# Private Security and Public Policing

*Preliminary Version*

Anna M. Wilke*

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**Abstract**

Law enforcement is a core task of governments. Yet, governments are not the only actors that provide security. In some contexts, the private security industry employs more than twice as much personnel as public law enforcement. In this paper, I build a theoretical model that sheds light on the incentives of political parties to invest in law enforcement when citizens are able to rely on private alternatives. The model features a continuum of citizens who are differentiated by their ability to earn income through legal means. Citizens choose whether to commit crime and whether to purchase private protection. The level of public spending on the police is determined by either a left-wing or a right-wing political party. Contrary to the popular wisdom that conservative parties are tough on crime, the model predicts that both left- and right-wing parties may over- and under-invest in policing relative to the social optimum. The extent to which they do depends on the wealth of society.

*amw2229@columbia.edu, Department of Political Science, Columbia University.

# 1 Introduction

Tough-on-crime policies such as increased or militarized policing and harsh sentences are common throughout the world. Prominent examples include the American "war on drugs" and other law enforcement initiatives that have contributed to a massive increase in incarceration rates in the United States since the 1970s, the more recent anti-drug campaign of President Rodrigo Duterte in the Philippines and *mano dura* ("strong-handed") crime policies in El Salvador. A main criticism of such tough-on-crime approaches, apart from their adverse consequences for the rights of criminal suspects, has been the diversion of a disproportionate amount of government resources towards law enforcement (Gottschalk, 2008; Soss and Weaver, 2017). Elsewhere, concerns are of the opposite nature. Insufficient police staff, resources and training are said to contribute to crime and insecurity in many contexts including parts of Africa (Baker, 2017), Latin America (Dammert, 2019), Asia (Human Rights Watch, 2009) and Europe.[1] What determines how much elected officials choose to invest in law enforcement?

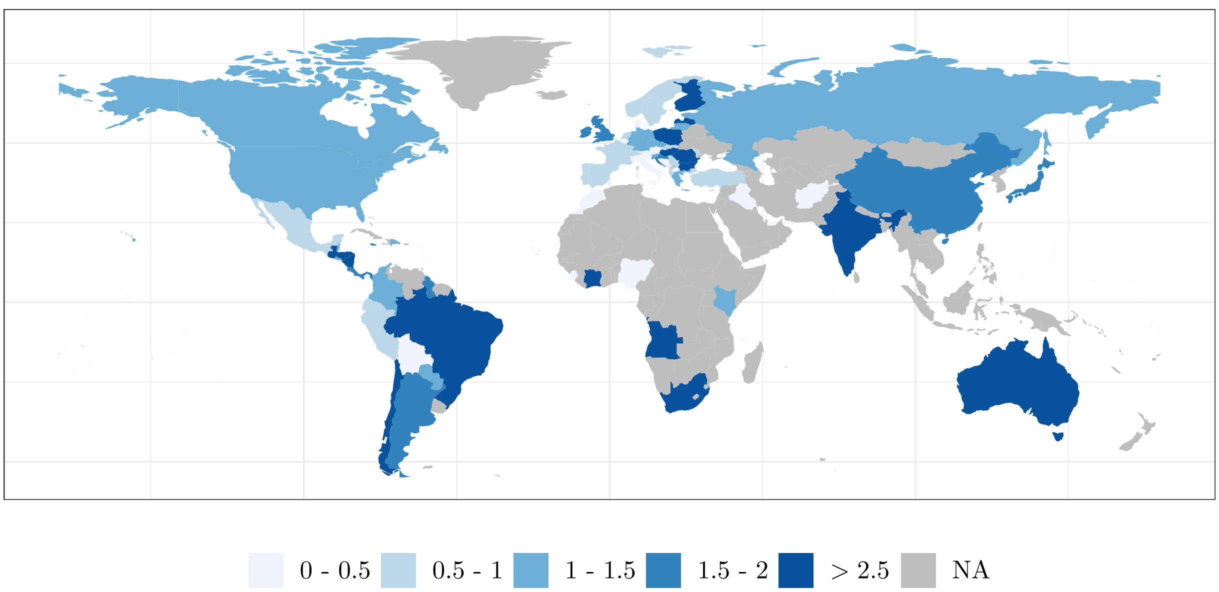
Law and order politics are traditionally associated with conservative parties. Given their focus on individual responsibility, parties on the right are often described as ideologically predisposed to emphasize law enforcement (Caldeira and Cowart, 1980). Yet, even though many tough-on-crime policies have been implemented by conservative parties, politicians on the left have not been entirely passive in this regard. Consider, for example, Andrés Manuel López Obrador, the current president of Mexico. During his term as mayor of Mexico City from 2000 to 2005, Obrador supported a group of local business men in hiring Rudolph Giuliani, former mayor of New York City who is known for his "zero-tolerance" approach to crime, to help address Mexico City's crime problem. Following Giuliani's recommendations, Obrador enacted legislation that increased prison terms for existing offenses, defined new categories of crime and led to a drastic increase in prison populations. Far from being a conservative, Obrador is a member of the social democratic Partido de la Revolución Democrática. Similar examples of left-wing politicians being tough on crime exist elsewhere in Latin America as well as in other parts of the world.[2]

[1] See here for a news report on British police being understaffed.

[2] Holland (2013) and Bonner (2019) provide other examples of Latin American parties on the left that have embraced tough-on-crime approaches. South Africa, which has been ruled by the center-left African National Congress since 1994, has one of the highest incarceration rates in Africa and the world (Super, 2016). In the US context, Forman Jr (2017) discusses the role of African American officer holders, many of whom are Democrats, in pushing for tough-on-crime policies. Examples include John Ray, a Democratic council member in D.C. from 1979 to 1997, who pushed for higher maximum and mandatory minimum sentences and Marion Barry, Democratic mayor of D.C. from 1979 to 1991, who oversaw a major antidrug initiative that massively extended police powers and produced a spike in drug-related arrests.

From a theoretical perspective too there are reasons to suspect that the relationship between partisan politics and law enforcement policies may be more complicated. One important consideration is that citizens do not only rely on governments for protection against crime. Around the world, citizens invest in various forms of private security to minimize crime-induced property loss and physical harm. Examples of such private security measures include but are not limited to burglar alarms, camera systems, security guards, armed response teams, and gated communities. Figure 1 shows that private security personnel outnumber police personnel across a range of contexts – sometimes by a factor of more than two-to-one. Those who can afford to move to a gated community or hire a security guard often belong to richer segments of society that also form the base of conservative parties. Where private security allows the rich to reduce their dependence on public efforts to maintain order, it appears less obvious that conservative parties will emphasize law enforcement.

Figure 1: Private security personnel per police officer




Data have been compiled by the Pulitzer Center using various sources and have been accessed here. They stem from various years between 2011 and 2016.

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In this paper, I develop a theory that sheds light on the incentives of right- and left-wing parties to spend public funds on policing when citizens can invest in private alternatives. My model features a continuum of citizens who are differentiated by how much income they earn through legal means. Citizens choose whether to commit crime and whether to purchase private protection. Those who commit crime earn additional income by expropriating others. Citizens can protect themselves against expropriation by purchasing private protection.

There are two political parties. The left-leaning party represents the lower half of the income distribution, while the right-leaning party represents the upper half of the income distribution. The party in power chooses how much of an exogenously given government budget to spend on policing. Public investments into the police force increase the costs of criminal activity, thereby reducing the incentives to commit crime as well as the need for private protection. Whatever is not invested into policing is spent on an alternative public good such as roads or education that yields the same marginal benefit for all citizens. Parties seek to maximize the welfare of their base, taking into account how crime and protection choices change as a result of how much is spent on policing.

The model predicts that both left- and right-wing parties may spend suboptimal amounts on policing and that their tendency to do so is linked to the wealth of society. If society is not too rich, the base of the left-wing party consists of a mix of criminally active individuals and individuals who are relatively poor and hence less concerned about protecting their income against crime. The base of the right-wing party is dominated by law-abiding citizens who are rich enough to care about the protection of their incomes but not so rich that they would purchase private protection. As a consequence, left-wing parties are prone to under- and right-wing parties prone to over-invest into law enforcement relative to what would be socially optimal.

As society grows richer, the base of the right-wing party becomes increasingly dominated by individuals who are rich enough to purchase private protection and who thus oppose investments into public policing. The base of the left-wing party becomes less dominated by those who are engaged in crime. Supporters of the left-wing party also become richer and hence more concerned with keeping their incomes safe, though not rich enough to purchase private protection. Ultimately, left-wing parties become prone to over-, and right-wing parties become prone to under-invest in law enforcement relative to the social optimum.

These results speak to empirical work on the relationship between partisanship and law enforcement policies. Existing evidence is concentrated in the US and suggests that Republican control on state and federal levels correlates with increased rates of incarceration and law enforcement expenditures (Caldeira and Cowart, 1980; Jacobs and Carmichael, 2001; Jacobs and Helms, 1996, 2001; Smith, 2004; Yates and Fording, 2005). Work that focuses on the local level and pays closer attention to causal identification, however, demonstrates that Democratic mayors may spend no less or even more on policing than Republican ones (de Benedictis-Kessner and Warshaw, 2016).[3] Outside the US, Block (2019) finds that whether Mexican governors from right-wing parties spend more on policing than those from parties on the left depends on the party of their political opponent. In Europe, the picture looks similarly mixed. Guillamón, Bastida and Benito (2013), for example, demonstrate that conservative parties in Spain increase local public spending on the police. A study of the law enforcement legislation passed under various national governments in the UK, on the other hand, assigns greater "toughness scores" to the Labor governments under Blair and Brown than to the preceding and subsequent conservative governments (Staff, 2018). My model contributes a new and testable hypothesis to this debate: The relationship between partisan politics and anti-crime policy may be conditional on the income level in the polity under consideration.

This paper also relates to the political economy literature on service provision by public and private actors. Several papers study the existence and characteristics of majority voting equilibria in the presence of private alternatives (see e.g. De la Croix and Doepke, 2009; Epple and Romano, 1996*a*,*b*; Glomm and Ravikumar, 1998). Similar to the set up presented here, these models consider a continuum of citizens who choose whether to purchase a private alternative and whose preferences collectively determine the quality of public provision. Yet, these models feature neither political parties nor a model of crime. Only a handful of papers combine the focus on public and private provision with an explicit focus on law enforcement.[4] One example is Guha (2013) who considers the effect of an exogenously given level of policing on the incentives to purchase various kinds of private protection. Closer to this paper are Helsley and Strange (2005) and Mendoza (1999) who endogenize the level of public spending on the police. In contrast to the model presented here, both papers do not feature political parties.

This paper proceeds as follows. Section 2 presents the model set up. Section 3 derives crime and protection choices for a given level of public spending on the police. Section 4 considers the resulting preferences over police spending for various parts of the population. Section 5 describes parties' spending choices. Section 6 concludes.

[3] de Benedictis-Kessner and Warshaw (2016) also find that Democratic mayors have generally higher expenditures than Republican mayors. Using a similar regression discontinuity design, Ferreira and Gyourko (2009) do not find any differences between Democratic and Republican mayors. Results shown by Gerber and Hopkins (2011), on the other hand, suggest that Republican mayors spend more on public safety than Democratic mayors.

[4] The focus in Epple and Romano (1996*a*) and De la Croix and Doepke (2009), for example, is education. Epple and Romano (1996*b*) considers health services.

# 2 Model

## 2.1 Income, Crime, and Private Protection

There is a continuum of individuals with population size normalized to 1. Individuals are distinguished by their ability to earn income through legal means. I denote by $\theta_i \in \Theta = [0, \overline{\theta}]$ the legal income of individual $i$. The distribution of income in the population is uniform with support $\Theta$. Citizens have risk-neutral preferences over income.

Each individual $i$ makes a choice $x_i^c \in \{0, 1\}$ of whether to commit crime and a choice $x_i^p \in \{0, 1\}$ of whether to purchase private protection. Let $\lambda_j$ denote the subset of types in $\Theta$ that choose to engage in activity $j \in \{c, p\}$. A citizen who commits crime expropriates the legal income of exactly one victim. This victim is chosen at random from the set of unprotected individuals, i.e., from those with $\theta_i \notin \lambda_p$. The expected return to crime is thus given by $\mathbb{E}[\theta_i \mid \theta_i \notin \lambda_p]$. Citizens who commit crime suffer cost $d\theta_i$. These costs capture the idea of a minimum amount of law enforcement that exists independent of the political process. Throughout, I assume $d > 1$, though my analysis of party platforms below will require a slightly more restrictive assumption. The exogenous costs of crime thus increase with a citizen's income. Richer individuals may have greater opportunity cost in terms of time when incarcerated, for example, and the decline in future job prospects as a result of incarceration may be greater for those who work white- rather than blue-collar jobs.

Citizens who purchase private protection are immune to expropriation and keep their legal income with certainty. Private protection comes at cost $c - e\theta_i$ with $c, e > 0$ and $0 < e < \frac{1}{2}$. The higher a citizen's legal income, the smaller the cost of private protection. This assumption reflects the notion that many forms of private protection are tailored to the lives of individuals at the upper end of the income distribution. Burglar alarms and CCTV systems, for example, require electricity. Households in low-income neighborhoods throughout the developing world often lack access to a stable electricity supply and would thus have to make additional investments such as the purchase of a generator to rely on such devices. Similarly, high-income individuals who can afford a car may be able to relocate to a gated community with relative ease, while low-income households who depend on public transportation may face a significant increase in travel costs.

Citizens who do not purchase private protection lose their legal income $\theta_i$ if they are the target of crime. Denote the share of such unprotected citizens in the population by $\gamma = \Pr\{\theta_i \notin \lambda_p\}$ and the share of citizens who commit crime by $\delta = \Pr\{\theta_i \in \lambda_c\}$. Recall that each citizen who is criminally active expropriates one victim that is randomly chosen from the set of unprotected individuals. It is thus intuitive to assume that the probability that an unprotected individual $i$ is the target of crime and loses her legal income equals $\frac{\delta}{\gamma}$. Equation 1 summarizes citizen $i$'s expected income as a function of her own and society-wide crime and protection choices.

$$y_i(x_i^c, x_i^p, \lambda_c, \lambda_p) = \begin{cases} \theta_i(1 - \frac{\delta}{\gamma}) & \text{if } x_i^c = 0 \text{ and } x_i^p = 0 \\ \theta_i(1 - \frac{\delta}{\gamma}) + \mathbb{E}\left[\theta_i \mid \theta_i \notin \lambda_p\right] - d\theta_i & \text{if } x_i^c = 1 \text{ and } x_i^p = 0 \\ \theta_i - c + e\theta_i & \text{if } x_i^c = 0 \text{ and } x_i^p = 1 \\ \theta_i - c + e\theta_i + \mathbb{E}\left[\theta_i \mid \theta_i \notin \lambda_p\right] - d\theta_i & \text{if } x_i^c = 1 \text{ and } x_i^p = 1. \end{cases} \tag{1}$$

## 2.2 Policing and Public Goods

There is an exogenously given government budget $G$ that can be spent in two ways. First, government revenue can be spent on policing which increases the cost of crime. Individuals who choose to commit crime face a marginal utility loss of $s$ with $0 < s < \frac{c}{G}$ from each additional dollar that is spent on policing. For example, investments into policing may increase the rate of criminal convictions. $s$ can be interpreted as a measure of police effectiveness. Second, government revenue can be spent on a public good unrelated to policing that has marginal benefit $b > 0$ for all citizens. Given a share $\alpha \in [0, 1]$ of government revenue that gets spent on policing, citizens earn the following expected utility:

$$u_i(x_i^c, x_i^p, \lambda_c, \lambda_p, \alpha) = y_i(x_i^c, x_i^p, \lambda_c, \lambda_p) - x_i^c \alpha G s + (1 - \alpha) G b \tag{2}$$

For any given share $\alpha \in [0, 1]$ of government revenue spent on policing, I derive a sorting equilibrium that takes the form of two cutpoints $\theta_j(\alpha) \in \Theta$ for $j \in \{c, p\}$. Each cutpoint $\theta_j(\alpha)$ partitions the type space $\Theta$ into two intervals $\lambda_j^*(\alpha)$ and $\lambda_{\neg j}^*(\alpha)$ such that, in equilibrium, individuals with $\theta_i \in \lambda_j^*(\alpha)$ find it optimal to engage in activity $j$ and individuals with $\theta_i \in \lambda_{\neg j}^*(\alpha)$ find it optimal not to engage in activity $j$. Formally, $\theta_c$ must be such that for each individual $i$, $u_i(1, x_i^{p*}, \lambda_c^*, \lambda_p^*, \alpha; \theta_i) \geq u_i(0, x_i^{p*}, \lambda_c^*, \lambda_p^*, \alpha; \theta_i)$ if $\theta_i \in \lambda_c^*(\alpha)$ and $u_i(0, x_i^{p*}, \lambda_c^*, \lambda_p^*, \alpha; \theta_i) \geq u_i(1, x_i^{p*}, \lambda_c^*, \lambda_p^*, \alpha; \theta_i)$ if $\theta_i \in \lambda_{\neg c}^*(\alpha)$. The conditions for $\theta_p$ are analogous. Individuals in this model hence take the interval of types $\lambda_c(\alpha)$ that commit crime and the interval of types $\lambda_p(\alpha)$ that purchase private protection as given and, for any given $\alpha$, choose optimally whether to engage in crime and whether to buy private protection.

In addition to the set up presented so far, I make the following assumption about the upper bound of the income distribution $\overline{\theta}$:

$$\overline{\theta}_{min} = \frac{2\left(cd + Gs\right)}{1 + 2de} < \overline{\theta} < \frac{4dc}{2de + 1} = \overline{\theta}_{max}. \tag{3}$$

This assumption makes sure that the two equilibrium cutpoints are always interior. It also ensures that, in equilibrium, median types with income $\frac{\overline{\theta}}{2}$ never commit crime and always remain unprotected.

### 2.3 Politics

There are two political parties indexed by $k \in \{L, R\}$. Party $L$ represents the lower half of the income distribution, i.e. all citizens with $\theta_i \in \left[0, \frac{\overline{\theta}}{2}\right]$. Party $R$ represents the upper half of the income distribution, i.e. all citizens with $\theta_i \in \left[\frac{\overline{\theta}}{2}, \overline{\theta}\right]$. Party $k$ chooses a proportion $\alpha_k$ of government revenue that is spent on policing rather than on the alternative public good. Parties seek to maximize the welfare of their base in the sorting equilibrium that results from their chosen platform.

## 3 Sorting Equilibrium

To gain intuition for the sorting equilibrium, consider first the decision of whether to engage in crime. In deciding whether to commit crime, a citizen trades off the benefit of additional income from expropriation against the cost of crime. The net benefit of engaging in crime is given by

$$\mathbb{E}\left[\theta_i \mid \theta_i \notin \lambda_p\right] - d\theta_i - \alpha Gs.$$

Taking the set of privately protected individuals $\lambda_p$ as given, it is easy to see that the net benefit of committing crime is decreasing in an individual's legal income $\theta_i$. As a consequence, individuals with a greater legal income have less incentive than individuals with a smaller legal income to commit crime. Hence, in any sorting equilibrium with a single indifferent type $\theta_c(\alpha)$, low income individuals with $\theta_i \leq \theta_c(\alpha)$ will choose to commit crime and high income individuals with $\theta_i > \theta_c(\alpha)$ will refrain from doing so.

Next, let us consider the decision of whether to purchase private protection. Individuals who do not purchase private protection lose their legal income to crime with probability $\frac{\delta}{\gamma}$. The benefit of purchasing private protection is that one gets to keep one's legal income with certainty. Yet, private protection comes at a cost $c - e\theta_i$. Any citizen will hence find it optimal to purchase private protection if

$$\theta_i - c + e\theta_i \geq \theta_i(1 - \frac{\delta}{\gamma}).$$

It is easy to see that the left-hand side of this expression increases faster with $\theta_i$ than the right-hand side. Intuitively, protecting oneself against expropriation becomes more important the higher the legal income that one may lose. In addition, private protection becomes less costly the higher one's legal income. For a given crime rate, richer individuals thus have a greater incentive than poorer individuals to purchase private protection. In a sorting equilibrium with a single indifferent type $\theta_p(\alpha)$, high income individuals with $\theta_i > \theta_p(\alpha)$ will thus find it optimal to purchase private protection, while low income individuals with $\theta_i \leq \theta_p(\alpha)$ will prefer to remain unprotected.

Given that the equilibrium takes this form, we can make use of the properties of the uniform distribution to express the quantities in citizens' utility function that depend on society-wide crime and protection choices as a function of the equilibrium cutpoints $\theta_c(\alpha)$ and $\theta_p(\alpha)$. Recall that the probability that an unprotected citizen loses her legal income to crime is given by $\frac{\delta}{\gamma}$, where $\delta$ denotes the population share of citizens who commit crime and $\gamma$ the share of citizens who remain unprotected. Since, in equilibrium, all individuals with $\theta_i \leq \theta_c(\alpha)$ choose to commit crime, we can write the equilibrium share of citizens who commit crime as $\delta = \frac{\theta_c(\alpha)}{\bar{\theta}}$. Similarly, the equilibrium share of citizens who remain unprotected can be expressed as $\gamma = \frac{\theta_p(\alpha)}{\bar{\theta}}$, since, in equilibrium, all individuals with $\theta_i \leq \theta_p(\alpha)$ choose to remain unprotected. Finally, recall that the expected return to crime is given by the expected income among unprotected citizens. In equilibrium, those who engage in crime can thus expect to earn $\mathbb{E}\left[\theta_i \mid \theta_i \notin \lambda_p(\alpha)\right] = \frac{\theta_p}{2}$.

Solving for the sorting equilibrium entails substituting these expressions into the utility function given in equation 2 and finding the values of $\theta_c(\alpha)$ and $\theta_p(\alpha)$ which jointly satisfy the requirement that type $\theta_c(\alpha)$ is exactly indifferent between committing and not committing crime, while type $\theta_p(\alpha)$ is exactly indifferent between purchasing and not purchasing private protection. In other words, $\theta_c(\alpha)$ and $\theta_p(\alpha)$ need to solve the following system of equations:

$$u_i(x_i^c = 1, x_i^p; \theta_c) = u_i(x_i^c = 0, x_i^p; \theta_c)$$
$$u_i(x_i^c, x_i^p = 1; \theta_p) = u_i(x_i^c, x_i^p = 0; \theta_p).$$

Lemma 1 characterizes the resulting sorting equilibrium. Its proof and all other proofs can be found in the appendix.

**Lemma 1** (Sorting Equilibrium)**.** *For all $\alpha \in [0,1]$, there is a unique sorting equilibrium with two cutpoints*

$$\theta_c(\alpha) = \frac{c - 2e\alpha Gs}{1 + 2de} \tag{4}$$
$$\theta_p(\alpha) = \frac{2(cd + \alpha Gs)}{1 + 2de} \tag{5}$$

*such that*

$$x_i^{c*} = \begin{cases} 1 & \text{if } \theta_i \in [0, \theta_c(\alpha)] = \lambda_c^*(\alpha) \\ 0 & \text{if } \theta_i \in \big(\theta_c(\alpha), \overline{\theta}\big] = \lambda_{\neg c}^*(\alpha) \end{cases}$$

*and*

$$x_i^{p*} = \begin{cases} 0 & \text{if } \theta_i \in [0, \theta_p(\alpha)] = \lambda_{\neg p}^*(\alpha) \\ 1 & \text{if } \theta_i \in \big(\theta_p(\alpha), \overline{\theta}\big] = \lambda_p^*(\alpha). \end{cases}$$

*For all $\alpha \in [0,1]$, the cutpoints satisfy the following inequalities:*[5]

$$0 < \theta_c(\alpha) < \frac{\overline{\theta}}{2} < \theta_p(\alpha) < \overline{\theta}.$$

Note that the two cutpoints $\theta_c(\alpha)$ and $\theta_p(\alpha)$ are sufficient to fully characterize citizen behavior in the sorting equilibrium. To simplify notation, I will subsequently dispense with $\lambda_j^*(\alpha)$ and $\lambda_{\neg j}^*(\alpha)$ and refer to the cutpoints only. According to lemma 1, the cutpoints are always interior and $\theta_c(\alpha) < \theta_p(\alpha)$ for all $\alpha$. In practice, the sorting equilibrium thus divides the type space into three intervals (see figure 2). Individuals with $\theta_i \in [0, \theta_c(\alpha)]$ at the lower end of the income distribution remain unprotected and commit crime. Individuals with $\theta_i \in (\theta_c(\alpha), \theta_p(\alpha)]$ in the middle of the income distribution also remain unprotected but do not commit crime. Individuals with $\theta_i \in \big(\theta_p(\alpha), \overline{\theta}\big]$ at the upper end of the income distribution do not commit crime but purchase private protection. No one finds it optimal, in equilibrium, to do both, commit crime and purchase private protection. The median of the income distribution remains unprotected and never commits crime.

[5]This result makes use of the following parameter restrictions introduced in the model set up: $d > 1$, $0 < e < \frac{1}{2}$, $c > Gs$ and $\overline{\theta}_{min} < \overline{\theta} < \overline{\theta}_{max}$.

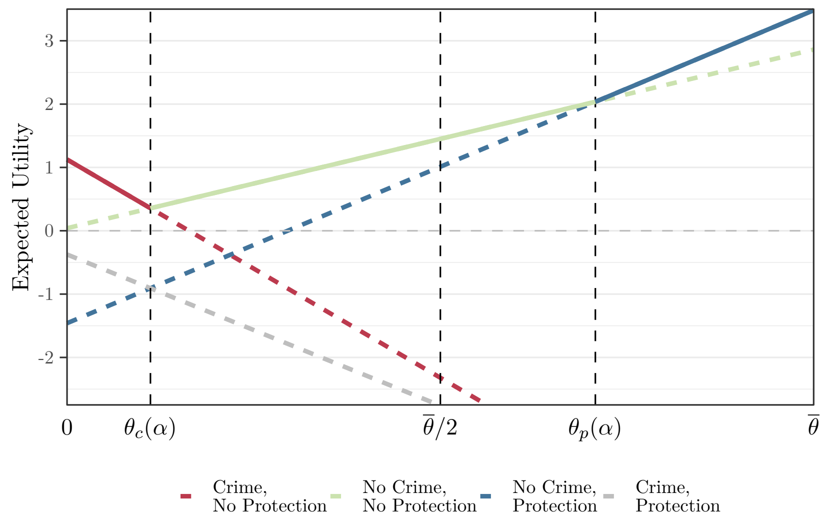


Figure 2: Sorting equilibrium for a given budget share $\alpha$ that is spent on policing

$\alpha = 0.1$, $G = 1$, $s = 1$, $c = 1.5$, $d = 2.9$, $e = 0.475$, $b = 0.045$

How does equilibrium behavior change as more of the public budget is spent on policing? It is easy to see that $\theta_c(\alpha)$ decreases in $\alpha$. Intuitively, increased public spending on the police decreases the size of the criminal sector, because it makes crime more costly. At the same time, $\theta_p(\alpha)$ increases in $\alpha$. As the size of the criminal sector decreases, fewer citizens at the upper end of the income distribution see the need to purchase private protection. In other words, an increase in $\alpha$ moves both equilibrium cutpoints outwards, thereby increasing the middle segment of the population that neither commits crime nor purchases private protection. Both, the decrease in the share of criminally active and the increase in the share of unprotected citizens contribute to a decrease in the equilibrium probability that any given citizen without protection loses her income to crime, which is given by

$$\frac{\delta}{\gamma} = \frac{\theta_c(\alpha)}{\theta_p(\alpha)} = \frac{c - 2e\alpha Gs}{2(cd + \alpha Gs)}.$$

## 4 Induced Preferences Over Police Spending

In this section, I discuss preferences over $\alpha$, the share of the available public budget spent on policing, that result from this sorting equilibrium. Given how crime and protection choices change with $\alpha$, what amount of police spending do different segments of the population prefer?

Note first that some but not all citizens change their equilibrium behavior with $\alpha$. The equilibrium cutpoints are always interior and $\theta_c(\alpha) < \theta_p(\alpha)$ for all $\alpha \in [0, 1]$. Hence, there always exists a set of types at the bottom, at the top and in the middle of the income distribution whose behavior does not depend on $\alpha$ (see also figure 4 below). Individuals with $\theta_i < \theta_c(\alpha = 1)$ will always commit crime, even if the entire public budget is invested in policing. Individuals with $\theta_c(\alpha = 0) < \theta_i < \theta_p(\alpha = 0)$ will never commit crime and never buy private protection, even if none of the available budget is invested in policing. Finally, individuals with $\theta_i > \theta_p(\alpha = 1)$ will always purchase private protection even if all of the available budget is invested into policing. The crime and protection choices of citizens with $\theta_i \in (\theta_c(\alpha = 1), \theta_c(\alpha = 0)]$ or $\theta_i \in (\theta_p(\alpha = 0), \theta_p(\alpha = 1)]$, on the other hand, will change as $\alpha$ changes.

Substituting the equilibrium expressions for $\theta_c(\alpha)$ and $\theta_p(\alpha)$ into the utility function given in equation (2) reveals that the indirect utility of types whose behavior does not depend on $\alpha$ is always concave in $\alpha$. Preferences of citizens who change their behavior based on $\alpha$, however, are not necessarily well behaved. To see why, consider figure 3 which plots citizens' indirect utility as a function of $\alpha$. The panel on the left concerns a citizen with $\theta_i \in (\theta_c(\alpha = 1), \theta_c(\alpha = 0)]$ who chooses to commit crime at low levels of police spending ($\alpha \leq \tilde{\alpha_c}$) and refrains from doing so at high levels of police spending ($\alpha > \tilde{\alpha_c}$). The red line depicts citizen $i$'s indirect utility as long as she commits crime, which, in this example, decreases across the entire range of $\alpha$ and is hence maximized at $\alpha = 0$. At $\alpha = \tilde{\alpha_c}$, individual $i$ switches from committing crime to abiding the law. As depicted by the green line, her indirect utility now begins to increase with $\alpha$ and is maximized at $\alpha = \alpha^*(0, 0)$.

Similarly, the right panel displays the indirect utility of a citizen with $\theta_i \in (\theta_p(\alpha = 0), \theta_p(\alpha = 1)]$ who purchases private protection at low levels of police spending ($\alpha \leq \tilde{\alpha_p}$) and refrains from doing so at high levels of police spending ($\alpha > \tilde{\alpha_p}$). As depicted by the blue line, the indirect utility of this individual is decreasing in $\alpha$ as long as she purchases private protection. After all, the main benefit of spending on the police is that it reduces the chance of losing one's income to crime. Privately protected individuals cannot be expropriated and hence always prefer for the entirety of the public budget to be spent on the alternative public good. At $\alpha = \tilde{\alpha_p}$, this citizen does no longer want to purchase private protection. Now, her indirect utility begins to increase with $\alpha$. In fact, conditional on not wanting to purchase private protection, the individual in this example prefers for the entirety of the available budget to be spent on policing. Clearly, in both of these examples, citizens' preferences are not single peaked in $\alpha$.

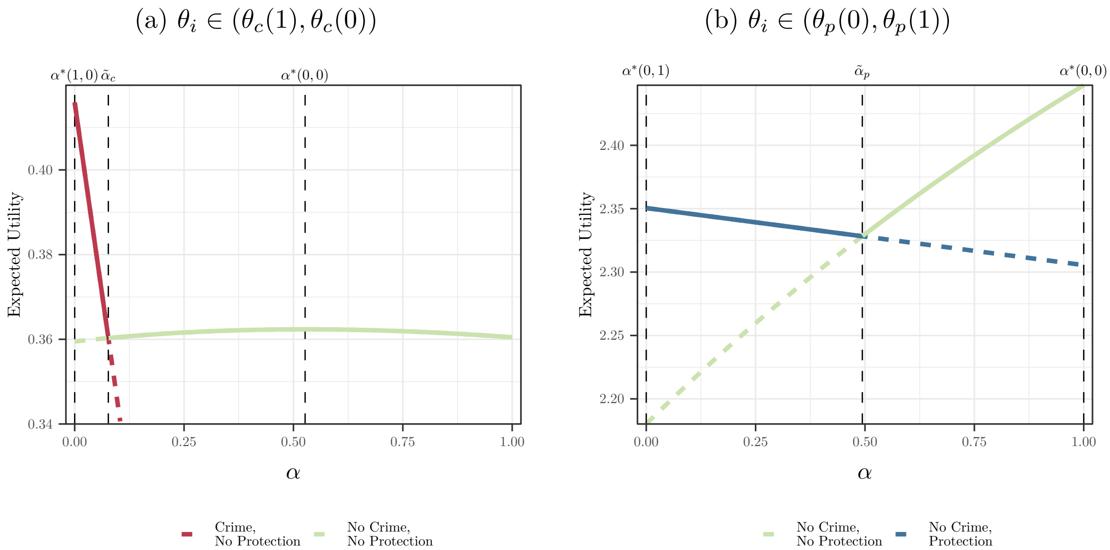


Figure 3: Indirect utility for a given type $\theta_i$ as a function of policing budget share $\alpha$

$G = 1$, $s = 1$, $c = 1.5$, $d = 2.9$, $e = 0.475$, $b = 0.045$. In the left panel, $\theta_i = 0.38$. $\tilde{\alpha}_c$ denotes the policing budget share for which $\theta_c(\alpha) = 0.38$. In the right panel, $\theta_i = 2.58$. $\tilde{\alpha}_p$ denotes the policing budget share for which $\theta_p(\alpha) = 2.58$

That the presence of private provision may induce non-single peakedness in the preferences over a publicly provided service is a well-known result in the literature. As a consequence, a simple majority voting equilibrium may not exist and, if it does exist, the median voter may not be pivotal. Others have focused on the conditions under which a majority voting equilibrium in models of public and private provision exist and on the form that such an equilibrium takes (Epple and Romano, 1996*a*).

Here, my interest lies with the policies chosen by left- and right-wing parties. Parties' choices will ultimately take into account both, how citizens' behavior and, conditional on their behavior, how citizens' utility changes as a result of changes in $\alpha$. To develop intuition for the forces that drive the choice of party platforms, this section characterizes citizens' preferences over police spending *conditioning* on a citizen's own crime and protection choices. In other words, I ask, presuming that an individual of type $\theta_i$, say, commits crime and does not purchase private protection, and taking into account how the crime and protection choices of *other* individuals change with $\alpha$, what is citizen $i$'s preferred budget share of policing? This is a partial equilibrium exercise in the sense that there is no guarantee that type $\theta_i$ would indeed want to commit crime and remain unprotected, even at the budget share of police spending that would maximize her utility conditional on these choices. Lemma 2 summarizes citizens' conditional preferences over police spending.

**Lemma 2** (Preferences over police spending)**.** *Conditional on individual i's crime and protection choices, $x_i^c$ and $x_i^p$, $u_i(x_i^c, x_i^p, \theta_c(\alpha), \theta_p(\alpha), \alpha)$ is concave in the budget share $\alpha$ that gets spent on policing. Preferred budget shares are given by*

$$\alpha^*(x_i^c, x_i^p; \theta_i) = \begin{cases} \min\left\{\max\left\{0, \frac{1}{Gs}\left[\sqrt{\frac{\theta_i cs(1+2de)^2}{2(b+2de(b+s))}} - cd\right]\right\}, 1\right\} & \text{if } x_i^c = 1 \text{ and } x_i^p = 0 \\ \min\left\{\max\left\{0, \frac{1}{Gs}\left[\sqrt{\frac{\theta_i cs(1+2de)}{2b}} - cd\right]\right\}, 1\right\} & \text{if } x_i^c = 0 \text{ and } x_i^p = 0 \\ 0 & \text{if } x_i^c = 0 \text{ and } x_i^p = 1 \end{cases} \quad (6)$$

$\alpha^*(0,1;\theta_i) \leq \alpha^*(1,0;\theta_i) \leq \alpha^*(0,0;\theta_i)$ *for all* $\theta_i \in \left[0, \overline{\theta}\right]$.

Privately protected citizens who do not commit crime always prefer zero spending on the police. These citizens only earn legal income and this legal income is privately protected against expropriation. Since the main upside of police spending is that it reduces the risk of expropriation, these citizens do not reap any benefit from increased policing and would like to see the entire public budget be invested into the alternative public good.

Citizens who remain unprotected may prefer non-zero levels of police spending irrespective of whether they do or do not commit crime. When considering an increase in police spending, all citizens who do not own private protection trade off the benefit of a decrease in the risk of losing their legal income to crime against the utility loss that results from reduced spending on the alternative public good. It is easy to see from equation (6) that unprotected citizens, regardless of their crime choice, prefer higher levels of police spending the lower the marginal value of the alternative public good, $b$, and the higher their legal income, $\theta_i$. Intuitively, a decrease in $b$ makes spending on the alternative public good less attractive relative to spending on the police. Similarly, citizens with a higher legal income stand to lose more to crime and hence derive a larger marginal benefit from spending on the police.[6]

Unprotected citizens who commit crime trade off two additional considerations when deciding how much of the public budget they would like to be spent on policing. First, an increase in police spending decreases the incentives for those at the upper end of the income distribution to purchase private protection. As the lowest type who purchases private protection, $\theta_p$, shifts to the right, the average income among unprotected individuals and hence the return to crime increases. On the flip side, an increase in police spending directly reduces the utility of criminally

[6] This result is driven by the assumption that expropriation causes the victim to lose her entire income. If criminally active individuals were to steal a fixed amount from their victims irrespective of the victim's income, preferences over police spending among this group would be independent of type.

active individuals by increasing the legal cost of crime. Ultimately, the share of police spending that an unprotected citizen of type $\theta_i$ prefers if she commits crime will always be lower than the share of police spending that she would prefer if she chose to abide by the law.

Taken together, the demand for police spending of a citizen of type $\theta_i$ is greatest if she remains unprotected and does not commit crime, lower if she remains unprotected but commits crime and smallest if she purchases private protection. These relationships are strict except for in cases in which preferences of the unprotected individual lie at the corner.

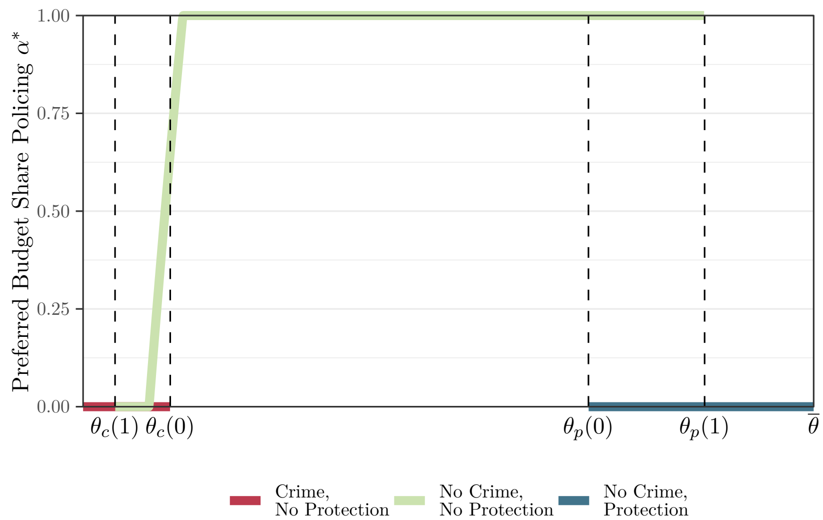


Figure 4: Induced preferences over budget share of policing as a function of type $\theta_i$

$G = 1$, $s = 1$, $c = 1.5$, $d = 2.9$, $e = 0.475$, $b = 0.045$

Figure 4 provides a sense of how the demand for police spending is distributed across the population. The figure plots preferred budget shares as a function of crime choices, protection choices and type. In any sorting equilibrium, individuals with $\theta_i < \theta_c(\alpha = 1)$ at the bottom of the income distribution remain unprotected and commit crime. Hence, this group prefers relatively little policing. In the example shown in figure 4, preferences among this group always lie at the corner. Individuals with $\theta_c(\alpha = 1) < \theta_i < \theta_c(\alpha = 0)$ change their behavior from committing crime to abiding by the law as public spending on policing increases. As they switch to being law-abiding citizens, individuals in this group begin to prefer weakly more police spending. Individuals with $\theta_c(\alpha = 0) < \theta_i < \theta_p(\alpha = 0)$ always remain unprotected and never commit crime. Since demand for policing among all unprotected citizens increases with their legal income, demand for policing is relatively high among this group. In fact, any unprotected type who does not commit crime will always prefer weakly more public spending on the police than any unprotected type who does commit crime, since types who commit crime in equilibrium are always poorer than those who do not.

Citizens with $\theta_p(\alpha = 0) < \theta_i < \theta_p(\alpha = 1)$ prefer high levels of policing up until the point where they switch to purchasing private protection. Once they are privately protected, their demand for policing falls to zero. Individuals with $\theta_i > \theta_p(\alpha = 1)$ at the very top of the income distribution always purchase private protection and hence always prefer zero public spending on the police.

Overall, the model thus predicts that demand for policing is highest among the middle class who is rich enough to care about the risk of losing one's income to crime but not so rich that it would privately protect its income. Demand for policing at the lower end of the income distribution is muted because poorer citizens care less about protecting their income and are more inclined to be criminally active, while demand at the upper end of the income distribution is low because the richest citizens rely on private security rather than public policing to protect their incomes.

# 5 Platform Choice

Before turning to party platforms, I first ask what level of police spending would be chosen by a social planner who maximizes the welfare of citizens. Social welfare is given by the following expression:

$$
\begin{aligned}
W(\alpha) = &\int_0^{\theta_c(\alpha)} \frac{u_i(1, 0, \theta_c(\alpha), \theta_p(\alpha), \alpha)}{\overline{\theta}} d\theta \\
&+ \int_{\theta_c(\alpha)}^{\theta_p(\alpha)} \frac{u_i(0, 0, \theta_c(\alpha), \theta_p(\alpha), \alpha)}{\overline{\theta}} d\theta \\
&+ \int_{\theta_p(\alpha)}^{\overline{\theta}} \frac{u_i(0, 1, \theta_c(\alpha), \theta_p(\alpha), \alpha)}{\overline{\theta}} d\theta. \qquad (7)
\end{aligned}
$$

Equation (7) makes explicit the ways in which social welfare depends on $\alpha$, the share of the public budget that is spent on policing. First, the level of police spending changes the limits of the three integrals. As more of the public budget is spent on policing, fewer people commit crime and purchase private protection, i.e., the limits of the first and third integral move closer together, while the limits of the integral in the middle of the expression move apart. Second, the level of police spending affects the utility functions over which each of the integrals is taken.

As discussed in the previous section, the utility of citizens among each of the three segments of society, those who commit crime, those who purchase private protection and those who do neither, changes with the level of police spending. In some cases, these changes are a result of the fact that $\alpha$ enters citizens' utility functions directly. In others, they result from the ways in which citizens' utility depends on $\theta_c(\alpha)$ and $\theta_p(\alpha)$ and thus on the set of types in the population who commit crime and purchase private protection.

Social welfare turns out to be convex in $\alpha$ and can increase or decrease with how much is spent on policing. The welfare optimum must hence always lie at one of the corners. Put differently, a welfare maximizing social planner will either spend the entirety of the available budget on policing or on the alternative public good. Lemma 3 summarizes the conditions under which either of these alternatives obtains. The result depends on the following threshold value of $b$, the marginal value of the alternative public good:

$$\bar{b}_W = \frac{s(c + 2de^2Gs)}{(1 + 2de)^2\bar{\theta}}. \tag{8}$$

**Lemma 3** (Welfare maximization). *Citizen welfare, $W(\alpha)$, is convex in $\alpha$. The welfare maximizing budget share of policing is given by*

$$\alpha_W^* = \begin{cases} 1 & \text{if } b \leq \bar{b}_W \\ 0 & \text{if } b > \bar{b}_W \end{cases} \tag{9}$$

*$\bar{b}_W$ is decreasing in $\bar{\theta}$.*

Intuitively, as $b$ increases, all citizens stand to gain more from public spending on the alternative public good. As was discussed in the previous section, segments of society who will ever prefer non-zero public spending on the police – those who do not purchase private protection – thus prefer lower levels of police spending at higher levels of $b$. Note also that $\theta_c(\alpha)$ and $\theta_p(\alpha)$ are independent of $b$. In other words, the marginal benefit of the alternative public good has no bearing on whether and which citizens commit crime and purchase private protection. An increase in $b$ thus reduces demand for policing among unprotected segments of the population without changing the size of these segments. Hence, as public spending on the alternative public good becomes less valuable, the overall demand for public spending on the police increases. If the value of the alternative public good exceeds the threshold $\bar{b}_W$, it is socially optimal to spend all of the public budget on the alternative public good. Otherwise, it is socially optimal to invest the entirety of the public budget into policing.

It is easy to see from equation (8) that the threshold $\overline{b}_W$ is always positive and that it decreases with the upper bound of the income distribution $\overline{\theta}$. In other words, as society becomes wealthier, the range of $b$ for which it is socially optimal to invest in policing shrinks. To gain intuition for this result, remember that, for any given share of police spending $\alpha$, all individuals with $\theta_i \in \left(\theta_p(\alpha), \overline{\theta}\right]$ purchase private protection. Behavior in the sorting equilibrium is unaffected by $\overline{\theta}$, which means that $\theta_p(\alpha)$ does not change with $\overline{\theta}$. An increase in $\overline{\theta}$ hence expands the set of types at the upper end of the income distribution who find it optimal to purchase private protection. As a consequence, a greater share of the population is immune to expropriation and prefers for the entirety of the available budget to be spent on the alternative public good. Intuitively, as societal wealth grows relative to the cost of private protection, a greater share of the population will be privately protected which diminishes the need for public policing.

With this knowledge about the welfare optimizing budget share of policing in hand, I now turn to the platform choices of parties. Party $L$ seeks to maximize the welfare of citizens that fall into the lower half of the income distribution, while party $R$ seeks to maximize the welfare of citizens that fall into the upper half of the income distribution. Parties' objective functions are hence given by

$$V_L(\alpha) = \int_0^{\theta_c(\alpha)} \frac{u_i(1,0,\theta_c,\theta_p,\alpha)}{\overline{\theta}} d\theta + \int_{\theta_c(\alpha)}^{\frac{\overline{\theta}}{2}} \frac{u_i(0,0,\theta_c,\theta_p,\alpha)}{\overline{\theta}} d\theta \tag{10}$$

$$V_R(\alpha) = \int_{\frac{\overline{\theta}}{2}}^{\theta_p(\alpha)} \frac{u_i(0,0,\theta_c,\theta_p,\alpha)}{\overline{\theta}} d\theta + \int_{\theta_p(\alpha)}^{\overline{\theta}} \frac{u_i(0,1,\theta_c,\theta_p,\alpha)}{\overline{\theta}} d\theta. \tag{11}$$

$V_R(\alpha)$, the objective function of party $R$, is always convex in $\alpha$. To guarantee convexity of $V_L(\alpha)$, it is sufficient to assume, in addition to parameter restrictions which have already been introduced, that the exogenous cost of crime decrease fast enough with a citizen's legal income:

**Assumption 1.** $d > \frac{1}{2e}(1+\sqrt{3}) = \underline{d}$.

Under this assumption, both party platforms – like the social optimum – will lie at the corner. Whether parties prefer to spend the available budget on the alternative public good or on policing will again depend on $b$, the marginal benefit of the alternative public. The relevant threshold values of $b$ are given by

$$\overline{b}_L = \frac{\overline{\theta}s(1+2de)}{8d(cd+Gs)} - \frac{4des(c-Gse)}{\overline{\theta}(1+2de)^2} \tag{12}$$

$$\overline{b}_R = \frac{2cs}{(1+2de)\overline{\theta}} - \frac{\overline{\theta}s(1+2de)}{8d(cd+Gs)}. \tag{13}$$

Since all citizens stand to gain more from spending on the alternative public good if $b$ is high, it is intuitive that parties choose to invest in policing whenever the alternative public good is not too valuable. The central result of this paper concerns the respective relationship of $\overline{b}_L$ and $\overline{b}_R$, the thresholds at which each of the parties switches from spending on the police to spending on the alternative public good, and the socially optimal threshold $\overline{b}_W$. As depicted in figure 5, this relationship depends on the upper bound of the income distribution $\overline{\theta}$.

If $\overline{\theta} = \overline{\theta}_W$, where

$$\overline{\theta}_W = \frac{2\sqrt{2d(cd+Gs)(2de(2c-esG)+c)}}{\sqrt{(1+2de)^3}},$$

all three thresholds, $\overline{b}_L$, $\overline{b}_R$ and $\overline{b}_W$, coincide. Hence, both parties behave like a welfare maximizing social planner in the sense that they invest in policing if and only if it is socially optimal to do so.

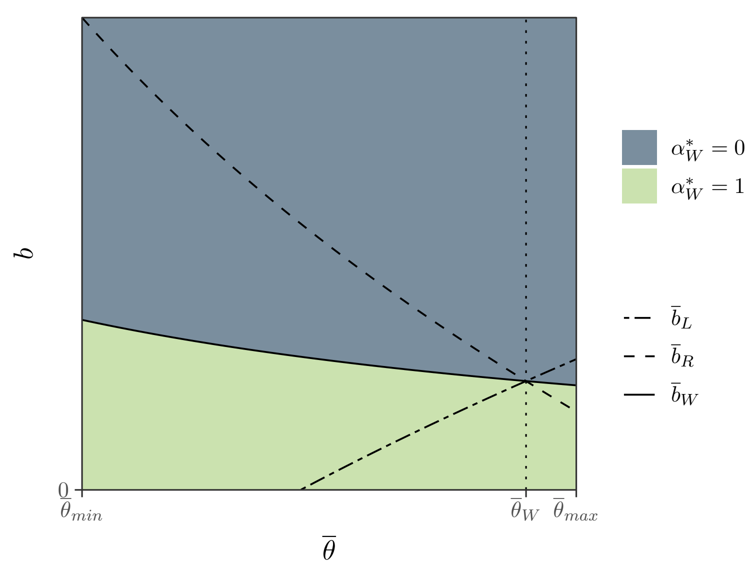


Figure 5: Welfare optimum and party platforms as a function of $b$ and $\overline{\theta}$

$G = 1$, $s = 1$, $c = 1.5$, $d = 2.9$, $e = 0.475$

If $\overline{\theta}$ lies to the left of $\overline{\theta}_W$, $\overline{b}_R$ exceeds $\overline{b}_W$ and $\overline{b}_W$ exceeds $\overline{b}_L$. This ordering implies that there exists a range of values of $b$ for which it would be socially optimal to invest in the alternative public good, and yet party $R$ chooses to invest in policing. Similarly, there exists a range of values of $b$ for which it would be socially optimal to invest in policing, and yet party $L$ chooses to invest in the alternative public good. Put differently, if society is not too rich, the right-wing party is prone to over- and the left-wing party is prone to under-invest in policing.

If $\overline{\theta}$ exceeds $\overline{\theta}_W$, the relationship between each party's platform and the social optimum is reversed, i.e. $\overline{b}_L$ exceeds $\overline{b}_W$ and $\overline{b}_W$ exceeds $\overline{b}_R$. There hence exist values of $b$ for which party $L$ chooses to invest in policing even though it would be socially optimal to invest in the alternative public good. Likewise, there exist values of $b$ for which party $R$ chooses to invest in the alternative public good even though it would be socially optimal to invest in policing. In other words, if society is sufficiently rich, the right-wing party is prone to under- while the left-wing party is prone to over-police.

Proposition 1 summarizes these party platforms as well as their relationships to the welfare optimum:

**Proposition 1** (Platform Choice)**.** *$V_R(\alpha)$ and $V_L(\alpha)$ are convex in $\alpha$. Parties' optimal platforms are given by*

$$\alpha_L^* = \begin{cases} 1 & \text{if } b \leq \overline{b}_L \\ 0 & \text{if } b > \overline{b}_L \end{cases} \tag{14}$$

$$\alpha_R^* = \begin{cases} 1 & \text{if } b \leq \overline{b}_R \\ 0 & \text{if } b > \overline{b}_R. \end{cases} \tag{15}$$

- *If $\overline{\theta} \in \left(\overline{\theta}_{min}, \overline{\theta}_W\right)$, then $\overline{b}_L < \overline{b}_W < \overline{b}_R$.*
- *If $\overline{\theta} = \overline{\theta}_W$, then $\overline{b}_L = \overline{b}_W = \overline{b}_R$.*
- *If $\overline{\theta} \in \left(\overline{\theta}_W, \overline{\theta}_{max}\right)$, then $\overline{b}_R < \overline{b}_W < \overline{b}_L$.*

To gain intuition for this result, consider figure 6 which depicts the base of each of the two parties for a case in which the richest individuals in society are relatively poor ($\overline{\theta} < \overline{\theta}_W$ in the upper panel) and a case in which the richest individuals in society are relatively rich ($\overline{\theta} > \overline{\theta}_W$ in the lower panel). Recall that behavior in the sorting equilibrium for a given $\alpha$ does not change with the upper bound of the income distribution, i.e., neither $\theta_c(\alpha)$ nor $\theta_p(\alpha)$ depend on $\overline{\theta}$. The dashed lines in figure 6 plot the highest and lowest possible equilibrium cutpoints for the two cases in which none or all of the available budget is spent on policing. The primary effect of an increase in the upper bound of the income distribution is that it adds individuals at the top end of the distribution who find it optimal to purchase private protection. This addition, in turn, changes the composition of the base of each party.

As can be seen in the upper panel of figure 6, a low $\overline{\theta}$ implies, for any given $\alpha$, that the base of party $L$ includes a non-trivial share of individuals who commit crime. These individuals prefer relatively little investment into policing. The rest of the base of party $L$ is made up of unprotected and law-abiding individuals. While this group demands relatively more public spending on the police, its demand increases with citizens' legal income. In a society that is not very rich, the unprotected and law-abiding part of party $L$'s base will also not be very rich. Demand for policing will hence remain muted among this group. Overall, a left-wing party in a relatively poor society thus has few incentives to invest in policing.

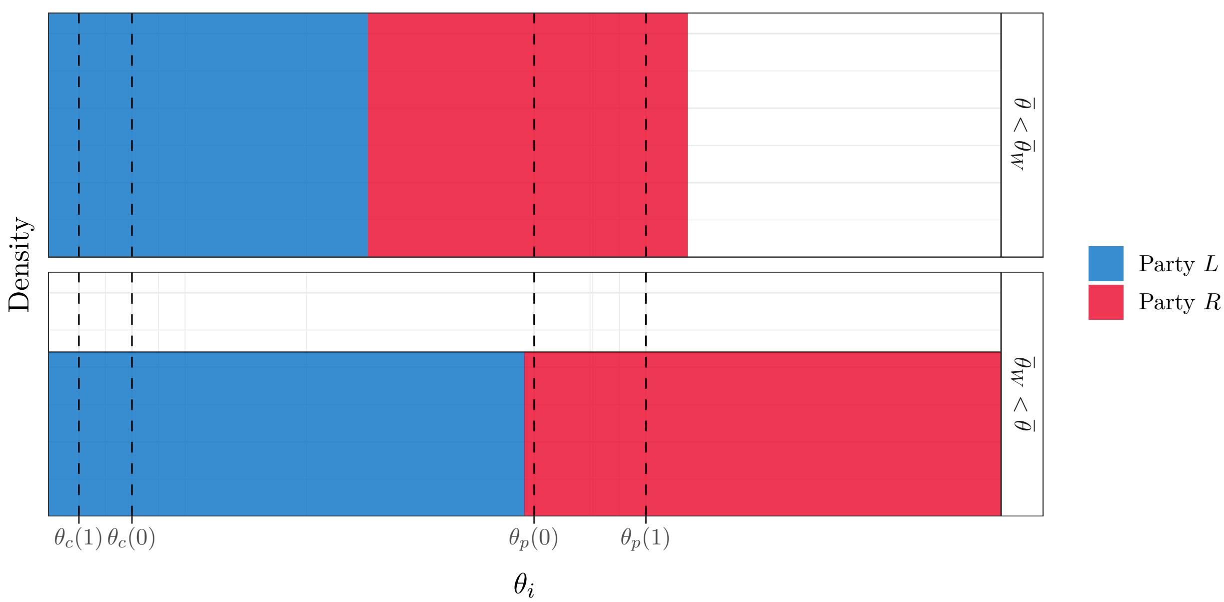


Figure 6: Composition of party bases for $\overline{\theta} < \overline{\theta}_W$ and $\overline{\theta} > \overline{\theta}_W$

$G = 1$, $s = 1$, $c = 1.5$, $d = 2.9$, $e = 0.475$, $\overline{\theta} \approx 3.05$ in the upper panel, $\overline{\theta} \approx 4.54$ in the lower panel

In contrast, the base of party $R$ in such a society is made up primarily of law-abiding citizens that are relatively rich but not rich enough to purchase private protection – the group with the greatest demand for policing. Privately protected individuals with zero demand for policing make up only a small share of party $R$'s base in this case. Right-wing parties in relatively poor societies may thus spend too little on other public goods and too much on policing.

Conversely, in a relatively rich society (see the lower panel in figure 6), individuals who commit crime make up a small share of the base of party $L$. As society becomes richer, party $L$'s base includes an increasingly greater share of citizens who are rich enough to demand substantial police spending but not so rich that they would want to privately protect their legal incomes. Party $L$'s incentives to invest in policing thus grow stronger as the upper bound of the income distribution expands. The base of party $R$, on the other hand, becomes more and more dominated by individuals who are privately protected and hence prefer zero public spending on the police. As $\overline{\theta}$ moves past $\overline{\theta}_W$, the left-wing party becomes prone to over-invest and the right-wing party becomes prone to under-invest in policing.

# 6 Discussion

Establishing order is a classic task of governments. Where governments fail to invest in law enforcement institutions, citizens suffer from crime and insecurity. Over-investment in law enforcement, on the other hand, diverts scarce public resources that could be used to provide other valuable services. This paper develops a model in which political parties decide how much of an exogenously given government budget to spend on policing as opposed to other public goods. Given a level of government spending on the police, citizens decide whether to commit crime and whether to purchase private protection.

The central distributional conflict in the model arises because citizens have different levels of income. The higher their income the less inclined citizens are to commit crime and the more interested they become in public spending on the police that reduces the risk of criminal expropriation. Those who are very rich, however, use private means to shield themselves against crime and hence lose all interest in public law enforcement. The demand for policing is strongest among citizens of the middle class who own enough to care about losing what they have to crime but not so rich that they would invest in private protection.

Contrary to conventional wisdom, the model predicts that the champions of law-and-order politics may not always be parties on the right. In a society that is relatively poor, the unprotected yet affluent middle class that has the strongest demand for policing forms part of the base of parties on the right. Right-wing parties thus have incentives to over-invest in policing. In a society where the rich are affluent enough to shield themselves from crime, however, the incentives of right-wing parties to invest in policing shrink. Here, the locus of demand for policing shifts to the base of parties on the left, who, as a result, become prone to over-emphasize law enforcement.

Open questions about the relationship between partisan politics, the availability of private security and public law enforcement remain. Two important features concern the distribution of income in society and electoral competition. First, income distributions are typically skewed to the right. Hence, it is important to ask whether the logical presented here is robust to changes in the shape of the income distribution. Second, parties may care not only about the welfare of their base but also about winning elections. Considering the effect of electoral competition may shed light on the conditions under which democratic institutions can mitigate or exacerbate the distributional conflicts that drive over- and under-investment into public law enforcement institutions.

# Appendix

**Proof of Lemma 1.** First, let us consider whether other forms of sorting equilibria with two cutpoints exist. Note that all citizens receive the utility $(1-\alpha)Gb$ from the alternative public good, irrespective of their crime and protection choices. Hence, we can ignore this part of the utility function for the purposes of deriving the sorting equilibrium. Moreover, note also that all terms in the citizen's utility function given in equation (2) that pertain to the cost and benefit or engaging in crime are additively separable from those that pertain to the benefit and cost of purchasing private protection. Hence, we can consider these two choices in isolation. Now, suppose that there is an equilibrium in which high income individuals with $\theta_i > \tilde{\theta}_c(\alpha)$ commit crime while low income individuals with $\theta_i \leq \tilde{\theta}_c(\alpha)$ refrain from doing so. The net benefit of committing crime is given by

$$\mathbb{E}\left[\theta_i \mid \theta_i \notin \lambda_p\right] - d\theta_i - \alpha Gs.$$

It is easy to see that this expression is decreasing in $\theta_i$. As a consequence, if individual $i$ finds it optimal to commit crime and $\theta_i > \theta_j$, individual $j$ must also find it optimal to commit crime. Hence, an equilibrium of this form cannot exist. Second, suppose that there is an equilibrium in which low income individuals with $\theta_i \leq \tilde{\theta}_p(\alpha)$ purchase private protection while high income individuals with $\theta_i > \tilde{\theta}_c(\alpha)$ refrain from doing so. If individual $i$ does not purchase private protection, she loses her legal income $\theta_i$ to crime with probability $\frac{\delta}{\gamma}$. If she purchases private protection, she keeps her legal income with certainty but pays cost $c - e\theta_i$. Hence, the net benefit of purchasing private protection is given by

$$\theta_i - c + e\theta_i - \theta_i(1 - \frac{\delta}{\gamma})$$

It is straightforward to see that this expression is increasing in $\theta_i$. As a consequence, if individual $i$ finds it optimal to purchase private protection and $\theta_i < \theta_j$, individual $j$ must also find it optimal to purchase private protection. Hence, an equilibrium of this form cannot exist. We have thus shown that, in any sorting equilibrium in which the cupoints are interior, it must be the case that individuals with $\theta_i \leq \theta_c(\alpha)$ commit crime while individuals with $\theta_i > \theta_c(\alpha)$ refrain from doing so. Similarly, it must be the case that individuals with $\theta_i > \theta_p(\alpha)$ purchase private protection while individuals with $\theta_i \leq \theta_p(\alpha)$ refrain from doing so.

Using the properties of the uniform distribution as described in the text to express $\frac{\delta}{\gamma}$ and $\mathbb{E}\left[\theta_i \mid \theta_i \notin \lambda_p\right]$ in terms of $\theta_c$ and $\theta_p$ yields the following two conditions that have to hold for type $\theta_c$ to be indifferent between committing crime and not committing crime and type $\theta_p$ to be indifferent between purchasing and not purchasing private protection:

$$\frac{\theta_p}{2} - d\theta_c - \alpha G s = 0 \tag{16}$$

$$\theta_p(1 - \frac{\theta_c}{\theta_p}) = \theta_p - c + e\theta_p \tag{17}$$

The cutpoints given in equations (4) and 5 are the unique solution to this system of equations.

Next, I show that $0 < \theta_c(\alpha) < \frac{\overline{\theta}}{2} < \theta_p(\alpha) < \overline{\theta}$ for all $\alpha \in [0, 1]$. Since $\theta_c(\alpha)$ is decreasing in $\alpha$, $\theta_c(1) > 0$ implies that $\theta_c(\alpha) > 0$ for all $\alpha \in [0, 1]$. We thus need

$$\theta_c(1) = \frac{c - 2eGs}{1 + 2de} > 0,$$

which holds for $e < \frac{1}{2}$ and $c > Gs$. Similarly, since $\theta_p(\alpha)$ is increasing in $\alpha$, we have $\theta_p(\alpha) < \overline{\theta}$ for all $\alpha \in [0, 1]$ if it is true that $\theta_p(1) < \overline{\theta}$, which holds for

$$\theta_c(1) = \frac{2\left(cd + Gs\right)}{1 + 2de} = \overline{\theta}_{min} < \overline{\theta}.$$

It is easy to verify that, for $d > 1$, $\overline{\theta}_{min} < \overline{\theta}$ also implies $\theta_c(0) < \frac{\overline{\theta}}{2}$. Since $\theta_c(\alpha)$ is decreasing in $\alpha$, it is hence true that $\theta_c(\alpha) < \frac{\overline{\theta}}{2}$ for all $\alpha \in [0, 1]$. Finally, it remains to show that $\theta_p(0) > \frac{\overline{\theta}}{2}$, which implies that $\theta_p(\alpha) > \frac{\overline{\theta}}{2}$ for all $\alpha \in [0,1]$. This is true if

$$\overline{\theta} < \frac{4dc}{2de+1} = \overline{\theta}_{max}.$$

Note that $d > 1$ and $c > Gs$ imply $\overline{\theta}_{min} < \overline{\theta}_{max}$.

**Proof of Lemma 2.** The equilibrium probability that an unprotected individual is losing her income to crime is given by

$$\frac{\delta}{\gamma} = \frac{\theta_c(\alpha)}{\theta_p(\alpha)} = \frac{c - 2e\alpha Gs}{2(cd + \alpha Gs)}.$$

In equilibrium, the expected return to crime is equal to

$$\mathbb{E}\left[\theta_i \mid \theta_i \leq \theta_p\right] = \frac{\theta_p(\alpha)}{2} = \frac{cd + \alpha Gs}{1 + 2de}.$$

Substituting these expressions into the utility function given in equation 2, the indirect utility $u_i(1, 0, \theta_c, \theta_p, \alpha)$ of committing crime without purchasing private protection is given by

$$u_i(1, 0, \theta_c, \theta_p, \alpha) = \theta_i \left(1 - \frac{c - 2e\alpha Gs}{2(cd + \alpha Gs)}\right) + \frac{cd + \alpha Gs}{1 + 2de} - d\theta_i - \alpha Gs + (1 - \alpha)Gb.$$

It is easy to see that the second derivative of $u_i(1, 0, \theta_c, \theta_p, \alpha)$ with respect to $\alpha$ is negative, which proves that $u_i(1, 0, \theta_c, \theta_p, \alpha)$ is concave in $\alpha$:

$$\frac{\partial^2 u_i(1, 0, \theta_c, \theta_p, \alpha)}{\partial \alpha^2} = -\frac{\theta_i G^2 s^2 c\,(1 + 2de)}{(cd + \alpha Gs)^3} < 0.$$

The preferred budget share $\alpha^*(1, 0; \theta_i)$ of an individual who chooses to remain unprotected and to commit crime is hence given by the solution to the following first order condition:

$$\frac{\partial u_i(1, 0, \theta_c, \theta_p, \alpha)}{\partial \alpha} = \frac{G}{2}\left(\frac{\theta_i sc\,(1 + 2de)}{(cd + \alpha Gs)^2} - \frac{4sde}{1 + 2de} - 2b\right) = 0.$$

This equation has the following two roots:

$$\alpha_1 = \frac{1}{Gs}\left[-\sqrt{\frac{\theta_i cs(1 + 2de)^2}{2\,(b + 2de(b + s))}} - cd\right]$$
$$\alpha_2 = \frac{1}{Gs}\left[\sqrt{\frac{\theta_i cs(1 + 2de)^2}{2\,(b + 2de(b + s))}} - cd\right].$$

It is straight forward to see that $\alpha_1 < 0$. Since $\alpha \in [0,1]$, we must have $\alpha^*(1,0;\theta_i) = \alpha_2$.

The indirect utility $u_i(0,0,\theta_c,\theta_p,\alpha)$ of not committing crime and not purchasing private protection is given by

$$u_i(0,0,\theta_c,\theta_p,\alpha) = \theta_i \left(1 - \frac{c - 2e\alpha Gs}{2(cd + \alpha Gs)}\right) + (1-\alpha)Gb.$$

Again, it is easy to see that the second derivative of $u_i(0,0,\theta_c,\theta_p,\alpha)$ with respect to $\alpha$ is negative, which proves that $u_i(0,0,\theta_c,\theta_p,\alpha)$ is concave in $\alpha$:

$$\frac{\partial^2 u_i(0,0,\theta_c,\theta_p,\alpha)}{\partial \alpha^2} = -\frac{\theta_i G^2 s^2 c\,(1+2de)}{(cd + \alpha Gs)^3} < 0.$$

The preferred budget share $\alpha^*(0,0;\theta_i)$ of an individual who chooses not to commit crime and to remain unprotected is hence given by the solution to the following first order condition:

$$\frac{\partial u_i(0,0,\theta_c,\theta_p,\alpha)}{\partial \alpha} = \frac{\theta_i Gsc\,(1+2de)}{2(cd + \alpha Gs)^2} - Gb = 0.$$

This equation has the following two roots:

$$\alpha_3 = \frac{1}{Gs}\left[-\sqrt{\frac{\theta_i cs(1+2de)}{2b}} - cd\right]$$
$$\alpha_4 = \frac{1}{Gs}\left[\sqrt{\frac{\theta_i cs(1+2de)}{2b}} - cd\right].$$

Again, it is straight forward to see that $\alpha_3 < 0$. Since $\alpha \in [0,1]$, we must have $\alpha^*(0,0;\theta_i) = \alpha_4$.

Finally, the indirect utility $u_i(0,1,\theta_c,\theta_p,\alpha)$ of not committing crime and purchasing private protection is given by

$$u_i(0,1,\theta_c,\theta_p,\alpha) = \theta_i - c + e\theta_i + (1-\alpha)Gb.$$

$u_i(0,1,\theta_c,\theta_p,\alpha)$ is linear and hence concave in $\alpha$. Moreover, it is easy to see that $u_i(0,1,\theta_c,\theta_p,\alpha)$ is decreasing in $\alpha$, which implies that the preferred budget share $\alpha^*(0,1;\theta_i)$ of an individual who chooses to purchase private protection but not to commit crime will always lie at the corner, i.e., $\alpha^*(0,1;\theta_i) = 0$.

The last part of lemma 2 requires

$$
\begin{aligned}
\alpha^*(1,0;\theta_i) &\leq \alpha^*(0,0;\theta_i) \\
\implies \frac{1}{Gs}\left[\sqrt{\frac{\theta_i cs(1+2de)^2}{2\left(b+2de(b+s)\right)}}-cd\right] &\leq \frac{1}{Gs}\left[\sqrt{\frac{\theta_i cs(1+2de)}{2b}}-cd\right] \\
\implies \frac{(1+2de)}{\sqrt{b+2de(b+s)}} &\leq \sqrt{\frac{1+2de}{b}} \\
\implies \sqrt{1+2de} &\leq \sqrt{1+2de(1+\frac{s}{b})}
\end{aligned}
$$

Since $\frac{s}{b} > 0$, this condition always holds. The inequality is strict with the exception of instances in which both preferred budget shares lie at the corner, i.e. $\alpha^*(1,0;\theta_i) = \alpha^*(0,0;\theta_i) = 0$ or $\alpha^*(1,0;\theta_i) = \alpha^*(0,0;\theta_i) = 1$.

**Proof of Lemma 3.** Evaluating the integral in equation (7) results in the following expression for welfare

$$
W(\alpha) = \frac{(1+e)\overline{\theta}}{2} - c + (1-\alpha)Gb + \frac{c^2d(3+4de) + 2\alpha Gsc + 4\alpha^2 de^2 G^2 s^2}{2(1+2de)^2\overline{\theta}}.
$$

The second derivative of $W(\alpha)$ w.r.t. $\alpha$ is given by

$$
\frac{\partial^2 W(\alpha)}{\partial \alpha^2} = \frac{4de^2G^2s^2}{(1+2de)^2\overline{\theta}}.
$$

It is easy to verify that $\frac{\partial^2 W(\alpha)}{\partial \alpha^2} > 0$ which proves that $W(\alpha)$ is convex in $\alpha$. As a consequence, the welfare maximizing budget share $\alpha_w^*$ will always lie at the corner. Welfare at $\alpha = 0$ and $\alpha = 1$ is given by

$$
\begin{aligned}
W(0) &= \frac{(1+e)\overline{\theta}}{2} - c + Gb + \frac{c^2d(3+4de)}{2(1+2de)^2\overline{\theta}} \\
W(1) &= \frac{(1+e)\overline{\theta}}{2} - c + \frac{c^2d(3+4de) + 2Gsc + 4de^2G^2s^2}{2(1+2de)^2\overline{\theta}}
\end{aligned}
$$

It is straightforward to verify that $W(1) \geq W(0)$ as long as

$$
b \leq \frac{s(c+2de^2Gs)}{(1+2de)^2\overline{\theta}} = \overline{b}_W.
$$

It follows that $\alpha_w^* = 1$ if $b \leq \overline{b}_W$ and $\alpha_w^* = 0$ if $b > \overline{b}_W$. Finally, it is easy to see from the above expression that $\frac{\partial \bar{b}_W}{\partial \overline{\theta}} < 0$.

**Proof of Proposition 1.** Evaluating the integrals in equation (11) yields the following expression for the objective function of party $L$:

$$V_L(\alpha) = \frac{(1-\alpha)Gb}{2} + \frac{\overline{\theta}(2\alpha Gs(1+e) + c(2d-1))}{16(cd+\alpha Gs)} + \frac{d(c-2\alpha Gse)^2}{2\overline{\theta}(1+2de)^2}.$$

Differentiating this expression twice w.r.t. $\alpha$ gives

$$\frac{\partial^2 V_L(\alpha)}{\partial \alpha^2} = \frac{4G^2s^2e^2d}{\overline{\theta}(1+2de)^2} - \frac{\overline{\theta}G^2s^2c(1+2de)}{8(cd+\alpha Gs)^3}.$$

$\frac{\partial^2 V_L(\alpha)}{\partial \alpha^2}$ is increasing in $\alpha$ and decreasing in $\overline{\theta}$. The following condition ensures that $\frac{\partial^2 V_L(\alpha)}{\partial \alpha^2} > 0$ for all $\alpha \in [0,1]$:

$$\overline{\theta} < \frac{4\sqrt{2}ed^2c}{(1+2de)^{\frac{3}{2}}}.$$

It is easy to verify that $\overline{\theta}_{max} < \frac{4\sqrt{2}ed^2c}{(1+2de)^{\frac{3}{2}}}$ if $d > \frac{1}{2e}(1+\sqrt{3}) = \underline{d}$. It follows that $\overline{\theta} < \theta_{max}$ and $d > \underline{d}$ are sufficient to ensure that $V_L(\alpha)$ is convex in $\alpha$ for all $\alpha \in [0,1]$. Hence, the budget share $\alpha_L^*$ that maximizes $V_L(\alpha)$ must lie at the corner. $V_L(0)$ and $V_L(1)$ are given by

$$V_L(0) = \frac{Gb}{2} + \frac{dc^2}{2\overline{\theta}(1+2de)^2} + \frac{\overline{\theta}}{8} - \frac{\overline{\theta}}{16d}$$
$$V_L(1) = \frac{d(c-2Gse)^2}{2\overline{\theta}(1+2de)^2} + \frac{\overline{\theta}(2Gs(1+e) + c(2d-1))}{16(cd+Gs)}.$$

It is straightforward to verify that $V_L(1) \geq V_L(0)$ as long as

$$b \leq \frac{\overline{\theta}s(1+2de)}{8d(cd+Gs)} - \frac{4des(c-Gse)}{\overline{\theta}(1+2de)^2} = \bar{b}_L.$$

It follows that $\alpha_L^* = 1$ if $b \leq \bar{b}_L$ and $\alpha_L^* = 0$ if $b > \bar{b}_L$.

Evaluating the integrals in equation (10) yields the following expression for the objective function of party $R$:

$$V_R(\alpha) = \frac{(1-\alpha)Gb}{2} - c + \frac{\overline{\theta}\,(6\alpha Gs(1+e) + c + cd(6+8e))}{16(cd+\alpha Gs)} + \frac{c(cd+\alpha Gs)}{\overline{\theta}(1+2de)}.$$

The second derivative of $V_R(\alpha)$ w.r.t. $\alpha$ is given by

$$\frac{\partial^2 V_R(\alpha)}{\partial \alpha^2} = \frac{\overline{\theta} G^2 s^2 c(1+2ed)}{8(cd+\alpha G s)^3}.$$

Clearly, $\frac{\partial^2 V_R(\alpha)}{\partial \alpha^2} > 0$ which proves that $V_R(\alpha)$ is convex in $\alpha$. Hence, the budget share $\alpha_R^*$ that maximizes $V_R(\alpha)$ must lie at the corner. $V_R(0)$ and $V_R(1)$ are given by

$$V_R(0) = -c + \frac{Gb}{2} + \frac{\overline{\theta}}{16}\left(\frac{1}{d} + 6 + 8e\right) + \frac{c^2 d}{(1+2de)\overline{\theta}}$$
$$V_R(1) = -c + \frac{\overline{\theta}\,(6Gs(1+e) + c + cd(6+8e))}{16(cd+Gs)} + \frac{c(cd+Gs)}{(1+2de)\overline{\theta}}.$$

It is straightforward to verify that $V_R(1) \geq V_R(0)$ as long as

$$b \leq \frac{2cs}{(1+2de)\overline{\theta}} - \frac{\overline{\theta} s(1+2de)}{8d(cd+Gs)} = \overline{b}_R.$$

It follows that $\alpha_R^* = 1$ if $b \leq \overline{b}_R$ and $\alpha_R^* = 0$ if $b > \overline{b}_R$.

Finally, consider the ordering of $\overline{b}_L$, $\overline{b}_W$ and $\overline{b}_R$. First, it is easy to verify that if $c > Gs$, $d > 1$ and $0 < e < \frac{1}{2}$, then $\overline{b}_L < \overline{b}_W < \overline{b}_R$ at $\overline{\theta} = \overline{\theta}_{min}$. Second, let us differentiate $\overline{b}_L$, $\overline{b}_W$ and $\overline{b}_R$ w.r.t $\overline{\theta}$:

$$\frac{\partial \overline{b}_L}{\partial \overline{\theta}} = \frac{s(1+2de)}{8d(cd+Gs)} + \frac{4des(c-Gse)}{(1+2de)^2\overline{\theta}^2}$$
$$\frac{\partial \overline{b}_W}{\partial \overline{\theta}} = -\frac{s(c+2de^2 Gs)}{(1+2de)^2\overline{\theta}^2}$$
$$\frac{\partial \overline{b}_R}{\partial \overline{\theta}} = -\frac{2cs}{(1+2de)\overline{\theta}^2} - \frac{s(1+2de)}{8d(cd+Gs)}.$$

It is easy to see that $\frac{\partial \overline{b}_L}{\partial \overline{\theta}} > 0$ and $\frac{\partial \overline{b}_W}{\partial \overline{\theta}}, \frac{\partial \overline{b}_R}{\partial \overline{\theta}} < 0$. Moreover, it is straight forward to verify that $c > Gs$, $d > 1$ and $0 < e < \frac{1}{2}$ imply that $\frac{\partial \overline{b}_R}{\partial \overline{\theta}} < \frac{\partial \overline{b}_W}{\partial \overline{\theta}}$, i.e., $\overline{b}_R$ decreases more quickly with $\overline{\theta}$ than $\overline{b}_W$. These facts together with the ordering of $\overline{b}_L$, $\overline{b}_W$ and $\overline{b}_R$ at $\overline{\theta}_{min}$ imply that there must be a unique $\overline{\theta} > \overline{\theta}_{min}$ at which $\overline{b}_L$ intersects $\overline{b}_W$ from below. Likewise, there must be a unique $\overline{\theta} > \overline{\theta}_{min}$ at which $\overline{b}_R$ intersects $\overline{b}_W$ from above. Solving the following two equalities for $\overline{\theta}$

$$\overline{b}_L = \overline{b}_W$$
$$\overline{b}_R = \overline{b}_W$$

reveals that all three curves have a unique intersection at

$$\overline{\theta} = \frac{2\sqrt{2d(cd+Gs)(2de(2c-esG)+c)}}{\sqrt{(1+2de)^3}} = \overline{\theta}_W.$$

Finally, $c > Gs$, $d > \underline{d}$ and $0 < e < \frac{1}{2}$ are sufficient to ensure that $\overline{\theta}_W < \overline{\theta}_{max}$, which completes the proof of the last part of the proposition.

# References


Baker, Bruce. 2017. *Taking the Law into their Own Hands: lawless law enforcers in Africa.* London and New York: Routledge.

Block, Douglas. 2019. Violence, Vote Choice, and the Provision of Public Security in Brazilian States PhD thesis University of Pittsburgh.

Bonner, Michelle D. 2019. *Tough on crime: The Rise of Punitive Populism in Latin America.* Pittsburgh: University of Pittsburgh Press.

Caldeira, Greg A and Andrew T Cowart. 1980. "Budgets, institutions, and Change: Criminal Justice Policy in America." *American Journal of Political Science* pp. 413–438.

Dammert, Lucía. 2019. Challenges of Police Reform in Latin America. In *Handbook on Law and Society in Latin America*, ed. Rachel Sieder, Karina Ansolabehere and Tatiana Alfonso. New York: Routledge.

de Benedictis-Kessner, Justin and Christopher Warshaw. 2016. "Mayoral Partisanship and Municipal Fiscal Policy." *The Journal of Politics* 78(4):1124–1138.

De la Croix, David and Matthias Doepke. 2009. "To segregate or to integrate: education politics and democracy." *The Review of Economic Studies* 76(2):597–628.

Epple, Dennis and Richard E Romano. 1996*a*. "Ends against the middle: Determining public service provision when there are private alternatives." *Journal of Public Economics* 62(3):297–325.

Epple, Dennis and Richard E Romano. 1996*b*. "Public provision of private goods." *Journal of political Economy* 104(1):57–84.

Ferreira, Fernando and Joseph Gyourko. 2009. "Do Political Parties Matter? Evidence from US cities." *The Quarterly journal of economics* 124(1):399–422.

Forman Jr, James. 2017. *Locking up our own: Crime and punishment in Black America.* New York: Farrar, Straus and Giroux.

Gerber, Elisabeth R and Daniel J Hopkins. 2011. "When Mayors Matter: Estimating the Impact of Mayoral Partisanship on City Policy." *American Journal of Political Science* 55(2):326–339.

Glomm, Gerhard and B Ravikumar. 1998. "Opting out of publicly provided services: A majority voting result." *Social choice and welfare* 15(2):187–199.

Gottschalk, Marie. 2008. "Hiding in Plain Sight: American Politics and the Carceral State." *Annual Review of Polititical Science* 11:235–260.

Guha, Brishti. 2013. "Guns and crime revisited." *Journal of Economic Behavior & Organization* 94:1–10.

Guillamón, Ma Dolores, Francisco Bastida and Bernardino Benito. 2013. "The electoral budget cycle on municipal police expenditure." *European Journal of Law and Economics* 36(3):447–469.

Helsley, Robert W and William C Strange. 2005. "Mixed markets and crime." *Journal of Public Economics* 89(7):1251–1275.

Holland, Alisha C. 2013. "RIGHT ON CRIME? Conservative Party Politics and" Mano Dura" Policies in El Salvador." *Latin American Research Review* pp. 44–67.

Human Rights Watch. 2009. "Broken System: Dysfunction, Abuse, and Impunity in the Indian Police." Available at `https://www.hrw.org/sites/default/files/reports/india0809web.pdf` (2020/06/01).

Jacobs, David and Jason T Carmichael. 2001. "The politics of Punishment across Time and Space: A Pooled Time-Series Analysis of Imprisonment Rates." *Social Forces* 80(1):61–89.

Jacobs, David and Ronald E Helms. 1996. "Toward a Political Model of Incarceration: A Time-Series Examination of Multiple Explanations for Prison Admission Rates." *American Journal of Sociology* 102(2):323–357.

Jacobs, David and Ronald Helms. 2001. "Toward a Political Sociology of Punishment: Politics and Changes in the Incarcerated Population." *Social Science Research* 30(2):171–194.

Mendoza, Juan. 1999. "The protection of private property: The government as a free-rider." *Unpublished Manuscript* .

Smith, Kevin B. 2004. “The politics of Punishment: Evaluating Political Explanations of Incarceration Rates.” *The Journal of Politics* 66(3):925–938.

Soss, Joe and Vesla Weaver. 2017. “Police Are Our Government: Politics, Political Science, and the Policing of Race–Class Subjugated Communities.” *Annual Review of Political Science* 20:565–591.

Staff, Helge. 2018. “Partisan effects and policy entrepreneurs. New Labours impact on British law and order policy.” *Policy Studies* 39(1):19–36.

Super, Gail Jennifer. 2016. “Punishment, violence, and grassroots democracy in South AfricaThe politics of populist punitiveness.” *Punishment & Society* 18(3):325–345.

Yates, Jeff and Richard Fording. 2005. “Politics and State Punitiveness in Black and White.” *The Journal of Politics* 67(4):1099–1121.