The Economics of Policing

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Abstract

Policing in the United States is highly decentralized. Variation in the jurisdictional and organizational structure of policing agencies can theoretically lead to different decisions about how these groups should balance community demands for public safety with concerns about fairness and trust in the mechanisms through which that public safety is achieved. This chapter outlines an economic framework for thinking about this tradeoff, highlighting links to law, psychology, and criminological theories of optimal policing. Research in the economics of crime in particular has made substantial progress in identifying the extent to which police funding can lead to crime reductions. There is also a growing body of economic evidence evaluating the impact of certain policing practices on crime. Economists have made important contributions to measuring the extent to which police may or may not be using their enforcement power in a way that is inconsistent with racial equity or legitimacy. In contrast, there is relatively little economic research on which policy interventions or organizational changes can increase perceptions of legitimacy and reduce racial bias in police actions. This imbalance in the quantity of high quality empirical evidence on the benefits and costs of law enforcement currently complicates efforts to identify socially optimal policing policies.

Series Cross-References

Affirmative Action and Employment (Development and Labor); Fair and unfair income inequality (Behavioral Economics); Inequality Measurement: Methods and Data (Inequality and Poverty); Inequality and Happiness (Welfare, Well-Being, Happiness); Causality (Program Evaluation); Costs of Victimisation (Risky behaviors)

1. Introduction

This chapter describes how law enforcement can be understood through the lens of economics, specifically public economics and the economics of government. In addition, it offers a brief summary of recent contributions that applied economists have made to the study of policing, and places where economists can contribute more. Of course, the majority of research on policing is done by people who are not economists. This chapter will make no attempt to summarize the broader social science evidence on policing. Instead, readers interested in doing high-quality research on policing, which is informed by advances in criminology, sociology and psychology, can review reports published by organizations that regularly synthesize this work, such as the National Academy of Sciences and Medicine or the Campbell Collaboration. In addition, scholars affiliated with organizations like the Center for Policing Equity, the National Police Foundation, the Yale Justice Collaboratory, Stanford SPARQ and the Center for Evidence-Based Crime Policy produce high quality research on policing that is accessible to economists.

2. A Very Short History of Publicly Provided Law Enforcement

The job that most closely resembles what is thought of as a modern "police officer" first appeared in London in 1829, when the Metropolitan Police Act created the Metropolitan Police of London (MPL). The MPL was tasked with preventing and detecting crime in the city of London. Officers were granted the authority to arrest people they observed disturbing the peace or suspected of committing a crime, and to bring them to the central court authority. Unlike the constables and night watchmen who preceded them, offering essentially fee-for-service investigation and patrol, or Sheriffs who are distinct political entities, an officer of the MPL was a bureaucratic government employee, paid by the Secretary of State through property tax revenues. When on duty, an MPL officer wore a uniform and was prohibited from drinking alcohol. Further, the Metropolitan Police Act clarified that threatening or attacking an on-duty officer was a more serious offense, with a harsher penalty, than assaulting a citizen.

These central features of modern police served two purposes: Police officers served the interest of the state, not of individual crime victims, per se. This is wholly in line with criminological philosophy at the time- Bentham's idea that, while crime can certainly be devastating to the victim, the total social burden of crime is almost entirely driven by the small

changes that potential victims make to their daily lives to avoid victimization (Bentham 1781). As the benefits of and crime reduction are therefore shared by everyone in a particular society, policing is best understood as a public good, which traditional market mechanisms will fail to provide at a socially efficient level. Consistent with this, the MPL was a government agency.

Further, the uniform of the MPL was distinct from military uniforms, and also from what a general citizen would wear. Someone wearing an MPL uniform was not acting as a private individual, and not acting as an agent of the military offering protection from a foreign entity. Rather, a uniformed officer was serving a distinct, and highly visible, role as an agent of the state, physically enforcing the rules of behavior set by the government for its own citizens. As this physical embodiment of the state's domestic authority, police officers were expected to exercise good judgement (and thus not be intoxicated) when wielding the state's power. Further, attacks or threats against a uniformed officer were seen as attacks on the state itself, and thus more socially harmful than assault or threats made against individual citizens.

Shortly after the founding of the Metropolitan Police Department, other counties in the United Kingdom, as well as the cities of Boston (1832) and New York (1845) passed their own ordinances creating city-funded organizations whose members were tasked with engaging in uniformed patrol and enforcing the city's rules, while not intoxicated, as their primary means of employment.

Despite these rules directing officers to soberly protect the peace, American municipal police almost immediately became subject to concerns about corruption. Specifically, police officers were granted the ability to physically restrain people who were "disturbing the peace," but individual officers were left to decide what, exactly, that meant. Police officers have, to only a slightly lesser extent today, complete discretion as to who they identify as causing harm to society. Their authority to use physical force means that officers can cause potentially irreparable harm to individuals they suspect of committing crime. Police officers are also expected to make these decisions about who to engage, and how forcefully to engage, quickly and often in high stress situations with limited information. Even the most careful officer will sometimes inadvertently exercise their authority in a way that imposes a cost on someone that is disproportionate to the social harm that individual caused. An important question, though, is how the incidence of (ex post) disproportionate force is distributed across the population.

Early reports on police activity in New York City describe police officers as using their policing power as a means to maintain the political control of the mayor. Abadinsky (1994) argues that the early NYPD officers were used by upper class New Yorkers to restrict the social mobility of lower class citizens, both in a geographic and economic sense, by arresting individuals who were "out of place," and breaking up strikes. In other words, police regularly used force in a way to protect wealth and power. In fact, the Pennsylvania State Police Historical Educational and Memorial Centers argues that concerns over municipal police being used for corrupt political purposes by promoting the interests of a moneyed few over the population as a whole, directly lead to the creation of the first State Police Department in Pennsylvania in 1905. The tenuous balance between using force to coerce individuals, while maintaining society's trust that force will only be used in a way that promotes overall social welfare, rather than the welfare of a subset of society, remains the fundamental problem of policing today. Two of the earliest policing scholars, August Vollmer and his student O. W. Wilson, where harshly critical of the existence of any political influence on police decision making given the complexity of this tradeoff. Their suggested solutions, framed as "Police Professionalism" included hiring educated police officers with similar demographics as the population they would patrol, reliably measuring and recording what officers do, and using technology to maximize the ability of police to catch criminals. (Wickersham 1931, Wilson and McLaren 1977).

By the 1980s, police scholars began to push back against how police professionalism used technology, specifically the practical emphasis on moving officers from "walking the beat" (which could also increase the changes of bribery) to rapidly responding to calls for service from their vehicles. Community -Oriented Policing focused on increasing the extent to which officers interacted with the general public to more correctly identify the source of crime problems (Goldstein 1979). Of course, from a social welfare standpoint, the success of such a strategy depends on the police coming into contact with and learning from a representative sample of the community. This is not obviously guaranteed in many standard community-oriented practices, like community forums or "coffee with a cop," which rely on feedback from community members who voluntarily show up to meet with officers (Muñiz 2011).

In practice, increasing the involvement of police officers in the community has generated public pushback, particularly to the extent that some of the manifestations of this recommendation were "zero-tolerance policing" or "broken windows policing." These strategies,

popularized by William Bratton during his time as the Commissioner of the New York Police Department, involve officers making more arrests for low-level offenses, particularly in areas with higher crime rates. The extent to which aggressive policing of low-level offenses contributed to the decline in crime in New York over the 1990s is unclear (Levitt 2004). The racial disparities in arrest rates for the types of low-level offenses generally prioritized in zero-tolerance policing is not (Geller and Fagan 2010). Roughly 40 years after the rise of Community -Oriented Policing, in 2015 the Presidential Task Force on 21st Century Policing identified that "too many individuals, particularly young people of color, do not feel as if they are being treated fairly" (President's Task Force on 21st Century Policing, 2015).

This is a classic problem in public and institutional economics. Most economic conceptualizations of "good" government involve a benevolent social planner taking coercive actions that maximize a utilitarian social welfare function (e.g. Gruber 2018). Given that the benevolent social planner has coercive power, how do they credibly commit to using that power in a social welfare maximizing, rather than predatory way that prioritizes people based not on their productivity, but on patronage (e.g. North 1981)? In the case of city police, how do officers commit to credibly using their power to arrest, detain, or use force against citizens in a way that is consistent with utilitarian social welfare maximization?

3. The Institutional Structure of American Law Enforcement

In 2017, there were approximately 22,800 law enforcement agencies in the United States. Of those agencies, roughly 60% were Municipal Police Departments, which is what many people reflexively think of when they hear the word "police." However, depending on one's location at any given point in time in the United States, the person responding to your 911 call or stopping you on the street might work for a Sheriff's Department (there are just over 3,000 agencies) a County Police Department (there are about 300), a State Police Department (sometimes called Highway Patrol), a Tribal Department, or one of the roughly 7,000 "special jurisdiction" law enforcement agencies in the US. Special Jurisdiction agencies include organizations like school police, park police, or transit police. Special Jurisdictions agencies are sometimes referred to as "zero population" agencies, because they frequently don't report any information about the size of the population in their jurisdiction - this is not entirely inaccurate, since people rarely "live" in their specific jurisdiction in the way people live in a city or county. In 2017, 22,784 distinct

agencies voluntarily reported data to the Uniform Crime Reports (UCR). However, other data sets measuring law enforcement agencies, specifically the Census of State and Local Law Enforcement Agencies (CSLLEA) and the National Crime Information Center (NCIC), typically include as many as 6,000 additional distinct agencies. Further, there are about 8,000 additional agencies that have unique law enforcement identification numbers in the UCR, CSLLEA or NCIC that are part of larger "parent" agencies (e.g. state agencies with separate units dedicated to different geographic places).

Statistics like this reveal that US law enforcement is highly decentralized. In comparison, there are 181 law enforcement agencies in Canada, 38 in India, 51 in the United Kingdom, and four in China. Most US police departments serve small communities; about 70% of municipal police departments serve as the primary law enforcement agency in places where fewer than 10,000 people live. At the same time, police, like most Americans, are concentrated in relatively large cities; roughly 25% of Americans live under the jurisdiction of 1.1% of police departments. Most of what researchers "know" about policing is based on studies of this 1.1%.

Law enforcement in the United States is decentralized not only in the sense that there are many organizations. Differences in the institutional structures of these agencies plausibly affects how agencies choose to trade off the costs and benefits of exercising force against citizens. Within an agency, sworn law enforcement officers who possess the state-granted the authority to make arrests, also vary in how they optimally exercise this authority.

More specifically, law enforcement officers can be divided into two groups, based on the ability of an external government official to fire them. "Command Staff," are generally not protected by a union, lead the agency, frequently working in one centralized location. Police agencies are led by either a Commissioner or Chief (and sometimes both). The title of "Commissioner" usually indicates a civilian head, while the title "Chief" is held by a sworn officer. The head of Command is supported be a small number of deputy chiefs, who could be assigned different administrative roles, such as to Human Resources, Operations, or Internal Affairs. Ranking below deputy chiefs are Assistant or Bureau Chiefs, who will have more specialized levels of command, like investigations, homeland security, or patrol. Larger organizations may have additional "layers" of command staff below Assistant or Bureau Chief. The head of Command can be removed or demoted by the local government leader at any time, and turnover in Police Chiefs can be quite high – tenure of five years or less is not uncommon.

Institutionally, the incentives of Command Staff are therefore closely tied to those of the current broader political administration.

The highest-ranking unionized officers, meaning officers who cannot be fired at will, frequently hold the rank of Captain. Captains have a geographic component to their authority; most police departments divide their jurisdiction into different geographical areas, typically called precincts. Captains are responsible for the day-to-day operations of law enforcement within that area, and there can be a high degree of variation across precincts in how the goals set by Command are implemented. Captains are supported by Lieutenants, who may have specific operational specialties like training or investigations. Lieutenants may also be responsible for the supervision of a small number of Sergeants.

Sergeants may engage in some regular patrol (something that is more unusual for a Lieutenant), but they are primarily front-line supervisors, meaning they, not Captains or Command, directly monitor the police officers that citizens interact with. This supervision is operationalized through "roll call" meetings multiple times a day, which is a pre-deployment meeting attended by all officers prior to each shift. During roll call, the Supervisory (or "shift") Sergeant will give beat assignments, update officers about any special information they need to conduct their jobs that day, and sometimes engage in quick training sessions. After roll call, police officers are responsible for patrolling their beats and responding to calls for service, under the immediate oversight of their Sergeants.

"Officer" is the entry-level position for law enforcement officers. Averaging over 2007 and 2017 American Community Survey (ACS), almost half of police officers had a college degree; 28.8% of police officers had a bachelor's degree, and 16.5% had an associate's degree. Most departments require applicants to pass a physical and mental exam, a background check, and then complete an academy training course. State governments typically regulate these training academies through a Peace Officer Standards and Training (POST) commission or department. The Bureau of Justice Statistics estimated that in 2013 there were 664 law enforcement training academies, about half of which were operated by a law enforcement agency directly (Reaves 2016). Academies can graduate multiple classes a year, after which recruits transition into the field as officers, sometimes with a designated field supervisor for a probationary period. To date, the economic literature has not credibly tested the impact of police officers' education or training on crime, or any other dimensions of police performance. Indeed, there is little evidence on the

impact of police training more generally on outcomes in the field, with the exception of a handful of experimental evaluations of very specific, short run, training programs (e.g. Quinton et al 2013 or Owens et al 2018). After a few years on the job, officers become eligible to take a series of tests that can allow them to be promoted to Sergeant. Alternatively, officers can apply for more specialized positions, such as Detective, Internal Affairs, Special Weapons and Tactics (SWAT), or Trainer (someone who trains officers).

This basic organization structure is found in all types of law enforcement agencies. However, there are two dimensions along which Sheriff's department, State Police, Municipal Police, and Special Jurisdiction Agencies, differ. The first dimension is the extent to which officers are tasked with what the public generally considers "policing" – responding to calls for service, investigating crimes, or engaging in patrol. The second dimension is to whom the head of the agency reports to, which affects what the objective function of the agency looks like.

Municipal police primarily engage in "policing" in incorporated cities or towns. County police also engage primarily in policing services, but in parts of a county that are unincorporated, or in places that have chosen to not form their own police force. In parts of the country where county governments are more important, county police are generally the main law enforcement agency the public comes into contact with. State Police may also patrol unincorporated areas where there are no county police, and/or places where the primary governing authority is the state. For example, most State Police patrol highways as a central part of their responsibilities. Municipal, County, and State Police Departments are all lead by a commissioner or chief who serves at the pleasure of an elected government leader.

In contrast, special jurisdiction police serve at the pleasure of whoever leads that particular jurisdiction. In some instances, like Park Police or Transit Police, this may be a public employee. In others, like University Police or Hospital Police, this may be the head of a private company. In either of these cases, the head of a special jurisdiction agency rarely reports to a government official who is directly elected by the population that the agency patrols. In theory, this weakly reduces the ability of the patrolled population to seek redress for perceived corruption or improper policing by officers; citizens can vote on their mayor or governor, but tend to have little role in the selection of a company head.

Sheriffs, on the other hand, differ from the previously described agencies along both dimensions. Employees of the Sheriff, itself a more ancient position than Police Chief, are

responsible for the safe and orderly operation of Courts. Sheriff Departments run local jails, where people accused of crimes may be detained while their case is being processed, and provide security in criminal courts. Since most criminal courts and jails are county government facilities, sheriffs operate at the county level. In counties where the entire population is patrolled by a police force, sheriffs work in courts and jails exclusively, providing no regular "police" service. However, in parts of the country with more unincorporated places, and no county police (like Southern California), sheriffs will engage in more active day-to-day policing. In addition to this difference in primary responsibility, the head of a Sheriff's Department, the Sheriff, is a directly elected official. The role of Police Department head, particularly in large agencies, generally requires a high level of skill in communication and public relations. Sheriffs, however, are political creatures of an entirely different type.

As politicians, sheriffs would tend to set policies that appeal to the median voter- one general policy position they affect is public safety. Of course, an important point to make here is that direct crime victimization, and actual interaction with the criminal justice system, tends to be concentrated in one part of the population; according to the National Crime Victimization Survey, in 2018 1.18% of the US population age 12 and older were victims of violent crime, 1.68% were victims of property crime and the maximum arrest rate in the United States was about 3%. As a result, in most jurisdictions, the median voter is better characterized as someone who may fear being a crime victim, but has no direct experience with the criminal justice system, as a victim or arrestee, itself. In more economic terms, such a voter probably benefits from strict criminal justice policies that make them feel safe. However, the median voter is unlikely to bear any direct costs of experiencing said punishment. Based on this framework, one would expect that Sheriffs would have a strong incentive to appear "tough on crime" relative to a police chief who is more removed from direct political concerns.

The structure of different types of policing organizations thus has theoretical implications for policy setting and individual officer behavior, as it affects both how connected agency leaders are to citizen preferences and the ability of those leaders to monitor officer actions. However, in large part due to the relatively static nature of the jurisdiction of these organizations, there is only a small body of causal empirical evidence (across all social science disciplines) on how structure affects the ability of agencies to use force in a social welfare maximizing way.

Ornaghi (2018) provides evidence that transferring hiring and firing decisions from a city mayor to a more independent civil service commission leads to lower property crime rates, and higher rates at which police "solve" violent crimes. The results in Ornaghi (2018) would suggest that, relative to a less politically sensitive leader, politicians may have an incentive to appear "tough on crime." Police unions, which protect the interests of police ranking up to Captain, also appear to be able to sway the on-the-ground decisions of officers; Chandrasekher (2016) documents a reduction in ticket writing, and an accompanying small increase in less serious offenses during a 1997 work slowdown in the New York Police Department. Mas (2006) also documents an average reduction in the rate at which police officers clear crimes via arrest, and report more crimes in the UCR, after a police union "looses" a negotiation with the city.

Makowsky and Stratmann (2009) show that police officers do behave in ways that are consistent with officers being responsive to the political concerns of their ultimate supervisors. Specifically, they show that officers in various local Massachusetts municipalities issue tickets with higher suggested fines to out-of-town drivers, for whom it is more difficult to contest the ticket. This form of "nonvoter tax" is particularly large when the officer's own jurisdiction has a limited ability to collect property tax revenue, and suggests that officers are shifting the burden of property tax collection to people outside of the mayor or city council's social welfare function. Ba (2018) exploits a credibly exogenous change in the cost to citizens of filing complaints against the police, providing some evidence on how police respond to feedback about people directly affected by criminal justice policy. He finds that, in Chicago, officers are more likely to use physical force when citizens are less likely to file a complaint. Taken together, both Makowsky and Stratmann (2009) and Ba (2018) suggest that reducing the operational distance between officers and the public they police can alter officer decision making.

4. Policing is a Tradeoff

How should police officers police? As previously discussed, figuring out a way to limit corruption, ensuring that police officers were exercising their authority in a fair way while simultaneously promoting public safety, has always been a central problem. From an economic perspective, "optimal" policing involves a tradeoff of what police produce, broadly defined as public safety, with the costs associated with that public safety provision. Outside of standard costs, like the opportunity cost of public funds used to pay officers' salaries and benefits, a

central cost of policing involves costs imposed on the people who are policed; police officers are granted the powers of the State- they have the authority to physically detain and restrain others in a way that members of the general public do not. It is up to police officers to use their legally granted force in a way that is consistent with the public's expectations of benevolence. Policing scholars have frequently referred to this "impossible task" as the warrior-guardian tradeoff, where officers must be warriors against crime as well as guardians who protect and defend potential victims (Manning 1977). This is further complicated by the fact that the sets of criminals and crime victims generally overlap.

In the Becker model of criminal justice, Becker (1968), police use their force to identify and detain people for a particular punishment, represented by the probability of detection. In other words, police officers are able to reduce crime because the state grants them the ability to use force that is in the state's interest. Force could be used to issue someone a ticket that compels them to pay a certain about of money, including a search, an arrest, or lethal force. These are all actions that the State grants police officers the right to take, in the name of maintaining public safety.

There are clear benefits of police officers' ability to forcibly coerce people. As modeled in Becker (1968), the threat of detection could dissuade a person from offending in the future or it could set an example for others, leading them to believe that they will be punished if they engage in criminal activity. Force can stop a crime in progress or incapacitate an individual who would otherwise continue to offend. Of course, force has associated costs. First, as specified in Becker (1968), when officers issue a citation or make an arrest it triggers actions by later criminal justice system actors. – sheriffs, prosecutors, defense attorneys, judges, and potentially correctional officers. Force also could result in officer injury, which could affect their future productivity.

Another cost of using force is the potential loss in the state's credibility as a truly benevolent social planner. People generally lose some personal utility when the state uses force against them. The key question, relevant to institutional economics as well as law and psychology, is whether or not others believe that force was used in a way that is consistent with the state's commitment to promoting the welfare of all people in its jurisdiction. Both North (1981) and Tyler (1990) refer to this idea as the extent to which the officer's use of force is legitimate.

The basic Becker (1968) framework implies that there is an optimal amount of force to be used in each police-citizen encounter: officers should use the amount of force that intuitively

balances the crime reducing benefits associated with force with court capacity and distortionary costs of that force. However, a third important cost is how that use of force affected the public's perceptions of the legitimacy of police- how much "legitimacy capital" the department has expended in that encounter (Acevedo 2016).

It is important here to highlight two insights from this framing. First, as emphasized in Nagin and Manski (2017) and Owens (2019), the optimal amount of force used by an officer is a positive function of the marginal benefit of crime reduction. To the extent that it is reasonable to assume that the marginal benefit of reducing crime is increasing in the crime rate, it implies that, ceteris paribus, officers should use less force (e.g. make fewer arrests) when crime rates are low. Aggressive and proactive policing, which was likely socially beneficial during the early 1990s, is no longer welfare enhancing during the first half of the 21st century, when crime rates, overall, are quite low (Owens 2019). This is consistent with the growing social concern about the use of police force, seen during the "Black Lives Matter" movement, for example. It is also not obvious how many of these costs and benefits are external, versus immediately realized by an individual officer making the force decision.

Second, this framing proposes a complementary definition of "excessive" force relative to what is typically used by police practitioners. Most jurisdictions define excessive force as force that is out of proportion to the context of the specific crime and risks to the officer and public (Graham v. Connor 490 U.S. 386 1989). In other words, force is excessive if the marginal benefit of using it is low. This economic framing clarifies that excessive force is not simply force with a low marginal benefit- it is force that generated lower crime reduction benefits than it created in costs, in terms of resource distortion and legitimacy.

How is the marginal cost of force determined? Manski and Nagin (2017) highlight the cost of using force against people who have not committed crime in a static framework. However, it is reasonable to imagine that the marginal legitimacy cost of any force is not only a function of an individual's criminal culpability of the specific person. As emphasized by North (1981), people's perceptions of the legitimacy of their institutions develop over generations. The extent to which using force against an individual person imposes a cost on society is likely a function of how officers have used force against other people in the past - particularly against people in the same identity group as the immediate individual.

As emphasized by the National Academy of Sciences (2018) and the Presidential Task Force on 21st Century Policing (2015), law enforcement in the United States has had a fraught and antagonistic history with many non-white identity groups. As a result of this history, the legitimacy cost of using force against a White person is almost certainly lower than the legitimacy cost of the same amount of force used against a Black or Latinx person in the United States. Of course, being subjected to force by police lowers the utility of any person, but when used against certain identity groups, it cannot be disentangled from images of law enforcement violence that occurred in Selma, Alabama (1965), Los Angeles, CA (1991), and Ferguson, MO (2015). Police force will be socially inefficient if the marginal benefit of crime reduction does not equal or exceed the marginal legitimacy cost of that force (along with marginal congestion and distortion costs identified in the Becker model).). An absence of criminal behavior on the part of the individual is sufficient, but by no means necessary, for this to be the case.

4.1 Becker, Policing Legitimacy, and Crime

Incorporating legitimacy costs of policing into the Becker (1968) model of crime (Becker, 1968) leads to the finding that police actions can increase an individual's perceived probability of arrest, but simultaneously leads to an increase in the supply of offenders in a given "market for crime"- a reduction in overall deterrence. The reverse is also possible: reductions in police activity that lead to fewer arrests can reduce crime. In this model, the legitimacy of the police is conceptualized as the probability that someone will be subject to arrest if they do not engage in crime, similar to Manski and Nagin (2017). The somewhat counterintuitive result that less police force (sometimes called "de-policing") can reduce crime comes from the observation that not all arrests reduce crime by as much as they reduce police legitimacy. A reduction in these socially inefficient arrests, which reduce legitimacy but do not reduce crime, can result in an increase in the ability of police to deter potential offenders.

This model extends the basic Becker framework in two ways. First, it incorporates costs associated with any negative interaction with the criminal justice system, not just conviction. Examples of such costs include initial detention by law enforcement, or and expenses incurred during adjudication, including any pre-trial detention during the adjudication process (Feeley 1979, Geller 2016). For purposes of this chapter, costs are divided into two parts In this sense, rather than thinking of a one-time probabilistic punishment, a slightly more complex, but

substantially more realistic, version of the Becker model would incorporate the probabilistic cost associated with any negative interaction with the criminal justice system. For purposes of this chapter, the Becker (1968) model is divided into two stages: the probability and cost associated with the initial law enforcement encounter, p_l and f_l, and the probability and costs associated with actually being convicted and sentenced, p_c and f_c. As in Becker, the "income" associated with engaging in crime is referred to as y, and is assume to be independent of policing.

There are therefore three possible states that an individual who engages in crime could end up in: 1) Not encountering law enforcement at all, meaning that their final utility is U(y), which occurs with probability ($1 - p_l$). 2) Encountering law enforcement, but either the district attorney declines to file charges, or their case is otherwise dismissed. This occurs with probability $p_l(1 - p_c)$, and in this case, the criminal achieves final utility U($y - f_l$). 3) Encountering law enforcement, and subsequently being adjudicated guilty. Here, their final utility would be U($y - f_l - f_c$), and they will end up in this state with probability $p_l p_c$.

Simplifying terms, this means that someone will engage in crime if and only if their expected utility is larger than their outside option (U(w), or:

eq. 1. $\quad U(y) - p_l U^l(y) - p_l p_c U^c(y - f_l) > U(w)$

Where U^i(j) refers to the reduction in utility associated with moving from U(j) to U(j - f$_i$). Note that both increasing the probability that a criminal encounters a police officer, along with increasing the additional disutility associated with that encounter will reduce the likelihood that an individual commits crime. For some offenses, particularly misdemeanors, the initial encounter with law enforcement generally constitutes the end of criminal justice involvement; for example, jaywalking is typically punished with a citation, meaning that f$_c$ = 0 for these crimes.

Second, the Becker model assumes that the cost of interacting with the criminal justice system are only incurred if the person is an offender; individuals who do not engage in crime are assumed to have a deterministic utility of U(w). Depending on the police policies in place, this assumption may or may not be true. For example,; many "proactive" policing policies, including but not limited to "Stop Question and Frisk" or "Terry Stops" (SQF) will, by definition, lead to people who do not engage in crime having costly encounters with law enforcement. A SQF policy might be one where officers are instructed to spend their shifts detaining people in particular neighborhoods whom they suspect, for an articulable and specific reason, to possess contraband. Similar to Manski and Nagin (2017), this model conceptualizes "legitimacy costs" as

an individual's probabilistic utility loss from an encounter with the police, in the absence of criminal behavior.

The cost of having a negative encounter with law enforcement, in the absence of a criminal act is f_L and the probability that this will occur is p_L. Similarly, people who have not engaged in crime may be convicted, incurring costs f_C with probability p_C. Using the same notational conventions, incorporating these potential costs of having a negative interaction with the criminal justice system means that the expected utility associated with not engaging in crime is defined as

eq. 2. $$E(U) = U(w) - p_L U^L(w) - p_L p_C U^C(w - f_L)$$

Combining equations 2 and 3 yields the following decision rule governing criminal behavior:

eq. 3. $$[U(y) - U(w)] - [p_l U^l(y) - p_L U^L(w)] - [p_l p_{lc} U^c(y - f_l) - p_L p_C U^C(w - f_L)] > 0$$

The first term reflects the difference in the amount of utility an individual obtains if they spend one unit of time, or effort, engaging in crime relative to their outside option, typically thought of as legitimate work. The second term reflects how engaging in crime affects their expected utility of having a negative encounter with law enforcement; this depends on how engaging in crime changes the probability that you have a negative encounter with police (p_l vs. p_L) as well as the disutility associated with that encounter if one has, or has not, committed an offense, $U^l(y)$ $vs. U^L(w)$. The third term reflects the difference in expected cost of actually being convicted by the criminal justice system if you have, or have not, actually engaged in crime, $p_l p_{lc} U^c(y - f_l)$ vs. $p_L p_C U^C(w - f_L)$.

There is a growing body of legal scholarship on the role of legitimacy and accuracy in increasing legal compliance (Papachristos et al 2012; Sunshine and Tyler, 2003; Tyler et al, 2015). Writing out a rational actor's decision rule in this way simply formalizes these ideas in a mathematical framework that has become standard within the economics of crime. It also generates clear predictions about how changes in criminal justice policy can have beneficial, muted, or perverse effects on crime, consistent with the theoretical predictions of legal scholarship.

For example, two potential issues facing police departments implementing a proactive policy like SQF are (1) many of the people who will be stopped and frisked will not be violating any laws ($p_L > 0$) and (2) depending on the way in which the stops are conducted, the experience of

being stopped and frisked may be humiliating or degrading, perhaps even more so for individuals who are not criminals and suspect they are being searched because of racial animus on the part of the officer involved ($f_L > 0$). Note that these issues are entirely separate from whether or not such a proactive policy would increase the probability that people who engage in crime are caught (p_l), or the disutility associated with criminals being frisked by the police (f_l).

A policy of increasing general stops, or lowering the threshold of suspicion that will allow an officer to make a legal stop, will increase both p_l and p_L. Assuming that the cost associated with interacting with an officer are unchanged by the policy, SQF will only reduce the likelihood that someone engages in crime if the total derivative of equation 4 with respect to the change in policy is less than zero, or

eq. 4. $$[U^l(y) + p_c U^c(y - f_l)]\frac{dp_l}{dSQF} > [U^L(y) + p_c U^C(y - f_L)]\frac{dp_L}{dSQF}$$

Equation 4 is a model of individual decision making, meaning that the change in overall crime will depend on how many people are just at the margin of criminal behavior. Note that the larger the change in p_L (the impact the SQF policy has on stops of law-abiding people) the less likely the policy will reduce crime. Further, imposing a high cost on people who are stopped, making $U^L(y)$ large, will also dampen the crime reducing effects. The less likely it is that stopping people who did not commit a crime will be convicted, or otherwise punished by the justice system (meaning that p_C is low), the more likely it is that SQF will reduce crime.

Also note that for crimes which are typically only punishable with a citation, meaning that $U^C(y - f_L)$ and $U^c(y - f_l)$ are close to zero, improving the ability of prosecutors and judges to successfully sort guilty people from not guilty people in the adjudication process, i.e. lowering p_C, will have a relatively small impact on the likelihood that someone complies with the law. This is because the expected costs of later court action are already only a small part of the decision rule. Intuitively, when the majority of the expected punishment associated with a crime occurs during the police interaction, the public's view of those interactions are more important in their decision making.

The empirical literature that has tried to estimate the impact of SQF policies on individual criminal decision making has found mixed results; crime likely fell in places designated as "high impact" zones by the New York Police Department, but the frequency that police engaged in

SQF was not correlated with crime rates outside of these zones et al 2016). More generally speaking, SQF may be associated with small reductions in crime at very local levels, but there is less of a measurable effect once data are aggregated (Rosenfeld and Fornango, 2014, 2017). Based on the spatial patterns in the implementation of SQF in New York, which were potentially not highly focused on actual crime hot spots (Weisburd et al 2014), equation 4 makes it clear that the impact of SQF on crime is, also, theoretically ambiguous.

The economic framing of the costs associated with police officers using their state-granted force has parallels in law, specifically the way the 14th amendment has been interpreted by the courts. The 14th amendment constrains the ability of police officers, as agents of the state, to respond to residents in a way that is a function of their race, gender, age or nationality, thus denying someone "equal protection of the law" because of their identity group. Since 1938, the courts have recognized that people in certain identity groups have reduced political power relative to people in other categories e.g. Black and Latinx people relative to White people, Jewish people relative to Christian people, and immigrants relative to native-born residents (United States v Carolene Products Company 304 U.S. 144 (1938)).)). Government policies that reference different treatment for people based on "suspect categories" are subject to heightened scrutiny by the courts. It is important to note here that the court references both identity and political power; suspect categories are suspect because of the particularly high potential for (implicit) favoritism by the government, for marginal improvements in utility for people in one of those groups relative to another. This is a situation that would violate the commitment made by a benevolent social planner to maximize a utilitarian social welfare function, which places equal weight on all individuals.

Government agencies accused of using a suspect category in decision making, to the detriment of a group with reduced political power, are held to a high legal standard in court. The agency is required to demonstrate that (1) there is a particularly large social benefit associated with this particular decision rule, and (2) the suspect classification must be used in the decision rule in order to achieve this social benefit. This means that governments are not barred from using a suspect classification in their decision making out of hand; this socially costly activity is legal if the courts determined that the social benefit of doing so is sufficiently large and cannot be obtained any other way (Strauss 2011). Thus, the courts implicitly trade off the marginal benefits and marginal costs of discrimination, allowing discrimination in cases where doing so

results in an offsetting increase in social welfare, forbidding actions in which the marginal cost of discrimination is larger than the additional social benefit.

4.2 How is Social Efficiency Enforced?

As previously discussed, the majority of police officers ultimately work under the authority of a local government- usually a city or county. In instances where these officers are identified as using force in a socially inefficient way, the federal government has the ability to directly influence the actions of that local government. The Violent Crime and Control Act of 1994 specifically prohibited any government authority or government agent from engaging in a "pattern or practice of conduct … that deprives persons of rights, privileges, or immunities secured or protected by the Constitution or laws of the United States." Under the same act, the Attorney General was granted the authority to use the civil court system to obtain "equitable and declaratory relief to eliminate the pattern or practice."

The process by which the US Department of Justice investigates a local law enforcement agency it believes has engaged in conduct inconsistent with utilitarian social welfare optimization is known as a "Pattern and Practice Investigation." In court, these investigations can result in a legally binding agreement between the local and federal government known as a "Consent Decree." Agencies operating under a consent decree are assigned a Monitor by a federal judge. A Monitor is one or more individuals, external to the law enforcement agency, who are given the authority to observe and analyze the agency's operations, and generate a list of policy changes the agency must implement in order to have this federal oversight removed.

According to DOJ reports, between 1994 and 2017, 41 local law enforcement agencies were subject to consent decrees. There is only limited research, all outside of economics, on the impact of these decrees on police behavior or legitimacy (Powell et al 2017, Stone et al 2009, Davis et al 2002). In 2018, then Attorney General Jeff Sessions issued a memo limiting the time frame and potential scope of consent decrees, as well as the situations in which the federal government could use this process – essentially in situations where other non-consent decree options, to alter the local government actions and reduce the alleged violations, have already been tried and shown to be ineffective. Due to the absence of clear guidance on what these other options might be, it is unclear whether or not any pattern and practice investigations have been initiated after this memo.

A first order reason that consent decrees have not been thoroughly evaluated is that, as pointed out by Harmon (2017), there is currently little quality data on what police officers actually do that would lend itself to a credible evaluation of the impact of such reforms on legitimacy or police actions. While surveys like the Law Enforcement Management and Administrative Statistics (LEMAS) offer some information about the types of policies that guide police officer actions, careful research by criminologists have identified wide gaps between official descriptions of how officers should act under particular policies and actual officer behavior (Lum et al 2020). Measuring how official policies may be adopted in response to federal oversight is not an uninteresting question, but it is a different one from how officers respond in the field.

Most of the economic research on policing uses data collected by the Federal Bureau of Investigation through the UCR, or the related National Incident Based Reporting System (NIBRS). These data sets contain measures of individual criminal activity, as well as the arresting decisions made by officers. They contain basic information about the number of sworn officers on a force, and some shift assignments, but they were not intended to measure officer behavior. Increasingly, individual police departments are making their administrative records of stops and calls for service publicly available, and researchers at Stanford University, The Center for Policing Equity, and the Police Foundation have provided an invaluable public service by aggregating this information. However, each law enforcement agencies' administrative data are collected for internal agency use, not scientific research, and as well documented by Stanford's ongoing Open Policing Project, there is variation in the quality and coverage of these data that varies arbitrarily across and within agencies over time

Currently, there are a number of promising initiatives that may rectify this situation. For example, in 2018 the FBI announced that it would begin requesting data on force used by local police officers, in the same way that it requests data on arrests. In the same way that the UCR defines crime in a specific and standardized way, the FBI data covers specific, predetermined, actions (actions that result in death or serious bodily injury or a firearm discharged at a person) which may or may not align with how a department itself defines "force." In addition, in 2018, the California Department of Justice began requiring law enforcement agencies to report detailed, standardized information on people stopped by police and the subsequent actions taken by officers under the Racial and Identity Profiling Act of 2015. Both of these advances in data

collection have the potential to open up new lines of research and understanding of how police operate, and how government intervention can increase or decrease socially-efficient police actions.

5. Recent Economic Contributions to the Study of the Economics of Policing

5.1. Policing Rates and Crime

Estimates of the relationship between police and crime are a striking example of the "credibility revolution" in economics. Whether or not hiring police officers will result in lower crime is an economic and policy question of first order importance. Police are hypothesized to affect the probability of detection, which is a central component of the Becker model of criminal behavior. There are non-public alternatives to police, like private security guards, so understanding whether or not increasing the amount of this government service actually leads to the desired outcome- lower crime- is clearly situated within public economics. It is also the case that both police staffing levels and crime at the police jurisdiction level are readily available, making it a question well-suited for empirical, quantitative evaluation of policies that vary at the city, county, or state level.

Of course, simply estimating the correlation between the number of police and the number of crimes in a particular area is problematic for a number of reasons. The first is one of simultaneity; one of the reasons a local government would want to hire more police officers is in response to rising crime. Since the most readily available data on crime is at the annual level, and police staffing in the UCR is measured in October, one could actually argue that officer strength should be the dependent, rather than independent variable in a regression of police and crime in a given year. One of the earliest modern contributions of economics to the study of policing was Corman and Mocan (2000), which used administrative records from one police agency, the NYPD, to show that simply measuring crime and officers at more frequent intervals would lead to the finding that police reduced property crime and assault.

A second and related issue is omitted variables bias, more broadly. Police deployment may reflect strategic expectations about future conditions that could also lead to higher rates of crime. Examples of these might include changes in the local economy, drug use, or population centers. One of the most substantive areas in which economists have contributed to the study of policing is through finding ways to address the positive correlation unobserved determinates of crime and

policing, by identifying situations in which police force size changes for reasons that are distinct from general staffing policy.

Levitt (1997) noted that police departments tend to be larger when mayors are running for reelection, consistent with theory laid out earlier in this chapter. While these estimates were not statistically precise, as noted in McCrary (2004), this paper was one of the first to find that hiring more police could lead to crime reductions. This work was followed by three papers, which identified an increased deployment of officers in response to terrorist attacks in Buenos Aires (DiTella and Schargodsky, 2004), Washington, DC (Klick and Tabarrok 2005), and London (Draca et al 2011). Draca et al (2011) estimated that the elasticity of crime with respect to police was around -0.3 to -0.4, not far off from the point estimates in Levitt (1997).

The federal Department of Justice's Office of Community Oriented and Policing Services (COPS) has also provided researchers with the ability to credibly estimate the impact of officers on crime. The COPS office provides federal funds to local governments for various crime prevention activities, including multiple programs aimed at hiring more police officers. Prior to 2006, these grants were not distributed in a way that was related to underlying crime trends; using variation in the timing and size of grants distributed in this period, Evans and Owens (2008) estimated an elasticity of property (violent) crime with respect to police of -0.26 (-0.99). After 2008, the COPS office began to distribute grants in a more competitive way, based on a numeric formula, which lent itself to a regression discontinuity design. Three studies, Cook et al (2017), Mello (2019) and Weisburst (2019a) used these formula driven COPS grants, from the Obama era, to estimate elasticities of crime with respect to police ranging from -0.7 (Weisburst 2019a) to -2.5 (Cook et al 2017).

Third, it is also the case that the UCR is not a perfect dataset. As noted, police force strength is of all sworn officers in October, which includes command staff who rarely engage in patrol, and excludes any fluctuation in force size throughout the year (as officers leave the force and new recruiting classes enter.). Chalfin and McCrary (2018) find that correcting this specific source of measurement error will lead to precise, negative estimates of police on crime in large US cities between 1960 and 2000. Further, crimes in the UCR, as in most administrative data, are crimes known to police, which is a noisy measure of what we actually care about- crime itself. When officers are more readily available to citizens, the likelihood that citizens notify the officers of a crime is likely to increase, meaning that this measurement error is unlikely to simply

be noise. Vollaard and Hamed (2012) show that, even with credibly exogenous variation in police strength, changes in the propensity of victims to contact the police can lead to substantial upwards bias in the estimated relationship, particularly for violent crimes.

In the United States, the National Crime Victimization Survey (NCVS) has asked a nationally representative sample of US adults about their experiences with crime since 1972. In theory, the NCVS can be used to estimate the impact of police on total crime, but there are three important limitations. First, due to privacy concerns, information on where NCVS respondents live, below the region level, for post-2004 periods is only available in Census Restricted Data Centers. NCVS data from 1979-2004 is available with MSA identifiers. Second, the NCVS doesn't ask, and people may not know, which law enforcement jurisdiction the crime occurred in, unless the crime occurred in the person's place of residence. Finally, only living people over the age of 14 are included in the NCVS, meaning homicide and crimes against younger children are not included.

Each of the cited studies has produced a specific local average treatment effect, and many have been produced in highly different contexts. The general consistency of the magnitude of the negative effect of police on violent crime is therefore somewhat surprising. Of course, there may be situations where researchers find that department size is not negatively related to street crime; the identification of such a situation would be a particularly novel result.

It is also the case that the majority of these studies (DiTella and Schargodsky (2004), Klick and Tabarrok (2005), and Draca et al (2011) are exceptions) examine aggregate increases in police force size. This means that the policy "experiment" tested involves increasing the police force size and allowing commanders to direct the additional officers to engage in any number of tasks or work in any number of beats. To date, quantitative evaluations of policies, which instruct command staff to deploy their officers in particular ways, including directing more officers to small areas with higher crime, known as "hot spots policing," less frequently fail to identify large reductions in overall offending; small, short run, crime reductions are a more common finding. Some of this work is experimental, meaning that it is less likely to be subject to the concerns about simultaneity and omitted variables bias previously discussed. Telep and Weisburd (2012) is a high quality, relatively recent review.

For example, Blattman et al (2019) does not find meaningful reductions in crime in Bogota, Colombia, after the amount of police presence in high crime areas increased by up to 70%. This

opens up the possibility that additional police resources might not always lead to reductions in crime – command staff could allocate those resources in a way that was particularly ineffective. Maheshri and Mastrobuoni (2019) estimate the spatial distribution of bank robberies in Milan as private law enforcement (security guards) are hired and fired. Like DiTella and Schargrodsky (2004), which also examine quasi-experimental variation in localized police deployment, Maheshri and Mastrobuoni (2019) find that additional law enforcement in an area reduces crime. Unlike Di Tella and Schargordsky (2004), but more similar to Blattman et al (2019), they find substantial displacement of crime to immediately surrounding areas.

Further, there is currently only suggestive, and conflicting, evidence on how any crime reduction occurs. If additional police officers reduce crime by deterring potential offenders, rather than using force to incapacitate them, the associated costs are primarily the marginal costs of that officer's employment. However, if police officers reduce crime through using force, e.g. arresting and incapacitating people, one must consider the further criminal justice costs explicit in Becker (1968), as well as the legitimacy costs outlined earlier in this chapter. Owens (2016) presents evidence that, in the case of the COPS program, increasing the number of police officers does not appear to have resulted in an increase in arrest rates, suggesting that potential offenders were deterred from committing crime. This is also consistent with Levitt (1998), which found that increases in the city-level arrest rate for one type of crime appeared to reduce the frequency of many different crimes, not just ones likely to be committed by the same person and thus prevented by incapacitation. In contrast, Mastrobouni (2019) finds that, in the case of Milan, the quasi-exogenous removal of police officers from parts of the city at different times of day leads to sizable reductions in the incapacitation of repeat offenders. Of course, if incapacitation is an important component of how officers reduce crime, without information on the legitimacy cost of those arrests, the social efficiency of those crime reductions is less obvious.

5.2 Policing Policies and Crime

Compared to the number of well-identified studies examining the impact of the size of a police force on crime, there is relatively scant evidence on the extent to which non-deployment related police policies reduce crime. Of course, many criminologists have been successful at conducting RCTs of various policing policies with individual police departments. This is an area

where Campbell Collaboration reviews will be particularly helpful to economists interested in a specific policy.

5.2.1. *Public vs Private Provision*

Bindler and Hjalmarsson (2019) estimate the impact of police professionalization on crime, using historical court records to identify how crime changed when the Metropolitan Police, and later rural police forces, replaced the local constable and night watch system in the United Kingdom. They estimate that the creation of a public police force lowered robbery by as much as 46%, and that the later creation of professionalized police in more rural areas lowered crime by 20%. Cheng and Long (2018) examine the same policy in reverse, estimating how crime in New Orleans changed in response to the addition of a privately owned and designed security force in the French Quarter. When the security service was administered entirely by a private citizen, theft fell by 13% and robbery fell by 37%. When the service was incorporated into the NOPD, however, the crime reduction benefits diminished. The authors attribute this to the management decisions of the public, rather than private law enforcement agency, specifically in regards to officer oversight and the construction of incentives.

5.2.2. *Militarization*

The 2015 restriction on the Federal 1033 Program, a defense department initiative which allowed law enforcement agencies to acquire used military equipment at low cost, lead to a number of papers estimating the impact of police militarization on crime. What militarization means in a particular context, of course, needs to be clarified; military equipment provided under the 1033 program included weapons, vehicles, and clothing, but also computers, medical supplies, and flashlights. Bove and Gavrilova (2017) estimate that a 10% increase in the value of military equipment received by a local department, broadly defined, reduced local crimes by 4.9 per 100,000 residents. They find little impact on reported arrest rates for serious offenses. Harris et al (2017) focused on how weapons, vehicles, and optical gear affected the way that police interacted with civilians, using police officer injuries and civilian complaints to measure the quality of police-citizen interactions. In contrast to concerns raised by the ACLU (ACLU 2014), this analysis does not show evidence that providing police with military tactical gear has caused a deterioration of police-community relations; rather, officers appear to be assaulted less frequently, and citizen complaints fall. Using a slightly different instrument, Masera (2019) suggests that Bove and Gavrilova (2017) and Harris et al (2017) may be lower bounds for the

socially positive effect low-cost military equipment has had on crime and police officer safety. In light of these results, which estimate a specific, well-identified local average treatment effect and contrast strongly with research on the legitimacy costs of police militarization from outside of economics (e.g. Hinton 2016 or Mummolo 2018), more causal work on police militarization is probably needed before drawing any strong policy conclusions.

5.2.3 *Proactive Policing*

In addition to militarization, there has also been a perceived increase in the use of "proactive policing." While this term is not clearly or consistently defined across practitioners or academics, proactive policing can generally be thought of as a clearly stated, official directive given to police officers that involves doing more than responding to crimes either observed by the officer or reported by a citizen. Based on the number of studies conducted as of 2017, the National Academy of Sciences concluded that there was sufficient evidence that many proactive policing policies, particularly policing hot spots and focused deterrence, could reduce crime in the short run, with little evidence of adverse crime spillover effects. Most of the cited research was the result of randomized controlled trials and to date, the contribution of economists to the evaluation of proactive policies has been relatively small.

Grogger (2002) and Ridgeway et al (2018) carefully examine the impact of policies that enhance the ability of police to stop and arrest people suspected of being gang members. Both papers examine how crimes known to police in Los Angeles neighborhoods are affected by the imposition of civil gang injunctions. In specific targeted areas, individuals believed by the State of California to be gang members are enjoined, by a civil court, from engaging in a number of behaviors that are compliments to criminal activity, e.g. wearing gang colors. Police therefore have the authority to use force, stopping, searching, or arresting, people who engage in these "pre-crime" behaviors for violating the court's restraining order, which is a criminal misdemeanor. Grogger (2002) finds that granting police this authority results in a drop in violent assaults, which Ridgeway et al. (2018) finds to be relatively persistent over time.

With the cautions about the implementation of policing policies raised by Lum et al (2020) in mind, there is still a likely large return to further evaluation at a larger scale, . Long run criminal impacts of these and other policing policies, including community-oriented policing, problem-solving policing, hot-spots policing, and third-party policing, all of which have received little attention from economists.

5.2.4. *Policing and Technology*

Garicano and Heaton (2010) point out that, perhaps like officer redeployment, the adoption of advanced information technology (IT) alone will not guarantee a reduction in crime or improvement in crime clearance rates. On average, they find little correlation between the adoption of IT, as reported in the LEMAS, and crime outcomes. In order for IT adoption to improve the ability of police to reduce crime, it needs to be coupled with changes in management or supervision that complement and take advantage of the new technology (Garicano and Heaton 2010).

Specific IT advances, that have clearly defined and easily quantified outcomes, have shown some promise. Mastrobuoni (2017) evaluates the impact of predictive policing on bank robberies. Using a quasi-experimental identification strategy that exploits a unique historical quirk of policing in Milan, Italy, Mastrobuoni (2017) is able to observe the probability that otherwise similar bank robberies are cleared by arrest when the robbery occurs in the jurisdiction of a more traditional police force, or a police force which predicted the likely location of that robbery, based on past events. Giving police commanders access to software which predicts the location of future crimes appears to result in substantial increases in arrests per crime, with corresponding overall reductions in crime. Technological advancements that directly aid police investigatory practices, such as the expansion of DNA databases, may increase the ability of police to make arrests and subsequently reduce overall crime (Doleac 2017, Tegner Anker et al 2019). Carr and Doleac (2016) show that audio surveillance can increase the number of potential assaults that police know about by 88%%, however the impact this increase in knowledge about the criminal environment has on police effectiveness is unclear.

5.3. Recent Economic Contributions to the Study of Police and Legitimacy

While there are certainly gaps, economists, like other social scientists, have made substantial contributions to our understanding of the causal effect of policing on crime. There is close to no information on whether crime reductions achieved through policing are socially efficient; this requires knowing more about the legitimacy costs of police force.

In the United States, one particularly salient cost of police force is the concern that it is biased. In other words, do -police officers perceive a lower net expected benefit, when making decisions about whether or not to exercise their state-granted authority, place more weight on the

cost of force used against one type of person than they do on force used against another type? Indeed, one of the central recommendations of the Presidential Task Force on 21st Century Policing was that officers should share cultural, racial, gender, and language background with the citizens they police (President's Task Force on 21st Century Policing, 2015). In both the ACS and Uniform Crime Reports policing is male-dominated profession; over 85% of officers are male, and there has been little change in the gender composition of law enforcement over time. In 2017 just over 68% of officers identified as White, 15% identified as Hispanic, 14% as Black and about 3% as Asian. This was slightly more White than the United States at the time, which was 60% White, 18% Hispanic, 13% Black, and 6% Asian.

A small number of economic studies have examined the role of the race and gender of police officers on how those officers interact with the community, along with crime rates. McCrary (2007) presents evidence that hiring more Black officers has little impact on crime, but does appear to reduce the fraction of arrestees who are Black. This is consistent with an increase in the social efficiency of policing, to the extent that prior to the policy change the marginal Black person arrested by a White officer generated little social benefit. Miller and Segal (2012) also examine the impact of hiring changes spurred by credibly exogenous lawsuits, finding that hiring more female officers increases the likelihood that women report domestic violence, with corresponding reductions in assaults against women. While not examining changes in the makeup of the police force, per se, Perova and Reynolds (2016) find supporting evidence that having access to female police officers can increase the probability that young women seek police assistance, based on spatial and temporal variation in intimate partner violence and the opening of all-female police stations in Brazil. Heaton (2010b), measures how the racial composition of arrestees changed after police in New Jersey were subject to intense scrutiny over their use of race in traffic stops. Heaton finds that this oversight did reduce arrest rates for Black people in New Jersey by up to a third, but also presents evidence that car theft in police jurisdictions where more Black people lived increased. While Heaton (2010b) suggests the marginal arrest of a black person in New Jersey did have a non-zero social benefit, there is no explicit evaluation of whether or not this increase in car thefts was more socially harmful than the observed reduction in racial profiling. Cunningham and Gillezeau (2018, 2019) examine how police violence changes after periods of civil uprising. Both present evidence that there is a long run increase in the number of people, specifically non-white people, killed by law enforcement in

counties where public protests against racially disparate police force occurred.   This is potentially driven by an increase in the likelihood of subsequent uprisings.

With these exceptions, economic research on policing and racial bias is almost entirely descriptive, in that it can be characterized as developing strategies to identify and quantify the presence of racial bias in police decision making. Here, the challenge is that the set of people at risk of having some level of force used against them is unobserved by the researcher. This means that identifying the presence of different decision rules across different groups of people sometimes requires making strong assumptions.

The most straightforward test for bias is an "external benchmark," which attempts to create some sophisticated estimate of this at-risk population. In the specific case of racial bias, constructing an external benchmark requires researchers to take a stand on where exactly the impact of racial bias in policing "begins." Any particular stand on this is going to be ultimately unsatisfactory. For example, it is unlikely that police officers are the sole source of structural racial disadvantage in the U.S. Comparing the incidence of force to the general population attributes any racial bias in the workforce, which that lowers legal income for Black people and increases the likelihood they commit crime, to police officers. Alternatively, comparing the incidence of serious bodily injuries inflicted by police officers among Black and White arrestees will not capture the influence of any bias in an officer's decisions leading up to the point of arrest.

One of the earliest contributions to detecting racial bias, in the absence of information on the population at risk, was the "hit rate" analysis developed by Knowles, Persico, and Todd (2001). Knowles, Persico and Todd (2001) extended the Becker (1957) outcome test by pointing out that, in a simple model with binary officer decisions that are exogenous to observables, if officer and citizens are homogenous then having identical average "success rates" of search rates across groups implies an equal search probability of the marginal offender in each group. This work led to a series of papers which developed strategies to identify racial bias with weaker assumptions, particularly allowing for differences in the severity of offending, and variation in the influence of bias across officers. Anwar and Fang (2005) and Antonovics and Knight (2004) both build on Knowles, Persico and Todd (2001) KPT by exploiting, among other things, variation in the decision of officers of different races to stop or search people in difference racial groups.

Having access to the identity of an officer can allow for an additional test for discrimination, specifically an "internal benchmark," which essentially compares the propensity of an officer to stop or arrest people of different races, to others in the department. The idea of an internal benchmark is generally attributed to criminologist Samuel Walker (Walker, 2001), and was statistically formalized in Ridgeway and MacDonald (2009). Weisburst (2019b) provides a clear example of an economic application of an internal benchmark test, showing that police officers in Dallas, Texas demonstrate a substantial amount of variation in the propensity to make an arrest. This inconsistency in which force is used, and the subsequent horizontal inequality in law enforcement responses to otherwise similar events, is particularly interesting as it may increase the legitimacy cost of any particular expression of police force (Tyler 1990).

The third strategy commonly used by economists, along with other social scientists, to identify racial bias is the "veil of darkness" test, formalized by Grogger and Ridgeway (2006). This test identifies the presence of racial bias by comparing the racial composition of people stopped when race is observable to the racial composition of those stopped when race is unobservable. Of course, the key issue here is properly identifying situations where race is and is not observed by an officer, but all other conditions are equal. Police-citizen interactions during inter-twilight hours, before and after daylight savings time, is a common identification strategy (e.g. Grogger and Ridgeway 2006, Ritter 2017, caveated in Kalinowski et al 2019), but alternative strategies include variation in observability generated by light pollution (Horrace and Rohlin 2016) or other weather phenomena (Kalinowksi et al 2020).

Economists have also identified specific situations where individual police officers appear to behave in ways that favor one racial group over another. Goncalves and Mello (2019) identify bunching in the reported speeds of motorists of different races, consistent with Florida Highway Patrol officers systematically downgrading the reported excess speed of Whitewhite drivers. Luh (2020) presents evidence that state troopers in Texas are more likely to report that stopped drivers with Hispanic surnames are White if they conducted a search, but did not discover contraband. While the overall prevalence of the specific biased behaviors evident in these papers is unknown, when the observed outcome (a stop) is a function of race, or when observed race is a function of the outcome of a stop, all of the previous methods of detecting racial bias will break down.

6. Summary / Conclusion

Police officers are the literal manifestation of the State's coercive power. Economists and non-economist policing scholars have long noted, with different terminology, that "good" policing requires a careful balancing act between being a forceful and coercive warrior, and a guardian with a credible commitment to the social welfare of all people. In the United States, policing is done at a highly decentralized level, in stark contrast to other developed countries. This creates a situation where there are many opportunities for quasi (or actual) experimental variation in policing that can inform how governments can reduce crime in a socially efficient way that balances both the costs and benefits of force used by officers.

Economists, particularly applied microeconomists, have made important contributions to our understanding of the negative relationship between police force size and crime, as well as the measurement of racial bias, which is an important component of the social cost of policing, particularly in the United States. Economists have made relatively less progress evaluating the impact of non-deployment related policing policies on crime, although a handful of methods do seem to be effective at reducing crime in specific contexts.

Back-of-the-Envelope calculations of the return to police are generally based on estimates of the benefits of crime reduction (e.g. Heaton 2010a) and the fiscal cost of administering criminal justice. This has left out the impact that police actions can have on the legitimacy of law enforcement and credibility of the state as a benevolent social planner. To date, economists have paid scant attention to how variation in policing strategies can affect the social costs of law enforcement, even in the area of racial bias where the tools to quantity it have reached a high level of sophistication. Where the data suggest that bias exists, how large are the costs of racial bias relative to the benefits of any crime reduction associated with these police choices? More work quantifying the incidence and social costs of force and perceived discrimination by police officers is also necessary.

One important reason for this is the relative paucity of data on what police officers do, compared with publicly available data on criminal activity. Recent federal, state, and academic initiatives, such as California's Racial Identity and Profiling Act of 2015, as well as the rise of technology which has increased the monitoring of officers, is beginning to change this imbalance. In addition to legislative advances in measuring police behavior, like the rise of technology in policing has opened the possibilities for economists to make real progress in this

area. For example, one potential impact of the spread of IT in policing, such as body worn cameras, is that the data collected by these cameras has increased the visibility of police officers' actions in the field – both for their immediate supervisors and for researchers. Voigt et al (2016) provides an exciting example of the possibilities of this research, which in theory could extend the systematic social observations of officer activity (e.g. Jonathan-Zamir et al 2015) to multiple departments, before and after policy changes. Many specific police actions and associated costs that could be quantified are clearly identified in scholarship outside of economics (e.g. Desmond and Valdez 2013, Hinton 2015, Muñiz 2015, Rios 2011, 2017, Del Toro et al 2019, Western 2006, Meares 2015, Meares and Fagan 2008). Quantitative social science has only begun to engage with estimating the social costs of policing, specifically identifying how varying policing policies can affect perceived racial bias, police legitimacy, or discriminatory behavior by officers themselves.

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