Civil Liberties and Social Structure*

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Abstract

Governments use coercion to aggregate distributed information relevant to objectives such as the containment of regime-stability threats or the prosecution of terrorism. A cohesive social structure facilitates this task, as reliable information will often come from friends and acquaintances. A cohesive citizenry can more easily exercise collective action to resist such intrusions, however. We present an equilibrium theory where this tension mediates the joint determination of social structure and civil liberties. Segregation and unequal treatment sustain each other as coordination failures: citizens segregate along the lines of an arbitrary trait only when the government exercises unequal treatment as a function of the trait, and the government engages in unequal treatment when citizens segregate based on the trait. Civil liberties can serve as a commitment device that benefits both citizens and the government, particularly when information-aggregation technologies are efficient. We characterize when unequal treatment against a minority or a majority can be sustained, and how equilibrium social cohesiveness and civil liberties respond to surveillance technologies, shocks to threat perceptions or privacy preferences, or community norms such as codes of silence.

Keywords: Civil liberties, socialization, segregation, information aggregation, surveillance.

JEL Codes: D23, D73, D85.

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1 Introduction

Governments often have objectives such as the containment of regime-stability threats or the prosecution of terrorism. Their pursuit requires aggregating information that is distributed across the citizenry, and governments can exercise coercion to collect this information. Common institutional expressions of this are the intelligence agencies and secret police services of most contemporary states. More recently, many states have begun using digital surveillance tools over their citizens, including AI-powered ones. Courts of law also partially play this role. Social scientists agree that civil liberties are a key buffer protecting the rights and well-being of the citizenry from these kinds of governmental action.

In this paper we study how concerns about state intrusion, and the limits imposed on it by civil liberties, shape individual socialization choices, and consequently features of the social structure such as the density and distribution of social ties across citizens. Understanding this problem requires a general equilibrium perspective because the social structure in turn shapes the government's ability to aggregate information. In our model, social structure and civil liberties are jointly determined. Our premise is that the government's information aggregation capacity partly depends on the underlying social structure. For example, cohesive societies where individuals are well informed about their acquaintances allow governments to search for information more effectively. Searching for information over a fragmented citizenry, in contrast, makes following clues and extracting accurate information harder.

A variety of scholars have pointed out that governmental coercion and repression result in an erosion of social ties, as citizens respond to the government's exercise of coercion by reshaping their social networks. Discussing the French Revolution, de Tocqueville (2011, p. 5) argued that "Despotism... deprives citizens of... all necessity to reach a common understanding... It immures them... in private life. They were already apt to hold one another at arm's length. Despotism isolated them. Relations between them had grown chilly; despotism froze them." In a similar vein, discussing the Soviet experience Jowitt (1993, p. 304) argued that "The Leninist Legacy in Eastern Europe consists largely... of fragmented, mutually suspicious societies..." By constraining the government's ability to collect information, civil liberties can reshape the underlying social structure. Governments thus face a trade-off: weaker civil liberties standards facilitate information collection but also weaken the underlying social fabric, undermining the quality of the information.

This logic, however, is incomplete. It ignores that civil liberties are an equilibrium outcome dependent on the ability of citizens to get organized, and that a cohesive citizenry can more easily exercise such collective action. Besides mediating the effectiveness of the government's information aggregation efforts, the social structure shapes civil liberties by determining the citizens' effectiveness at collective resistance. The recent rise and diffusion of social media exemplifies this tension. Social media has become both a key tool for governments' surveillance and for citizens' collective action coordination (e.g., Fergusson and Molina (2019); Qin et al. (2024)).

Our model rests on two premises. i) There is a potential threat, and information about it is distributed across the population. ii) While the preferences of citizens and the government are misaligned, there is no conflict between citizens. There is a continuum of citizens, for whom socialization is valuable. Citizens vary along a payoff-irrelevant but observable trait, a group identity uncorrelated with threat membership and irrelevant for the payoff from forming friendships. When people socialize with each other, they learn information about each other. The government exploits those social ties to collect information, interrogating citizens about their acquaintances. It can then arrest individuals perceived as a threat based on the information collected. We consider two main dimensions of civil liberties, as limits on the coercive behavior of the government: an endogenous limit on how many people can be questioned (e.g., a "limit on searches and seizures"), and an exogenous restriction on how strong the evidence against a citizen must be for an arrest to be possible (e.g., a "standard of proof").[1] Civil liberties, as a buffer between the government and civil society, are often seen as an attempt to compromise between the conflicting objectives of prosecuting potential threats and protecting citizens from state intrusion. The Bill of Rights of the U.S. Constitution, for example, imposes restrictions on the government's ability to undertake searches and seizures and on the use of cruel punishments, and imposes minimal requirements for prosecution in the form of probable cause, Miranda rights, or varying degrees of evidentiary standards of proof. Indeed, our model can capture a variety of threats: terrorism threats, subversive threats, or imaginary threats such as a witch hunt. Faced with the prospect of being perceived as a threat, citizens make socialization choices. Finally, we model society's ability to resist coercion with a contagion technology that depends on the strength of citizens' underlying 'civic values', which we take as exogenous, and more importantly, on features of the endogenous social structure.

Our analysis allows for asymmetric strategies: the government can condition its interrogation choices, and citizens can condition their socialization efforts, on the trait. This allows

[1]Experiences abound where coercion and intrusion are used for information aggregation purposes. The medieval witch hunts in Europe (Briggs (1996); Johnson and Koyama (2014); Roper (2004)), the Salem witch hunt of 1692 (Godbeer (2011)), the Spanish Inquisition (Hassner (2020); Langbein (1977)) or Stalin's, Mao's, and Pinochet's purges are all well documented. Another example is Senator McCarthy's persecution of alleged communist sympathizers in the 1950s (Klingaman (1996); Oshinsky (1983)). In the US, intelligence agencies were allowed to use waterboarding for terrorism suspect interrogations following 9/11. Also, advanced information-verification technologies involving massive databases are now deployed to track unlawfully present immigrants in the US (Ciancio and García-Jimeno (2024)).

the government to weaken social cohesion by altering the socialization incentives of citizens, who may prefer to segregate (i.e., choose different in-group and cross-group socialization efforts). We refer to an equilibrium under which the government interrogates citizens with different traits at different rates as one exhibiting *unequal treatment*.

A key trade-off shapes citizens' socialization efforts: while social ties are intrinsically valuable, the government collects better information about citizens with more ties. Weak civil liberties exacerbate this trade-off by increasing the cost of becoming a subject of interest to the government. To prevent the government from learning about them, citizens reduce the intensity of their socialization. The citizens' response brings about a commitment problem for the government: at the interim stage after citizens have socialized, more intensive interrogation allows more information collection. Ex-ante, citizens' expectations of aggressive interrogation weaken their socialization incentives. Such erosion of social ties weakens the information aggregation ability of the government. Strong civil liberties both protect citizens, and are a valuable commitment device for the government. Weak civil liberties make friendships scarce and the government unable to aggregate information effectively. At the same time, lower intrusion produces a cohesive social structure that makes collective resistance more effective, further constraining the government from interrogating widely. The government's strategic problem is to mediate this trade-off.

We show that in the absence of in-group biases in citizens' socialization preferences, and in the absence of ex-ante government favoritism towards any group, multiple equilibria with unequal treatment (different standards of government intrusion across groups) and segregation (different rates of socialization across groups) exist. Socialization decisions by citizens are responsive to the government's asymmetric treatment of them. This is because forming friendships with citizens who are targets of government interrogation is costly. As a result, unequal treatment equilibria exhibit social segregation. These equilibria are sustained by self-fulfilling beliefs. An expectation of unequal treatment is necessary for citizens to segregate, and a segregated social structure is necessary for the government to find unequal treatment profitable.

Unequal treatment equilibria represent coordination failures from the citizens' perspective. These coordination failures result from two externalities: first, a citizen who socializes more intensely increases the mass of friends of other citizens, making it more likely that the government receives information about them. Second, a citizen who socializes more intensely facilitates contagion of social resistance, tightening the collective action constraint faced by the government. Unequal treatment equilibria coexist with an equal treatment equilibrium where all players ignore the trait. The equilibria with unequal treatment, however, are robust: whenever they exist, they are the unique strict equilibria. All citizens are hurt by unequal treatment, including those experiencing better treatment. The government, in contrast, can be strictly better off under unequal treatment, but only when equal treatment would entail high levels of social cohesiveness.

The model yields qualitative predictions about the resulting social structures, the extent of unequal treatment, and the distribution of traits required to sustain unequal treatment. When the minority (the group with the least prevalent trait) is relatively large and incentives for socialization are relatively weak, society segregates completely. In this case, cohesiveness (as measured by citizens' average degree) and segregation covary positively. When the minority is relatively small and incentives for socialization are relatively strong, there is partial segregation, and cohesiveness and segregation covary negatively. We also find that there is more unequal treatment (in the sense that the difference in interrogation rates across groups is larger) in partially segregated societies than in fully segregated ones. This is because preventing contagion of social resistance is harder in a society where there is some cross-group socialization, forcing the government to reduce the interrogation rate on the more favorably treated group. In the equilibria with unequal treatment the extent of segregation is pinned down by the socialization efforts of the more favorably treated group. Finally, we find that in equilibria leading to both fully or partially segregated societies, the government will prefer to target the largest group for unfavorable treatment unless the majority is so large that targeting it would be sufficient to make the social resistance constraint bind.

We also explore two extensions. First, we generalize the model to settings where the prior likelihood of threat membership differs across groups. Second, we consider an alternative micro-foundation in which community-enforced norms against disclosure (such as the codes of silence documented in Banfield (1958) or Servadio (1976)) limit the government's interrogation effectiveness.

Two insights emerge from our analysis. First, even when groups are ex-ante identical, unequal treatment and segregation sustain each other in equilibrium: an expectation of unequal treatment leads citizens to segregate, and segregation makes unequal treatment optimal for the government. Second, civil liberties can serve as a commitment device that benefits citizens and the government alike. Their social value is particularly high when information aggregation technologies are efficient, since that is precisely when socialization incentives would otherwise erode the most.

Our results highlight that civil liberties can sustain social cohesion. Our model identifies a novel nexus between social structure and unequal treatment by the government. It also highlights how features of the informational environment are key mediators between citizens' willingness to socialize and the state's ability to exercise coercion over them. We discuss how different dimensions relevant to the informational environment shape equilibria. The increasing use of real-time monitoring technologies by governments (video cameras, social media tracking, large databases, etc.) makes these comparative static results particularly relevant. Moreover, our model highlights the endogenous and dual role of the social structure, both as a component of the government's information aggregation technology and as a determinant of society's ability to resist coercion.

2 Related Literature

Most models of endogenous network formation treat privacy as a horizontal concern between agents. The closest precursor to our work is Acemoglu et al. (2017), who study network formation when agents have privacy concerns vis-à-vis each other, and find that the resulting networks exhibit clustering and homophily. We add the government as a second strategic actor, and a vertical privacy concern between citizens and the state. Civil liberties then endogenously limit what the state can learn through the network, and the vertical structure surfaces a commitment problem on the part of the government that the network-formation literature has not addressed.

A related literature studies civil liberties and the rule of law as endogenous outcomes of political conflict. Mukand and Rodrik (2020) derive civil-liberties protections from a political bargain among an elite, a majority, and a pivotal minority facing coercion; Lagunoff (2001) from a majority's reluctance to criminalize minority behaviors when interpretive errors could lead to punishments of majority members. Closest in spirit is Mui (1999), who studies how civil liberties and the leader's informational advantage over the populace jointly determine the incidence of illegitimate witch hunts. In all of these, political conflict between groups –or between a ruler and the population– is the primitive driver, with the social structure taken as given. We instead show that civil liberties can serve as a commitment device benefiting both citizens and the government: stronger protections sustain the social structure on which the state's information aggregation depends.

A growing literature studies targeted repression and state surveillance.[2] Shadmehr and Haschke (2016) study how a state responds to a population whose protest propensity varies across age cohorts, with the institutional capacity to discriminate determining whether aggregate repression rises or falls as the population grows younger. Rozenas (2020) treats demographic targeting as a way to avoid broad-based opposition when some groups already hold anti-regime preferences. Mele and Siegel (2017) argue that strong states may raise

[2]Recent historical work by Harari (2024) emphasizes the role of information networks — and in particular the bureaucracies and information technologies that enable the centralization, flow, and retrieval of information — in shaping political regime forms such as democratic and totalitarian systems.

repression in response to minority assimilation, because assimilated minorities can mount anti-state operations more successfully. In all three, identity is exogenously informative about something the state cares about. In our paper identity is payoff-irrelevant and carries no exogenous information about citizens; asymmetric treatment emerges from the coordination of socialization choices, not from the trait's content. Related work on counterterrorism mobilization (de Mesquita and Dickson (2007)) and on protest dynamics through social interaction (Bursztyn et al. (2021)) shares our citizen-government framing without trait-based asymmetric treatment.

Our results connect to the literature on segregation and discrimination as equilibrium phenomena. Lang and Kahn-Lang (2020) observe that economists have largely focused on taste-based or statistical discrimination, while "[The] idea of discrimination as a system is not easy for economists to address. Developing truly general equilibrium models is difficult, especially when the endogenous variables go beyond prices and quantities" (p. 85). Our model is one attempt to take on that challenge. Closest to our setup are Fang and Norman (2006), whose discriminatory policies are mandated by the state, and Persico (2002), who studies the state's choice of racial profiling under deterrence constraints. In our setting discrimination arises endogenously from the strategic interaction between citizens' socialization choices and the state's interrogation policy.

A related empirical literature documents the long-run consequences of coercion for trust and social capital. Nunn and Wantchekon (2011) trace persistent reductions in trust to the slave trade in tropical Africa; Badescu and Uslaner (2003) and Traps (2009) document the erosion of social ties under Eastern European communist regimes; and broader work on social capital and civic engagement (Letki (2008); Putnam (2007)) documents the variation in these patterns across institutional environments. Our model provides one mechanism behind these empirical patterns: an anticipated risk of unequal treatment by the state induces citizens to fragment socially, with social capital lost as an equilibrium response rather than as a residual of the coercive episode itself.

3 Environment

We consider a static economy with a continuum of citizens partitioned into two groups by an observable, payoff-irrelevant trait. Citizens make socialization efforts leading to friendships. Friendships are valuable, but also allow citizens to (imperfectly) learn information about each other. After citizens form friendships, they may exogenously become members of a threat. The government tries to learn which citizens are members of this threat by interrogating them about their friends. Civil liberties and civil resistance limit the government's ability to interrogate citizens and to subsequently arrest those who are deemed likely members of the threat.

Citizens, groups, and socialization. Citizens belong to one of two groups $\mathcal{G} = \{\mathcal{A}, \mathcal{B}\}$. Let $\lambda_G \equiv \lambda(G)$ denote the measure of group $G \in \mathcal{G}$, with $\lambda_{\mathcal{A}} + \lambda_{\mathcal{B}} = 1$. Citizen $i \in S = [0, 1]$ chooses private socialization strategy $p_{ij} \in [0, 1]$ towards all other citizens j. For each pair of citizens i and j, a friendship is formed between them with probability $p_{ij}p_{ji}$. Ties are drawn independently across pairs of citizens.[3] We write $e_{ij} = 1$ if a friendship is formed, and $e_{ij} = 0$ otherwise. As a result, the realized *degree* of citizen i will be:[4]

$$d_i = \int_{j \in S} e_{ij} \mathtt{d}j = \int_{j \in S} p_{ij} p_{ji} \mathtt{d}j. \tag{1}$$

Threat and payoffs. After friendships are realized, each citizen independently becomes member of a threat with probability χ.[5] We denote by T the set of citizens who belong to the threat, so that

$$\lambda(T) = \chi \tag{2}$$

is the measure of the threat set.[6] We also suppose that each citizen, regardless of threat-membership status, receives information about each of his friends, as we will describe below. Citizens value friendships and incur a cost if arrested according to the payoff function

$$U_i = \sqrt{d_i} - \kappa \mathbb{1}_{i \in A}, \tag{3}$$

where A denotes the set of arrested citizens.

The government, in contrast, cares about prosecuting the potential threat. Here we

[3] Golub and Livne (2010) model socialization choices in a similar vein in a network formation model where not only direct links but also higher order connections are valuable.

[4] Strategies are $(p_{ij})_{j \in S \setminus \{i\}}$. Within a group, members are indistinguishable to citizen i: any two such citizens contribute symmetrically to i's expected degree and arrest cost. Best replies therefore assign the same p_{ij} to all j in a given group, and the equilibrium analysis is unaffected by measurability concerns raised by asymmetric within-group strategies, which arise only along off-path deviations.

[5] Assuming the threat is realized only after socialization decisions are made implies socialization strategies will not depend on membership status. This is inconsequential when the government cannot observe citizens' realized degree: citizens don't value links based on threat membership directly, and the government is unable to target citizens based on their degree. If the government could observe citizens' degree, in the resulting asymmetric information game threat members would need to play a pooling socialization strategy; otherwise, their differential degree would reveal their type.

[6] Throughout, $\lambda(X)$ denotes the measure of set X.

assume its payoff function is simply

$$V = \lambda(A). \tag{4}$$

Under (4), the government cares only about the mass of citizens arrested. It does not face a cost from arresting non-threat members. This payoff function can be interpreted as a reduced-form of a micro-founded objective where the government cares about regime survival, for example, if regime survival depends on the mass of arrests of threat members.

The government can undertake two actions: first, it selects a subset of citizens for interrogation. We denote by N the set of citizens brought forth for interrogation. Second, once interrogations have happened, it selects a subset of citizens to arrest. Neither set needs to be a subset of the other. We interpret the interrogating and arresting limits faced by the government as reflecting the extent of civil liberties in place. We will discuss these below, once we have clarified how the government aggregates information.

Information aggregation. The government has access to an information aggregation technology it employs over interrogated citizens. For simplicity, we suppose it operates as follows: each citizen j in the interrogation set $N \subseteq S$ generates a clue about each of his friends.[7] As a result, the government receives a measure s_i of clues about citizen i:

$$s_i = \int_{j \in N} e_{ij} \mathtt{d}j. \tag{5}$$

The government then receives a binary signal θ_i about i's membership in the threat with precision proportional to s_i. We suppose that

$$\begin{aligned} \sigma_0(s_i) &\equiv \mathbb{P}(\theta_i = 1 | i \notin T, s_i) = a - bs_i \\ \sigma_1(s_i) &\equiv \mathbb{P}(\theta_i = 1 | i \in T, s_i) = a + bs_i, \end{aligned} \tag{6}$$

where $a, b > 0$, $b < a < 1$, and $a + b < 1$. Larger values for b imply more efficient information aggregation. This information structure satisfies the monotone likelihood ratio property. The government will learn more accurately the type of a citizen who had a larger fraction of his friends interrogated. Under this technology, governments facing more cohesive social structures —as measured by citizens' average degree—, can aggregate information more effectively. Moreover, interrogated citizens cannot provide, on average, misleading information to the government. This may capture the idea that most governments rely

[7] For simplicity we will assume that a citizen does not provide evidence about himself, only about his friends. This could, for example, follow from an existing right not to testify against oneself.

on specialized bureaucracies that can corroborate information obtained from citizens using a variety of surveillance technologies, for example.[8] It does rule out other mechanisms through which citizens may resist the government's use of the social network to aggregate information.

After observing the realized signals for each citizen, the government updates its beliefs using Bayes' rule. χ_i denotes the posterior belief that $i \in T$, after observing $\theta_i = 1$:

$$\chi_i \equiv \mathbb{P}(i \in T|\theta_i = 1, s_i) = \left(1 + \frac{1-\chi}{\chi}\frac{\sigma_0(s_i)}{\sigma_1(s_i)}\right)^{-1}. \tag{7}$$

We incorporate civil liberties into our model as (possibly endogenous) restrictions on the government's ability to interrogate and arrest citizens.

Civil liberties: standard of proof. We suppose that the government faces a lower bound $\underline{\chi}$ 'standard of proof', so that only citizens with posterior above $\underline{\chi}$ can be arrested. This civil liberty restriction is drawn from a uniform distribution

$$\underline{\chi} \sim U\left[\chi, \overline{\chi}\right], \tag{8}$$

with $0 < \chi < \overline{\chi} < 1$ so that the 'standard of proof' is subject to some ex-ante uncertainty.[9] It captures the idea that societies may require minimum levels of evidence to allow an arrest or a conviction, for example through probable cause or varying degrees of standards of proof. Its uncertainty can reflect the margin of leeway that judges or courts often have in interpreting a given legal standard. A lower bound on the uniform distribution rules out 'blind arrests': the government cannot arrest citizens based on the prior alone. The assumption that the lower bound is equal to the prior is only for simplicity: all qualitative results below hold with any lower bound weakly larger than the prior.

Bayesian updating implies that citizens for whom a signal $\theta_i = 0$ is realized cannot be arrested either, as the posterior over them will fall below the prior. Higher values of $\overline{\chi}$ imply stronger expected civil liberties' protections, while $\overline{\chi} < 1$ ensures there will always be some posterior evidence convincing enough to warrant an arrest. We will maintain the following assumption:

[8]Facing this technology, a government that could observe citizens' degree would have incentives to target highly connected individuals for interrogation. Here we rule out this possibility by assuming that the government does not observe citizens' degree at the time of deciding whom to interrogate.

[9]The randomness in $\underline{\chi}$ simply allows us to smooth out a discontinuity in the citizens' payoff function arising when citizens can perfectly predict a threshold level of civil liberties. The discontinuity gives rise to an uninteresting equilibrium where citizens would choose a level of socialization just below the discontinuity.

Assumption 1.

$$\overline{\chi} > \left(1 + \frac{1-\chi}{\chi}\frac{a-b}{a+b}\right)^{-1}.$$

This inequality implies that all feasible posteriors following a signal $\theta_i = 1$ are in the support of $\underline{\chi}$. Since the government's payoff increases with the number of arrests, the optimal arrest rule is to arrest every citizen whose posterior χ_i exceeds $\underline{\chi}$.

Civil liberties: collective resistance. We now describe interrogations. Governments face limits on their ability to interrogate citizens or collect evidence through, for example, search and seizure restrictions. We argue that social structure shapes society's ability to limit governmental intrusion. Thus, we propose a network-based micro-foundation for the emergence of an endogenous constraint on it. After socialization choices are realized, the government can interrogate as many citizens as it wants. Excessive interrogation, however, generates a response from civil society in the form of a protest or riot, based on a simple form of contagion across citizens. This form of backlash will set a limit on the government's willingness to interrogate indiscriminately. In this way, we allow for citizens' ability to resist arbitrary levels of government coerciveness to depend on key features of its social structure. Citizens become 'reactive' over rounds of contagion, and we suppose the interrogated citizens[10] are the seed of the contagion process (e.g., Erol et al. (2023); Morris (2000)). A citizen for whom more than share ψ of his friends are reactive becomes reactive himself into the next round. Denoting R_t as the set of reactive citizens in step t, with $R_0 = N$, the contagion dynamics are given by

$$R_t = R_{t-1} \cup \left\{ i \in [0,1] : \int_{j \in R_{t-1}} p_{ij} p_{ji} \mathrm{d}j > \psi d_i \right\}.$$

Because lower values of ψ require fewer reactive friends for contagion to spread across social ties, ψ can be interpreted as an (inverse) measure of the strength of civic values. Societies with smaller values of ψ are ones where citizens are more easily persuaded to engage in collective action. The set of citizens who eventually become reactive is

$$R_* = \cup_{t \geq 0} R_t$$

The set R_* is the smallest fixed point of the contagion operator with seed $R_0 = N$; it is therefore determined by the government's interrogation choice and the realized friendship

[10] Reactivity is triggered by interrogation rather than by arrest itself. Arrest could plausibly inflame collective action through anger or dampen it through fear, but adjudicating between these would require a separate modeling decision that we do not take here. We focus on interrogation because it is the direct information-extraction channel in our setting.

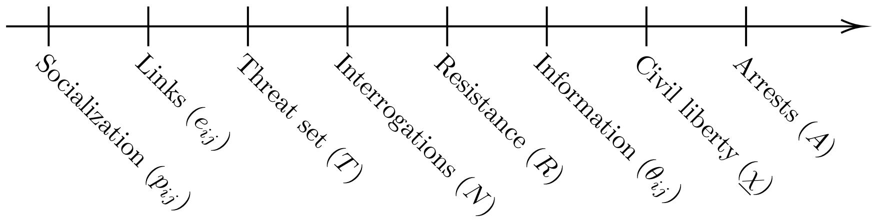


Figure 1: Timeline of Events. The figure illustrates the timing of events in the baseline game.

network.

If fraction ν of society eventually becomes reactive, citizens engage in a form of collective action (riot) that, for simplicity, we suppose prevents the government from undertaking any arrests. Thus, the *no-riot constraint* (NRC) is

$$\lambda(R_*) \leq \nu. \tag{NRC}$$

ν allows us to parametrize the strength of the government vis-a-vis the citizens. When ν is large, even large numbers of reactive citizens are insufficient to prevent the government from engaging in intrusive behavior.

Throughout we assume $\nu \in [\psi, 1)$. If $\nu = 1$, (NRC) would never be violated. We also rule out $\nu < \psi$ because in that range there would either be no contagion, or any measure of interrogations would directly induce the riot even without contagion. If the riot takes place, the government cannot make any arrests and its payoff is zero. Because satisfying the (NRC) is always feasible, we will treat it as a constraint on the government's choice set N.

Timing. Given the information aggregation technology (a, b), the prior threat perception χ, standard of proof $\overline{\chi}$, citizen's disutility of arrest κ, civic values ψ, and relative government strength ν, the timeline of events is as follows (see Figure 1):

1. Each citizen $i \in S$ chooses socialization efforts $(p_{ij})_{j \in S}$, and friendships e_{ij} are formed as described in (1).
2. Nature chooses the threat set T uniformly at random according to (2).
3. The government chooses the set of citizens to interrogate, $N \subseteq S$, satisfying (NRC).
4. The government observes signals θ_i according to (5) and (6), the standard of proof $\underline{\chi}$ is realized according to (8), and the government arrests the set A of citizens whose posterior in (7) exceeds $\underline{\chi}$.

Equilibrium.

Definition 1. An equilibrium is a collection $\left(((p^*_{ij})_{j\in S})_{i\in S}, N\right)$ such that

1. $(p^*_{ij})_{j\in S}$ maximizes citizen i's expected payoff (3) given $((p^*_{jj'})_{j'\in S})_{j\in S/i}$ and N.

2. N maximizes the government's payoff (4) given a $((p_{ij})_{j\in S})_{i\in S}$.

Definition 2. Given a partition of S into two sets $\mathcal{G} = \{\mathcal{A}, \mathcal{B}\}$[11], where $\lambda_G \equiv \lambda(G)$ denotes the measure of group $G \in \mathcal{G}$, a strategy profile is called $\mathcal{G}$-group symmetric if for some $(p_{AA}, p_{AB}, p_{BA}, p_{BB})$, for any $i \in G \in \mathcal{G}$ and any $j \in H \in \mathcal{G}$, $p_{ij} = p_{GH}$. An equilibrium is called $\mathcal{G}$-group symmetric if:

- The strategy profile of citizens is $\mathcal{G}$-group symmetric.

- The government interrogates uniformly at random within each group: any citizen in $G \in \mathcal{G}$ is interrogated independently with probability t_G.

The profile in which all citizens choose zero socialization is also an equilibrium of the game, since the multiplicative friendship technology makes each citizen indifferent when all others play zero. We do not consider this trivial equilibrium further.

Discussion

Information aggregation technology. The technology in (6) captures how governments can learn about citizens through their social ties. The Spanish Inquisition provides a historical illustration: Hassner (2020, p. 2) describes "...how information provided under torture by one detainee led to the arrest, interrogation, or torture of others in their network." The nature of the threat can also shape features of the technology — during medieval witch trials a rumor could suffice to convict, while in a terrorism context torture-based interrogations may yield unreliable confessions. Baliga and Ely (2016) show that prosecutors allowed to use torture face commitment problems: ex-post it is hard to relinquish its use even if doing so would yield better information ex-ante.

Collective resistance. The collective-resistance mechanism echoes the idea that effective coordination among citizens can pose threats to the survival of governments that violate expected limits on their behavior (Weingast (1997)). Indeed, features such as size, ethnic or demographic homogeneity, and social connectedness are key determinants of participation in community activities, political engagement, and public goods provision (see Alesina and

[11] A partition $\mathcal{G}$, for example, could be induced by an observed and immutable characteristic that is payoff irrelevant (it is independent of threat membership, and for all citizens, the utility from forming friendships with members of either group is the same).

LaFerrara (2000); Banerjee et al. (2008); Chay and Munshi (2015); Dippel (2014)). Scholars of the Soviet Union have illustrated how social cohesiveness was a key constraint on state coercion: facing the threat of a strong civil society, the regime focused its efforts on co-opting all forms of social organization: "Autonomous social organization was ... replaced by state-administered apparatuses that coordinated the behavior of ... trade unions, professional associations, youth groups, the mass media, the education system, and even, at the high point of totalitarian aspirations, leisure-time clubs" (Bernhard and Karakoc, 2007, p. 545-6). Recent empirical work further provides evidence of the importance of social network ties in fostering the spread of collective action (e.g., García-Jimeno et al. (2022)).

Civic engagement. The civic-engagement parameter ψ is treated as exogenous in our model. In practice, ψ is likely to respond to the government's exercise of coercion and to society's cohesiveness. Bautista (2025) documents how Chilean citizens who suffered human rights abuses as young adults under the Pinochet dictatorship report low political engagement thirty years later. In the Soviet context, Jowitt (1993, p. 288) similarly argued that "The population at large viewed the political realm as something... to avoid."

4 Unequal Treatment and Social Segregation: Equilibria under Group-symmetric Strategies

In many societies *unequal treatment* is pervasive: equally situated citizens are treated differently by the government or the law. Our main analysis proposes a novel relationship between social segregation and unequal treatment, in the context of the environment we posited above. As we will show here, they sustain each other in equilibrium. We do this focusing on group-symmetric strategies, where groups are defined by a payoff-irrelevant trait.[12]

The density of social ties across the citizenry mediates in two ways the government's ability to aggregate information. First, a cohesive society allows the government to aggregate information more effectively because each interrogated citizen can provide information about more citizens. Second, in cohesive societies collective action may more easily galvanize in response to intrusion by the government. This creates a tension between the government's ex-ante and the ex-post incentives. Whereas for a given social structure the government benefits from weak civil liberties that allow widespread information collection, before citizens have made their socialization decisions expectations of strong civil liberties lead to more intense socialization that results in more efficient information aggregation.

[12]Equal treatment under the law can itself be considered a type of civil liberty. Indeed, it was arguably the prime concern of the Civil Rights movement in the US, and is also addressed in the US Constitution.

Because societal resistance spreads through contagion via social ties, and citizens' socialization choices respond to beliefs about interrogation intensity over peers, an asymmetric strategy that treats subsets of citizens differently can allow the government to relax the (NRC) and ease this trade-off. The expectation that the government will target a subset of the population with a high interrogation rate, for example, should decrease the willingness of citizens to socialize with that group, as it becomes costly to be friends with citizens likely to reveal information about you. The erosion of social ties can in turn undermine the effectiveness of contagion, relaxing the (NRC), allowing the government to fulfill the expectation. The government trades off the erosion of social ties implied by such interrogating behavior, against the increased interrogation rate it can afford under the consequently relaxed (NRC). We formalize this intuition showing that group-symmetric equilibria with unequal treatment exist. We also discuss their properties and implications over social structure.

4.1 The Government's Problem

We first characterize the optimal arresting behavior, which takes place after the standard of proof has been drawn, and the optimal interrogation behavior, which takes place after citizens have made their socialization decisions and the threat set has been drawn. The government wants to maximize the number of arrests. Accordingly, it will want to arrest any citizen whose signal is $\theta_i = 1$, regardless of the signal's precision. This in turn implies that conditional on $\theta_i = 1$, the government's arresting strategy is easily characterized: an arrest happens if and only if $\chi_i > \underline{\chi}$.

Taking a step back, the government chooses possibly different interrogation rates $t_{\mathcal{A}}$ and $t_{\mathcal{B}}$ for each group. Because the government gets a payoff of zero if contagion across all of society happens, it will avoid choosing interrogation rates that lead to full contagion.

Proposition 1. *For $\{G, H\} = \{\mathcal{A}, \mathcal{B}\}$, define*

$$\tilde{t}_G \equiv min\left\{1 - \frac{1-\nu}{\lambda_G}, \psi - (1-\psi)\frac{p_{GH}p_{HG}}{p_{GG}^2}\frac{\lambda_H}{\lambda_G}\right\}.$$

Under any group-symmetric strategy profile played by citizens, the government's optimal action is one of the three possibilities below:

1. Unequal treatment towards $\mathcal{A}$: interrogate all members of $\mathcal{A}$ and interrogate as many members of $\mathcal{B}$ as possible without violating (NRC). This is, $t_{\mathcal{A}} = 1$, $t_{\mathcal{B}} = \tilde{t}_{\mathcal{B}}$.

2. Unequal treatment towards $\mathcal{B}$: interrogate all members of $\mathcal{B}$ and interrogate as many members of $\mathcal{A}$ as possible without violating (NRC). This is, $t_{\mathcal{B}} = 1$, $t_{\mathcal{A}} = \tilde{t}_{\mathcal{A}}$.

3. Equal treatment: interrogate citizens uniformly regardless of group $t_{\mathcal{A}} = t_{\mathcal{B}} = \psi$.

See the proof in Appendix A.

Proposition 1 describes necessary features of the government's optimal behavior given the realized pattern of socialization. To understand it, consider the government's interim expected payoff after citizens have socialized at rates $\mathbf{p} = (p_{\mathcal{AA}}, p_{\mathcal{AB}}, p_{\mathcal{BA}}, p_{\mathcal{BB}})$. It is proportional to

$$\widetilde{V} = \left(\lambda_{\mathcal{A}}^2 p_{\mathcal{AA}}^2 + \lambda_{\mathcal{A}}\lambda_{\mathcal{B}} p_{\mathcal{AB}} p_{\mathcal{BA}}\right) t_{\mathcal{A}} + \left(\lambda_{\mathcal{B}}^2 p_{\mathcal{BB}}^2 + \lambda_{\mathcal{A}}\lambda_{\mathcal{B}} p_{\mathcal{AB}} p_{\mathcal{BA}}\right) t_{\mathcal{B}},$$

which is linear in both interrogation rates, with slopes that depend on the average degree of citizens of each group. The degree of $\mathcal{A}$ citizens, for example, is $\lambda_{\mathcal{A}} p_{\mathcal{AA}}^2 + \lambda_{\mathcal{B}} p_{\mathcal{AB}} p_{\mathcal{BA}}$. The indifference contours are straight lines.

With two groups and group-symmetric strategies, contagion takes one of three forms: either it is absent (only interrogated citizens are reactive), restricted to one group, or society-wide. To characterize the government's problem, consider the constraints that determine whether there is contagion within each of the groups. Define Γ_g recursively as the fraction of reactive citizens in group g when the group experiences interrogation rate t_g: it equals t_g when NC-g holds and 1 otherwise:

$$\Gamma_g \equiv \begin{cases} t_g & \text{if NC-g holds} \\ 1 & \text{otherwise} \end{cases}$$

The no-contagion constraint for group G takes the form

$$\lambda_G p_{GG}^2 t_G + \lambda_H p_{GH} p_{HG} \Gamma_H \leq \psi \left(\lambda_G p_{GG}^2 + \lambda_H p_{GH} p_{HG}\right). \tag{NC-G}$$

The left-hand side is the mass of reactive friends of a group-G citizen. This includes his interrogated friends from G, $\lambda_G p_{GG}^2 t_G$, and his reactive friends from H, $\lambda_H p_{GH} p_{HG} \Gamma_H$. The citizen stays non-reactive if this mass is at most fraction ψ of his total friends. Whether contagion takes hold depends on the share of a citizen's friends that are reactive, not on the density of his friendships. Under equal treatment, where socialization is uniform across groups, this share is the same for every citizen and the friendship structure plays no role in NC-G. Under unequal treatment, the relative weight of within-group ($\lambda_G p_{GG}^2$) and cross-group ($\lambda_H p_{GH} p_{HG}$) ties determines whether reactivity can spread across groups.

The government must keep the total reactive mass at or below ν, so at least one no-contagion constraint must hold. Otherwise, contagion across all citizens would occur. The best reply therefore solves

$$\mathbf{t}(\mathbf{p}|\psi, \nu, \lambda_{\mathcal{A}}) = \underset{(t_{\mathcal{A}}, t_{\mathcal{B}}) \in [0,1]^2}{\operatorname{argmax}} \widetilde{V}$$

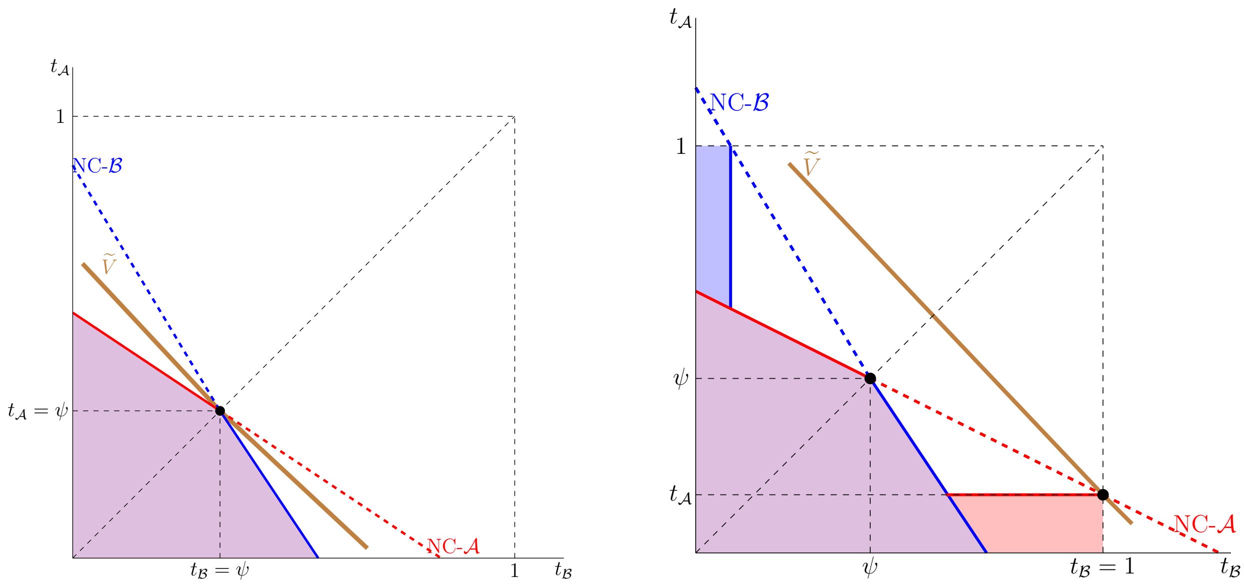
subject to

$$\Gamma_{\mathcal{A}}\lambda_{\mathcal{A}} + \Gamma_{\mathcal{B}}\lambda_{\mathcal{B}} \leq \nu. \tag{NRC$'$}$$

This is a linear program: the objective is linear in $(t_{\mathcal{A}}, t_{\mathcal{B}})$ and the constraint set is piece-wise linear. The slope of the indifference curves is a weighted average of the slopes of the no-contagion constraints when neither group experiences contagion.

$\tilde{t}_G$ takes the form of a minimum over two bounds in Proposition 1 because a higher t_G could trigger a riot through two distinct channels. The first term in the min, $1-(1-\nu)/\lambda_G$, is the largest t_G consistent with (NRC$'$) when group H is fully interrogated and group G stays non-reactive: at any higher rate, the total reactive mass $\lambda_H + \lambda_G t_G$ would exceed ν directly. The second term, $\psi - (1-\psi)(p_{GH}p_{HG}/p_{GG}^2)(\lambda_H/\lambda_G)$, is the largest t_G consistent with (NC-G): at any higher rate, contagion would spread from the fully reactive group H to group G through cross-group ties, making all citizens reactive and violating (NRC$'$) via that channel instead. Each interrogation contributes positively to expected arrests, so the government's payoff is increasing in both interrogation rates: it always wants to push rates up. Whichever group is marginally more informative — that is, has the higher average degree, which determines its coefficient in $\widetilde{V}$ — gets its rate driven to the ceiling at 1, yielding a corner with unequal treatment. Equal treatment is the unique case of indifference: when both groups have the same average degree, the government has no reason to prefer interrogating one over the other, and both rates are pinned at the kink (ψ, ψ) where the no-contagion constraints meet.

Figure 2 illustrates the logic graphically. In panel (a), citizens' socialization rates are such that neither of the no-contagion constraints can be violated without triggering contagion on the other group. In this case, the constraint set is convex with a kink at (ψ, ψ), making *equal treatment* the unique best response (case 3 of Proposition 1). Note that (ψ, ψ) is always a feasible choice that avoids contagion in both groups. In the case represented in panel (b), in contrast, citizens' socialization rates make it possible to violate only one of the no-contagion constraints. When the government chooses a high enough interrogation rate for group $\mathcal{B}$ citizens such that this group experiences contagion, for example, (NC-B) becomes a horizontal line, and the constraint set is non-convex. Symmetry within a group implies that if contagion happens within the group, the whole group becomes reactive. In such case it must be optimal for the government to interrogate all citizens of the group. It follows that the unique optimum entails a corner solution with *unequal treatment*, where $t_{\mathcal{B}} = 1$. In this case (NC-A) and (NRC$'$) coincide. Accordingly, $t_{\mathcal{A}} = t_A^*$ is sufficiently low that (NC-A) exactly binds and a second round of contagion is prevented (cases 1 and 2 of Proposition 1).



(a) Interior (equal treatment) **(b) Corner (unequal treatment)**

Figure 2: Government's Best Response: The figure illustrates the optimal choice of interrogation rates by the government for fixed socialization rates. Panel (a) represents the case in which the optimum entails no contagion on either group, and equal treatment. Panel (b) represents the case in which one group experiences contagion and there is unequal treatment. The brown lines labeled $\widetilde{V}$ represent the highest indifference curves that satisfy the constraint set. The red and blue curves represent the no-contagion constraints for groups $\mathcal{A}$ and $\mathcal{B}$.

The extent of unequal treatment depends on the intensity of cross-group socialization relative to within-group socialization of the more favorably treated group. Lower socialization efforts across groups make it easier for the government to satisfy (NC-G), allowing it to impose a larger interrogation rate on the more favorably treated group. Thus, a more segregated society enhances the government's ability to implement worse civil liberties. Relative group sizes are also a key determinant of the feasibility and extent of unequal treatment. Holding socialization rates constant, when the unequally treated group is smaller, the government can afford a higher interrogation rate for the favorably treated group. Finally, a stronger civil society (lower ψ) forces the government to choose a more favorable interrogation rate toward the favorably treated group. Note this *increases* the extent of inequality in treatment across groups.

4.2 Citizens' Socialization Decision

We now describe the citizens' socialization choices. Under group-symmetric strategies, citizens can choose different in-group and out-group socialization efforts, that depend on beliefs about the subsequent government interrogating behavior $(\tau_{\mathcal{A}}, \tau_{\mathcal{B}})$, and on other citizens' socialization efforts. Optimal effort choices, which maximize the expected utility in (A.1), are shaped by the trade-off between a higher degree (more friendships) and a higher risk that the government will learn more information about the citizen through his increased connections.[13] The trade-off is mediated by

$$\omega \equiv \frac{\overline{\chi} - \chi}{2b(\chi(1-\overline{\chi}) + \overline{\chi}(1-\chi))\kappa} > 0, \tag{9}$$

a reduced-form parameter that depends on the underlying information aggregation technology and the disutility of being arrested.[14] Larger values of ω increase the marginal benefit of socialization. An increased informativeness of signals, b, for example, reduces ω. A higher upper bound for the standard of proof, $\overline{\chi}$, which reduces the likelihood that a positive signal can turn into an arrest, increases ω.

Straightforward first order conditions from (A.1) with respect to the socialization efforts yield citizens' best responses to each other. Further imposing symmetry within groups, for citizens from group $\mathcal{A}$ we have:

Proposition 2. *When citizens believe the government will interrogate citizens of groups $\mathcal{A}$ and $\mathcal{B}$ at rates $\tau_\mathcal{A}$ and $\tau_\mathcal{B}$, their best replies satisfy*

$$p_{\mathcal{AA}} = \left[\!\left[\frac{(\omega/\tau_\mathcal{A})^2 - \lambda_\mathcal{B} p_{\mathcal{AB}} p_{\mathcal{BA}}}{\lambda_\mathcal{A} p_{\mathcal{AA}}} \right]\!\right], \qquad p_{\mathcal{AB}} = \left[\!\left[\frac{(\omega/\tau_\mathcal{B})^2 - \lambda_\mathcal{A} p_{\mathcal{AA}}^2}{\lambda_\mathcal{B} p_{\mathcal{BA}}} \right]\!\right], \tag{10}$$

and for citizens from group $\mathcal{B}$,

$$p_{\mathcal{BA}} = \left[\!\left[\frac{(\omega/\tau_\mathcal{A})^2 - \lambda_\mathcal{B} p_{\mathcal{BB}}^2}{\lambda_\mathcal{A} p_{\mathcal{AB}}} \right]\!\right], \qquad p_{\mathcal{BB}} = \left[\!\left[\frac{(\omega/\tau_\mathcal{B})^2 - \lambda_\mathcal{A} p_{\mathcal{AB}} p_{\mathcal{BA}}}{\lambda_\mathcal{B} p_{\mathcal{BB}}} \right]\!\right], \tag{11}$$

where $[\![x]\!] = max\{0, min\{1, x\}\}$.

See the proof in Appendix A.

This is a system of four non-linear equations in the four socialization rates, which we write more compactly as $\mathbf{p} = \Psi(\mathbf{p}|\boldsymbol{\tau}, \omega, \lambda_\mathcal{A})$. Fixed points of Ψ on $[0,1]^4$ are mutually consistent in-group and out-group socialization strategies for a given vector of interrogation rates $\boldsymbol{\tau}$.

Proposition 2 highlights the forces shaping citizens' socialization decisions. First, expectations about the government's behavior. Within-group and cross-group socialization decisions depend on the interrogation rates expected on both groups. The ratio ω/τ_H cap-

[13] In our benchmark model the government cannot target citizens based on their network characteristics. Although we do not explore the alternative possibility, if the government could target people with many friends, this would be an additional reason to reduce socialization efforts.

[14] Although κ is a utility parameter, it may also be interpreted as partly reflecting civil-liberty standards. The Eighth Amendment to the U.S. Constitution, for example, directly bans excessive bail and fines, and forbids cruel and unusual punishments.

tures the net per-friend benefit of socializing toward group H: ω is the marginal benefit of one more friendship, τ_H is the interrogation-driven arrest cost each group-H friend brings. Citizens target a total degree of $(\omega/\tau_H)^2$. When they expect equal treatment ($\tau_{\mathcal{A}} = \tau_{\mathcal{B}}$), friends in either group are equally costly per unit of degree; the citizen is indifferent across the within/cross-group composition as long as the target degree is met, and homogeneous socialization rates are consistent with equilibrium (Ψ has a continuum of fixed points). When citizens expect unequal treatment ($\tau_{\mathcal{A}} \neq \tau_{\mathcal{B}}$), friends in the more lightly interrogated group are less costly per unit of degree; citizens push the corresponding socialization rate to its upper bound 1 and use socialization toward the more heavily interrogated group only to fill any residual target degree. In that case Ψ has a unique fixed point and, as we will see below, relative group sizes pin down which corner of the best-reply structure arises in equilibrium.

4.3 Equilibria

We now discuss the equilibria of this game. Because $\mathbf{t}(\mathbf{p}|\psi, \lambda_{\mathcal{A}})$ describes the government's best reply to all citizens' strategies, and the fixed points of $\Psi(\mathbf{p}|\boldsymbol{\tau}, \omega, \lambda_{\mathcal{A}})$ describe consistent citizens' play against each other for given beliefs about the government's interrogation response, the equilibria of this game are the $(\mathbf{p}^*, \mathbf{t}^*)$ such that: (i) $\mathbf{p}^*$ is a fixed point of $\Psi\left(\mathbf{p}|\mathbf{t}(\mathbf{p}|\psi, \nu, \lambda_{\mathcal{A}}), \omega, \lambda_{\mathcal{A}}\right)$, and (ii) $\mathbf{t}^* = \mathbf{t}(\mathbf{p}^*|\psi, \nu, \lambda_{\mathcal{A}})$. Proposition 3 presents our main result. Throughout, we define partial segregation as an equilibrium pattern of socialization under which in-group degree is different from cross-group degree, and full segregation as one under which cross-group degree is zero. Define

$$\Omega_H \equiv \frac{\omega}{\tau_H},$$

which captures the benefit for a citizen from befriending a citizen from group H.

Proposition 3. *Assume $\omega < \psi$.*[15] *Equilibria exist and every equilibrium satisfies one of the following:*

Unequal treatment with full segregation (UTF). *For one $G \in \{\mathcal{A}, \mathcal{B}\}$, the interrogation rates are such that members of G are treated unfavorably:*

$$(t_H^*, t_G^*) = \left(\min\left\{\psi, \frac{\nu - \lambda_G}{\lambda_H}\right\}, 1\right). \tag{12}$$

[15] When $\psi \leq \omega$, citizens from one of the groups will always choose maximal socialization regardless of other citizens' strategies. The parameter restriction, thus, rules out equilibria in which strategic dependence in citizens' socialization decisions is absent.

The (unique) profile of socialization rates implies a fully segregated society:

$$(p^*_{HH}, p^*_{HG}, p^*_{GH}, p^*_{GG}) = \left(\min\left\{1, \frac{\Omega_H}{\sqrt{\lambda_H}}\right\}, 0, 1, \min\left\{1, \frac{\Omega_G}{\sqrt{\lambda_G}}\right\}\right). \tag{13}$$

The region of the parameter space where UTF exists is a subset of $\nu \geq \lambda_G$ and $\lambda_H \geq \omega^2$. In this region, UTF is the unique strict equilibrium. The complete description of this region can be found in Lemma A.7 in the Appendix.

Unequal treatment with partial segregation (UTP). *For one $G \in \{\mathcal{A}, \mathcal{B}\}$, the interrogation rates are such that members of G are treated unfavorably:*

$$(t^*_H, t^*_G) = \left(\min\left\{1 - \frac{1-\psi}{\lambda_H}\omega^2, \frac{\nu - \lambda_G}{\lambda_H}\right\}, 1\right). \tag{14}$$

The (unique) profile of socialization rates implies a partially segregated society:

$$(p^*_{HH}, p^*_{HG}, p^*_{GH}, p^*_{GG}) = \left(1, \frac{\Omega_G^2 - \lambda_H}{\lambda_G}, 1, \min\left\{1, \frac{1}{\lambda_G}\sqrt{\Omega_G^2(\lambda_G - \lambda_H) + \lambda_H^2}\right\}\right). \tag{15}$$

The region of the parameter space where UTP exists is a subset of $\nu \geq \lambda_G$ and $\lambda_H < \omega^2$. In this region, UTP is the unique strict equilibrium. The complete description of this region can be found in Lemma A.7 in the Appendix.

Equal treatment (ET): *The interrogation rates are such that members of both groups are treated equally:*

$$(t^*_{\mathcal{A}}, t^*_{\mathcal{B}}) = (\psi, \psi). \tag{16}$$

Any equilibrium profile of socialization rates $(p^*_{\mathcal{AA}}, p^*_{\mathcal{AB}}, p^*_{\mathcal{BA}}, p^*_{\mathcal{BB}})$ leads to the same degree for each citizen:

$$\begin{aligned} \lambda_{\mathcal{A}}(p^*_{\mathcal{AA}})^2 + \lambda_{\mathcal{B}} p^*_{\mathcal{AB}} p^*_{\mathcal{BA}} &= \Omega_{\mathcal{A}}^2 \\ \lambda_{\mathcal{B}}(p^*_{\mathcal{BB}})^2 + \lambda_{\mathcal{A}} p^*_{\mathcal{BA}} p^*_{\mathcal{AB}} &= \Omega_{\mathcal{B}}^2, \end{aligned} \tag{17}$$

ET exists everywhere in the parameter space.

See the proof in Appendix A.

Below, Proposition 4 characterizes which group is disfavored, Corollary 2 gives the comparative statics of equilibrium quantities in group size, and Lemma 1–Lemma 2 compare payoffs across the three equilibria.

4.4 Civil liberties and social structure under group symmetric strategies

Each of the three equilibria in Proposition 3 arises as a fixed point of citizens' and government's best responses. Group symmetry sustains equal treatment: when the government treats both groups equally, citizens have no reason to differentiate their socialization across groups, and the homogeneous degree distribution that follows gives the government no reason to interrogate the groups differently. Unequal treatment arises through self-fulfilling beliefs: citizens anticipate the corner solution from Proposition 1, where the government's linear payoff and its inability to commit imply that ex-post it interrogates one group fully ($t_G = 1$) and pins the other's rate at the binding no-riot constraint. Anticipating this, the favored group cuts socialization toward the heavily-interrogated group, since each such friend carries a high arrest cost. The resulting segregated, less cohesive social structure weakens the spread of civic contagion, relaxing the no-contagion constraints and letting the government actually impose the unequal rates citizens expected. If the favored group's within-group network is large enough to deliver the citizens' target degree, the favored group does not socialize at all with the disfavored group, and we have full segregation (UTF); otherwise, the favored group adds cross-group ties to reach its target, and we have partial segregation (UTP). In regions where both UT and ET coexist, UT is the unique strict equilibrium while ET is not.

Unequal treatment equilibria exist only if $\min\{\lambda_{\mathcal{A}}, \lambda_{\mathcal{B}}\} \leq \nu$, that is, as long as group sizes are such that contagion over all society can be prevented while fully interrogating one group. The favorably treated group is subject to an interrogation rate weakly lower than ψ. The extent of inequality in treatment is thus pinned down by how favorably the more advantaged group is treated. Economies with a civil society that can galvanize collective action effectively (small ν), or with a relatively large minority, are less likely to sustain unequal treatment.

Our result from Proposition 3 stands in contrast to the previous literature on inter-group socialization. Bisin and Verdier (2011) point out that to rationalize segregation, all models of socialization starting at least with Schelling (1969) rely on *imperfect empathy* –assumed differences in payoffs, even if small, from interacting with individuals of different types–. Our model assumes no such differences. Society may still experience segregation even when citizens have no inherent bias for interacting with their own type. Here self-fulfilling beliefs about differences in the government's treatment of people from different groups induce the heterogeneity in willingness to socialize differentially across groups.

Equal treatment, where the government ignores group membership and citizens choose any socialization rates that yield their optimal mass of friends, is an equilibrium for any economy. This is no surprise, as the group labels in our model are economically irrelevant. Heterogeneous socialization rates across groups are a necessary condition for unequal treatment to be of any value to the government.[16]

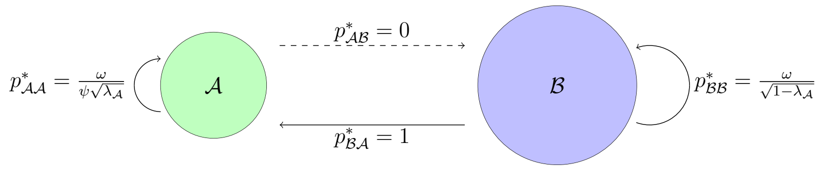
4.4.1 Social Structure

The proposition also yields sharp predictions about social structure. Equilibria with unequal treatment always entail segregation. Full segregation, where there are no friendships across groups, requires λ_H, the size of the favorably treated group, to be larger than ω^2. This is because in a full segregation equilibrium, it is the favorably treated group that is unwilling to socialize with the disadvantaged group ($p_{HG} = 0$). If the size of the advantaged group were smaller, it would be a profitable deviation for its members to socialize with members of the disfavored group. The threshold ω^2 is the favored citizen's optimum degree when each friend is interrogated at the maximal rate, the rate the unfavored group faces under unequal treatment. When the favored group's within-group network of size λ_H meets or exceeds this optimum, no profitable deviation to cross-group socialization exists; when it falls short, the deviation is profitable and full segregation cannot be sustained. Figure 3a illustrates the social structure under an unequal treatment equilibrium with full segregation, in an example where $\lambda_{\mathcal{A}} < \lambda_{\mathcal{B}}$, and $\mathcal{B}$ is the unfavorably treated group.

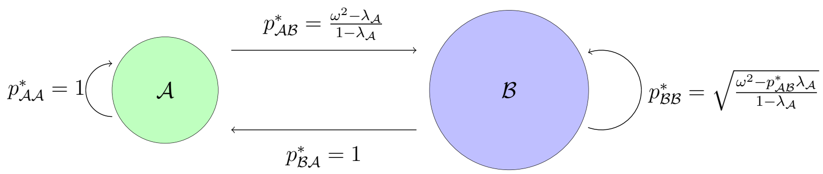
Partial segregation can be sustained when the size of the favorably treated group, λ_H is less than ω^2. The favored group is small enough that the marginal benefit of connecting to a fraction of the disfavored group compensates for the increased risk of governmental information acquisition. Within-group socialization, however, is higher than cross-group socialization, and pinned down by the government's constraint on interrogations that just avoids a riot. In this equilibrium the favorably treated group is fully connected within. Under UTP, favored citizens create friendships with members of the disfavored group, who face the maximal interrogation rate. This tightens the favored group's no-contagion constraint, so the government must lower the favored interrogation rate further than under UTF. The interrogation gap is therefore strictly wider under partial than under full segregation. In Figure 3b we illustrate the social structure in an equilibrium with unequal treatment and partial segregation. Unequal treatment equilibria with either full or partial segregation produce societies with a heterogeneous degree distribution.

Equal treatment equilibria under group-symmetric strategies exist everywhere. Under

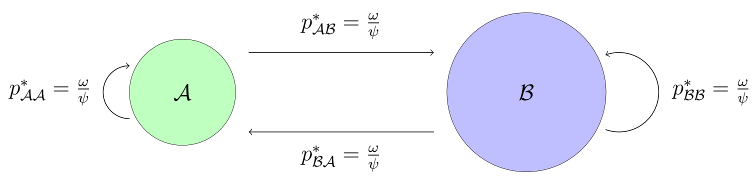
[16] When $p_{\mathcal{AA}} = p_{\mathcal{AB}} = p_{\mathcal{BA}} = p_{\mathcal{BB}}$, the no-contagion constraints for both groups coincide, and thus each group's constraint binds if the constraint for the other group binds. The government cannot improve upon equal treatment without triggering a riot. Moreover, in this case the slope of the government's indifference curves coincides with the slope of the no-contagion constraints, which is the reason why the ET equilibrium from Proposition 3 is not strict.



(a) Equilibrium Social Structure under UTF. Members of the group subject to a high interrogation rate –the majority– have a lower degree than members of the group subject to a low interrogation rate –the minority–. Members of the group subject to a low interrogation rate do not socialize with members of the group subject to a high interrogation rate, leading to complete segregation.



(b) Equilibrium Social Structure under UTP. Members of the group subject to a high interrogation rate –the majority– have a lower degree than members of the group subject to a low interrogation rate –the minority–. Members of the group subject to a low interrogation rate socialize at a low rate with members of the group subject to a high interrogation rate, leading to partial segregation.



(c) Equilibrium Social Structure under Equal Treatment. All players ignore the arbitrary group labels, leading to a homogeneous society where all citizens have the same degree, and where segregation is low.

Figure 3: Equilibrium Social Structures from Proposition 3. In these examples $\lambda_\mathcal{B} > \lambda_\mathcal{A}$.

them, the government treats citizens of both groups equally. As a result, citizens are indifferent about the group identities of whom they connect with, and any socialization rates that satisfy (17) constitute an equilibrium.

Corollary 1. *In any strategy profile that constitutes an ET equilibrium, the degree of every citizen is the same, and equal to* $(\omega/\psi)^2$*. All ET are payoff equivalent.*

See the proof in Appendix A.

Equal treatment equilibria produce a homogeneous (in degree) society. A focal equilibrium in this case is the one where $p_{\mathcal{AA}} = p_{\mathcal{AB}} = p_{\mathcal{BA}} = p_{\mathcal{BB}}$, so the group labels are ignored. Figure 3c illustrates this situation. Equal treatment equilibria are not strict equilibria because they are all payoff equivalent.

4.4.2 Group sizes and unequal treatment

Our model has implications about the relationship between group sizes and unequal treatment.

Proposition 4. *In any equilibrium that exhibits unequal treatment and full or partial segregation, the minority group will be the disfavored one only if disfavoring the majority group would violate* (NRC)*.*

In particular, if $\nu > max\{\lambda_{\mathcal{A}}, \lambda_{\mathcal{B}}\}$ *(strong government), the unequal treatment equilibria disfavor the majority. If* $max\{\lambda_{\mathcal{A}}, \lambda_{\mathcal{B}}\} > \nu > min\{\lambda_{\mathcal{A}}, \lambda_{\mathcal{B}}\} + \psi max\{\lambda_{\mathcal{A}}, \lambda_{\mathcal{B}}\}$ *(weak government), the unequal treatment equilibria disfavor the minority.*

See the proof in Appendix A.

Because the government does not have an inherent preference over group identities, inequality in treatment across groups is driven by how social structure shapes the government's incentives to aggregate information. As long as the government can satisfy (NRC) while unfavorably treating the larger group, unequal treatment equilibria will disfavor the majority. This preference is based on the value of information aggregation.[17]

Only when social structure makes targeting the majority infeasible should we observe a higher interrogation rate on the minority. Proposition 4 points out that unequal treatment against minorities may be observed when unequally treating majorities is infeasible given their strength in numbers relative to the government, or when social ties across groups are such that contagion of collective action can spread from the majority to the minority.

Historical experiences of majorities being the subjects of unequal treatment are not uncommon. Just to mention a few examples, between the 17th and the 19th centuries the population of the British Caribbean was at least three fifths black, the vast majority of whom were enslaved (Engerman and Higman (2003)). In Apartheid South Africa, by the 1950s native blacks constituted around three quarters of the population (Chimere-dan (1992)). In Syria prior to the deposition of the Assad regime in 2024, the advantaged Alawite Shia minority constituted around 15 percent of the population with the disadvantaged Sunni majority making up around three quarters of the population (CIA (2023)).

4.4.3 Comparative statics

While Proposition 4 indicates that the largest group is likely to be unfavorably treated, we now ask how the unequal treatment equilibria that lead to this outcome are affected by

[17] The reason why the minority is the favored group in such cases is different from Olson (1971)'s well-known argument about the success of minorities being driven by their comparative ability to avoid free-rider problems. It is also in contrast with the more traditional view of civil liberties as societal protections for minorities from majorities.

changes in relative group sizes.

Corollary 2. *Under any unequal treatment equilibrium, a marginal increase in the size of the unfavorably treated group* λ_G *has the following effects:*

- $t^*_G = 1$ *is unchanged, while* t^*_H *weakly decreases.*
- p^*_{HH} *and* p^*_{HG} *weakly increase.*
- $p^*_{GH} = 1$ *is unchanged, while* p^*_{GG} *decreases.*

See the proof in Appendix A.

When the unfavorably treated group becomes larger, the set of reactive citizens is larger. To make sure the (NRC) still holds, the government must treat the favorably treated group even more favorably, increasing the extent of unequal treatment between groups. And while socialization incentives for the favorably treated group go up, they go down for the unfavorably treated group.

In Appendix B we show that Proposition 3 also implies that through ω and across all equilibria, socialization rates (and the average degree of citizens) are weakly increasing in the standard of proof, and weakly decreasing in the threat likelihood and the precision of signals. They are also inversely related to ψ, as small values of this parameter tighten the (NRC). This echoes Besley and Persson (2019), for example, who argue that society's ability to organize depends on its social capital and democratic values. Thus, our model predicts that social cohesiveness and the strength of civil liberties should covary positively with the strength of civic engagement.

4.4.4 Equilibrium payoffs, lack of commitment, and coordination failure

Our results also illustrate how strong civic values, leading to stronger equilibrium civil liberties, are a source of commitment for the government. Consider, for example, equilibria with equal treatment where group labels are ignored. The mass of arrests the government can undertake in equilibrium is strictly larger than in the absence of a constraint on interrogations.[18] In the absence of a no-riot constraint, the government would choose $\lambda(N) = 1$, and its equilibrium payoff would be ω^2, the minimum possible. Thus, civil liberties in our model both protect citizens from the government, and protect the government from itself.[19]

[18] Because the measure A_τ of arrests under civil liberties τ corresponds to the ex-ante probability faced by a citizen of being arrested, $\mathbb{E}_\chi [\mathbb{1}\{\chi_i > \chi\}\mathbb{P}(\theta_i = 1)]$, it is easily verified from the proof of Lemma A.1 that A_τ is decreasing in τ so that $A_1 < A_\psi$.

[19] For $\omega < 1$, the government would like to commit to $\lambda(N) \leq \omega$, in which case its payoff would be ω.

The reason is that the erosion of social cohesion induced by citizens' expectations of the government's behavior undermines the effectiveness of the information aggregation technology more than one to one with the interrogation rate. This is not an artifact of the linearity in the information aggregation technology but rather of the multiplicative friendship technology: a citizen's expected degree is the product of his own socialization rate and that of his friends. An increase in the interrogation rate reduces every citizen's incentive to socialize, and the resulting fall in equilibrium degrees is quadratic in the fall in socialization rates.

This discussion motivates the following question: does the government aggregate more information under unequal treatment than under equal treatment?

Lemma 1. *Whenever unequal treatment is an equilibrium, the expected number of arrests is strictly lower than under the equal treatment equilibria.*

See the proof in Appendix B.

In the equilibria with unequal treatment the government interrogates the unfavorably treated group at a maximal rate. Ex-post, however, the equilibrium number of arrests it can undertake is lower than under the corresponding ET equilibrium. Lemma 1 highlights the underlying commitment problem faced by the government. Although ex-ante this government would benefit from committing to equal treatment, ex-post, once citizens have segregated, the government chooses unequal interrogation rates that yield fewer expected arrests. The reduction in information aggregation stemming from the erosion of the social fabric induced by expectations of unequal treatment outweighs the increased information collection possible under the higher interrogation rate on the unfavorably treated group, leading to fewer equilibrium arrests than if the government could commit to equal treatment.

Looking at the citizens' payoffs, we have the following result:

Lemma 2. *Whenever unequal treatment is an equilibrium, the payoff for citizens of both groups is lower than under the equal treatment equilibria.*

See the proof in Appendix B.

Citizens are worse off under unequal treatment, *including* the members of the more favorably treated group. Thus, unequal treatment equilibria (and segregation) represent coordination failures by citizens of both groups. This is a novel result. It arises from the network effects embedded in our model, through which depressed socialization rates hurt all citizens. Although the favored group faces a lower interrogation rate under unequal treatment than under equal treatment, the heavy interrogation of the unfavored group depresses cross-group socialization. Members of the favored group socialize more within their own group in response, but their group size limits the extent to which this margin can compensate for the loss of cross-group friendships. In equilibrium, the lower interrogation rate therefore does not translate into a higher payoff. Equilibrium segregation in our model is of a different nature than in Lang (1986), for example, where a (transaction) cost of interaction between the two groups (in the form of a language barrier) is a primitive of the model. Here the differential cost from interacting across groups is endogenous. It is also in contrast to other models of socialization such as Alesina and LaFerrara (2000)'s model of participation in collective activities, where segregation can make one group better off at the expense of the other.[20]

Social segregation in the presence of coordination failure is reminiscent of models where social norms arise to sustain non-myopic behavior as in the caste model of Akerlof (1976) or the class systems model of Cole et al. (1998). In Akerlof's model, for example, a segregated caste system is sustained by a norm that excludes from the caste anyone who interacts with members of another caste. In our model, in contrast, members of the more favorably treated group reduce their socialization with members of the unfavorably treated group because the high interrogation rate imposed by the government on this group makes it costly to interact with them. Neither members of the favorably treated group nor the government face inter-temporal repercussions from deviating from equilibrium behavior. In our setting, social norms are not necessary to sustain segregation. In fact, in Appendix B we show that a caste system along the lines of Akerlof (1976) can only arise in the context of our model if group sizes are such that equilibrium *does not* entail unequal treatment.

4.5 Discussion

Several historical experiences are reminiscent of the feedback between civil liberties and social cohesiveness highlighted by our results. Contemporary Scandinavian societies, for example, are recognized to be highly cohesive and trustful, and also highly politically engaged. In turn their governments show a remarkable capacity to collect information about their citizens. In former Soviet republics, in contrast, citizens were suspicious of each other (Havel (1985)). Civic engagement was also low, as effective collective action is limited by the inability of citizens to publicly express their preferences (Kuran (1995)). In turn, these governments had to invest heavily in intelligence agencies and secret police services, possibly to compensate for their ineffectiveness at information aggregation. Discussing witch trials in 16th Century France, Johnson and Koyama (2014) similarly argue that in regions where local courts could exercise more discretion by ignoring standard rules of evidence, more trials took place because

[20] In classic labor market discrimination models (e.g., Coate and Loury (1993); Foster and Vohra (1992)), coordination failure happens only within the discriminated group: the advantaged group is unaffected. In subsequent labor market discrimination models (e.g., Mailath et al. (2000); Moro and Norman (2004)), the advantaged group benefits from discrimination on the disadvantaged group. In our model, both groups are hurt by unequal treatment, and the coordination failure involves citizens from both groups.

the trials themselves triggered fears of witchcraft among the population, leading to increased demand for further trials.

The East German experience between the 1950s and 1980s similarly suggests a two-way relationship between governmental intrusion and societal cohesiveness along the lines suggested by our model. In this period, the Stasi developed a widespread system of surveillance. At its height, around 15 percent of East Germans were Stasi informants, while the majority of citizens were the subjects of it. Historians have documented the deep distrust and erosion of social ties between East German citizens this produced (Fulbrook (2005); Gieseke (2014)). Recent work further documents the persistence of reduced interpersonal trust among post-reunification East Germans well into the present (Lichter et al. (2021)).

5 Extensions

5.1 Heterogeneous likelihood of threat membership

The model above assumes a homogeneous likelihood of threat membership. That special case allowed us to show that even in the absence of payoff-relevant heterogeneity, equilibria with unequal treatment exist. In some settings, the likelihood of threat membership may be correlated with group membership, which by itself could motivate differences in behavior by the government towards the different groups. Here we consider a more general setup where the common prior about the threat likelihood differs across groups: $\chi^A \neq \chi^B$. To maintain the assumption that in the absence of information the arrest threshold would not be met, we generalize our earlier restriction on χ: $\chi \geq \max\{\chi^A, \chi^B\}$. In this case, the posterior belief about $i \in G \in \{\mathcal{A}, \mathcal{B}\}$ after a signal $\theta_i = 1$ is

$$\chi_i = \left(1 + \frac{1-\chi^G}{\chi^G}\frac{\sigma_0(s_i)}{\sigma_1(s_i)}\right)^{-1}.$$

We maintain Assumption 1, and generalize the definitions from section 4 accordingly:

$$\omega^G = \frac{\overline{\chi} - \chi}{2b[\chi^G(1-\chi) + \chi(1-\chi^G)]\kappa}, \qquad \Omega_{GH} = \frac{\omega^G}{t_H}.$$

Ω_{GH} measures the benefit for a citizen from G from befriending a citizen from group H. While this benefit still depends on the interrogation risk faced by H citizens, it now also depends on the group-specific threat likelihood faced by a citizen from G.

Proposition 5. *Assume $\omega^{\mathcal{A}}, \omega^{\mathcal{B}} < \psi$. The results in Proposition 3 generalize as follows: Throughout, replace ω for ω^H.*

In (13)*, replace* Ω_H *for* Ω_{HH}*, and* Ω_G *for* Ω_{GG}*, and*

In (15)*, replace* Ω_G *for* Ω_{HG} *in the expression for* p^*_{HG}*, and replace* Ω_G *for* Ω_{GG} *in the expression for* p^*_{GG}*.*

In (17)*, replace* $\Omega_{\mathcal{A}}$ *for* $\Omega_{\mathcal{AA}}$*, and* $\Omega_{\mathcal{B}}$ *for* $\Omega_{\mathcal{BB}}$*.*

See the proof in Appendix A.

Proposition 5 shows that the equilibrium structure from section 4 is robust to heterogeneous priors. Heterogeneous priors give each group its own marginal-benefit-of-socialization parameter ω^G, since the threat-arrest trade-off faced by citizens of group G depends on χ^G. Which group is unfavored, however, is no longer determined by group size alone: when $\lambda_{\mathcal{A}} < \lambda_{\mathcal{B}}$ and $\chi^{\mathcal{A}} > \chi^{\mathcal{B}}$ (so $\omega^{\mathcal{A}} < \omega^{\mathcal{B}}$), the government can be induced to unequally treat the minority $\mathcal{A}$ even when unequally treating the majority $\mathcal{B}$ would leave (NRC) slack.

What we find most interesting about our model is that unequal treatment and segregation arise even without any primitive asymmetry between groups, as we showed in Sections 3–4. The heterogeneous-priors case is nonetheless of independent interest. Corollary B.2 in Appendix B shows that in the full-segregation regime, when group sizes are close, even small prior asymmetries are enough for the government to unequally treat the minority rather than the majority. In the limit $\lambda_{\mathcal{A}} \to \lambda_{\mathcal{B}}$, any positive asymmetry $\chi^{\mathcal{A}} - \chi^{\mathcal{B}} > 0$ is enough. The model amplifies small primitive differences in threat probability into large differences in interrogation and segregation.

5.2 Information Aggregation under Community Enforcement

We have considered an environment where citizens provide information to the government whenever they are interrogated. This hurts the citizens about whom information is revealed. While in section 4 we endogenized the limit on interrogations through a collective action mechanism, here we provide an alternative considering the existence of endogenous social norms limiting the ability of the government to interrogate effectively. Social norms such as Banfield (1958)'s *amoral familism* among Southern Italians, or the codes of silence of the mafia (e.g., Servadio (1976)), for example, suggest that community enforcement of social norms against collaboration with the government may emerge and limit its ability to exploit the social structure to aggregate information.

Consider an extension of our model (in the absence of group labels) where interrogated citizens can choose to resist sharing information about their friends. The government provides incentives in the form of punishments for resisting. We suppose that talking is publicly observed, so friends of a talking citizen may punish him for talking (ostracism, severing of economic relations, etc.). When the punishment for talking scales with the number of friends about whom an interrogated citizen talked, more cohesive social networks will be more effective at enforcing a code of silence. Citizens who resist are punishers.

Formally, we introduce two new sub-games: i) after a citizen is taken for interrogation, he decides whether to talk or resist. If he resists, the government imposes on him a cost $r_i \sim U[0, \tilde{r}]$, which is iid and realized at the time it is imposed. ii) This decision is observed by his $\tilde{d}_i$ punisher friends, who then impose a punishment $\tilde{r}\sqrt{\tilde{d}_i}$ if he talked, where $\tilde{r}$ is a constant. The extent of social punishment for talkers is determined by the mass of punishers and talkers. These masses, in turn, are determined by the cost of social punishment.

In symmetric equilibrium, all citizens choose a socialization rate p, so every citizen's degree is $d = p^2$. Denote by $r \in [0, \tilde{r}]$ the marginal resistance cost: if $r_i < r$, interrogated citizen i is willing to bear this cost, does not talk, and joins the group of punishers. If $r_i \geq r$, the punishment is too high and citizen i talks. Thus, $r/\tilde{r}$ is the fraction of punishers, and $1-(r/\tilde{r})$ is the fraction of talkers. Accordingly, the mass of punisher friends is $\tilde{d} = (r/\tilde{r})d$, and the cost of talking is $\sqrt{dr\tilde{r}}$. The marginal talker is thus pinned down by $r = \min\left\{\tilde{r}, \sqrt{dr\tilde{r}}\right\}$.

This talking sub-game has two equilibria. The first is $r = 0$. Here all citizens are talkers, and none punish, so no citizen has an incentive to resist. We call it the all-talk equilibrium. Because the continuation game is governed by the all-talk equilibrium, equilibrium socialization is simply $p^* = \omega$.

The second equilibrium of the talking sub-game is $r = d\tilde{r}$, which implies $d = r/\tilde{r}$. Fraction d of citizens are punishers and fraction $1 - d$ are talkers. We call it the community enforcement equilibrium. We now characterize the equilibrium socialization rate for this case. Consider a citizen i deciding on p_i given all other citizens choose p. His degree will be $d_i = p_i p$. During his interrogation, he can resist and suffer cost r_i. Alternatively, he can talk and suffer the social punishment $\tilde{r}\sqrt{d_i d}$ since, in equilibrium, fraction d of his friends will be punishers. The ex-ante expected interrogation cost for citizen i is thus,

$$\mathbb{E}_{r_i}\left[\min\left\{r_i, \tilde{r}\sqrt{d_i d}\right\}\right] = \tilde{r}\left(\sqrt{d_i d} - \frac{1}{2}d_i d\right).$$

Citizen i also must consider the expected cost of being arrested. There will be $d_i(1 - d)$ talkers among his friends, so the government will receive $s_i = d_i(1-d)$ clues about him. The expected arrest cost is thus $\frac{d_i(1-d)}{2\omega}$, and his ex-ante expected utility is proportional to

$$\sqrt{d_i} - \tilde{r}\left(\sqrt{d_i d} - \frac{1}{2}d_i d\right) - \frac{d_i(1-d)}{2\omega}.$$

Taking the first order condition and imposing symmetry ($d_i = d$), we find

$$\frac{1}{\sqrt{d}} - \left(\tilde{r} + \frac{1}{\omega}\right)(1-d) = 0 \quad \Longleftrightarrow \quad p(p-1)(p+1) + a = 0$$

since in equilibrium $p = \sqrt{d}$, and $a \equiv ((1/\omega) + \tilde{r})^{-1}$. This cubic equation has a solution iff $a \leq \frac{2}{3\sqrt{3}}$, in which case it has two positive roots in $[0, 1]$. The first solution is increasing in a, ranging from $p = 0$ to $p = 1/3$ as a increases from 0 to $\frac{2}{3\sqrt{3}}$. The second solution is decreasing in a, ranging from $p = 1$ to $p = 1/3$ as a increases from 0 to $\frac{2}{3\sqrt{3}}$.[21]

6 Conclusion

Civil liberties in the form of restrictions on the use of coercion by government agents are a key buffer between citizens and the state. While governments use such coercion to aggregate information that is distributed across the citizenry, the social structure, in turn, mediates both the government's ability to collect information efficiently and the citizens' ability to resist intrusion. In this paper we have offered a first look at how the government's ability to collect information and citizens' socialization decisions are jointly determined.

We argue that when civil liberties are weak, governments attempting to exploit their coercive advantages will be ineffective at aggregating information because such efforts will erode the social network of citizens. Iron Curtain governments were characterized by their unconstrained ability to exercise coercion over their citizens, and concomitantly by mistrustful societies with eroded social fabrics. The massive investments in intelligence agencies, secret police services, and prison camps of these governments may well have been a symptom of their ineffectiveness at aggregating information about their citizens. Thus, civil liberties that can be sustained in equilibrium both protect citizens from the state, and the government from itself.

Cohesive societies facilitate information aggregation, but they also strengthen the ability of civil society to resist it. We show this opens the door to the possibility of unequal treatment, where the government treats ex-ante identical citizens differently. By making

[21] This simple extension rationalizes the decision to reveal information to the government. It does not, however, provide a rationale for why punishers would want to punish. We can justify equilibrium punishment with the following argument: suppose that part of the social norm prescribes that punishers who refuse to punish talkers are treated as talkers and punished accordingly. As long as punishers have a large enough number of friends, punishing will be incentive compatible. This is true in the symmetric equilibrium we described above. What if a positive-mass coalition of punishers wanted to jointly deviate and not punish? It is easy to verify that in this model, no coalition within the set of punishers can benefit from jointly deviating: for any positive-mass coalition, the reduction in expected punishment (from there being fewer punishers) is strictly lower than the margin by which any citizen prefers to resist talking over talking.

some citizens the targets of more interrogation, the government makes them unattractive partners for socialization. The government can thus provide incentives that fracture the social structure, weakening civil society's resistance, and leading to segregation. We show that segregation is necessary for unequal treatment to be justified, and unequal treatment rationalizes segregated socialization choices. These equilibria are robust when they exist, providing a novel rationale for segregation. They are reminiscent of the high levels of segregation along ethnic lines inside US prisons, for example. An intriguing avenue for future research could explore whether ideas along the lines of our model can help explain inmates' socialization decisions and the corresponding behavior of guards and prison administrators.[22]

In two extensions, we study a setting where groups face different prior threat probabilities, and an alternative micro-foundation in which community-enforced norms against disclosure limit the government's interrogation effectiveness. Our model has many limitations. Throughout we took society's ability to engage in collective action as exogenous. In practice, civil liberties and the social structure likely shape some aspects of civic engagement. We also did not address the political economy shaping the government's information aggregation objective.

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[22] See Skarbek (2014) on prison-gang governance organized along race lines, and Goodman (2008) on guards' role in racially segregating inmates at California prison reception centers.

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A Proofs and Auxiliary Results

Below, we write down all our proofs in the context of the general model from subsection 5.1 with heterogeneous priors between groups. Accordingly, we work with the group-specific parameters as defined in that section. Throughout the appendix, we also denote

$$e_{GH} \equiv p_{GH} p_{HG} \lambda_G \lambda_H$$

as the measure of friends of citizens in group G from citizens in group H, and

$$e_G \equiv e_{GG} + e_{GH}$$

as the measure of friends of citizens in G.

Lemma A.1. ***(Auxiliary)***
The government's payoff function is proportional to

$$V \propto \sum_G \sum_H \frac{e_{GH}}{\Omega_{GH}}$$

Proof of Lemma A.1.
Given the citizens' group-symmetric socialization strategies and interrogation rates (t_A, t_B), the interim (before signals and standard of proof are realized) expected payoff of the government can be expressed as:

$$\begin{aligned}
\mathbb{E}_{\underline{\chi}}[V] &\propto \mathbb{E}_{\underline{\chi}}\left[\sum_G \lambda_G \mathbb{I}[\underline{\chi} < \chi_i] \left(\chi^G \sigma_1(s_G) + (1-\chi^G)\sigma_0(s_G)\right)\right] \\
&= \sum_G \lambda_G \frac{\chi^G - \underline{\chi}}{\overline{\chi} - \underline{\chi}} \left(\chi^G \sigma_1(s_G) + (1-\chi^G)\sigma_0(s_G)\right) \\
&= \sum_G \lambda_G \frac{\chi^G(1-\underline{\chi})b + \underline{\chi}(1-\chi^G)b}{\overline{\chi} - \underline{\chi}} s_G \\
&\propto \sum_G \lambda_G \frac{1}{\omega^G} s_G = \sum_G \lambda_G \frac{1}{\omega^G} \sum_H p_{GH} p_{HG} \lambda_H t_H = \sum_G \sum_H \frac{e_{GH}}{\Omega_{GH}}
\end{aligned}$$

Proof of Proposition 1.
By Lemma A.1, V is linear in (t_A, t_B) with strictly positive coefficients $\sum_G e_{GH}/\omega_G$, so the government's best reply lies on the boundary of the feasible set defined by NRC and the two no-contagion constraints (NC-G), as discussed in subsection 4.1. The boundary has three vertex types. When neither group is in contagion, both no-contagion constraints pass through (ψ, ψ) and NRC is satisfied, yielding case 3. When group G enters contagion ($\Gamma_G = 1$), the binding no-contagion constraint for H pins down $\tilde{t}_H = \psi - (1-\psi)(p_{GH}p_{HG}/p_{HH}^2)(\lambda_G/\lambda_H)$, while NRC slacks at $(\nu - \lambda_G)/\lambda_H$; monotonicity of V in t pushes the optimum to the tighter cap, giving cases 1 and 2. Putting both groups in contagion is infeasible since $\Gamma_A \lambda_A + \Gamma_B \lambda_B = 1 > \nu$, and interior points are dominated.

Proof of Proposition 2.
Given all other citizens play group-symmetric strategies, the expected payoff of $i \in G$ can be derived as

follows:

$$\begin{aligned}
\mathbb{E}_{\underline{\chi}}[u_i] &= \mathbb{E}_{\underline{\chi}}\left[\sqrt{d_i} - \mathbb{1}[\chi_i > \underline{\chi}](\chi^G\sigma_1(s_i) + (1-\chi^G)\sigma_0(s_i))\kappa\right] \\
&= \sqrt{d_i} - \frac{\chi^G(1-\chi)\,\sigma_1(s_i) - \chi(1-\chi^G)\,\sigma_0(s_i)}{\bar{\chi}-\chi}\kappa \\
&= \sqrt{d_i} - \frac{\chi^G(1-\chi)\,(a+bs_i) - \chi(1-\chi^G)\,(a-bs_i)}{\bar{\chi}-\chi}\kappa \\
&\propto \sqrt{d_i} - \frac{\chi^G(1-\chi)\,(bs_i) - \chi(1-\chi^G)\,(-bs_i)}{\bar{\chi}-\chi}\kappa \\
&\propto \sqrt{d_i} - \frac{\chi^G(1-\chi)\, + \chi(1-\chi^G)}{\bar{\chi}-\chi}\kappa b s_i \\
&= \sqrt{d_i} - \frac{1}{2\omega^G}s_i.
\end{aligned}$$

Substituting in for d_i and s_i, this is proportional to

$$\mathbb{E}_{\rho_{iA},,\rho_{iB},,\underline{\chi}}[u_i] \propto \mathbb{E}_{\rho_{iA},,\rho_{iB},}\left[\sqrt{\sum_H \rho_{iH}p_{HG}\lambda_H} - \frac{1}{2\omega^G}\left(\sum_H \rho_{iH}p_{HG}\lambda_H t_H\right)\right] \tag{A.1}$$

Taking first order conditions with respect to i's strategy (ρ_{iA}, ρ_{iB}), the best responses in (10) and (11) follow.

Lemma A.2. ***(Auxiliary)*** *In equilibrium, if $t_A = 1$, then for any $G \in \{A, B\}$, either $p_{GB} = 1$ or $p_{GA} = 0 \neq p_{GB} \neq 1$.*

Proof of Lemma A.2.

Suppose that $t_A = 1$. Then, $\Omega_{GA} = \omega_G < \frac{\omega_G}{\psi} \leq \frac{\omega_G}{\tau_B} = \Omega_{GB}$.

Using Proposition 2 we can show the following:

Step 1: $\{p_{GB}, p_{GA}\} \cap \{0, 1\} \neq \emptyset$.

Proof: If p_{AA} and p_{AB} in (10) are both interior (i.e. $p_{AB}, p_{AA} \in (0,1)$), then $\Omega^2_{AA} = p_{AB}p_{BA}\lambda_B + p^2_{AA}\lambda_A = \Omega^2_{AB}$ which does not hold. Similarly, p_{BA} and p_{BB} from (11) cannot be interior at the same time. □

Step 2: $p_{GA} = 1$ implies $p_{GB} = 1$.

Proof: If $p_{BA} = 1$, then by p_{BA} from (11), $\frac{\Omega^2_{BA} - p^2_{BB}\lambda_B}{p_{AB}\lambda_A} \geq 1$. This implies $p_{AB}\lambda_A + p^2_{BB}\lambda_B \leq \Omega^2_{BA} < \Omega^2_{BB}$. Then, by p_{BB} from (11), $p_{BB} = 1$. Similarly, $p_{AA} = 1$ implies $p_{AB} = 1$. □

Step 3: $p_{GB} \neq 0$.

Proof: If $p_{BB} = 0$, then by p_{BB} from (11), $\frac{\Omega^2_{BB} - p_{BA}p_{AB}\lambda_A}{p_{BB}\lambda_B} \leq 0$. This implies $p_{BA}p_{AB}\lambda_A \geq \Omega^2_{BB} > \Omega^2_{BA}$. In turn, by p_{BA} from (11),

$$p_{BA} = \max\left\{0, \min\left\{1, \frac{\Omega^2_{BA}}{p_{AB}\lambda_A}\right\}\right\} \leq \frac{\Omega^2_{BA}}{p_{AB}\lambda_A} < p_{BA}$$

which is a contradiction. So $p_{BB} \neq 0$.

If $p_{AB} = 0$, then by (10),

$$p_{AA} = \min\left\{1, \frac{\Omega^2_{AA}}{p_{AA}\lambda_A}\right\} \leq \frac{\Omega^2_{AA}}{p_{AA}\lambda_A} < \frac{\Omega^2_{AB}}{p_{AA}\lambda_A} < p_{AA}$$

which is a contradiction. So $p_{AB} \neq 0$. □

Step 4: Suppose $p_{GB} \neq 1$. Then by Step 2 $p_{GA} \neq 1$. If $p_{GA} \neq 0$ then by Step 1 $p_{GB} = 0$, which contradicts Step 3: $p_{GB} \neq 0$. So $p_{GA} = 0$. Combining all steps, we get the result. □

Lemma A.3. ***(Auxiliary)*** *Recall that Equal Treatment is always feasible (the NRC is not violated). Suppose that Unequal Treatment against A is feasible too. If Unequal Treatment against A is the government's best response — i.e., its payoff weakly exceeds that under both Equal Treatment and Unequal Treatment against B — then* $e_{AA}e_{BB} \geq e_{AB}e_{BA}$.

Proof of Lemma A.3.

By Lemma A.1, V takes the form $\sum_{G,H} e_{GH}t_H/\omega_G$. The condition $V^{UT\text{-}A} \geq V^{ET}$ rearranges to

$$\left(\frac{e_{AA}}{\omega_A} + \frac{e_{BA}}{\omega_B}\right)(1-\psi) \geq \left(\frac{e_{AB}}{\omega_A} + \frac{e_{BB}}{\omega_B}\right)(\psi - t_B). \tag{A.2}$$

We deduce $e_{AA}e_{BB} \geq e_{AB}e_{BA}$ by cases on the citizen strategy profile, using Lemma A.2.

Case 1: $p_{BA} = 0$. Then $e_{AB} = e_{BA} = 0$ and the conclusion is immediate.

Case 2: $p_{BA} \neq 0$ *and* $p_{AB} = 1$. By Lemma A.2 applied to $G = B$, $p_{BA} \neq 0$ implies $p_{BB} = 1$, so $e_{BB} = \lambda_B^2$ and $e_{AB} = e_{BA} = p_{BA}\lambda_A\lambda_B$. When $p_{BA} = 1$ all $p_{GH} = 1$ and the conclusion holds with equality. When $p_{BA} \in (0,1)$, Proposition 2 gives $p_{BA}\lambda_A = \omega_B^2 - \lambda_B$, and the government's optimal t_B satisfies $\psi - t_B \geq (1-\psi)p_{BA}\lambda_A/\lambda_B$ (with equality when the citizen-incentive cap on t_B binds; the conclusion is strengthened by monotonicity when the NRC cap binds instead). Substituting into (A.2), the ω_B terms cancel, leaving $e_{AA} \geq (p_{BA}\lambda_A)^2$, equivalent to $e_{AA}e_{BB} \geq e_{AB}e_{BA}$.

Case 3: $p_{BA} \neq 0$, $p_{AA} = 0$, $p_{AB} \in (0,1)$. The strengthened premise rules this out. As above $p_{BB} = 1$ and $e_{BB} = \lambda_B^2$. The interior FOC for p_{AB} gives $e_{AB} = \omega_A^2\lambda_A/t_B^2$, and the $p_{BB} = 1$ corner condition together with this FOC implies $\omega_B\sqrt{\lambda_B} \geq \omega_A$. Computing $V^{UT\text{-}A} - V^{UT\text{-}B}$ at these $\mathbf{e}$ with NRC-binding interrogation rates, the condition $V^{UT\text{-}A} \geq V^{UT\text{-}B}$ reduces to $\omega_A^2\lambda_B \geq \omega_A\omega_B\lambda_A + t_B^2\lambda_B^2$; combined with $t_B^2\lambda_B^2 \geq \omega_A^2\lambda_B$ (from the $p_{AB} \in (0,1)$ FOC) this gives $0 \geq \omega_A\omega_B\lambda_A$, a contradiction. (When the NRC does not bind under UT-B, the analogous reduction of $V^{UT\text{-}A} \geq V^{ET}$ produces the same contradiction, using $\omega_A \leq \omega_B\sqrt{\lambda_B}$.) □

Lemma A.4. ***(Auxiliary)*** *Any equilibrium in which* $p_{BA} = 0$ *and* $t_A = 1$ *satisfies*

$$t_A = 1,\ t_B = \min\left\{\psi, \frac{\nu - \lambda_A}{\lambda_B}\right\}$$
$$p_{AA}^2 = \min\left\{1, \frac{\Omega_{AA}^2}{\lambda_A}\right\}$$
$$p_{BB}^2 = \min\left\{1, \frac{\Omega_{BB}^2}{\lambda_B}\right\}$$
$$p_{AB} = 1,\ p_{BA} = 0$$

Suppose $\nu \geq \lambda_A$. *This strategy profile satisfies citizens' incentives in Proposition 2 if and only if* $\omega_B^2 < \lambda_B$. *Furthermore, notice this implies*

$$d_{BB} = \min\left\{\lambda_B, \Omega_{BB}^2\right\},\ \ e_{AB} = 0,\ \ d_{AA} = \min\left\{\lambda_A, \Omega_{AA}^2\right\}$$
$$e_{BB} = \min\left\{\lambda_B^2, \lambda_B\Omega_{BB}^2\right\},\ \ e_{AB} = 0,\ \ e_{AA} = \min\left\{\lambda_A^2, \lambda_A\Omega_{AA}^2\right\}.$$

Proof of Lemma A.4.

First notice that $\nu \geq \lambda_A$ must hold. Otherwise, $t_B < 0$ and so $t_A = 1$ is not feasible.

We have $p_{BA} = 0$. Then by p_{AA} in Proposition 2, $p_{AA} \neq 0$. Then by Lemma A.2, $p_{AB} = 1$. Then in Proposition 2, p_{AB} holds, p_{BA} becomes $\Omega_{BA}^2 < \lambda_B$, and p_{AA} and p_{BB} become

$$p_{AA}^2 = \min\left\{1, \frac{\Omega_{AA}^2}{\lambda_A}\right\},\ \ p_{BB}^2 = \min\left\{1, \frac{\Omega_{BB}^2}{\lambda_B}\right\}.$$

By $t_A = 1$, $\Omega_{BA}^2 < \lambda_B$ is equivalent to $\omega_B^2 < \lambda_B$. In this case, $t_B = \min\left\{\psi - (1-\psi)\frac{p_{AB}p_{BA}}{p_{BB}^2}\frac{\lambda_A}{\lambda_B}, \frac{\nu-\lambda_A}{\lambda_B}\right\} = \min\left\{\psi, \frac{\nu-\lambda_A}{\lambda_B}\right\}$.

Lemma A.5. ***(Auxiliary)*** *Any equilibria in which $p_{BA} \neq 0$ and $t_A = 1$ satisfies (a) or (b):*

(a)

$$
\begin{aligned}
& t_A = 1,\ \ t_B = \min\left\{1 - \frac{1-\psi}{\lambda_B}\omega_B^2\,,\ \frac{\nu - \lambda_A}{\lambda_B}\right\} \\
& p_{BA} = \frac{\Omega_{BA}^2 - \lambda_B}{\lambda_A} = \frac{\omega_B^2 - \lambda_B}{\lambda_A}, \\
& p_{AA}^2 = \min\left\{1, \frac{\Omega_{AA}^2 - p_{BA}\lambda_B}{\lambda_A}\right\}, \\
& p_{AB} = p_{BB} = 1.
\end{aligned}
$$

Note that this implies

$$
d_{BB} = \lambda_B,\ \ d_{BA} = \Omega_{BA}^2 - \lambda_B,\ \ d_{AA} = \Omega_{AA}^2 - d_{AB}
$$

$$
e_{BB} = \lambda_B^2,\ \ e_{BA} = e_{AB} = \Omega_{BA}^2\lambda_B - \lambda_B^2,\ \ e_{AA} = \min\left\{\lambda_A^2, \Omega_{AA}^2\lambda_A - e_{AB}.\right\}
$$

(b)

$$
\begin{aligned}
& t_A = 1,\ t_B = \min\left\{1 - \frac{1-\psi}{\lambda_B}, \frac{\nu - \lambda_A}{\lambda_B}\right\} \\
& p_{GH} = 1.
\end{aligned}
$$

Suppose $\nu \geq \lambda_A$. Case (a) satisfies citizens' incentives in Proposition 2 if and only if $1 > \omega_B^2 > \lambda_B$. Case (b) satisfies citizens' incentives in Proposition 2 if and only if $\omega_A, \omega_B \geq 1$.

Proof of Lemma A.5.

Note, $\nu \geq \lambda_A$ must hold. Otherwise, $t_B < 0$ and so $t_A = 1$ is not feasible.

By $p_{BA} \neq 0$ and Lemma A.2, $p_{BB} = 1$.

By Lemma A.2, $p_{AB} \neq 0$. From Lemma A.3 we have that $p_{AA}p_{BB} \geq p_{AB}p_{BA}$, so that $p_{AA} \neq 0$. Then by Lemma A.2, $p_{AB} = 1$.

Thus, $p_{AB} = p_{BB} = 1$ and $p_{BA}, p_{AA} \neq 0$. Then by the expression for p_{AA} from (10) and for p_{BA} from (11), it follows that $p_{BA} = \min\left\{1, \frac{\omega_B^2 - \lambda_B}{\lambda_A}\right\}$ and $p_{AA}^2 = \min\left\{1, \frac{\omega_A^2 - p_{BA}\lambda_B}{\lambda_A}\right\}$. Note that this makes $t_A = 1$ and $t_B = \min\left\{1 - \frac{1-\psi}{\lambda_B}\min\left\{1, \omega_B^2\right\}, \frac{\nu - \lambda_A}{\lambda_B}\right\}$.

Under the values above, (10) holds for p_{AB} and (11) holds for p_{BB}. Moreover, the expression for p_{BA} in (11) holds if and only if $\omega_B^2 > \lambda_B$. Finally, the expression for p_{AA} in (10) is implied by p_{BA} in (11) and Lemma A.3.

Finally observe that for part (b), $p_{BA} = 1$ if and only if $\omega_B \geq 1$. Also, $p_{AA}p_{BB} \geq p_{AB}p_{BA}$ if and only if $p_{AA} = 1$, which requires $\omega_A \geq 1$.

Lemma A.6. ***(Auxiliary)*** *Any equilibrium in which $t_A = t_B = \psi$ satisfies either of the following two cases:*

- *$\omega_G > \psi$ and $p_{GG} = p_{GH} = 1$.*
- *$\omega_G < \psi$ and $\frac{1}{\psi^2}\omega_G^2 = p_{GG}^2\lambda_G + p_{GH}p_{HG}\lambda_H$.*

If either of these cases holds, then citizens' incentives from Proposition 2 hold.

Proof of Lemma A.6.

Under $t_A = t_B = \psi$, the two equations in (10) have numerators $\omega_A^2/\psi^2 - \lambda_B p_{AB}p_{BA}$ and $\omega_A^2/\psi^2 - \lambda_A p_{AA}^2$, but the equilibrium p_{AA}, p_{AB} must satisfy the common identity $\lambda_A p_{AA}^2 + \lambda_B p_{AB}p_{BA} = \omega_A^2/\psi^2$ (and analogously for group B). This collapses each pair of FOCs to a single equation. The threshold $\omega_G \gtrless \psi$ determines whether the equation is satisfied at the interior locus or at the corner $p_{GG} = p_{GH} = 1$: at the corner, the bracket arguments in (10)–(11) exceed 1 iff $\omega_G^2/\psi^2 \geq 1$.

Proof of Proposition 5.

Corollary to Lemma A.4, Lemma A.5, Lemma A.6, and Lemma A.7. By the symmetry of the model in the group labels, the characterizations in Lemma A.4 and Lemma A.5 apply to UT against B after swapping A and B.

Proof of Proposition 3.

Corollary to Proposition 5, when $\omega_A = \omega_B = \omega$.

Lemma A.7. *Denote* $O_A = \frac{e_{AA}}{\omega_A} + \frac{e_{BA}}{\omega_B}$, $O_B = \frac{e_{AB}}{\omega_A} + \frac{e_{BB}}{\omega_B}$.

Unequal treatment against A *is a best reply if and only if (i) and (ii) hold:*

(i) $t_B \geq \max\left\{0, \psi - (1-\psi)\frac{O_A}{O_B}\right\}$.

(ii) $t_A < 0$ *or* $t_A \leq 1 - (1-t_B)\frac{O_B}{O_A}$.

Equivalently,

(i) $\max\left\{\frac{e_B}{e_{BB}}(1-\psi), \frac{1}{\lambda_B}(1-\nu)\right\} \leq \min\left\{1, (1-\psi)\left(1+\frac{O_A}{O_B}\right)\right\}$.

(ii) $\max\left\{\frac{e_A}{e_{AA}}(1-\psi), \frac{1}{\lambda_A}(1-\nu)\right\} \geq \max\left\{\frac{e_B}{e_{BB}}(1-\psi), \frac{1}{\lambda_B}(1-\nu)\right\}\frac{O_B}{O_A}$ *or* $\max\left\{\frac{e_A}{e_{AA}}(1-\psi), \frac{1}{\lambda_A}(1-\nu)\right\} > 1$.

Proof of Lemma A.7.

By Lemma A.1, if feasible, Unequal Treatment against A yields a payoff of $O_A + t_B O_B$ to the government. Unequal Treatment against B yields a payoff of $t_A O_A + O_B$ to the government. Equal Treatment yields a payoff of $\psi O_A + \psi O_B$ to the government. Then Proposition 1 and simple algebra deliver the result.

Proof of Proposition 4.

Maintain the parameter assumptions from Proposition 3.

Unequal Treatment against A yields a payoff of $O_A + t_B O_B$ to the government, whereas Unequal Treatment against B yields a payoff of $t_A O_A + O_B$. Suppose that Unequal Treatment against A and Unequal Treatment against B are both feasible, and that the government's payoff under Unequal Treatment against A is higher than under Unequal Treatment against B. Then we have $(1-t_A)O_A \geq (1-t_B)O_B$. Then, because $1 - t_G = \max\left\{\frac{e_G}{e_{GG}}(1-\psi), \frac{1}{\lambda_G}(1-\nu)\right\}$, $(1-t_A)O_A \geq (1-t_B)O_B$ implies that either (i) $\frac{e_A}{e_{AA}}O_A \geq \frac{e_B}{e_{BB}}O_B$ or (ii) $\frac{O_A}{\lambda_A} \geq \frac{O_B}{\lambda_B}$ hold. Next consider (i) and (ii) under both UTF and UTP equilibria.

Consider UTF. (i) is equivalent to $\min\left\{\lambda_A^2, \lambda_A\omega^2\right\} \geq \min\left\{\lambda_B^2, \lambda_B\omega^2\frac{1}{t_B^2}\right\}$ which implies $\lambda_A \geq \lambda_B$. (ii) is equivalent to $\min\left\{\lambda_A, \omega^2\right\} \geq \min\left\{\lambda_B, \omega^2\frac{1}{t_B^2}\right\}$ which also implies $\lambda_A \geq \lambda_B$. So $\lambda_A \geq \lambda_B$ under UTF.

Consider UTP. Note that $p_{AA}^2 = 1 + \min\left\{0, (\lambda_B - \lambda_A)\frac{1-\omega^2}{\lambda_A^2}\right\}$. Suppose (i) holds, and suppose also that $\lambda_B \geq \lambda_A$. Then $p_{AA} = 1$, then $d_A = \lambda_A + \lambda_B\frac{\omega_B^2 - \lambda_B}{\lambda_A}$ and $d_{AA} = \lambda_A$, then $\frac{\left(\lambda_A + \lambda_B\frac{\omega_B^2-\lambda_B}{\lambda_A}\right)\lambda_A}{\lambda_A^2}\left(\lambda_A + \lambda_B\frac{\omega_B^2-\lambda_B}{\lambda_A}\right)\lambda_A > \frac{\omega^2}{\lambda_B}\omega^2\lambda_B$, then $\lambda_A^2 + \lambda_B\left(\omega^2 - \lambda_B\right) > \omega^2\lambda_A$, then $\lambda_A > \lambda_B$, which contradicts $\lambda_B \geq \lambda_A$. So (i) implies $\lambda_A > \lambda_B$. Now suppose (ii) holds. It is equivalent to $d_A \geq d_B$, which is equivalent to $\min\left\{\lambda_A + \frac{\omega^2\lambda_B - \lambda_B^2}{\lambda_A}, \omega^2\right\} \geq \omega^2$. So $\lambda_A + \frac{\omega^2\lambda_B-\lambda_B^2}{\lambda_A} \geq \omega^2$, which yields $\lambda_A \geq \lambda_B$.

Proof of Corollary 1.

Follows trivially by evaluating (1) at any Equal Treatment equilibrium strategy profile.

Proof of Corollary 2.

In any UT equilibrium $t_G^* = 1$ identically by Proposition 3. The remaining comparative statics in λ_G follow from differentiating the closed-form expressions, treating $\lambda_H = 1 - \lambda_G$.

UTF. $p^*_{HH} = \min\{1, \omega/(\psi\sqrt{\lambda_H})\}$ depends on λ_G only through λ_H; interior, $\partial p^*_{HH}/\partial\lambda_G = \omega/(2\psi\lambda_H^{3/2}) > 0$. $p^*_{HG} = 0$ and $p^*_{GH} = 1$ are constant. $p^*_{GG} = \min\{1, \omega/\sqrt{\lambda_G}\}$ has interior derivative $-\omega/(2\lambda_G^{3/2}) < 0$. The interrogation rate $t^*_H = \psi$ is constant.

UTP. $p^*_{HH} = 1$ and $p^*_{GH} = 1$ are constant. For $p^*_{HG} = (\omega^2 - \lambda_H)/\lambda_G$, writing $\lambda_H = 1 - \lambda_G$ gives $p^*_{HG} = 1 - (1-\omega^2)/\lambda_G$, so $\partial p^*_{HG}/\partial\lambda_G = (1-\omega^2)/\lambda_G^2 \geq 0$ (the feasibility $p^*_{HG} \leq 1$ requires $\omega^2 \leq 1$). For p^*_{GG}, with squared expression $f \equiv \omega^2(\lambda_G - \lambda_H) + \lambda_H^2$, the quotient rule gives $\partial(\sqrt{f}/\lambda_G)/\partial\lambda_G = (f'\lambda_G - 2f)/(2\sqrt{f}\,\lambda_G^2)$ where $f' = 2(\omega^2 - \lambda_H)$; the numerator simplifies to $2\lambda_H(\omega^2 - 1) \leq 0$, so p^*_{GG} weakly decreases. For $t^*_H = \min\{1 - (1-\psi)\omega^2/\lambda_H, (\nu - \lambda_G)/\lambda_H\}$, the first branch has derivative $-(1-\psi)\omega^2/\lambda_H^2 < 0$ and the second has derivative $(\nu - 1)/\lambda_H^2 \leq 0$ since $\nu \leq 1$, so t^*_H weakly decreases. □

B Online Appendix

B.1 Welfare comparisons under unequal treatment

This section proves Lemmas 1 and 2 from the main text. Throughout, A denotes the favorably treated group and B the unfavorably treated group under the unequal treatment equilibrium under consideration; the equilibrium characterizations imply $\lambda_A < \lambda_B$.

B.1.1 Proof of Lemma 1

Throughout, we maintain the standing assumption $\omega < \psi$ from Proposition 3 in the main text.

We begin by comparing the government's ex-ante payoffs under an ET and under a UTF equilibrium. Fix an economy $(\psi, \omega, \lambda_A)$ such that a UTF equilibrium exists. Thus,

$$\omega^2 < \lambda_A < \lambda_B \psi^2 \quad \text{or} \quad \lambda_A \psi^2 < \frac{\lambda_A^2}{\lambda_B} < \omega^2 < \lambda_A.$$

Case UTF-A: $\omega^2 < \psi^2 \lambda_A$.

In this case,

$$\begin{aligned} V^{UTF} - V^{ET} &= \psi \left(\min \left\{ 1, \frac{\omega^2}{\psi^2 \lambda_A} \right\} \lambda_A^2 \right) + \omega^2 \lambda_B - \min \left\{ 1, \frac{\omega^2}{\psi^2} \right\} \psi \\ &= \frac{1}{\psi} \omega^2 \lambda_A + \omega^2 \lambda_B - \frac{\omega^2}{\psi} < 0. \end{aligned}$$

The government is worse off under the UTF than under the corresponding ET.

Case UTF-B: $\psi^2 \lambda_A < \omega^2 < \psi^2$.

In this case, $\omega^2 > \psi^2 \lambda_A$ gives $\min\{1, \omega^2/(\psi^2 \lambda_A)\} = 1$, while $\omega^2 < \psi^2$ gives $\min\{1, \omega^2/\psi^2\} = \omega^2/\psi^2$. So

$$\begin{aligned} V^{UTF} - V^{ET} &= \psi \left(\min \left\{ 1, \frac{\omega^2}{\psi^2 \lambda_A} \right\} \lambda_A^2 \right) + \omega^2 \lambda_B - \min \left\{ 1, \frac{\omega^2}{\psi^2} \right\} \psi \\ &= \psi \lambda_A^2 + \omega^2 \lambda_B - \omega^2 \frac{1}{\psi} \\ &< \psi \lambda_A^2 - \psi^2 \lambda_A \left(\frac{1}{\psi} - \lambda_B \right) \\ &= \psi \lambda_A \left(\lambda_A + \psi \lambda_B - 1 \right) < 0. \end{aligned}$$

The government is worse off under the UTF than under the corresponding ET.

Case UTF-C: $\psi < \omega$.

Excluded by the maintained assumption $\omega < \psi$.

Now we compare the government's ex-ante payoffs under an ET and under a UTP equilibrium. Fix an economy $(\psi, \omega, \lambda_A)$ such that a UTP equilibrium exists. Thus,

$$\lambda_A < \omega^2 < \min \left\{ 1, \frac{\lambda_A}{1 - \psi} \right\} \quad \text{and} \quad \lambda_A < \lambda_B.$$

Case UTP-A: $\omega < \psi$.

In this case,

$$V^{UTP} - V^{ET} = \left(\omega^2 - (1-\psi)\omega^4\right) - \min\left\{1, \frac{\omega^2}{\psi^2}\right\}\psi$$
$$= \omega^2 - (1-\psi)\omega^4 - \frac{\omega^2}{\psi} < 0.$$

The government is worse off under the UTP than under the corresponding ET.

Case UTP-B: $\omega > \psi$.
Excluded by the maintained assumption $\omega < \psi$.

B.1.2 Proof of Lemma 2

We consider the same cases as those from the proof of Lemma 1 above.

Case UTF-A: $\omega^2 < \psi^2 \lambda_A$.
Consider first the payoffs for citizens from group A. In this case,

$$u^{A,UTF} - u^{A,ET} = \left(\sqrt{\min\left\{1, \frac{\omega^2}{\psi^2\lambda_A}\right\}\lambda_A} - \frac{1}{2\omega}\min\left\{1, \frac{\omega^2}{\psi^2\lambda_A}\right\}\lambda_A\psi\right) - \left(\min\left\{1, \frac{\omega}{\psi}\right\} - \frac{1}{2\omega}\min\left\{1, \frac{\omega^2}{\psi^2}\right\}\psi\right)$$
$$= \left(\sqrt{\frac{\omega^2}{\psi^2}} - \frac{1}{2\omega}\frac{\omega^2}{\psi}\right) - \left(\frac{\sqrt{\omega^2}}{\psi} - \frac{1}{2\omega}\frac{\omega^2}{\psi}\right) = 0.$$

Group A citizens are indifferent between UTF and ET.
Now consider the payoffs for citizens from group B. In this case,

$$u^{B,UTF} - u^{B,ET} = \left(\omega - \frac{1}{2\omega}\omega^2\right) - \left(\min\left\{1, \frac{\omega}{\psi}\right\} - \frac{1}{2\omega}\min\left\{1, \frac{\omega^2}{\psi^2}\right\}\psi\right)$$
$$= \left(\omega - \frac{1}{2\omega}\omega\right) - \left(\frac{\sqrt{\omega^2}}{\psi} - \frac{1}{2\omega}\frac{\omega^2}{\psi}\right) < 0.$$

Group B citizens are worse off under UTF than under the corresponding ET.

Case UTF-B: $\psi^2\lambda_A < \omega^2 < \psi^2$.
Consider first the payoffs for citizens from group A. In this case,

$$u^{A,UTF} - u^{A,ET} = \left(\sqrt{\min\left\{1, \frac{\omega^2}{\psi^2\lambda_A}\right\}\lambda_A} - \frac{1}{2\omega}\min\left\{1, \frac{\omega^2}{\psi^2\lambda_A}\right\}\lambda_A\psi\right) - \left(\min\left\{1, \frac{\sqrt{\omega^2}}{\psi}\right\} - \frac{1}{2\omega}\min\left\{1, \frac{\omega^2}{\psi^2}\right\}\psi\right)$$
$$= -\left(\sqrt{\lambda_A} - \frac{\sqrt{\omega^2}}{\psi}\right)^2 \frac{1}{2}\frac{\psi}{\sqrt{\omega^2}} < 0.$$

Group A citizens are worse off under UTF than under the corresponding ET.
Now consider the payoffs for citizens from group B. In this case,

$$u^{B,UTF} - u^{B,ET} = \left(\sqrt{\omega^2} - \frac{1}{2\omega}\omega^2\right) - \left(\min\left\{1, \frac{\sqrt{\omega^2}}{\psi}\right\} - \frac{1}{2\omega}\min\left\{1, \frac{\omega^2}{\psi^2}\right\}\psi\right)$$
$$= \left(\sqrt{\omega^2} - \frac{1}{2\omega}\omega^2\right) - \frac{1}{\psi}\left(\sqrt{\omega^2} - \frac{1}{2\omega}\omega^2\right) < 0.$$

Group B citizens are worse off under UTF than under the corresponding ET.

Case UTF-C: $\psi < \omega$.

Excluded by the maintained assumption $\omega < \psi$.

Case UTP-A: $\omega < \psi$.

Consider first the payoffs for citizens from group A. In this case,

$$\begin{aligned} u^{A,UTP} - u^{A,ET} &= \left(\sqrt{\omega^2} - \frac{1}{2\omega}\psi\omega^2\right) - \left(\min\left\{1, \frac{\sqrt{\omega^2}}{\psi}\right\} - \frac{1}{2\omega}\min\left\{1, \frac{\omega^2}{\psi^2}\right\}\psi\right) \\ &= \omega\left(1 - \frac{1}{2}\left(\psi + \frac{1}{\psi}\right)\right) \\ &< \omega\left(1 - \frac{1}{2}\cdot 2\right) = 0. \end{aligned}$$

Group A citizens are worse off under UTP than under the corresponding ET.

Now consider the payoffs for citizens from group B. It suffices to note that $u^{B,UTP} < u^{A,UTP}$, and $u^{B,ET} = u^{A,ET}$. Thus, group B citizens are worse off under UTP than under the corresponding ET.

Case UTP-B: $\omega > \psi$.

Excluded by the maintained assumption $\omega < \psi$.

B.2 Changes in the Economic Environment

Here we turn to a description of the comparative statics with respect to several parameters of interest. Conveniently, these affect equilibrium quantities exclusively through ω, the reduced-form parameter capturing how the information technology shapes socialization incentives. Here we discuss only the UT equilibria. In all unequal treatment equilibria, comparative statics over socialization rates and over interrogation rates are monotone in the key parameters of the model (within an equilibrium). We rely on the following Corollary to Proposition 3:

Corollary B.1. *Comparative statics with respect to ω:*

1. *UTF:*

$$\frac{\partial p^*_{HH}}{\partial\omega} > 0, \quad \frac{\partial p^*_{HG}}{\partial\omega} = \frac{\partial p^*_{GH}}{\partial\omega} = 0, \quad \frac{\partial p^*_{GG}}{\partial\omega} > 0,$$
$$\frac{\partial t^*_H}{\partial\omega} = \frac{\partial t^*_G}{\partial\omega} = 0.$$

2. *UTP:*

$$\frac{\partial p^*_{HH}}{\partial\omega} = 0, \quad \frac{\partial p^*_{HG}}{\partial\omega} > 0, \quad \frac{\partial p^*_{GH}}{\partial\omega} = 0, \quad \frac{\partial p^*_{GG}}{\partial\omega} > 0,$$
$$\frac{\partial t^*_H}{\partial\omega} < 0, \quad \frac{\partial t^*_G}{\partial\omega} = 0.$$

Proof. Differentiate the closed-form expressions in Proposition 3 with respect to ω. Under Proposition 4, the unfavorably treated group is the larger one, so $\lambda_G \geq \lambda_H$. *UTF*: $\partial p^*_{HH}/\partial\omega = 1/(\psi\sqrt{\lambda_H}) > 0$ when interior; $p^*_{HG} = 0$, $p^*_{GH} = 1$, $t^*_H = \psi$, $t^*_G = 1$ are independent of ω; $\partial p^*_{GG}/\partial\omega = 1/\sqrt{\lambda_G} > 0$ when interior. *UTP*: $p^*_{HH} = 1$, $p^*_{GH} = 1$, $t^*_G = 1$ are constant; $\partial p^*_{HG}/\partial\omega = 2\omega/\lambda_G > 0$. For p^*_{GG} with squared expression $f = \omega^2(\lambda_G - \lambda_H) + \lambda_H^2$, $\partial f/\partial\omega = 2\omega(\lambda_G - \lambda_H) \geq 0$ since $\lambda_G \geq \lambda_H$, so $\partial p^*_{GG}/\partial\omega \geq 0$ (strict when $\lambda_G > \lambda_H$ and p^*_{GG} interior). For $t^*_H = \min\{1 - (1-\psi)\omega^2/\lambda_H, (\nu - \lambda_G)/\lambda_H\}$, the first branch has derivative $-2(1-\psi)\omega/\lambda_H < 0$ and the second is independent of ω, so t^*_H weakly decreases (strict when the first branch binds). □

Increases in the likelihood of a threat χ:

$$\frac{\partial \omega}{\partial \chi} < 0. \tag{B.1}$$

When a threat is perceived to be more likely (e.g., the US following the 9/11 terrorist attacks, or Turkey after the failed coup attempt of 2016), incentives for socialization fall. Thus, from Corollary B.1, a more likely threat leads to lower within and cross-group socialization, and a smaller gap between the interrogation rates of the favorably and unfavorably treated groups (a smaller gap between t^*_H and t^*_G).

Improvements in the information technology b:

$$\frac{\partial \omega}{\partial b} < 0.$$

Improvements in the efficiency of the government's information aggregation technology (e.g., better internet surveillance protocols, diffusion of video camera use by law enforcement) reduce incentives for socialization. Recall that a signal $\theta_i = 1$ is necessary for citizen i to be arrested. Conditional on such a signal, the posterior probability of threat membership will be higher the better the technology at correctly detecting threat members, and at avoiding wrong threat membership signals (the larger b). Because citizens unambiguously benefit from a lower probability of a signal $\theta_i = 1$, information technologies that make fewer of both type I and type II errors will reduce ex-ante socialization incentives. Corollary B.1 implies that more efficient information aggregation technologies lead to lower within and cross-group socialization, and a smaller gap between the interrogation rates of the favorably and unfavorably treated groups.

Improvements in the 'standard of proof' $[\underline{\chi}, \overline{\chi}]$:

$$\frac{\partial \omega}{\partial \overline{\chi}} > 0. \tag{B.2}$$

As (B.2) indicates, a higher upper bound for the standard of proof requirement, which makes it harder for the government to undertake arrests ex-post, increases socialization incentives. Corollary B.1 implies that a more stringent standard of proof leads to more within and cross-group socialization, and a larger gap between the interrogation rates of the favorably and unfavorably treated groups under partial segregation.

B.3 Amplification of prior asymmetries

Corollary B.2. *Consider the heterogeneous-prior model with $\chi^{\mathcal{A}} > \chi^{\mathcal{B}}$ in the normal-threat regime $\chi < 1/2$ (so $\omega^{\mathcal{A}} < \omega^{\mathcal{B}}$). Suppose that both UTF against $\mathcal{A}$ and UTF against $\mathcal{B}$ are feasible: $\nu \geq \lambda_{\mathcal{B}}$, and $(\omega^G)^2 < \lambda_H$ for $\{G, H\} = \{\mathcal{A}, \mathcal{B}\}$. Then the government strictly prefers UTF against $\mathcal{A}$ to UTF against $\mathcal{B}$ if and only if*

$$\frac{\omega^{\mathcal{A}}}{\omega^{\mathcal{B}}} < \overline{\omega}(\lambda_{\mathcal{A}}, \nu), \qquad \overline{\omega}(\lambda_{\mathcal{A}}, \nu) \equiv \frac{\lambda_{\mathcal{B}}(\nu - \lambda_{\mathcal{B}})}{\lambda_{\mathcal{A}}(\nu - \lambda_{\mathcal{A}})}.$$

The threshold $\overline{\omega}(\lambda_{\mathcal{A}}, \nu) \in (0, 1)$ whenever $\lambda_{\mathcal{A}} < \lambda_{\mathcal{B}}$ and $\nu < 1$, and $\overline{\omega}(\lambda_{\mathcal{A}}, \nu) \to 1$ as $\lambda_{\mathcal{A}} \to \lambda_{\mathcal{B}}$.

Proof. By Lemma A.4 generalized to heterogeneous ω, the equilibrium friendships under UTF against $\mathcal{A}$ are $e_{\mathcal{A}\mathcal{A}} = (\omega^{\mathcal{A}})^2 \lambda_{\mathcal{A}}$, $e_{\mathcal{B}\mathcal{B}} = (\omega^{\mathcal{B}})^2 \lambda_{\mathcal{B}}^2 / (\nu - \lambda_{\mathcal{A}})^2$, $e_{\mathcal{A}\mathcal{B}} = e_{\mathcal{B}\mathcal{A}} = 0$ (with NRC binding at $\tau_{\mathcal{B}} = (\nu - \lambda_{\mathcal{A}})/\lambda_{\mathcal{B}}$). By Lemma A.1,

$$V^{UT\text{-}\mathcal{A}} = \omega^{\mathcal{A}} \lambda_{\mathcal{A}} + \frac{\omega^{\mathcal{B}} \lambda_{\mathcal{B}}^2}{\nu - \lambda_{\mathcal{A}}}.$$

A symmetric calculation gives $V^{UT\text{-}\mathcal{B}}$. Subtracting and using $\lambda_{\mathcal{A}} + \lambda_{\mathcal{B}} = 1$,

$$V^{UT\text{-}\mathcal{A}} - V^{UT\text{-}\mathcal{B}} = \frac{(\nu - 1)\left[\omega^{\mathcal{A}} \lambda_{\mathcal{A}}(\nu - \lambda_{\mathcal{A}}) - \omega^{\mathcal{B}} \lambda_{\mathcal{B}}(\nu - \lambda_{\mathcal{B}})\right]}{(\nu - \lambda_{\mathcal{A}})(\nu - \lambda_{\mathcal{B}})}.$$

Since $\nu \leq 1$, the $(\nu - 1)$ factor is non-positive, so $V^{UT\text{-}\mathcal{A}} > V^{UT\text{-}\mathcal{B}}$ iff $\omega^{\mathcal{A}}\lambda_{\mathcal{A}}(\nu - \lambda_{\mathcal{A}}) < \omega^{\mathcal{B}}\lambda_{\mathcal{B}}(\nu - \lambda_{\mathcal{B}})$, which rearranges to the stated condition. That $\overline{\omega} < 1$ when $\lambda_{\mathcal{A}} < \lambda_{\mathcal{B}}$ and $\nu < 1$ follows from concavity of $f(\lambda) = \lambda(\nu - \lambda)$, peaked at $\nu/2$: $f(\lambda_{\mathcal{A}}) - f(\lambda_{\mathcal{B}}) = (\lambda_{\mathcal{A}} - \lambda_{\mathcal{B}})(\nu - 1) > 0$. As $\lambda_{\mathcal{A}} \to \lambda_{\mathcal{B}}$, the numerator and denominator of $\overline{\omega}$ converge to the same value, hence $\overline{\omega} \to 1$. □

At the threshold $\omega^{\mathcal{A}}/\omega^{\mathcal{B}} = \overline{\omega}$, the government is indifferent between unequally treating $\mathcal{A}$ and unequally treating $\mathcal{B}$, and equilibrium socialization rates jump discretely as the ratio crosses this threshold: the corner pair $(p^*_{\mathcal{AB}}, p^*_{\mathcal{BA}})$ switches from $(0, 1)$ to $(1, 0)$, and the unfavored group's interrogation rate jumps from $(\nu - \lambda_{\mathcal{B}})/\lambda_{\mathcal{A}}$ to 1. As $\lambda_{\mathcal{A}} \to \lambda_{\mathcal{B}}$, this threshold approaches $\omega^{\mathcal{A}}/\omega^{\mathcal{B}} = 1$, so any positive primitive asymmetry $\chi^{\mathcal{A}} - \chi^{\mathcal{B}} > 0$ is enough for the government to strictly prefer unequally treating the minority $\mathcal{A}$.

B.4 Unequal Treatment in the Akerlof (1976) Model

Suppose a group with label $\mathcal{B}$ and endogenous size $\lambda_{\mathcal{B}}$ is the outcast group. A social norm exists according to which any citizen who forms a link with an outcast is also an outcast. Group identities and socialization choices are determined simultaneously. Each citizen chooses $(\rho_{i,\mathcal{A}}, \rho_{i,\mathcal{B}})$, and $\mathcal{B}$ is determined as $\mathcal{B} = \{i : \rho_{i\mathcal{B}} > 0\}$. As in our benchmark model, interrogation rates $(\tau_{\mathcal{A}}, \tau_{\mathcal{B}})$ are determined after socialization decisions have taken place. Notice that by construction, $\mathcal{A}$ and $\mathcal{B}$ are two disjoint groups. Consider symmetric equilibria where members of $\mathcal{A}$ play $(\rho_{\mathcal{AA}}, 0)$, and members of $\mathcal{B}$ play $(0, \rho_{\mathcal{BB}})$. Assuming no agent is born an outcast, $\mathcal{A} = \varnothing$ and $\mathcal{B} = \varnothing$ are both equilibrium group compositions. Are there (symmetric) equilibria where $\lambda_{\mathcal{B}} \neq 0$? Given $p_{\mathcal{AA}}, p_{\mathcal{BB}}$ and the expectations $t_{\mathcal{A}}, t_{\mathcal{B}}$, citizens' best replies can be characterized as follows: citizen i playing $(p_{i\mathcal{A}}, p_{i\mathcal{B}})$ has payoff

$$\begin{cases} \sqrt{p_{i\mathcal{A}}p_{\mathcal{AA}}\lambda_{\mathcal{A}}} - \frac{1}{2\omega}p_{i\mathcal{A}}p_{\mathcal{AA}}\lambda_{\mathcal{A}}t_{\mathcal{A}} \text{ if } p_{i\mathcal{B}} = 0 \\ \sqrt{p_{i\mathcal{B}}p_{\mathcal{BB}}\lambda_{\mathcal{B}}} - \frac{1}{2\omega}p_{i\mathcal{B}}p_{\mathcal{BB}}\lambda_{\mathcal{B}}t_{\mathcal{B}} \text{ if } p_{i\mathcal{B}} > 0 \end{cases}$$

Thus, in equilibrium,

$$\max_{p_{i\mathcal{A}}} \sqrt{p_{i\mathcal{A}}p_{\mathcal{AA}}\lambda_{\mathcal{A}}} - \frac{1}{2\omega}p_{i\mathcal{A}}p_{\mathcal{AA}}\lambda_{\mathcal{A}}t_{\mathcal{A}} = \max_{p_{i\mathcal{B}}} \sqrt{p_{i\mathcal{B}}p_{\mathcal{BB}}\lambda_{\mathcal{B}}} - \frac{1}{2\omega}p_{i\mathcal{B}}p_{\mathcal{BB}}\lambda_{\mathcal{B}}t_{\mathcal{B}},$$

which implies

$$\frac{\omega}{2t_{\mathcal{A}}} = \frac{\omega}{2t_{\mathcal{B}}} \Longrightarrow t_{\mathcal{A}} = t_{\mathcal{B}}.$$