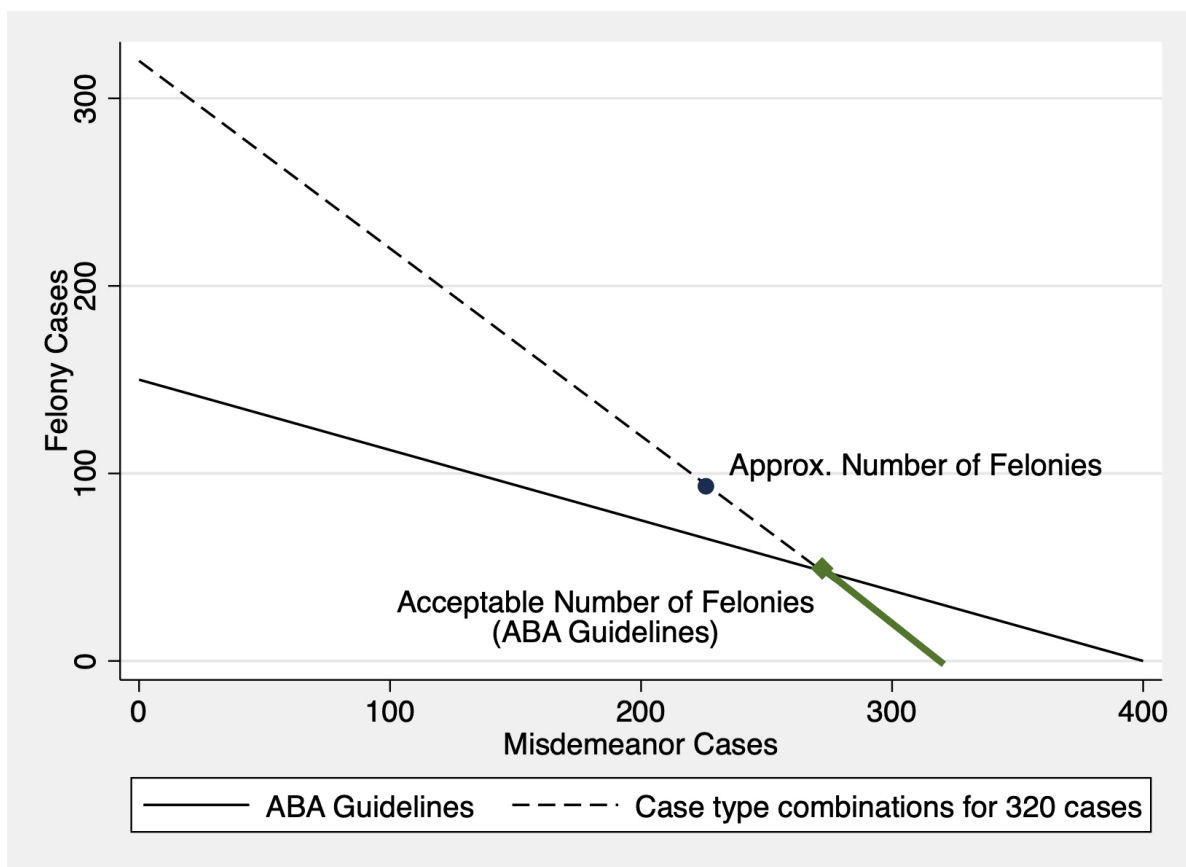


Figure A.6: Defense attorney PPF under ABA guidelines and caseloads for VA public defenders

APPENDIX B

CHAPTER 2 APPENDIX

B.1 Additional Data Notes

The attorney pay data are rich, but nonetheless there are a couple of nuances to this data set that warrant discussion.

Firstly, since some district courts also handle juvenile and domestic court cases matters, I cannot always differentiate payments made for adult criminal complaints in the district court and juvenile legal matters. These combined courts represent 34 percent of district court jurisdictions in my sample. Because of this, for the courts where these payments are differentiated, I combine juvenile and adult district records to maintain consistency. In reality, the juvenile indigent defender pool is substantially smaller than the adult indigent defender pool (VIDC, 2017) and entails a small share of the total payments made by the district/juvenile court pairs. Across the locality-year combinations for courts with separated juvenile and adult district courts, the largest share of juvenile/domestic court payments to attorneys was 11.7 percent and the median was 2.6 percent of total combined payments.

Secondly, because the data denotes vendors by name rather than a standardized identifier, it is common for a single attorney to be listed under slightly different vendor names across localities and years. To manage this, I identified vendors using similarities in the first and last words (names) present in the vendor name entry as well as suffixes if relevant. I additionally visually inspected the results and corrected by hand a few that, by this process, clearly misclassified vendors as distinct or the same. Notably, this process will oftentimes classify firms that gain or lose partners as distinct firms. It is not necessarily clear whether these firms truly should be considered the same or distinct since we cannot observe who within the firm is engaging in indigent defense work. For example, we could envision the scenario in which “Roberts”– the primary attorney handling indigent defense cases– retires from firm “Cass, Wish, and Roberts”. In the current setup, in

the subsequent period, “Cass, Wish, and Roberts” would have exited the indigent defense labor market and the less productive firm “Cass and Wish” may have entered the market. In this case, separate vendor identifiers seems appropriate. However, this classification stands even if “Roberts” is unengaged in indigent defense work and “Cass and Wish” continues in the market unencumbered by his absence.

Finally, because this is an administrative pay dataset, there are times in which adjustments result in a negative payment recorded for a vendor. These cases are rare, and I only adjust for them if they result in a negative total annual payment to the vendor; when this happens, I omit the observation from analysis.

APPENDIX C

CHAPTER 3 APPENDIX

C.1 Duration of Stay Analyses

To test for the appropriate duration of stay for through-migrants, I regress the number of Venezuelan exits through El Oro at time t on the number of Venezuelan entrances at Carchi at time t under specification (1). The sample for these regressions includes data from 2008-2017. Due to the substantial changes in migrant flows in 2017, as well as the strengthening of the Carchi-El Oro routing during this time, I include D_t^{2017} as a dummy variable taking the value of 1 if the exits at time t occurred in 2017 and 0 otherwise. I interact D_t^{2017} with lagged entries to capture differential durations of stay during the periods of highest migrant flows. Since I am interested in the explanatory power of lagged entries I test the inclusion of lags $j \in 1, \dots, 200$.

(1)

$$Y_t = \alpha + \sum_{i=0}^j \beta_i X_{t-i} + \sum_{i=1}^j \gamma_i D_t^{2017} X_{t-i} + \delta D_t^{2017} + u_t$$

Robust to any selection of $j \in 1, \dots, 200$, $\hat{\beta}_1$, the coefficient on the entries in Carchi one day prior to the observed exits in El Oro, is always significant at conventional levels and larger in magnitude than the coefficients on other lags. Further, γ_1 is also always significant and large in magnitude compared to the other interaction terms. Together, these results suggest that a one day stay better represents migrant movements than any other single-day increment. Since through-migration is most evident in more recent years, I experiment with restricting the time period for this regression to later periods and find the previous results to be robust to selection of starting year. These results suggest that a one-day stay in Ecuador may be modal for migrants in transit.

To address concerns that one day lags insufficiently account for dispersion of migrant stays, I also aggregate migrant entries to three and seven day groupings, and estimate models (2) and (3) using OLS. Results from these regressions affirm my prior findings: Figures C.1 and C.2 show that $\hat{\beta}_0$, which encompasses the single-day lag, is significant at all levels and of a greater magnitude

than all other three or seven day increments. Figure C.1 shows the estimated coefficients from the model regressing El Oro exits on grouped, lagged Carchi entrances with entrances grouped in three-day increments, while C.2 shows the same for the coefficients under seven-day groupings. In both figures, i indexes these lag groups with $i = 0$ reflecting the lag group closest to the date of exit (i.e. the first 3 days or first 7 days after exit, inclusive of the date of exit).

(2)

$$Y_t = \alpha + \sum_{i=0}^{66} \sum_{k=0}^2 \beta_i X_{t-3i-k} + \sum_{i=0}^{66} \sum_{k=0}^2 \gamma_i D_t^{2017} X_{t-3i-k} + \delta D_t^{2017} + u_t$$

(3)

$$Y_t = \alpha + \sum_{i=0}^{29} \sum_{j=0}^6 \beta_i X_{t-3i-j} + \sum_{i=0}^{29} \sum_{j=0}^6 \gamma_i D_t^{2017} X_{t-3i-j} + \delta D_t^{2017} + u_t$$

For both three day and seven day groupings $\hat{\gamma}_i$ was significant for multiple i : $i = 0, 4, 48, 52, 58, 59, 63, 66$ in 3 day groupings and $i = 0, 25, 27$ with 7 day lags, shown in Figures C.3 and C.4. In each case, the estimated coefficient on $i = 0$ was the largest at approximately 0.10. Again this supports that entries through Carchi statistically and economically significantly explain observed exits in El Oro in the very-short term, and do so most strongly in 2017 (the year in which migrants in transit most used the route). Results again hold when I categorically group durations, grouping lags of 0 day, 1 day, 2-4 days, 5-7 days, 8-14 days, 15-30 days, and 31-180 and regress El Oro exits on these categories according to specification (4). It appears that the modal migrant on the Carchi-El Oro route is traveling quickly through the country to reach Peru rather than stopping en route.

(4)

$$Y_t = \alpha + \sum_{i=0}^6 \beta_i X_i + \sum_{i=0}^6 \gamma_i D_t^{2017} X_i + \delta D_t^{2017} + u_t$$

Finally, I subset the data based on 18 age categories, sex, and 11 skill groupings comprised of the four primary skill levels and additional classifications for uncategorized groups such as students, retirees, and homemakers. To maintain classification consistency and sufficient samples, I use data from 2014-2017 and drop subsets for which there were less than 150 positive observations. That is, I drop subsets for which I observed less than 150 dates on which members of the

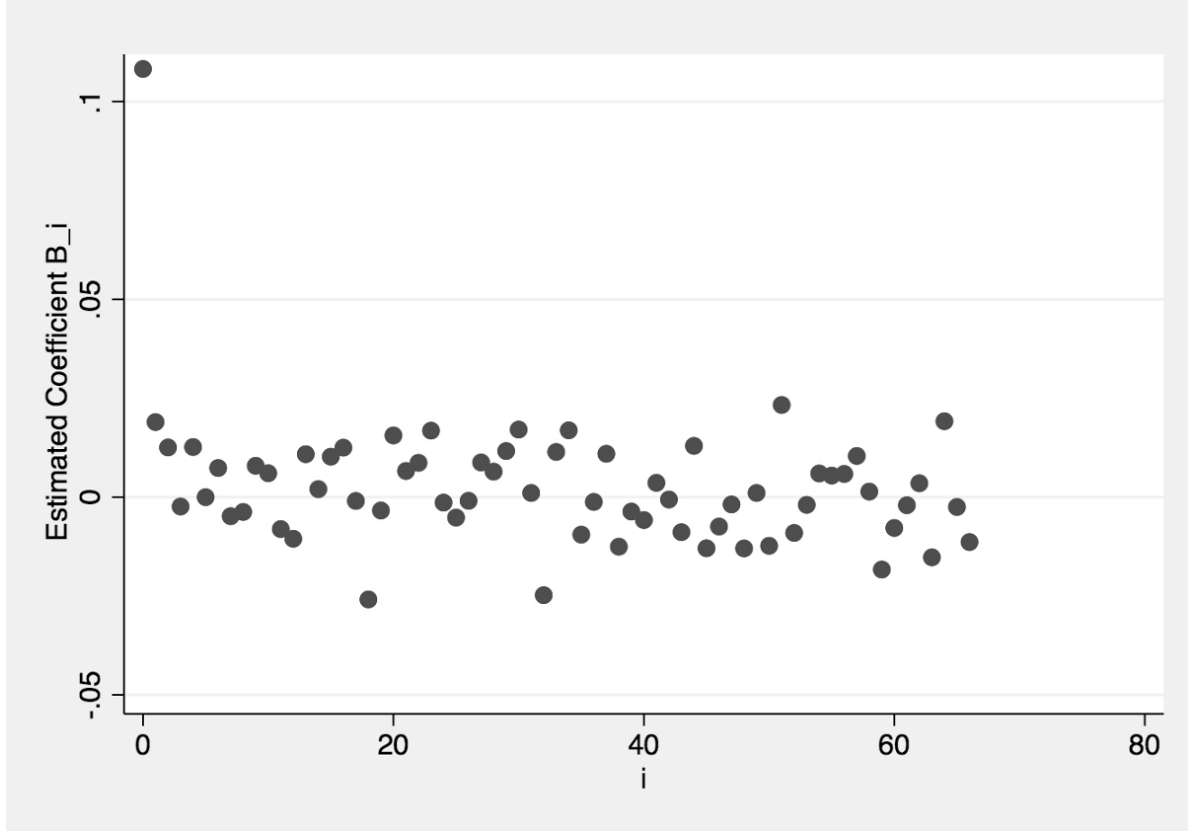


Figure C.1: 3 day group coefficients on lags

subset were recorded either entering through Carchi or exiting through El Oro– this corresponds to approximately 10 percent of the total days represented in the data. I then estimated equation (1) with 50 lags on each of the remaining 155 subsets.

I find that $\hat{\beta}_1$ is statistically significant ($t \geq 1.96$) in 144 of the 155 possible subsets, while $\hat{\beta}_2$ is significant in 30 subsets. The ten lags that were significant most often are shown in Table C.1. That $\hat{\beta}_1$ is significant across subgroups indicates that the previous results supporting a one-day duration of stay for migrants does not depend on migrant characteristics. Results are similar for the estimated coefficients on $\hat{\gamma}_i$, shown in Table C.2. Thus, not only do I find that total entries in Carchi on a given day are the strongest predictor of total exits in El Oro the following day, but that this also is true when looking at restricted semi-homogeneous groups of migrants in transit.

*Table C.1: Significance of $\hat{\beta}_i$
in 155 age-gender-skill subsets*

i	Number Subsets Significant	Mean Value Coefficient (all subsets)
0	10	0.00216
1	144	0.40135
2	30	0.06633
4	9	0.02787
7	11	0.00381
8	11	0.00987
25	9	0.01130
30	9	0.00209
43	8	0.00409
47	9	0.01116
$\alpha = 0.10$		

*Table C.2: Significance of $\hat{\gamma}_i$
in 155 age-gender-skill subsets*

i	Number Subsets Significant	Mean Value Coefficient (all subsets)
1	105	0.08832
2	33	0.05585
3	18	0.03267
7	19	0.00851
11	17	-0.02961
13	16	-0.00162
15	18	-0.00181
16	17	-0.02056
27	16	-0.02343
34	20	-0.01397
37	18	-0.02334
40	16	0.00528
$\alpha = 0.10$		

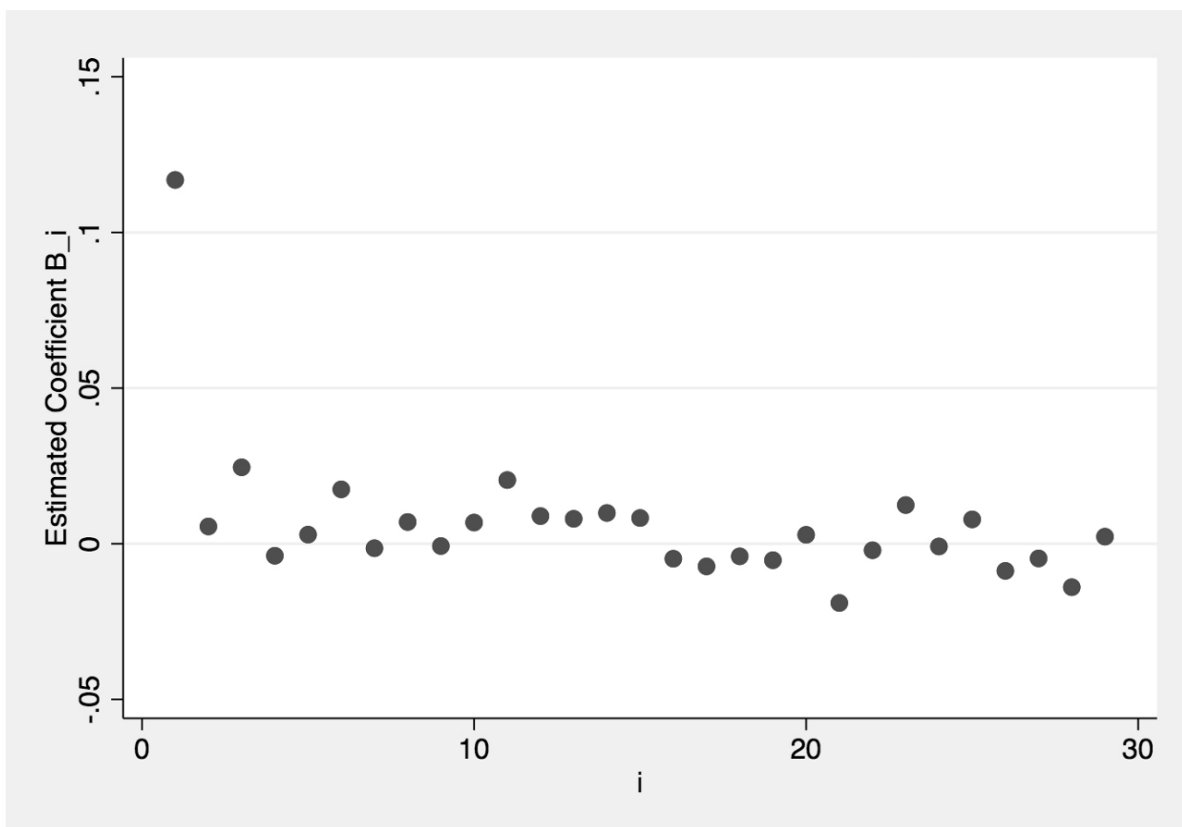


Figure C.2: 7 day group coefficients on lags

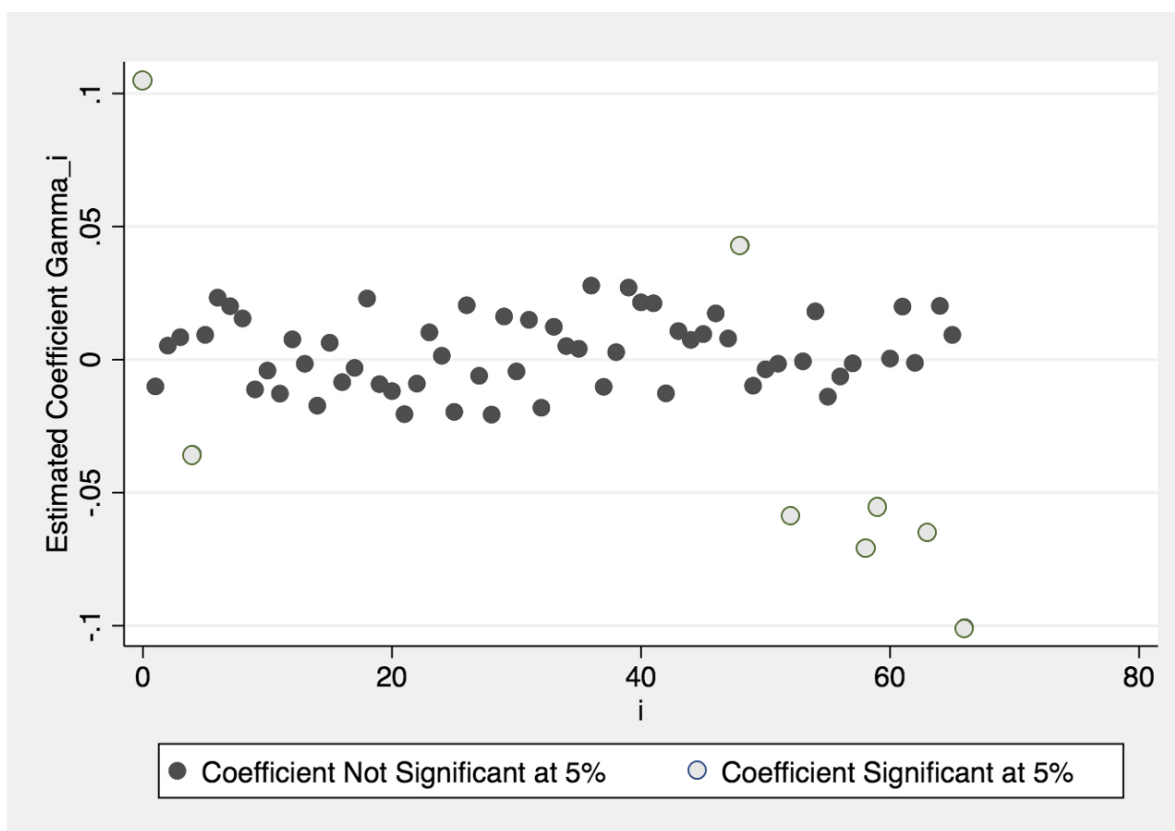


Figure C.3: 3 day group coefficients on interactions

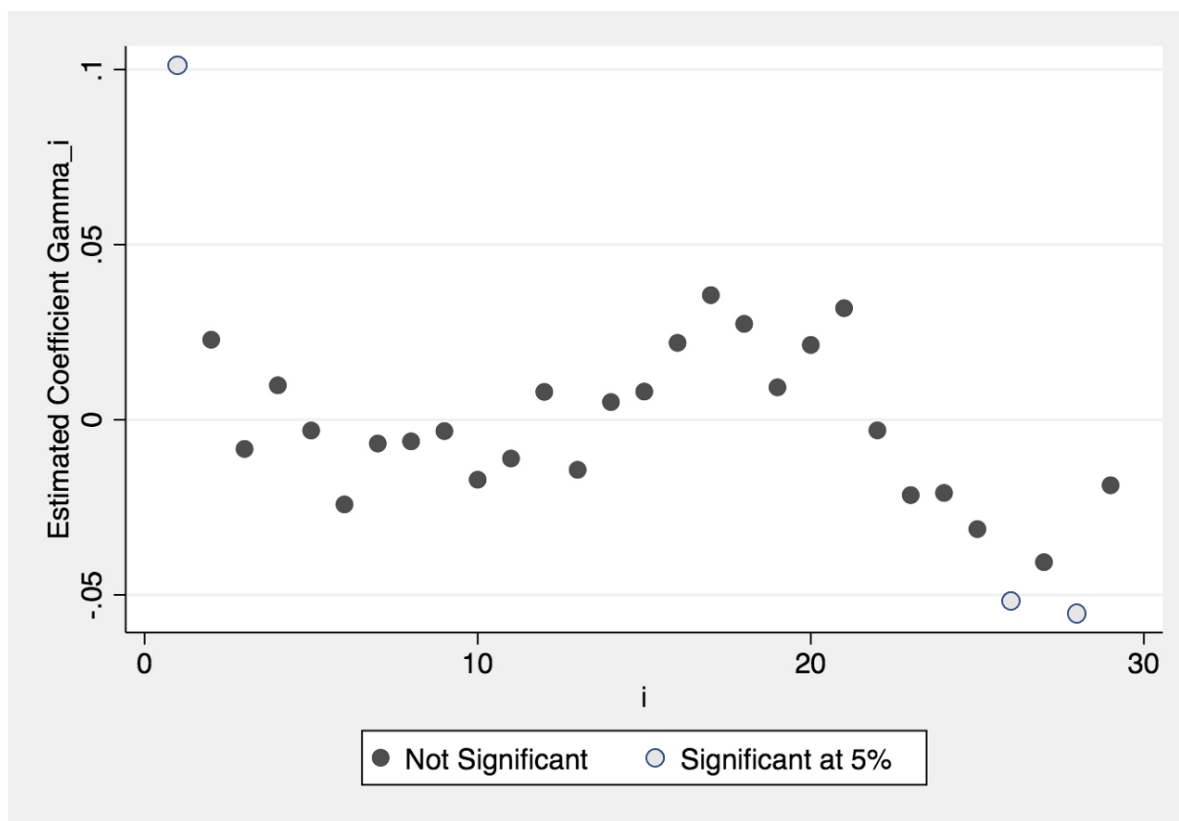


Figure C.4: 7 day group coefficients on interactions

BIBLIOGRAPHY

BIBLIOGRAPHY

- Abrams, David S., Marianne Bertrand, and Sendhil Mullainathan. 2012. "Do Judges Vary in Their Treatment of Race?" *The Journal of Legal Studies*, 41(2): 347-383.
- Agan, Amanda, Matthew Freedman, and Emily Owens. 2021. "Is Your Lawyer a Lemon? Incentives and Selection in the Public Provision of Criminal Defense." *The Review of Economics and Statistics*, 103(2): 294-309.
- Agan, Amanda, and Sonja Starr. 2017. "The Effect of Criminal Records on Access to Employment." *American Economic Review*, 107(5): 560-64.
- Akerloff, George A., and Rachel E. Kranton. 2005. "Identity and the Economics of Organizations." *Journal of Economic Perspectives*, 19(1): 9-32.
- Al Jazeera. 2019a. "Colombia border hospitals struggle with Venezuelan migrant influx." <https://www.aljazeera.com/news/2019/3/5/colombia-border-hospitals-struggle-with-venezuelan-migrant-influx>.
- Al Jazeera. 2019b. "Venezuelans stranded as Ecuador imposes new visa rules." <https://www.aljazeera.com/news/2019/8/26/venezuelans-stranded-as-ecuador-imposes-new-visa-rules> Last accessed: July 4, 2022.
- Albiges, Marie. 2019. "Police body cameras are capturing so much footage it's driving some defense attorneys to quit." *The Virginian-Pilot*.
- Alesina, Alberto, and Eliana La Ferrara. 2014. "A Test of Racial Bias in Capital Sentencing." *American Economic Review*, 104(11): 3397-3433.
- American Bar Association. 2009. "Eight Guidelines of Public Defense Related to Excessive Caseloads." https://www.americanbar.org/content/dam/aba/administrative/legal_aid_indigent_defendants/ls_sclaid_def_eight_guidelines_of_public_defense.pdf.
- Ang, Desmond. 2021. "The Effects of Police Violence on Inner-City Students." *The Quarterly Journal of Economics*, 136(1): 115-168.
- AP-NORC. 2015. "Law enforcement and violence: The divide between black and white Americans." Issue Brief. <https://apnorc.org/wp-content/uploads/2020/02/Issue-Brief-PoliceFinal.pdf>.
- Antonovics, Kate and Brian G. Knight. 2009. "A New Look at Racial Profiling: Evidence from the Boston Police Department." *The Review of Economics and Statistics*, 91(1): 163-177.
- Anwar, Shamena, Patrick Bayer, and Randi Hjalmarrsson. 2012. "The Impact of Jury Race in Criminal Trials." *The Quarterly Journal of Economics*, 127(2): 1017-1055.

Ariel, Barak, William A. Farrar, and Alex Sutherland. 2015. "The Effect of Police Body-Worn Cameras on use of Force and Citizens' Complaints Against the Police: A Randomized Controlled Trial." *Journal of Quantitative Criminology*, 31 (3): 509-35.

Ariel, Barak, Alex Sutherland, Darren Henstock, Josh Young, Paul Drover, Jayne Sykes, Simon Megicks, and Ryan Henderson. 2016. "Wearing body cameras increases assaults against officers and does not reduce police use of force: Results from a global multi-site experiment." *European Journal of Criminology*. 13(6): 744-755

Arnold, David, Will Dobbie, and Crystal S. Yang. 2018. "Racial Bias in Bail Decisions." *The Quarterly Journal of Economics*, 133(4): 1885-1932.

Ashraf, Nava, Oriana Bandiera, and B. Kelsey Jack. 2014. "No margin, no mission? A field experiment on incentives for public service delivery." *Journal of Public Economics*, 120: 1-17.

Ayres, Ian, and Steven D. Levitt. 1998. "Measuring Positive Externalities from Unobservable Vic- tim Precaution: An Empirical Analysis of Lojack." *The Quarterly Journal of Economics*, 113(1): 43-77.

Ba, Bocar A. and Roman G. Rivera. 2019. "The Effect of Police Oversight on Crime and Allegations of Misconduct: Evidence from Chicago." University of Pennsylvania, Institute for Law & Economics Research Paper No. 19-42.

Bahar, Dany. 2018. "Latin America Is Facing a Refugee Crisis." <https://www.foreignaffairs.com/articles/venezuela/2018-10-23/latin-america-facing-refugee-crisis>.

Barbarino, Alessandro, and Giovanni Mastrobuoni. 2014. "The Incapacitation Effect of Incarceration: Evidence from Several Italian Collective Pardons." *American Economic Journal: Economic Policy*, 6(1): 1-37.

Bayer, Patrick, Randi Hjalmarsson, and David Pozen. 2009. "Building Criminal Capital Behind Bars: Peer Effects in Juvenile Corrections". *Quarterly Journal of Economics*: 105-147.

BBC News. 2014. "Michael Brown Shooting: Ferguson Police Wear Cameras." <https://www.bbc.com/news/world-us-canada-29018911>.

Becker, Gary S. 1968. "Crime and Punishment: An Economic Approach." *Journal of Political Economy*, 76(2): 169-217.

Beine, Michel, Frédéric Docquier, and Çağlar Özden. 2011. "Diasporas." *Journal of Development Economics*, 95(1): 30-41.

Bénabou, Roland, and Jean Tirole. 2003. "Intrinsic and Extrinsic Motivation." *The Review of Economic Studies*, 70(3): 489-520.

Bénabou, Roland, and Jean Tirole. 2006. "Incentives and Prosocial Behavior." *American Economic Review*, 96 (5): 1652-1678.

- Bertoli, Simone. 2010. "Networks, Sorting and Self-Selection of Ecuadorian Migrants." *Annals of Economics and Statistics*, (97/98): 261–288.
- Billings, Stephen B., David J. Deming, and Stephen L. Ross. 2019. "Partners in Crime." *American Economic Journal: Applied Economics*, 11(1): 126-150.
- Bjerk, David and Eric Helland. 2020. "What Can DNA Exonerations Tell Us about Racial Differences in Wrongful-Conviction Rates?" *Journal of Law & Economics*, 63(2): 341-366
- Bó, Ernesto Dal, Frederico Finan, and Martín A. Rossi. 2013. "Strengthening State Capabilities: The Role of Financial Incentives in the Call to Public Service." *The Quarterly Journal of Economics*, 128(3): 1169–1218.
- Borjas, George J., Richard B. Freeman, and Lawrence F. Katz. 1996. "Searching for the effect of immigration on the labor market." *The American Economic Review Papers and Proceedings*, 86(2): 246–251.
- Borusyak, Kirill, Xavier Jaravel, and Jann Spiess. May 19, 2021. "Revisiting Event Study Designs: Robust and Efficient Estimation." *Working Paper*.
- Brennan Center for Justice. 2018. "Voting Rights Restoration Efforts in Virginia." <https://www.brennancenter.org/our-work/research-reports/voting-rights-restoration-efforts-virginia>.
- Buchanan et al. 2015. "What Happened In Ferguson?" *The New York Times*. <https://www.nytimes.com/interactive/2014/08/13/us/ferguson-missouri-town-under-siege-after-police-shooting.html>.
- Bureau of Labor Statistics, U.S. Department of Labor. 2021. "Occupational Outlook Handbook, Lawyers." <https://www.bls.gov/ooh/legal/lawyers.htm>.
- Buonanno, Paolo and Daniel Montolio. 2008. "Identifying the Socio-economic and Demographic Determinants of Crime across Spanish Provinces." *International Review of Law and Economics*, 28(2): 89-97.
- Buurmana, Margaretha, Josse Delfgaauwa, Robert Dura, and Seth Van den Bosschee. 2012. "Public sector employees: Risk averse and altruistic?" *Journal of Economic Behavior & Organization*, 83: 279–291.
- Butcher, Kristin F., Kyung H. Park, and Anne Morrison Piehl. 2017. "Comparing Apples to Oranges: Differences in Women's and Men's Incarceration and Sentencing Outcomes." *Journal of Labor Economics*, 35(S1): S201-S234.
- Butcher, Kristin F., Kyung H. Park, and Anne Morrison Piehl. 2021. "Judge Effects, Case Characteristics, and Plea Bargaining." *Journal of Labor Economics*, 39(S2): S543-S574.
- Cabrera, Jose Maria Leon. 2019. "La xenofobia en Ecuador empuja a migrantes venezolanos a salir del país." <https://www.nytimes.com/es/2019/01/28/ecuador-ibarra-venezolanos>.

- Callaway, Brantly, and Sant'Anna, Pedro H. C. 2020. "Difference-in-Differences with multiple time periods." *Journal of Econometrics*, Forthcoming, December 2020.
- Card, David. 1990. "The Impact of the Mariel Boatlift on the Miami Labor Market." *Industrial and Labor Relations Review*, 43(2): 245–257.
- Card, David. 2001. "Immigrant inflows, native outflows, and the local market impacts of higher immigration." *Journal of Labor Economics*, 19(1): 22–61.
- Caruso, German, Christian Gomez Canon, and Valerie Mueller. 2021. "Spillover effects of the Venezuelan crisis: migration impacts in Colombia." *Oxford Economic Papers*, 73(2): 771-795.
- de Chaisemartin, Clément, and Xavier D'Haultfœuille. 2020. "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects." *American Economic Review*, 110(9): 2964-2996.
- Chalfin, Aaron and Jacob Kaplan. 2021. "How many complaints against police officers can be abated by incapacitating a few 'bad apples?'" *Criminology & Public Policy*.
- Chalfin, Aaron and Justin McCrary. 2018. "Are U.S. Cities Underpoliced? Theory and Evidence." *The Review of Economics and Statistics*, 100(1): 167-186.
- Chalfin, Aaron and Justin McCrary. 2017. "Criminal Deterrence: A Review of the Literature." *Journal of Economic Literature*, 55(1): 5-48.
- City of Chicago. 2019. "2019 Budget Overview." pg. 139.
<https://www.chicago.gov/content/dam/city/depts/obm/suppinfo/2019Budget/2019BudgetOverview.pdf>.
- City of Chicago. 2020. "City of Chicago's Report on Chicago Police Department: 2019 Litigation." https://www.chicago.gov/content/dam/city/sites/police_reform/docs/PoliceLitigationReport- Revised10-1-2020.pdf.
- Compensation Board. 2018. "Report to the General Assembly: Workgroup Study of the Impact of Body Worn Cameras on Workload in Commonwealth's Attorneys' Offices." <https://rga.lis.virginia.gov/Published/2019/RD68/PDF>.
- Cornaglia, Francesca, Naomi E. Feldman, and Andrew Leigh. 2014. "Crime and Mental Well-Being". *The Journal of Human Resources*, 49(1): 110–140.
- Çubukçu, Suat, Nusret M. Sahin, Erdal Tekin, and Volkan Topalli. 2021. "Body-worn cameras and adjudication of citizen complaints of misconduct." NBER Working Paper 29019.
- Currie, Janet, and Erdal Tekin. 2012. "Understanding the Cycle: Childhood Maltreatment and Future Crime." *Journal of Human Resources*, 47(2): 509-549.
- Dahl, Gordon, and Stefano DellaVigna. 2009. "Does Movie Violence Increase Violent Crime?" *The Quarterly Journal of Economics*, 124(2): 677–734.

Damm, Anna Piil, and Christian Dustman. 2014. “Does Growing Up in a High Crime Neighborhood Affect Youth Criminal Behavior?” *American Economic Review*, 104(6): 1806-1832.

Defensoría del Pueblo. 2018. “Se Aceptan Medidas Cautelares Solicitadas Por Defensoría Del Pueblo, Defensoría Pública Y Sociedad Civil Para Que Se Elimine Solicitud De Pasaporte Para Ingresar Al Ecuador.” <https://www.dpe.gob.ec/se-aceptan-medidas-cautelares-solicitadas-por-defensoria-del-pueblo-defensoria-publica-y-sociedad-civil-para-que-se-elimine-solicitud-de-pasaporte-para-ingresar-al-ecuador/>. Last accessed: July 4, 2022.

Department of Judicial Services, Office of the Executive Secretary. 2021. “General District Court Manual.” pg. 2-1. <http://www.courts.state.va.us/courts/gd/resources/manuals/gdman/chapter02.pdf>.

Department of Judicial Services, Office of the Executive Secretary. 2022. “Circuit Court Clerk’s Manual - Criminal.” pg. 2-1. <http://www.vacourts.gov/courts/circuit/resources/manuals/ccmanualcriminal/chapter02.pdf>.

Department of Justice. 2017. “Law Enforcement Agency Roster (LEAR), 2016.” Inter-university Consortium for Political and Social Research [distributor], 2017-04-05. <https://doi.org/10.3886/ICPSR36697.v1>.

Department of Justice, Civil Rights Division. 2015. “Investigation of the Ferguson Police Department.” https://www.justice.gov/sites/default/files/opa/press-releases/attachments/2015/03/04/ferguson_police_department_report.pdf.

Department of Justice, Office of Public Affairs. 2015. “Justice Department Announces \$20 Million in Funding to Support Body-Worn Camera Pilot Program.” <https://www.justice.gov/opa/pr/justice-department-announces-20-million-funding-support-body-worn-camera-pilot-program>.

Department of Magistrate Services, Office of the Executive Secretary. 2021. “Magistrate Manual: Adult Arrest Procedures.” pg. 2-1. <http://www.courts.state.va.us/courtadmin/aoc/mag/resources/magman/chapter02.pdf>.

Deshpandi, Manasi, and Yue Li. 2019. “Who Is Screened Out? Application Costs and the Targeting of Disability Programs.” *American Economic Journal: Economic Policy*, 11(4): 213-48.

DiTella, Rafael, and Ernesto Schargrodsky. 2013. “Criminal Recidivism after Prison and Electronic Monitoring.” *Journal of Political Economy*, 121(1): 28–73.

Dobbie, Will, Jacob Goldin, and Crystal Yang. 2018. “The Effects of Pretrial Detention on Conviction, Future Crime, and Employment: Evidence from Randomly Assigned Judges.” *American Economic Review*, 108(2): 201-240.

Doleac, Jennifer. 2017. “The Effects of DNA Databases on Crime.” *American Economic Journal: Applied Economics*, 9(1): 165-201.

- Doleac, Jennifer and Benjamin Hansen. 2020. "The Unintended Consequences of "Ban the Box": Statistical Discrimination and Employment Outcomes When Criminal Histories Are Hidden." *Journal of Labor Economics*, 38(2): 321-374.
- Doyle Jr., Joseph J. 2008. "Child Protection and Adult Crime: Using Investigator Assignment to Estimate Causal Effects of Foster Care." *Journal of Political Economy*, 116(4): 746-770.
- Draca, Mirko, Stephen Machin, and Robert Witt. 2011. "Panic on the Streets of London: Police, Crime, and the July 2005 Terror Attacks." *American Economic Review*, 101(5): 2157-81.
- Eriksson, Karin Hederos, Randi Hjalmarsson, Matthew J. Lindquist, and Anna Sandberg. 2016. "The Importance of Family Background and Neighborhood Effects as Determinants of Crime." *Journal of Population Economics*, 29(1): 219-262.
- Evans, William N., and Emily G. Owens. 2007. "COPS and Crime". *Journal of Public Economics* 91(1-2): 181–201.
- Fajnzylber, Pablo, Daniel Lederman, and Norman Loayza. 2002a. "Inequality and violent crime" *Journal of Law and Economics*, 45(1): 1-40.
- Fajnzylber, Pablo, Daniel Lederman, and Norman Loayza. 2002b. "What causes violent crime?" *European Economic Review*, 46(200): 1323-1357.
- Fehler, Sebastian, and Michael Kosfeld. 2014. "Pro-social missions and worker motivation: An experimental study." *Journal of Economic Behavior & Organization*, 100: 99-110.
- Flanagan, Francis X. 2018. "Race, Gender, and Juries: Evidence from North Carolina." *Journal of Law & Economics*, 61(2): 189-214.
- Frey, Bruno S., and Felix Oberholzer-Gee. 1997. "The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding-Out." *The American Economic Review*, 87(4): 746-755.
- Friedberg, Rachel. 2001. "The Impact of Mass Migration on the Israeli Labor Market." *Quarterly Journal of Economics*, 116(4): 1373–1408.
- Fryer Jr., Roland G. 2019. "An Empirical Analysis of Racial Differences in Police Use of Force." *Journal of Political Economy*, 127(3).
- Gaub et al. 2019. "Understanding the Impact of Police Body-Worn Cameras on Virginia Public Defenders."
- Gestión. 2018a. "Gobierno declara estado de emergencia en Tumbes por migración venezolana." <https://gestion.pe/peru/gobierno-declara-emergencia-tumbes-migracion-venezolana-nndc-242837-noticia/> .
- Gestión. 2018b. "Ingreso de venezolanos al Perú cayó de 3,500 a 1,250 por día tras exigencia de pasaporte." <https://gestion.pe/peru/politica/ingreso-venezolanos-peru-cayo-3-500-1-250-dia-exigencia-pasaporte-243991-noticia/?ref=gesr>.

- Gómez, Santiago, Daniel Mejía, and Santiago Tobón. “The Deterrent Effect of Surveillance Cameras on Crime.” *Journal of Policy Analysis and Management*, 40(2): 553-571.
- Gonzalez, Robert, and Sarah Komisarow. 2020. “Community monitoring and crime: Evidence from Chicago’s Safe Passage Program.” *Journal of Public Economics*, 191: 1-18.
- Gonzalez-Navarro, Marco. 2013. “Deterrence and Geographical Externalities in Auto Theft.” *American Economic Journal: Applied Economics*, 5(4): 92–110.
- Goodman-Bacon, Andrew. 2021. “Difference-in-Differences with Variation in Treatment Timing.” *Journal of Econometrics*, 225(2): 254-277.
- Greene, Renss. 2020. “Loudoun Lawyers Urge Better Pay for Public Defenders.” <https://loudounnow.com/2020/03/06/public-defenders-ask-for-better-pay/>.
- Greenwood, Michael J. 2016. “Perspectives on Migration Theory–Economics.” In: White, M. (eds) *International Handbook of Migration and Population Distribution*. *International Handbooks of Population*, 6: 34.
- Gregg, Paul, Paul A. Grout, Anita Ratcliffe, Sarah Smith, and Frank Windmeijer. 2011. “How important is pro-social behaviour in the delivery of public services?” *Journal of Public Economics*, 95: 758–766.
- Grogger, Jeffrey. 1998. “Market Wages and Youth Crime.” *Journal of Labor Economics*, (16)4: 756-791.
- Grönqvist, Hans, and Susan Niknami. 2014. “Alcohol availability and crime: Lessons from liberalized weekend sales restrictions.” *Journal of Urban Economics*, 81: 77-84.
- Harlow, Caroline Wolf. 2000. “Defense Counsel in Criminal Cases.” Bureau of Justice Statistics Special Report. <https://bjs.ojp.gov/content/pub/pdf/dccc.pdf>.
- Harrell, Erika and Elizabeth Davis. 2020. “Contacts Between Police and the Public, 2018 Statistical Tables.” Bureau of Justice Statistics. <https://bjs.ojp.gov/content/pub/pdf/cbpp18st.pdf>.
- Heaton, Paul. 2012. “Sunday liquor laws and crime.” *Journal of Public Economics*, (96): 42-52.
- Horrace, William C. and Shawn M. Rohlin. 2016. “How Dark is Dark? Bright Lights, Big City, Racial Profiling.” *Review of Economics and Statistics*, 98(2): 226-232.
- Hunt, Jennifer. 1992. “The Impact of the 1962 Repatriates from Algeria on the French Labor Market.” *Industrial and Labor Relations Review*, 45(3): 556–72.
- Ibáñez, Ana María, and Sandra V. Rozo. 2020. “Forced migration and the spread of infectious diseases.” CEGA Working Paper Series No. WPS-140.

Imberman, Scott A., and Michael F. Lovenheim. 2015. "Incentive Strength and Teacher Productivity: Evidence from a Group-Based Teacher Incentive Pay System." *The Review of Economics and Statistics*, 97(2): 364–386.

Imrohoroglu, Ayse, Antonio Merlo, and Peter Rupert. 2000. "On the Political Economy of Income Redistribution and Crime." *International Economic Review*, 41(1): 1-25.

Instituto Nacional de Estadística y Censos. Estadística de Entradas y Salidas Internacionales. <https://anda.inec.gob.ec/>.

International Monetary Fund. 2022. "Country Data." <https://www.imf.org/en/Countries/\protect\@normalcr\relaxVEN#countrydata>.

Jacob, B., Lefgren, L. 2003. "Are idle hands the devil's workshop? Incapacitation, concentration, and juvenile crime." *American Economic Review*, 93(5): 1560–1577.

Jones, Jeffrey M. 2020. "Black, White Adults' Confidence Diverges Most on Police." *Gallup News*. <https://news.gallup.com/poll/317114/black-white-adults-confidence-diverges-police.aspx>.

Kahn-Lang, Ariella, and Kevin Lang. 2018. "The Promise and Pitfalls of Differences-in-Differences: Reflections on '16 and Pregnant' and Other Applications." NBER Working Paper 24857.

Katz, Charles M., David E. Choate, Justin R. Ready, and Lidia Nunˆo. 2014. "Evaluating the Impact of Officer Worn Body Cameras in the Phoenix Police Department." Phoenix, AZ: Center for Violence Prevention & Community Safety, Arizona State University.

Kelly, Morgan. 2000. "Inequality and Crime." *The Review of Economics and Statistics*, 82(4): 530-539.

Kim, Taeho. 2020. *Facilitating Police Reform: Body Cameras, Use of Force, and Law Enforcement Outcomes*. <https://ssrn.com/abstract=3474634>

King, Lauren. 2015. "300 Norfolk police officers outfitted with body cameras." *The Virginian-Pilot*. https://www.pilotonline.com/news/crime/article_80eae2b6-7a94-5d08-8191-179ba6a4366d.html

Kleiman, Matthew and Cynthia G. Lee. 2010. "Virginia Indigent Defense Commission Attorney and Support Staff Workload Assessment: Final Report." <https://www.american.edu/spa/jpo/initiatives/right-to-counsel/upload/va-workload-assessment.pdf>

Kreps, David. 1997. "Intrinsic Motivation and Extrinsic Incentives." *The American Economic Review, Papers & Proceedings*, 87(2): 359-364.

Kull, Stephen. 2020. "Americans on Police Reform." <https://www.publicconsultation.org/wp-content/uploads/2020/07/PoliceReformReport0720.pdf>

- Landaeta-Jimaénez, Maritza, Marianella Herrera Cuenca, Guillermo Ramírez, and Maura Vásquez. 2018. "Encuesta Nacional de Condiciones de Vida Venezuela 2017: Alimentación I." <https://assets.website-files.com/5d14c6a5c4ad42a4e794d0f7/5eb9bfda4ed90d3d4e8e08f8encovi-2017.pdf>.
- Lavoie, Denise. 2021. "Virginia, with 2nd-most executions, outlaws death penalty." AP News. <https://apnews.com/article/virginia-to-end-death-penalty-ralph-northam-0a5b51f2e4458a0600bce6b75e6389bd>.
- LEMAS-BWCS. 2016. "Law Enforcement Management and Administrative Statistics- Body-worn Camera Supplement." Bureau of Justice Statistics Data Collection.
- Linden, Leigh, and Jonah E. Rockoff. 2008. "Estimates of the Impact of Crime Risk on Property Values from Megan's Laws." *American Economic Review*, 98 (3): 1103-27.
- Loyalka, Prashant, Sean Sylvia, Chengfang Liu, James Chu, and Yaojiang Shi. 2019. "Pay by Design: Teacher Performance Pay Design and the Distribution of Student Achievement." *Journal of Labor Economics*, 37(3): 621-662.
- Luh, Elizabeth. 2020. "Not So Black and White: Uncovering Racial Bias from Systematically Masked Police Reports." SSRN.
- Mai, Chris and Ram Subramanian. 2017. "The Price of Prisons: Examining State Spending Trends, 2010-2015." Vera Institute of Justice Report. <https://www.vera.org/downloads/publications/the-price-of-prisons-2015-state-spending-trends.pdf>.
- Mastrobuoni, Giovanni. 2019. "Police disruption and performance: Evidence from recurrent redeployments within a city." *Journal of Public Economics*, 176: 18-31.
- McCullough, Jolie. 2018. "Police officers are almost never convicted of murder. Body cameras may have made the difference in this Texas case." *The Texas Tribune*. <https://www.texastribune.org/2018/08/28/jordan-edwards-roy-oliver-body-cameras-murder/>.
- Mellström, Carl, and Magnus Johannesson. 2008. "Crowding out in Blood Donation: Was Titmuss Right?" *Journal of the European Economic Association*, 6(4): 845-863.
- Ministerio de Relaciones Exteriores y Movilidad Humana. 2018a. "Ecuador declara estado de emergencia al sector de Movilidad Humana en Carchi, Pichincha y El Oro, para la atención de los flujos migratorios inusuales de ciudadanos venezolanos." <https://www.cancilleria.gob.ec/ecuador-declara-estado-de-emergencia-al-sector-de-movil>.
- Ministerio de Relaciones Exteriores y Movilidad Humana. 2018b. "Comunicado Oficial." <https://www.cancilleria.gob.ec/2018/08/16/comunicado-oficial-35/>.
- Mueller-Smith, Michael. 2015. "The Criminal and Labor Market Impacts of Incarceration." <https://sites.lsa.umich.edu/mgms/wp-content/uploads/sites/283/2015/09/incar.pdf>.

- NACDL. 2018. "Defending Cases in Body Camera Jurisdictions." <https://www.nacdl.org/Content/Body-Cameras-1Nov>.
- NCSL. 2021. "Body-Worn Camera Laws Database." <https://www.ncsl.org/research/civil-and-criminal-justice/body-worn-cameras-interactive-graphic.aspx>. Last accessed July 28, 2021.
- Observatorio Venezolano de Violencia. 2018. "Informe OVV de Violencia 2017." <https://observatoriodeviolencia.org.ve/informe-ovv-de-violencia-2017/>.
- Office of the Executive Secretary. 2014a. "Caseload Statistics of the District Courts." 2014. http://www.courts.state.va.us/courtadmin/aoc/judpln/csi/stats/district/dbr1_2013.pdf.
- Office of the Executive Secretary. 2014b. "Caseload Statistics of the Circuit Courts." http://www.courts.state.va.us/courtadmin/aoc/judpln/csi/stats/circuit/cr01annual/cr01_2013.pdf.
- Office of the Executive Secretary. 2016. "Quarterly Report on Court-Appointed Counsel." <https://rga.lis.virginia.gov/Published/2016/RD239/PDF>.
- Ottaviano, Gianmarco, and Giovanni Peri. 2012. "Rethinking the effect of immigration on wages." *Journal of the European Economic Association*, 10(1): 152–197.
- Ouellet, M., S. Hashimi, J. Gravel, and A.V. Papachristos. 2019. "Network exposure and excessive use of force: Investigating the social transmission of police misconduct." *Criminology & Public Policy*, 18(3): 675-704.
- PeruMinisteriodelInterior. 2019a. "Preguntas frecuentes Migración." <https://www.ministeriointerior.gob.ec/preguntas-frecuentes-migracion/>. Last accessed: February 8, 2019.
- Peru Ministerio del Interior. 2019b. "Requisitos para ingresar a Ecuador." <https://www.ministeriointerior.gob.ec/requisitos-para-ingresar-a-ecuador/>. Last accessed: February 8, 2019.
- Piza, E., B. Welsh, D. Farrington, and A. Thomas. 2019. "CCTV Surveillance for Crime Prevention: A 40-Year Systematic Review with Meta-Analysis." *Criminology & Public Policy*, 18(1): 135-159.
- Prat, Andrea. 2004. "The Wrong Kind of Transparency." *The American Economic Review*, 95(3): 862-877.
- Quispe, Karen Guardia. 2019. "Venezolanos con visa humanitaria ya no requerirán PTP para trabajar en el Perú." *Gestión*. <https://gestion.pe/economia/management-empleo/venezolanos-visa-humanitaria-requeriran-ptp-peru-269622-noticia/>.
- Rambachan, Ashesh, and Johnathan Roth. 2020. "An Honest Approach to Parallel Trends." Working Paper.
- Raymer, James. 2017. "Measuring flows of international migration." IZA World of Labor.

Roth, Johnathan. 2021. “Pre-test with Caution: Event-study Estimates After Testing for Parallel Trends.” Working Paper.

Rozo, Sandra V., and Juan F. Vargas. 2019. “Brothers or invaders? How crisis-driven migrants shape voting behavior.” LACEA WORKING PAPER SERIES No. 0014.

RPP. 2018. “Poder Judicial deja sin efecto exigencia de pasaporte para inmigrantes venezolanos.” <https://rpp.pe/politica/estado/poder-judicial-deja-sin-efecto-exigencia-de-pasaporte-para-inmigrantes-venezolanos-noticia-1154652?ref=rpp>.

Sant’Anna, Pedro H. C., and Jun Zhao. 2020. “Doubly Robust Difference-in-Differences Estimators.” *Journal of Econometrics*, 219(1): 101-122.

Schoenfeld, Ben. 2021. Virginia Court Data. Data version: May 11, 2021. virginiacourtdata.org.

Schoenfeld, Ben. 2017. “Virginia Court Data Fields.” <https://virginiacourtdata.medium.com/virginia-court-data-fields-e224a9a41e15>.

Schwartz, Amy Ellen, Agustina Laurito, Johanna Lacoe, Patrick Sharkey, and Ingrid Gould Ellen. 2016. “The Academic Effects of Chronic Exposure to Neighborhood Violence.” Center for Policy Research. 229. <https://surface.syr.edu/cpr/229>.

Shem-Tov, Yotam. 2022. “Make Or Buy? The Provision of Indigent Defense Services in the U.S.” *The Review of Economics and Statistics*, 104(4): 819–827.

Sourcebook of Criminal Justice Statistics. 2009. “Criminal defendants disposed of in U.S. District Courts.” <https://www.albany.edu/sourcebook/pdf/t5222009.pdf>.

Sun, Liyang, and Sarah Abraham. 2021. “Estimating dynamic treatment effects in event studies with heterogeneous treatment effects.” *Journal of Econometrics*, 225(2): 175-199.

Tumen, Semih. 2016. “The Economic Impact of Syrian Refugees on Host Countries: Quasi-experimental Evidence from Turkey.” *American Economic Review*, 106(5): 456–60.

United Nations. 1998. “Recommendations on statistics of international migration.” Statistical Paper Series M, Revision 1.

UN DESA-Population Division and UNICEF. 2014. “Migration Profiles– Ecuador.” <https://esa.un.org/migmgprofiles/mpcsi.htm>.

UNGRD. 2018. “Registro administrativo de migrantes venezolanos - ramv.” <http://portal.gestiondelriesgo.gov.co/Paginas/Slidehome/Registro-Administrativo-de-Migrantes-Venezolanos-RAMV.aspx>. Last accessed: April 16, 2019.

UNHCR. 1984. “Cartagena declaration on refugees.”

UNHCR. 2018. “Number of refugees and migrants from Venezuela reaches 3 million.” <https://www.unhcr.org/en-us/news/press/2018/11/5be4192b4/number-refugees-migrants-venezuela-reaches-3-million.html>.

Urban Institute. 2021. “Criminal Justice Expenditures: Police, Corrections, and Courts.” <https://www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/state-and-local-backgrounders/criminal-justice-police-corrections-courts-expenditures>.

U.S. Census Bureau. 2019. “U.S. and World Population Clock.” <https://www.census.gov/popclock/world>. Last accessed: February 8, 2019.

VACO. 2019. “Expanded Body-Worn Camera Workgroup Holds First Meeting.” <https://www.vaco.org/expanded-body-worn-camera-workgroup-holds-first-meeting/>.

Valencia, Alexandra, and Mitra Taj. 2018. “Ecuador, Peru tighten entry requirements for Venezuelans as influx swells.” Reuters. <https://www.reuters.com/article/us-ecuador-venezuela/ecuador-peru-tighten-entry-requirements-for-venezuelans-as-influx-swells-idUSKBN1L12IM>.

Virginia Office of the Attorney General. 2017. “Office of the Attorney General and Department of Law Compensation Report.” <https://rga.lis.virginia.gov/Published/2017/RD223/PDF>.

Virginia Indigent Defense Commission. 2005. “2005 Annual Report.” <https://rga.lis.virginia.gov/Published/2005/RD152/PDF>.

Virginia Indigent Defense Commission. 2007. “2006 Annual Report.” <https://rga.lis.virginia.gov/Published/2007/RD134/PDF>.

Virginia Indigent Defense Commission. 2017. “2016 Annual Report.” <https://rga.lis.virginia.gov/Published/2016/RD305/PDF>.

Virginia Indigent Defense Commission. 2018. “Standards of Practice for Indigent Defense Counsel.” <http://www.vadefenders.org/wp-content/uploads/2018/04/SOP-4-10-18.pdf>.

Vollaard, Ben, and Joseph Hamed. 2012. “Why the Police Have an Effect on Violent Crime After All: Evidence from the British Crime Survey.” *The Journal of Law & Economics*, 55(4): 901-924.

Weisburd, Sarit. 2021. “Police Presence, Rapid Response Rates, and Crime Prevention.” *The Review of Economics and Statistics*, 103(2): 280-293.

Williams Jr., Morgan C., Nathan Weil, Elizabeth A. Rasich, Jens Ludwig, Hye Chang, and Sophia Egrari. 2021. “Body-Worn Cameras in Policing: Benefits and Costs.” NBER Working Paper #28622.

Wooldridge, Jeffrey. 2021. “Two-Way Fixed Effects, the Two-Way Mundlak Regression, and Difference-in-Differences Estimators.” Working Paper, Available at SSRN: <https://ssrn.com/abstract=3906345>.

World Bank. 2019. "GDP (current us \$)." <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations>. Last accessed: April 13, 2019.

Yokum, David, Anita Ravishankar, and Alexander Coppock. 2017. "Evaluating the Effects of Police Body-Worn Cameras: A Randomized Controlled Trial." [https://bwc.thelab.dc.gov/TheLabDC MPD BWC Working Paper 10.20.17.pdf](https://bwc.thelab.dc.gov/TheLabDC%20MPD%20BWC%20Working%20Paper%2010.20.17.pdf).