Repressed Memories: State Terror and the Street Politics of Memorialization*

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Abstract

Why do some victims of state repression become memorialized, while others do not? Public "places of memory," like monuments, museums and street signs, are contested political spaces, where efforts to expose and confront historical traumas clash with efforts to advance and legitimate power. Street-level data on Stalin's Great Terror and contemporary memorials in Moscow show that memorials to victims are likeliest to appear – and are hardest to remove – in locations where the cumulative death toll from repression was higher (e.g. where authorities executed multiple individuals from the same building or workplace for the same, usually fictitious, offense). The strength of this "severity effect" varies by victims' ethnicity, political affiliation, and local state security presence. Larger acts of violence are harder to hide. Yet memorialization depends not only on the supply of victims, but also on victims' identities, and the proximity of historical repression to contemporary bastions of power.

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Most victims of state repression — the use of violence and intimidation to maintain political power — are publicly unknown. By various estimates, governments killed tens of millions of their own citizens over the last century.[1] Yet for every Fred Hampton, Jina Amini and Alexey Navalny, there are countless others who disappear into the dark of the state repressive apparatus, with no statues or commemorative plaques to remind us of their existence. Why are some victims publicly memorialized, but others are not?

Public "places of memory," like monuments, museums, and street signs, are contested political spaces, where efforts to expose and confront historical traumas can clash with efforts to advance and legitimate political power (Forest and Johnson, 2002). Political actors create and manipulate these physical structures to forge collective memories (Halbwachs, 1980), establish norms (Cosgrove, 1998), communicate power relations (Ross, 2007), and construct identities around symbolic events and ideas (Gellner, 1983; Anderson, 1991). A growing empirical literature has shown that these symbolic sites can have tangible consequences for public behavior and attitudes, influencing electoral turnout and vote shares (Villamil and Balcells, 2021; Rozenas and Vlasenko, 2022; Turkoglu et al., 2023), migration (Ferlenga, 2023), labor markets (Williams, 2021), housing prices (Green et al., 2022), racial resentment (Rahnama, 2025), and support for democratic values (Balcells et al., 2022).

Despite scholarly recognition that "places of memory" can meaningfully shape politics and society, it is not always clear why some memorials exist while others do not. Most studies on this question have examined temporally proximate contributing factors, observed immediately before or during memorialization. For example, researchers have shown that monuments can reflect contemporary struggles for "symbolic capital" among elites (Forest and Johnson, 2002), the partisan affiliation of local officials (Núñez and Dinas, 2023), the demographics and political preferences of local residents (Benjamin et al., 2020), and macro-level structures like democracy and regime type (Forest and Johnson, 2011). These sources of variation emerge well after the historical events being memorialized, and may themselves be consequences of those events. For example, if political violence compels those threatened by it to leave, we should not be surprised if the remaining residents — some of whom may have been complicit in the violence — oppose memorializing the victims.

What such analyses — particularly quantitative ones — usually overlook is how the

[1] Anderton (2016)

"hard facts" of historical events (i.e. who did what to whom, when and where) shape the contestation of memorialization. Research outside political science has long viewed memorialization as an inherently selective process, where groups face incentives to foreground some perspectives and exclude others (Halbwachs, 1980; Gillis, 1994). Yet no quantitative study, to our knowledge, has examined how variation across historical acts of state violence – in scale, location, selection of victims – shapes the preservation of their memory.

Our theoretical point of departure is that some acts of violence are too big to hide. Memorials to victims are most likely to appear (and remain in place) where repression was initially more severe, in cumulative human costs.[2] The strength of this "severity effect" depends on *who* is being memorialized and *where*. Memorialization more closely tracks the severity of repression where the costs of recognizing a victim are low, relative to the costs of suppressing the victim's memory. This dynamic favors the memorialization of certain victims over others (e.g., ethnic in-groups vs. out-groups), net of the severity of repression. We derive these predictions from a simple theoretical model of contested memorialization. We test them with street-level data on Stalin's Great Terror and memorials in Russia.

Specifically, we take advantage of the empirical opportunity presented by the *Posledniy Adres* (*Last Address*) memorial project, which since 2014 has installed hundreds of commemorative markers on buildings where victims of the Great Terror resided prior to their execution. *Last Address* is a nongovernmental organization that receives petitions from private citizens to memorialize specific victims. Its approach mirrors that of other decentralized, grassroots efforts to integrate memorial signs into urban spaces, like the *Stolpersteine* (*Stumbling Blocks*) project commemorating Holocaust victims in Germany, and the Equal Justice Initiative's *Community Remembrance Project* for victims of racial violence in the U.S. To install the plaques on public streets, *Last Address* exploits a legal loophole, bypassing municipal authorities and securing approval directly from the owners of building facades. Owners may approve the request (in which case *Last Address* installs the plaque), or they may deny or indefinitely delay it. Sometimes, unknown parties remove plaques after installation. This project provides an unprecedented chance to study grassroots memorialization of repression victims in an autocratic state, at a micro level.

[2]We define "severity" as the cumulative human cost of repression in a discrete geographic area (e.g. persons killed or arrested per city block).

Using declassified street maps from the Soviet secret police (National Commissariat of Internal Affairs, or NKVD) and detailed data on where victims of the Great Terror had lived, we digitally reconstruct Moscow's and Saint Petersburg's (Leningrad's) urban landscapes in the 1930s. We compare the distribution of *Last Address* memorials (and their denials and removals) to the number of repression victims at each address. Multiple estimation strategies at multiple levels of analysis, including small-area fixed effects, regression discontinuity design, and spatial autoregressive models, confirm that the number of repressed neighbors (or coworkers) strongly predicts whether an individual's own name appears on a commemorative marker. This result holds for victims of the same ethnicity, occupation, class, party, sex and age, in the same type of building in the same part of town.

While there are generally more memorials where there was more violence, some victims face higher barriers to recognition than others. Victims from locally underrepresented groups (e.g., ethnic minorities, foreign-born) may have fewer advocates in the community (Halbwachs, 1980). Some victims (e.g. purged members of the repressive regime) may receive lower priority due to the complexities of their experiences (McEvoy and McConnachie, 2012). Others (e.g. intelligensia) may receive higher priority due to their socio-economic status (Lankina et al., 2025). Memorialization also depends on the local distribution of political power (Forest and Johnson, 2011; Rozenas and Vlasenko, 2022; Núñez and Dinas, 2023). We find, for instance, that the effect of past repression is more muted on city blocks with a state security or law enforcement presence — which may deter family members from requesting memorials, incentivize property owners to deny them, or both. A restrictive local political opportunity structure can dampen the severity effect.

We focus our inquiry on Moscow for several reasons. First are the analytical advantages of studying a single administrative area, where we can hold constant many potential confounding factors — particularly the type of repression being examined (arrests under Article 58 of the Soviet Russian criminal code, on "counter-revolutionary activity") and local laws and regulations on the installation of monuments. Second is the inherent importance of Moscow as Russia's capital and most populous federal subject; memorialization dynamics there can have national visibility and resonance (Forest and Johnson, 2002). Third, Moscow is a "hard case" for this type of memorialization. *Last Address* operates in an autocratic political environment, where authorities have taken legislative and administrative steps to

redeem the public image of Josef Stalin and control public debate around the Great Terror. In a 2019 survey by the independent Levada Center polling firm, 70% of Russians agreed that Stalin played a positive role in the country's history, and 46% (plurality) agreed that the human costs of his reign were "justified." In 2024, the General Prosecutor's office announced that it will reconsider past decisions to rehabilitate victims of Soviet repression. The chairman of Russia's Presidential Council on Human Rights criticized *Last Address* for "rubbing murder in people's faces." If grassroots memorialization can proceed against these headwinds, we can expect similar dynamics in less prohibitive political settings.

To ensure that our findings travel beyond Moscow, we replicate our analyses and results in a second post-Soviet city (Saint Petersburg). We also consider the broader transportability of our findings to other political settings, types of violence, and time periods, drawing on illustrative examples and cross-national evidence from past research.

Our study contributes to several strands of scholarship. To research on historical legacies of violence and exploitation (Acharya et al., 2016; Lupu and Peisakhin, 2017), it highlights memory activism — non-state efforts to challenge or defend historical narratives — as a mechanism of intergenerational transmission (Menon, 2023). We show that remembrance is not automatic, and explain why some historical events cast a longer shadow than others.

To the growing quantitative literature on "symbolic politics" (Balcells et al., 2022; Rozenas and Vlasenko, 2022) and the manipulation of public symbols (Forest and Johnson, 2011; Johnson et al., 2019; Núñez and Dinas, 2023), we contribute new evidence on an unprecedented micro-scale. As we show, memorialization reflects an interplay between contemporary struggles for power and the damage past struggles for power left behind.

Our study also extends interdisciplinary research on collective memory (Olick and Robbins, 1998; Alexander, 2013), corroborating previous qualitative findings that selective memorialization and in-group favoritism are pervasive in post-violence settings.

Finally, our findings should be of general interest to scholars of conflict (Davenport, 2009), who have studied how the intensity, location and timing of violence affect its public visibility (Weidmann, 2016; Hammond and Weidmann, 2014; Shaver et al., 2022). We show that higher-casualty events are indeed more visible — to journalists, scientists, and the public, decades after they occur — but there are important exceptions.

1 The Dynamics of Contested Memorialization

Memory activism is the contentious, dynamic process by which non-state actors advance, challenge, or defend narratives about the past (see reviews in Olick and Robbins, 1998; Gutman and Wüstenberg, 2022). As a form of political communication, it involves the purposeful use of commemorative practices to shape political beliefs and behaviors (McNair, 2017), including — critically — beliefs about who should rule, and what makes that rule legitimate. It is contentious, in that no single actor has an unchallenged monopoly over public commemorations. It is dynamic, in that instances of remembrance or erasure are not isolated, but parts of broader cycles of contention. This contention often focuses on the control of narratives in public spaces, like museums, monuments, and place names.

The scope of our study is on memorials to individual victims of state violence. Unlike collective memorials to participants of historical events (e.g. battles, massacres, famines) or members of groups (e.g. veterans, massacre and famine victims), individualized memorials recognize specific persons by name, and typically emerge from decentralized advocacy on each person's behalf.[3] We conceive of such memorials as products of two countervailing forces: efforts to publicly recognize specific individuals, and efforts to suppress recognition.

Agents of memorialization needn't have a personal connection to the victim. Memory activists can be relatives, community members, or outsiders. Members of each coalition (recognition, suppression) can vary in their personal motivations. Some may wish to honor a grandparent, others may seek government accountability or policy change. Installing (or denying) an individual's memorial is a shared intermediate objective on the path to these goals. This process unfolds across small community units (e.g. blocks, buildings), differentiated by their exposure to repression, and the relative cost of activism on both sides. We summarize these dynamics qualitatively here, and formally in Appendix A0.

The outcome we hope to explain is the number of historical markers to victims (e.g, memorial plaques) that exist in a given place and time. This number can range from zero to the total number of repression victims who once resided in that location (*severity*).[4]

[3]Individualized memorialization requires more granular information than collective memorialization. This includes personal identifiers (e.g. name, date and place of birth) and documents (e.g. arrest orders, court records, personnel files) to establish one's status as "victim," "veteran" or other memorialized category.

[4]Severity sets an upper bound for memorials, similar to the concept of "carrying capacity" in ecology.

The number of markers fluctuates over time, increasing in the relative strength of efforts to recognize victims (*recognition rate*), and decreasing with efforts to suppress recognition (*suppression rate*). In practice, recognition may take the form of petitioning for the installation of a memorial, and mobilizing the administrative, legal and logistical resources needed to see this process through (e.g. gathering documents, negotiating with local stakeholders, developing and installing the marker). Suppression may entail denying petitions, physically removing markers, or placing pressure on other local actors to do so. The relative cost of recognition and suppression varies across victims, locations and times.

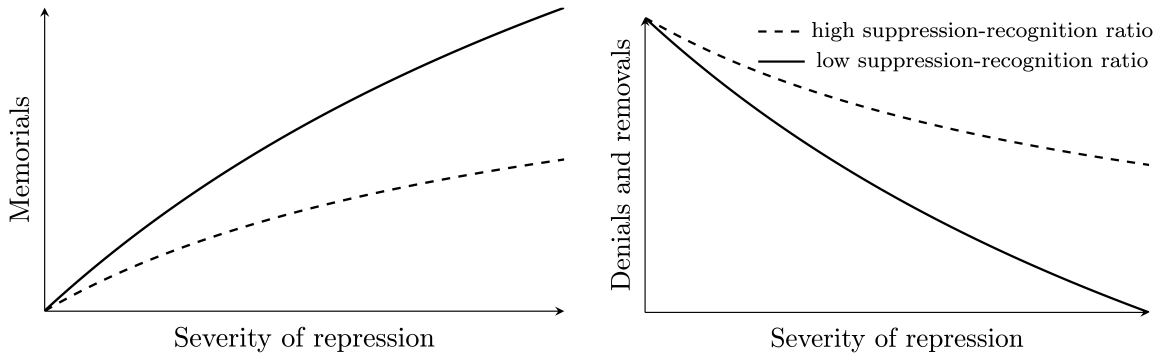
Over time, this process converges to one of two equilibria: one where the number of markers is stably above zero (*remembrance*), and one where no markers can durably exist (*erasure*). In any location with at least one repression victim, memorials become permanent only if recognition outpaces suppression.[5] Otherwise, memorials will gradually disappear. Yet this erasure is not instantaneous; some memories do not fade easily into the dark.

A formal analysis of these equilibria (Appendix A0) yields two main predictions. First (*severity* prediction), at any given point in time, we should expect more memorials — and a lower share of denials and removals — where there are more victims to be memorialized. In locations with greater exposure to repression, there will be more memorials to victims, and the elimination of these memorials will be slower. Second (*non-uniformity* prediction), the number of memorials does not always mirror the supply of victims. As the costs of recognition increase relative to the costs of suppression, the severity effect becomes weaker.

Figure 1 illustrates these predictions.[6] As the severity of repression rises, (a) the expected number of memorials increases, and (b) the expected share of denials and removals decreases. The slope of each curve depends on whether suppression can keep pace with recognition. Where it cannot (low suppression-to-recognition ratio, solid lines), memorialization is more responsive to severity. Where this ratio is higher (dashed line), both curves flatten out, with fewer memorials — and more removals — for the same number of victims.

[5] These equilibria are not all-or-nothing. Remembrance can include cases where only a tiny fraction of victims have markers, so long as that number of markers is nonzero.

[6] See Appendix A0 for derivations and details.



(a) Number of memorials at time t (b) Percent denied or removed by time t

Figure 1: **Expected patterns of memorialization**. See Appendix A0 for full details on model specification, proofs, and parameter values used in numerical integration.

What drives the suppression-to-recognition ratio? We cannot observe this parameter directly, but can reasonably expect it to correlate with the costs of recognizing a particular victim in a particular place. Some individual cases are costlier to pursue than others, and — with limited resources — activists must be selective in their memorialization efforts.

Costs of recognition are lower where there is already some grassroots pressure to memorialize.[7] For example, victims from higher educational and socio-economic strata (Lankina et al., 2025) are more likely to have left behind acquaintances who wrote memoirs, petitioned for rehabilitation, and transmitted memories to new generations.[8] These vectors of pressure may be weaker for victims from numerically underrepresented groups, like ethnic minorities, due to a lack organized advocacy or surviving relatives in the community. In-group favoritism, where dominant groups prioritize the recognition of their own historical victimhood over out-group suffering (Sodaro, 2018), may also drive grassroots pressure.

On a more basic level, administrative costs may be higher for some victims. Documentation may be scarce for foreign-born persons, but easier to find for victims more deeply embedded in local social networks, with multiple ancestors and acquaintances in the area.

For some activists, selective memorialization may depend on how neatly a victim's experience maps onto preferred interpretations of historical events (Williams, 2022). For

[7] Grassroots pressure enables resource pooling, and the mobilization of volunteer labor and donations.
[8] We are grateful to Kathleen Smith for this insight.

example, repressed members of the security services may face barriers due to perceptions of complicity, or because the complexities of their case invite greater scrutiny.

Opponents of memorialization face similar considerations in deciding how aggressively to push back. The cost of suppression may be lower for certain victims (e.g. foreigners and other socially-isolated persons), and higher for others (e.g. well-known public figures). Opposition may be easier to mobilize against memorials perceived as transgressive against dominant norms or narratives, or honoring victims from marginalized social groups.

The cost of suppression is lower still if memory activists can be deterred from making a petition in the first place, through a credible fear of retribution. For example, the local presence of state security and law enforcement can contribute to a restrictive political opportunity structure, where efforts at collective action are more easily monitored, interrupted and punished. Memory activists may expect memorials to provoke more effective obstruction and punitive action in such areas, and shift their efforts elsewhere.

The number of historical markers in a given place and time reflects the local scale of historical repression (*severity*), and the case-specific incentives facing contemporary memory activists (*non-uniformity*). To make the non-uniformity predictions in Figure 1 more concrete, we expect the severity effect to follow the solid lines where the victim (a) was a member of the locally dominant ethnic group, (b) had no appearance of complicity in their biography, (c) had relatively high social status, or (d) where local political opportunity structures are more permissive. Where these conditions are absent — (a) out-groups, (b) "complex" biographies, (c) lower socio-economic status, (d) locations where security services create fear of retribution — empirical patterns are more likely to follow the dashed lines.

2 The Great Terror and Its Victims

To see if our theoretical predictions align with empirical evidence, we use novel individual- and street-level data on memorials to Stalin-era repression victims in Russia.

2.1 Background

Between the October Revolution of 1917 and the communist regime's collapse in December 1991, the Soviet Union executed, arrested, exiled or otherwise punished 12.5 to 13.7 million citizens for suspected political dissent (Zhemkova, 2017). This includes 3.8 million people charged on an individual basis for alleged "counter-revolutionary" activity, and millions of victims of collective punishment, like famine and mass deportation. Most of this repression occurred under the rule of Josef Stalin (1923-1953), with a peak during a series of campaigns in 1937-1938 (Great Terror). The Main Directorate of State Security within the People's Commissariat for Internal Affairs (NKVD) was the secret police agency that planned and implemented the Great Terror, on orders from the Communist Party's Central Executive Committee. The agency's mission was to preserve and protect the regime, by investigating, punishing and deterring those who "threaten the Soviet order" (Gregory, 2009, pp. 5-6).

Every layer of Soviet society fell under the NKVD's microscope at some point, but authorities consistently branded several categories of citizens as "socially malign." These included individuals with suspected foreign connections (e.g. ethnic minorities, people who studied abroad), perceived political rivals (e.g. military officers, Trotskyites), "class enemies" (e.g. wealthy farmers, clergy, academics), and "social parasites" (e.g. sex workers, long-term unemployed). The Great Terror kicked into high gear after NKVD Order 00447 ("On the operation to repress former kulaks, criminals and other anti-Soviet elements") from July 30, 1937. The order called for an "extirpation of anti-Soviet elements" on a national scale, and issued quotas for executions and imprisonment to regional NKVD directorates.

Ultimate responsibility for identifying, investigating, detaining and interrogating suspects, and implementing sentences, rested with district-level (*rayon*) NKVD branches (RO UNKVD). There was, on average, one RO for every 60,000-70,000 citizens (Vatlin, 2004, p. 7), including one in each of Moscow's 23 city districts. ROs were under intense pressure to complete their work quickly, but had discretion in implementing orders. On paper, cases under Order 00447 followed a standard investigative procedure, with a separate criminal cases and charges filed for each arrest. However, these individualized charges were usually pretextual, designed and optimized to expedite conviction (Junge et al., 2009, p. 55).

In broad terms, the NKVD looked for signs of "counter-revolutionary activity." Article

58 of the 1926 criminal code defined this term as "any action directed at the overthrow, sabotage or weakening of the power of worker-peasant Soviets ... or weakening of the foreign security of the USSR and main economic, political and national achievements of the proletarian revolution" (VTsIK, 1926). This definition was broad enough to politicize ordinary criminal offenses, and to criminalize everyday administrative incompetence, negligence and mismanagement (Gregory, 2009, p. 121). Under Article 58-12, a failure to report counterrevolutionary activity was also a form of counterrevolutionary activity.

Evidence of the commission of a crime was not necessary to convict under Article 58. To keep pace with the scale of operations in 1937-1938, the NKVD shifted investigations away from the collection of material evidence, and toward the forcible extraction of signed confessions. By law, a signed confession was sufficient evidence for conviction, and effectively the only piece of information needed to complete an investigation. The NKVD prioritized espionage and conspiracy cases, which had a lower evidentiary bar because "state secrets" could not be disclosed in charging documents. The NKVD built these cases by relying on group arrests, charging multiple managers from the same factory, or multiple residents from the same building with the same offense. These events occurred in clusters of about 10 arrests each, as ROs used lists of workers from local enterprises to create (and neutralize) entirely fictitious "counterrevolutionary-diversionary groups" (GARF 10035/2/23854-23857).

In one such case, the RO in Kuntsevo charged five stablehands from the public works department with membership in a "terrorist group," citing horse care as evidence of counterrevolutionary leanings. This argument succeeded in obtaining a guilty verdict from a special collegium of the Moscow oblast court (GARF 10035/23043). All five were executed.

These mass killings allowed ROs to meet their quotas sooner, but they made state violence appear transparently indiscriminate (Conquest, 2008, p. 434). The type of information the NKVD previously used to obtain arrest warrants (e.g. denunciations, performance reviews, evidence of foreign contacts) was now collected post-arrest, and back-dated (Vatlin, 2004, p. 34). In some cases, NKVD asked citizens to sign blank denunciation documents, promising to add accusations later (Vatlin, 2004, p. 49). In other cases, NKVD officers invented "informants" and "witnesses" from whole cloth (Vatlin, 2004, p. 52).

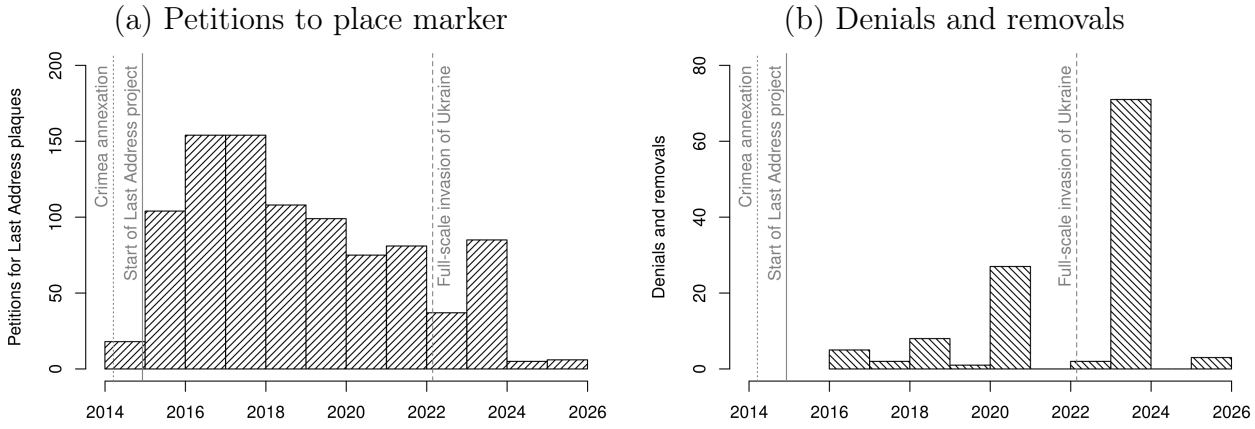
In 2014, a group of Russian dissident journalists and human rights activists launched a grassroots project, *Last Address*, to memorialize individual victims of Soviet repression.

Inspired by the German *Stolpersteine* project, *Last Address* sought to place commemorative plaques listing individuals' names, professions, dates of birth, detention, death, and rehabilitation on the facades of the buildings where they last resided. Anyone can petition for the installation of a commemorative plaque.[9] Applicants pay for the cost of the plaque, while volunteers with *Last Address* seek consent from the owners of the facade. The project started in Moscow and Saint Petersburg, and has since expanded to dozens of cities.

Last Address is distinctive for three reasons. First, unlike state-supported memorials in Russia, *Last Address* circumvents municipal authorities by exploiting a legal loophole, by which the only consent needed to install an "informational" plaque on a building is that of the facade's owner. A relative lack of government involvement makes this a rare grassroots effort, in a country where almost all memorialization has historically been state-directed.

Second, *Last Address* is unusual in recognizing individual victims in separate, geographically dispersed locations ("One name. One life. One sign."). This sets the project apart from collective monuments, like Moscow's "Wall of Grief," which depersonalize the memory of state terror by focusing instead on its scale (Smith, 2019).

Figure 2: **Volume of Last Address petitions over time**.



Third, the timing of the *Last Address* project — launched after Russia's 2014 invasion of Ukraine, and intensifying crackdown on dissent — leaves little doubt about its fate.

[9] According to project organizers, relatives of the repressed account for slightly less than half of petitions in most cities. The remainder come from current building residents, historians and volunteers.

As Figure 2 shows, the volume of *Last Address* petitions has declined over time, while denials and removals have increased; the period following Russia's full-scale invasion of Ukraine in 2022 accounts for 13% of new petitions, and 64% of denials and removals.[10] In our theoretical framework, the system seems headed toward erasure. This leaves a critical window of opportunity to investigate a "hard case," where opponents of memorialization have a clear upper hand in the local balance of power. If our theoretical expectations find support here, we can expect similar patterns in less politically restrictive environments.

2.2 Data

Testing our theoretical predictions requires linking contemporary data on memorials to historical data on repression, and estimating the impact of the latter on the former. We do so at two levels of analysis: (1) city blocks, and (2) individuals. Block-level analyses situate individuals in a common set of spatial units, revealing how memorials might co-vary not only with the local number of victims, but with victims as a (rough) percentage of local residents. Individual-level analyses help address ecological inference concerns, and account for differences across professions, ethnicities, ages, sexes, and other personal traits.

Because many decades of urban development separate Stalin-era repression from contemporary memorialization, we use historical sources to reconstruct Moscow as it existed at the time of the Great Terror. Our primary data source is a 1938 tactical map of Moscow from the NKVD's Main Directorate for Geodesic Surveying and Cartography (Krasil'nikov, 1938). The map's resolution (1:30,000) provides sufficient topographic detail to navigate every street corner and alleyway in the city, with additional information on trolley, bus, light rail, ferry and metro stops, cultural sites, parks, gardens and city district boundaries. Importantly for our needs, the map reflects the NKVD's information set — this same map hung on the walls of RO branches when they were planning and conducting operations.

We georeferenced the map and vectorized its 5,400 polygons representing city blocks, including 1,646 (30%) in neighboring settlements that had not (yet) been incorporated into Moscow (e.g. Davydkovo, Kuntsevo). We classified blocks by zoning with information from Memorial's *Topography of Terror* (topos.memo.ru) project and supplementary sources. We

[10] Figure 2 includes only events with non-missing dates (55% of Moscow sample; 65% Saint Petersburg).

identified 4,897 (91%) blocks with residential buildings, including 3,305 within city limits.

Our data source for exposure to repression is Memorial's *Victims of State Terror in Moscow* database (mos.memo.ru), which contains the names, residential addresses and biographical information for 11,035 Moscow residents executed by the secret police in 1921-1953 (and subsequently rehabilitated), including 9,526 in 1936-1938. This database is the population of cases from which *Last Address* petitions are drawn, due to organizational links between the projects, and *Last Address*' focus on victims who were executed and posthumously cleared of crimes.[11] As we show in Appendix A3, rehabilitated victims differed statistically from the non-rehabilitated: ethnic Russians, government workers, high-school graduates, managers and military personnel were the most likely to be rehabilitated. We geocoded victims' residential addresses at time of arrest.

Figure 3a shows the 5,400 Moscow city blocks; Figure 3b shows the last known street addresses of 11,035 repression victims. Most victims lived in Moscow's historic center, inside the so-called Garden Ring road, where the city's population was densest. Prior to Moscow's expansion and the mass construction of apartment blocks in the 1950s and 1960s, most residents lived in low-rise communal flats, with two or more families per apartment.

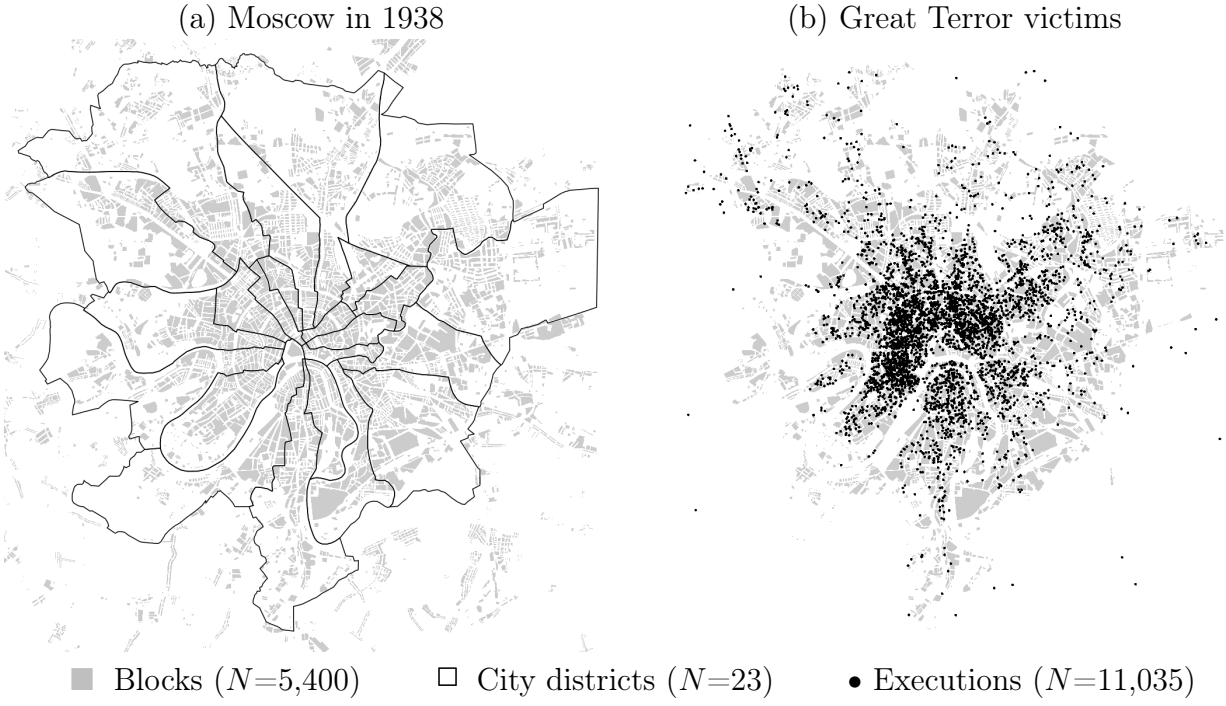
We extracted data on memorials from the *Last Address* website (poslednyadres.ru), collecting the names, addresses, dates, geographic coordinates, and status (requested, installed, denied) of commemorative plaques in Moscow, among other cities. We supplemented this information with press reports of illegal plaque removals. Within Moscow's 1938 city limits, we identified 1,377 petitions to install plaques, 744 (54%) of which resulted in approval and installation, and the remainder of which resulted in a denial (11, 1%), removal (42, 3%) or no response from owners (580, 42%). We combine the latter three bins into a general "denial/removal" category for our analyses.

We supplemented these data with information on the borders of Moscow's city districts (*rayony*). The district boundaries (Krasil'nikov, 1938), which remained in place from 1936 to 1960, reflect the territorial jurisdictions of ROs. They also allow us to link our data to district-level population counts from the census (Central Statistical Directorate of USSR,

[11] Until its liquidation in 2021, Memorial was an organizational partner of *Last Address*. *Last Address* still uses the Memorial dataset in its work, to (1) factually validate petitions, and (2) in cases when donations arrive without naming a specific person, to select individuals for memorialization.

1939). Because official block-level population statistics are unavailable, we disaggregated district population counts through dasymetric interpolation (Mennis, 2003), employing ancillary data to obtain filtered area-weighted local estimates.[12]

Figure 3: **Spatial distribution of Moscow data**. Each polygon in (a) represents a city block. Each point in (b) represents the last known address of a citizen executed by NKVD.



To account for the local costs of repression, we collected data on the locations of RO NKVD branches and other organs of state security (Krasil'nikov 1938, topos.memo.ru). We identified 32 physical NKVD facilities in Moscow, including a branch in each city district, several detention centers and other administrative buildings. As ROs raced to meet their repression targets, the need to follow bureaucratic protocol constrained their actions, at least nominally. Even with simplified investigative procedures, officers had to hand-deliver sensitive documents, physically apprehend suspects, transport them to holding facilities, and interact with other government agencies. To rapidly process cases, the NKVD formed

[12]Dasymetric interpolation loosens the uniformity assumption of traditional area-weighted interpolation, by excluding non-residential blocks, parks, roadways, and other uninhabitable areas from local estimates.

ad hoc extrajudicial tribunals with prosecutors and party officials, known as *troika*s. Across the city, the average "intra-troika distance" (i.e. distance from residential block to nearest NKVD branch, plus the distance from that NKVD branch to its nearest prosecutor and party offices) was two kilometers. These travel and coordination costs were predictive of the local scale of repression. In blocks with a below-mean "intra-troika distance" (i.e. under two kilometers), the NKVD executed 4.9 people, on average. In blocks with an above-mean distance, they executed 1 person, on average. Muscovites' chances of surviving the Terror depended, in part, on how costly it was for security services to reach and process them.

To see how the determinants of *Last Address* memorialization differ from those of state-directed memorialization, we collected data on 1,688 Soviet-era plaques installed on Moscow buildings since 1938 (Kukina, 2018). During this period, the Soviet government fully controlled the commemorative process — from petitions to maintenance — and no grassroots memorialization initiative could succeed without direct state involvement.

For external validation, we mimicked our measurement strategy on a second city, Saint Petersburg (Appendix A4), extracting data on 3,070 blocks from a 1936 street map, 3,272 rehabilitated victims from a separate Memorial dataset, and 686 petitions from *Last Address*.[13] We use these data to assess the reproducibility of our Moscow results.

3 Memorialization and the Severity of Repression

We test our theory in two steps. We first test the *severity* prediction, which expects more commemorative markers — and lower rates of denial and removal — in locations more heavily exposed to repression. In Section 4, we test the *non-uniformity* prediction, which expects the strength of the severity effect to depend on victim identity and location.

[13]The measurement strategy here slightly diverges from Moscow (Appendix A4). Because there is no Saint Petersburg counterpart to the *Victims of State Terror in Moscow* database, we use Memorial's larger *Victims of Political Terror in the USSR* database to identify *Last Address*-eligible victims with a residence in the city. Since the city block map is from civilian municipal authorities rather than the NKVD, our Saint Petersburg data lack comparable information on RO NKVD locations and intra-troika distance.

3.1 Variation Across City Blocks

We begin with a "big picture" look at memorialization, by examining variation across the full population of residential city blocks that existed in Moscow during the Great Terror. Our block-level analyses revolve around the following core model specification:

$$y_i = g^{-1}\left(\gamma \cdot \log(\text{Repression}_i) + \beta' \mathbf{X}_i + \text{District}_{k[i]} + \text{Zoning}_i + f(\text{Long}_i, \text{Lat}_i) + \epsilon_i\right) \quad (1)$$

where y_i is the memorialization outcome in block i (e.g. logged number of petitions for markers, percent denied or removed) and Repression_i is the number of executed and rehabilitated block residents. $\mathbf{X}_i$ contains location-specific covariates capturing the logistical costs of repression, including the distance from i to the nearest RO, and from that RO to its nearest prosecutor and party offices ("intra-troika distance"). To account for differences across RO jurisdictional lines, we include fixed effects for the city district k in which block i was located in 1936-1938. Because memorialization may face different obstacles on mixed-use city blocks, where residential properties share space with commercial, cultural, or government facilities, we include fixed effects for zoning. We capture within-district geographic trends with a spatial spline, $f(\text{Long}_i, \text{Lat}_i)$. $g(\cdot)$ is a link function.

Table 1 reports block-level coefficient estimates. The first two columns correspond to linear regression models, where the outcomes are (1) number of petitions per city block and (2) percent of petitions that resulted in denials or removals.[14] The third column corresponds to a Binomial model with a logit link, where the outcome (denials, removals) is re-scaled as a proportion.[15] Because measurement of proportional variables is more precise where the denominator is large, we weight blocks by estimated population size (Appendix A1).

The estimates in Table 1 align with theoretical expectations. According to columns 1 and 2, for each percentage-point (pp) increase in repression, there will be a 0.3 pp rise in petitions on the same city block, and a 10.3 pp decline in the share of these petitions that result in denial or removal. Column 3 further reports that doubling exposure to repression is associated with a 41 pp decline in the odds of denial or removal (i.e., $2^{-0.76} = 0.59$).

These results withstand multiple robustness tests and supplementary analyses (Ap-

[14] These models use an identity link function with log-transformed outcomes (to reduce skewness).
[15] We estimate Models 2 and 3 on a subsample of city blocks with at least one petition.

Outcome	Petitions	Denied/Removed (%)	
Model	1. Linear	2. Linear	3. Binomial
Estimate	0.3	-10.3	-0.76
Std. error	(0.04)**	(2.68)**	(0.23)**
Rayon FE	✓	✓	✓
Zoning FE	✓	✓	✓
Adj. R^2	0.55	0.28	
Pseudo R^2			0.45
RMSE	16.7	1349.97	0.26
N	3305	1191	1191

Estimates from Linear and Binomial fixed effect regression models. Treatment is number of city block residents executed (logged). Outcome is log-transformed in Linear model, rescaled as proportion between 0 and 1 in Binomial model. Robust standard errors in parentheses, clustered by rayon. All models include spatial spline and block-level covariates. Observations (blocks) weighted by population size. Significance levels (two-tailed): $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Table 1: **Severity of repression and memorialization**.

pendix A2), including (a) conditional and spatially autoregressive models, to test whether proximity to early markers inspires others in the neighborhood to apply, (b) a fuzzy regression discontinuity design, to exploit exogenous variation in repression across the boundaries of RO jurisdictions, (c) re-estimation with per-capita measures of repression, and (d) consideration of alternative explanations, like coordination costs among facade owners. In all cases, estimates retain their signs and levels of significance. These results also hold in our analysis of block-level external validation data from Saint Petersburg (Appendix A4).

3.2 Variation Across Individual Victims

Zooming in for a closer look, we examine variation in memorialization across individuals:

$$y_j = g^{-1}\left(\gamma \cdot \log(\text{Repression}_j) + \beta'\mathbf{X}_j + \mathbf{F}_j\delta + \text{District}_{k[j]} + \text{Zoning}_{i[j]} + \epsilon_j\right) \qquad (2)$$

where y_j is the memorialization outcome for victim j (petition, denied or removed) and Repression_j is the number of other victims who shared an address ("repression at home")

or an employer ("repression at work") with j.[16] The matrices $\mathbf{X}_j$ and $\mathbf{F}_j$ include continuous and categorical biographic information, like j's age, sex, ethnicity, industry of employment, party membership, association with the clergy, military, and whether j held a managerial post at their place of work.[17] Again, we include fixed effects for district and zoning.

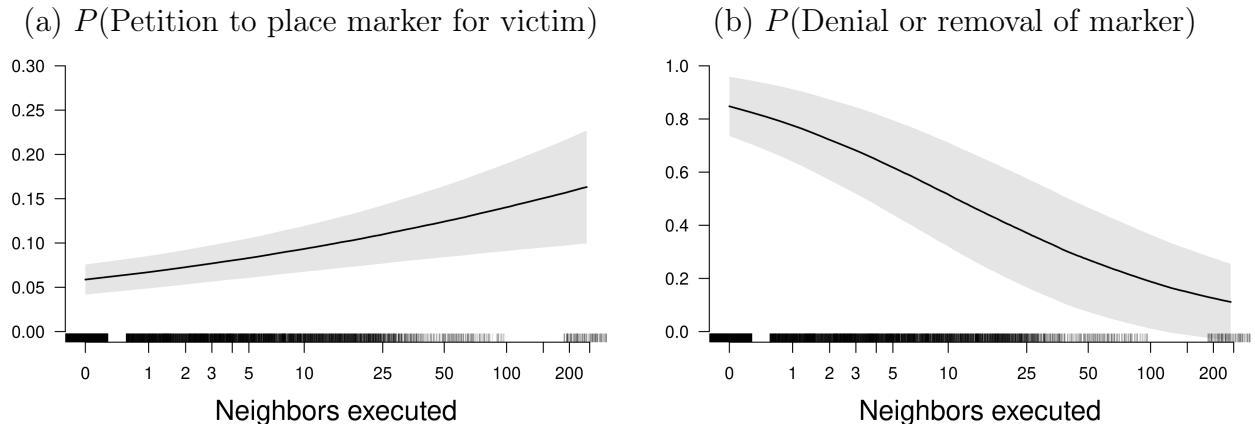


Figure 4: **Repression at home and victim's memorialization**. Black lines are predicted probabilities from the individual-level model in Equation 2; grey regions are bootstrapped 95% confidence intervals. Horizontal axis on logarithmic scale.

Individual-level estimates align with expectations. Figure 4 reports predicted probabilities of petition and denial/removal, as a function of repression levels at j's home address.[18] In Figure 4a, the probability of a petition is 0.06 for "solitary" victims (i.e. zero neighbors executed), and 0.16 for those with 242 victimized neighbors (empirical maximum). The magnitude of the statistical relationship is larger for the probability of denial or removal (Figure 4b): 0.84 for "solitary" victims and 0.11 for those with 242 executed neighbors.

The NKVD conducted group arrests not only in residential buildings, but also in workplaces. Figure 5 presents separate model predictions, showing how one's chances of memorialization vary with the severity of repression against co-workers.[19] Consistent with Figure 4, victims of mass workplace arrests have significantly higher chances of petition than "soli-

[16] We fit separate models for repression in the two contexts (domestic and workplace).
[17] We used industry classifications from the All-Union Classifier of Economy Branches (OKONKh).
[18] Full set of coefficient estimates is in Appendix A3.
[19] "Co-workers" are individuals with a common employer, per Memorial.

tary" victims (0.29 for maximum of 96 co-workers executed, 0.04 for 0 co-workers). The impact on denials and removals is weaker than for residential repression, but still negative.

We find consistent results in the individual-level Saint Petersburg data (Appendix A4).

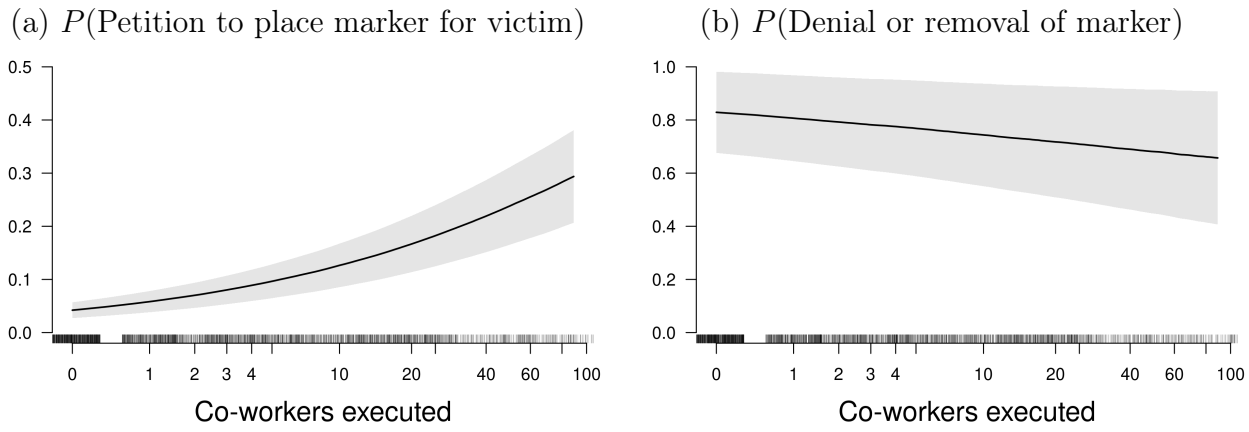


Figure 5: **Repression at work and memorialization**. See details under Figure 4.

4 Obstacles to Memorialization

To test our theory's non-uniformity prediction, we compare how the estimated severity effect varies with the relative costs of recognition and suppression, across several scenarios.

First, we might expect the suppression-to-recognition ratio to be higher (and the severity effect to be weaker) for victims from ethnic out-groups, potentially due to under-representation among local activists. Second, the ratio may be higher for purged affiliates of the repressive regime (i.e. Communist Party members, NKVD officers), whom citizens may not perceive as chance victims of indiscriminate state violence. Third, the ratio may be higher for victims with lower educational and professional attainment, who may similarly lack robust local advocacy. Fourth, the ratio should be higher in communities where the political opportunity structure favors opponents of memorialization — where the presence of state security services deters petitions and incentivizes denials and removals.

4.1 Victim Identity

The Great Terror disproportionately targeted minorities. Ethnic Russians represented 87% of Moscow's population in the 1939 census, but account for 44% of the city's repression victims during the Great Terror. The remaining victims include Jews (19%), Latvians (10%), Poles (8%), Germans (4%), Ukrainians (3%), Belarusians (3%), Hungarians, Armenians, Estonians, Lithuanians, Chinese (1% each), and 56 other groups (under 1% each).[20] 22% were foreign-born.[21] Past studies have found higher support for memorials where memorialized individuals' identities are more aligned with those of the local population (Orey, 2004; Ross, 2007; Benjamin et al., 2020; O'Connell, 2022; Rahnama, 2025). We expect the suppression-to-recognition ratio to be higher — and the severity of repression to have a weaker impact on memorials — for non-Russian victims.

To test this possibility, we expand the individual-level model specification in Equation 2 with interaction term $\log(\text{Repression}_j) \times \mathbb{1}\{\text{Ethnicity}_j = \text{“Russian”}\}$, where Repression_j is the number of repression victims who shared an address with victim j and the second term is an indicator equal to 1 if j's ethnicity is Russian and 0 otherwise.

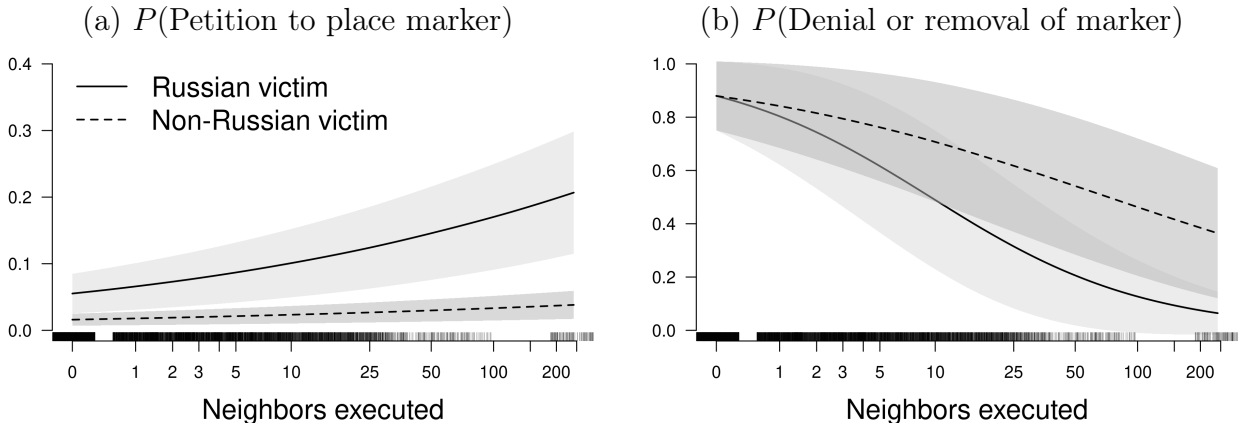


Figure 6: **Ethnicity and victim's probability of memorialization**. Solid and dashed lines represent point estimates for ethnically Russian and non-Russian victims, respectively; grey regions are bootstrapped 95% confidence intervals from 1000 simulations.

Figure 6 reports simulations from this expanded model, for Russian (solid line) and

[20] Statistics from Memorial's *Victims of State Terror in Moscow* database.
[21] We define "foreign born" individuals as those born outside the original (1922) borders of the USSR.

non-Russian victims (dashed line). Figure 6a confirms that the severity effect is stronger for ethnic Russians. The probability of a petition is 0.06 for "solitary" Russian victims and 0.21 for Russians with 242 victimized neighbors. For non-Russian victims, the fitted curve is lower and flatter, rising from 0.02 to 0.04. Figure 6b reveals a similar pattern for denials and removals. For Russians this probability drops from 0.88 to 0.06; for non-Russians the curve is flatter, ranging from 0.88 to 0.36. Memorials to non-Russians are less durable, and their chances of memorialization less sensitive to local severity. Results are consistent for foreign-born victims (Appendix A3), and in Saint Petersburg (Appendix A4).

4.2 Victim's Perceived Culpability

The Great Terror originated as an internal purge, targeting potential political rivals to Stalin within the *nomenklatura*. This group included individuals holding mid to high-level roles within the Central Committee apparatus of the All-Union Communist Party – Bolsheviks (VKP(b)) or closely affiliated organizations (trade unions, party youth). However, 99% of victims in Moscow were not in the *nomenklatura*, and 55% were not members of any party. Past research has shown that indiscriminate violence (i.e. applied regardless of target's behavior) tends to provoke a stronger attitudinal backlash than selective violence (Lyall et al., 2013; Benmelech et al., 2015). While most criminal charges against the *nomenklatura* were fabricated, activists may see these victims as political insiders (targeted "selectively"), not as ordinary citizens (targeted indiscriminately). Victims of internal purges tend to have complicated biographies that do not align neatly with activists' preferred frames of remembrance (Williams, 2022). We expect the suppression-to-recognition ratio to be higher, and the severity effect to be weaker, for victims from the *nomenklatura*.

Figure 7 reports simulation results from another expanded individual-level model (Eq.2), interacting repression of neighbors with victim's *nomenklatura* status. At addresses where they were the sole victims of repression, purged *nomenklatura* members (dashed line) were *more* likely to receive a petition than other victims (solid line) (0.16 vs. 0.06), and *less* likely to be denied or removed (0.22 vs. 0.83). These relationships flip as the local severity of repression rises. With 242 repressed neighbors, the predicted probabilities of petition are 0.07 (*nomenklatura*) vs. 0.17 (others); and probabilities of denial or removal are 0.86 vs.

0.14. These results suggest that higher local concentrations of victims may elicit greater scrutiny of (and opposition to) the memorialization of party elites, deterring petitions for such victims. We find similar patterns with expanded measures of VKP(b) affiliation, including rank-and-file members, candidates, and communist youth (Appendix A3).

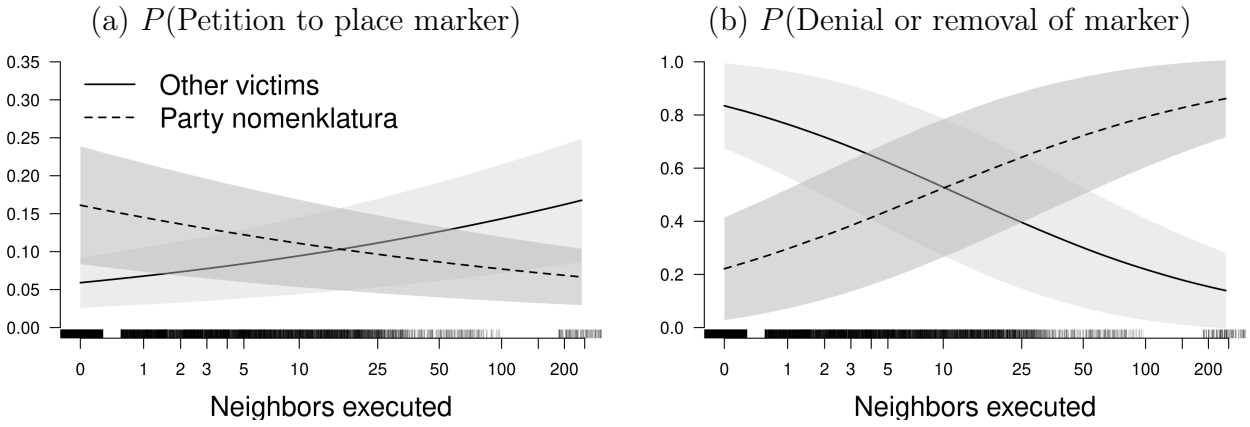


Figure 7: **Nomenklatura members and memorialization**. See details under Figure 6.

Beyond civilian elites, the Great Terror ensnared thousands of the NKVD's own personnel in a series of purges and molehunts. While *Last Address* declines petitions for individuals "who played an active role in repression," many of the purged served in posts far from the front lines (e.g. fire service, border troops).[22] We repeated the previous analysis, interacting victim's service in the NKVD with the local severity of repression. The results for purged NKVD personnel are very similar to those for *nomeklatura* members (Appendix A3).

Unfortunately, our Saint Petersburg data on victims' VKP(b) membership and NKVD service are too sparse to permit a replication of these Moscow analyses.

4.3 Victim Social Status

Among the "socially malign" groups the NKVD pursued were the pre-revolutionary educated strata, including nobility, clergy, merchants, and the urban middle class. Through in-group social bonding and strategic adaptation, some of these groups exhibited remarkable

[22] *Last Address* explicitly rejects petitions for individuals who played an active role in repression. Installation of a marker requires: (1) formal rehabilitation of the victim, and (2) "absence of documentary evidence that the repressed person was an active organizer of mass political repression."

intergenerational social resilience, despite ideological hostility and state violence (Lankina, 2021). Decades later, this resilience may have helped mobilize local grassroots pressure for commemoration. We may expect the suppression-to-recognition ratio to be lower — and the severity effect to be stronger — for victims of higher pre-repression social status.

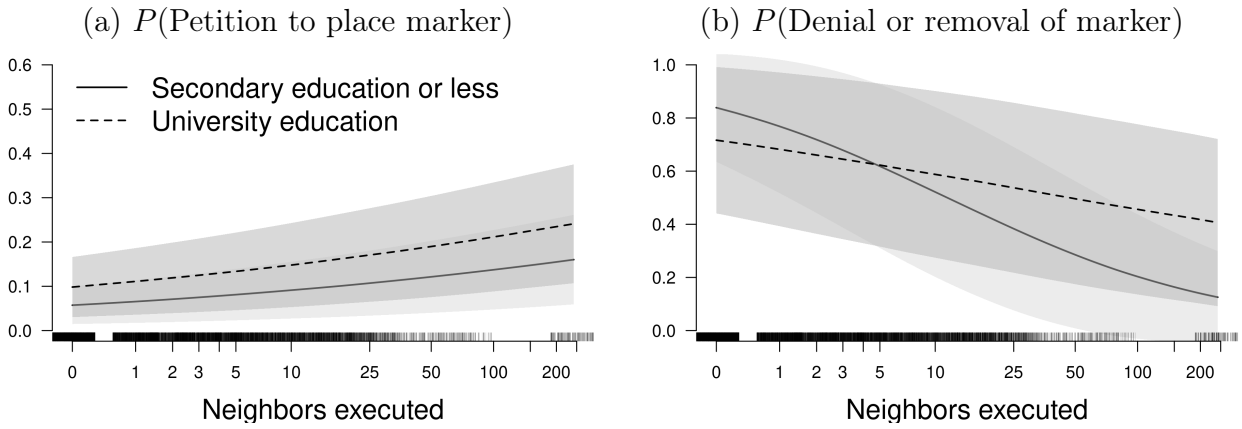


Figure 8: **Educational attainment and memorialization**. See details under Figure 6.

Following past studies (Lankina et al., 2025), we use university education as a proxy for social status, and re-estimate the individual-level model (Eq.2), interacting repression with victim's education. Figure 8 reports the results. While higher education (dashed line) slightly increases one's probability of petition (8a), it does not change the slope of the severity curve. For denials or removals (8b), the curve is flatter among highly-educated victims — indicating a persistently higher probability of removal — but estimates are highly uncertain. We find similar patterns using an alternative status measure: whether one served in a professional-managerial capacity before arrest (Appendix A3).

In Saint Petersburg, we find somewhat starker inequalities across educational and professional strata, in the same direction as here (Appendix A4). On net, however, there is insufficient evidence to conclude that social status meaningfully shapes the severity effect.

4.4 Local Political Opportunity Structure

A third potential barrier to memorializing victims is a fear of retribution — against those who write petitions, and against those reluctant to deny or remove them. Past research on

social movements and repression has sought to identify conditions — "political opportunity structures" — that constrain or facilitate collective action (Kitschelt, 1986; McAdam, 1982). While definitions of political opportunity structures vary, the perceived deterrent capacity of the state is a common thread, including potential for renewed repression (Gleditsch and Ruggeri, 2010; Rozenas and Zhukov, 2019). While much of the literature has focused on macro-level variation in this retributive threat, our study necessitates a focus on local variation, like the physical presence or proximity of government agencies. This includes state security, law enforcement, and other public administration entities capable of imposing economic or legal pressure on citizens. We expect the suppression-to-recognition ratio to be higher — and the severity effect to be weaker — where such agencies are visibly present.

We used Bureau van Dijk's Orbis database to identify entities with industry codes corresponding to state security services (NACE codes 8422-8424). For the time period overlapping with *Last Address*, we found 579 such entities in Moscow, including 282 public order and safety institutions (e.g. Federal Security Service, Ministry of Internal Affairs, and local branches), 195 judicial entities (e.g. courts, Ministry of Justice), and 102 defense entities (e.g. military units, recruitment stations). We matched these entities to city blocks, and expanded our block-level model (Eq.1) to include an interaction between repression severity and the presence of at least one such entity on the same block.

The simulation results in Figure 9 confirm that the presence of public order and safety institutions suppresses the severity effect. Repression increases the probability of petitions more for victims who resided on blocks without state security agencies (solid line), than on blocks with at least one such entity (dashed). The heterogeneity is less pronounced for denials and removals. We find similar results with an expanded set of agencies, including courts and the military (Appendix A3), and in Saint Petersburg (Appendix A4).

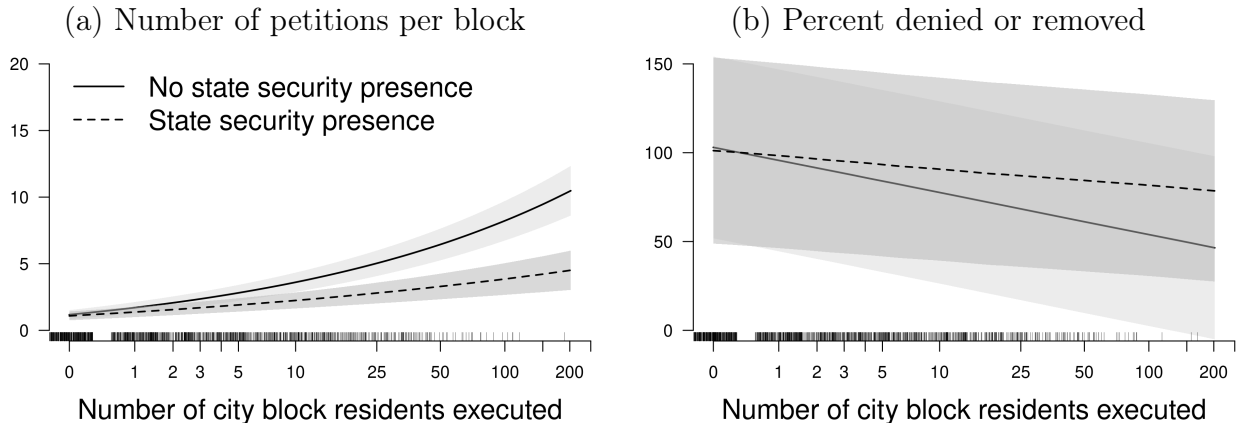


Figure 9: **State security presence and memorialization**. Block-level estimation.

5 Comparison to State-Directed Memorialization

How is grassroots memorialization different from state-controlled memorialization? In the decades since the Great Terror, the Soviet government installed 1,688 plaques on Moscow buildings. These plaques commemorate notable Muscovites, including 151 military officers, 167 party leaders, 128 government workers, 334 artists and cultural figures, 388 scientists and explorers, 29 medical doctors, and 24 athletes.[23] In the context of our theoretical framework, Soviet-era memorialization resembled a system with a forbiddingly high suppression-to-recognition ratio. All memorials were state-directed.[24] Soviet law mandated that all monuments reflect socialist revolutionary values, emphasizing the celebration of figures and events that reinforced state narratives.[25] Contested subjects like purges and repression violated these content restrictions. Where plaques to repressed individuals did appear (e.g. Mikhail Tukhachevskiy, Serhiy Korolyov), they invariably omitted these aspects of their biography. Grassroots efforts at memorialization faced immediate crackdowns.

[23] Many public figures, like Vladimir Lenin, appear in multiple plaques. Data from Kukina (2018).

[24] The only entities legally permitted to petition for a plaque during the Soviet period were official state and public organizations, not private citizens. Municipal councils managed practical approvals, like building permissions, but deferred to higher party organs on ideological matters. The Ministry of Culture oversaw artistic and textual content. The Union of Soviet Artists designed plaques. State security agencies monitored compliance and suppressed unauthorized initiatives, like those hinting at alternative histories.

[25] 1918 decree Republican Memorials; 1976 law Protection and Use of Historical and Cultural Memorials.

To see if repression nonetheless left a mark on Soviet-era memorialization, we re-estimate the first severity model from Table 1, replacing *Last Address* plaques with seven categories of state-directed plaques (Table 2). There is no statistically significant relationship between repression and Soviet memorials, other than to party leaders and artists.

Outcome	Military	Party	Government	Arts	Science	Medicine	Sports
Model	1. Linear	2. Linear	3. Linear	4. Linear	5. Linear	6. Linear	7. Linear
Estimate	-0.002	0.04	0.004	0.04	0.004	-0.005	0.001
Std. error	(0.01)	(0.01)**	(0.01)	(0.02)*	(0.01)	(0.003)	(0.001)
Rayon FE	✓	✓	✓	✓	✓	✓	✓
Zoning FE	✓	✓	✓	✓	✓	✓	✓
Adj. R^2	0.08	0.15	0.11	0.5	0.12	0.1	0.02
RMSE	5.55	6.69	5.81	8.1	9.33	3.42	1.18
N	3305	3305	3305	3305	3305	3305	3305

Estimates from linear fixed effect models. Treatment is number of block residents executed (logged). Outcome is post-1938 memorial plaques per block (logged). See note under Table 1 for other details.

Table 2: **Severity of repression and government-sanctioned memorialization**.

While Soviet-era monuments may appear to have little to do with the memory of repression, there are three scenarios in which empirical associations may emerge.

First, repressed individuals may be memorialized for reasons other than repression. All seven categories in Table 2 feature a few plaques to repressed individuals, commemorated for professional achievements. This includes 3.6% of Soviet-era plaques to artists (e.g. poet Osip Mandelstam) and 9.8% of plaques to party leaders (e.g. Aleksandr Kosarev).[26]

Second, repression may correlate with some Soviet memorials due to Soviet housing policy, which strictly regulated where citizens lived. The purges heavily targeted "elite" buildings where multiple apartments were assigned to party officials (e.g. House on the Embankment, 242 executions). The government rewarded compliant artists, writers and musicians with apartments in some of these same "elite" buildings. That said, preferential housing assignments — which also existed in other sectors, like military and academia —

[26]These statistics include persons who received non-lethal forms of repression (e.g. exile, blacklist). The results in Table 2 hold after dropping these cases from the sample.

cannot explain why only plaques to party leaders and artists have significant relationships with repression. Regression discontinuity results (Appendix A2) further show that residency in similar or proximate locations does not drive the severity effect.

Third, state-directed memorials may correlate with repression if they are part of an effort to distract or "flood the zone" with alternative commemoration. Soviet authorities may have used these memorials to promote narratives of political loyalty (party leaders) or apolitical excellence (artists), prioritizing locations where these narratives might become contested due to recent memories of repression. Many plaques in both categories commemorate well-known public figures who "slept" or "visited" there, not long-term residents.[27] Blocks that experienced more repression tended to see more of these "celebrity memorials" to subjects with questionable local ties. Whether this correlation is coincidental or evidence of a deeper distraction campaign is a question we cannot answer with available data.

6 External Validity

Empirically rare and transient phenomena — like grassroots memorialization in Moscow — can be valuable to study in their own right, but their empirical infrequency poses difficulties for external validity. Because exceptional events often arise under exceptional circumstances, we may worry that memory activism in the capital city of a rapidly autocratizing state, with a long history of political repression, may differ in key ways from activism elsewhere. While our data do not permit extensive replications outside our study's context — using comparable units, treatments, outcomes and settings — we can posit informed expectations about the transportability of our findings (Findley et al., 2021).

First, we are confident that our inferences are not tethered to the idiosyncratic environment of Moscow, or to specific design choices. By systematically re-estimating our models with data from Saint Petersburg, our study has demonstrated transortability across urban areas (e.g., federal capital vs. "second city") and populations (e.g., Moscow blocks to Leningrad blocks, Muscovites to Petersburgians). Our results hold across levels of analysis

[27] Vladimir Lenin accounts for one in four party plaques, but removing him from the sample does not change the results in Table 2. The most common subject of artistic plaques is poet Aleksandr Pushkin, whose complex relationship with Tsarist authorities made him adaptable to Soviet ideological needs.

(e.g., blocks, individuals), with different operationalizations of key variables (i.e., absolute vs. per capita repression exposure), in multiple empirical models (Appendix A2). That said, our design in not without blind spots (e.g., rural areas), and cities outside our sample (e.g., Perm', Yekaterinburg) may potentially deviate from the patterns we found here.

Second, we expect our findings to be transportable to other time periods. If *Last Address* had begun decades before its launch in 2014, we would expect similar empirical patterns. Grassroots memory activism is not a new phenomenon in post-Soviet countries — Memorial International started in 1989. Had it been founded in less politically restrictive times, *Last Address* might have expanded further and become more entrenched, potentially reaching a scale similar to *Stolpersteine* in Germany. In light of research findings from similar cases (see below), there is every reason to expect non-uniform severity effects to have also governed the project's emergence over this extended time span. Yet the ultimate fate of Memorial — which Russian authorities liquidated in 2022 — makes us doubt that a longer runway would have prevented the mounting pressures visible in Figure 2.

Third, because the Great Terror is one of the deadliest episodes of state repression in recorded history, we should consider the transportability of our findings to other types of violence. On the severity effect, studies on genocide, civil wars and racial violence have found results congruent to ours: larger-scale atrocities are more likely to be reported and memorialized (Weidmann, 2016; Henderson et al., 2021). On non-uniformity, there is extensive evidence of in-group favoritism and out-group marginalization in memorialization. Holocaust memorials have faced scrutiny over disparities in representing some victim groups (Apel, 2014; Östman, 2018), like sexual minorities, Roma, Sinti and political prisoners. Research on memory activism in Bosnia-Herzegovina has shown the primacy of ethnocentric narratives (Demirel, 2023). Research on post-genocide memorialization has similarly documented a wariness toward commemorating complex political actors (Williams, 2022). The severity effect and its non-uniformity are not unique to the Great Terror or to autocracies.

Finally, *Last Address* is but one of many decentralized, grassroots efforts, seeking to personalize victims of violence and integrate their memorials into everyday public spaces. The most direct counterpart is *Stolpersteine*, which since 1992 has placed over 116,000 brass plaques commemorating Holocaust victims in 31 European countries. A similar but smaller effort in the U.S. is the Equal Justice Initiative's *Community Remembrance Project*,

which has installed over 80 markers at locations of historical lynchings since 2015. Like *Last Address*, these projects have encountered resistance, vandalism, and removals. Yet even in autocratic settings where unauthorized memorials are criminalized, locations of atrocities tend to attract grassroots memorialization. In 1989, Belarusian activists installed crosses at an NKVD mass burial site in Kurapaty forest near Minsk. Also in 1989, families of Great Terror victims installed photographs at a mass grave in Levashovo, Leningrad. In China, authorities have restricted physical access to such sites (e.g. an industrial park in Chongqing, where 400-500 victims of the Cultural Revolution are buried), pushing grassroots memorialization to digital platforms. These examples suggest that *Last Address* is not *sui generis*, and is part of a broader, transnational trend in memory activism.

7 Repressed Memories

Some acts of state violence are too big to hide. Micro-level data on the memorialization of Stalin's Great Terror suggest that memorials to individual victims are more likely to appear, and less likely to disappear, in locations where the NKVD executed more people from the same address or workplace. Our theoretical model shows that this pattern holds irrespective of the relative power of contemporary political actors to advance or suppress memorials. It should hold even where opponents of memorialization are on track to prevail and ultimately eliminate all memorials to victims. The path to this "erasure" equilibrium is longer and costlier where the set of individuals to potentially be memorialized is large. Our analysis indicates that this may be the case in Moscow and Saint Petersburg today.

At the same time, this "severity effect" does not extend to all victims equally. The effect is stronger for ethnic Russians and native-born persons than for victims from minority groups and foreign-born individuals. It is similarly weaker for victims affiliated with the Stalinist regime and in locations where a local state security presence may deter petitions. We interpret this heterogeneity as indicative of selective allocation of limited resources by memory activists and their opponents, prioritizing cases that are less costly to pursue.

Beyond these inequities, our findings suggest that efforts to expedite and reduce the administrative costs of repression (for example, by arresting multiple individuals from the same factory or building for the same fictitious crime) can have the unintended effect

of making victims harder to forget. For example, the NKVD executed 20 residents of 37 Pokrovka street. These victims included one ethnic Pole, two Ukrainians, six Jews and 11 Russians, ranging in age from 47 to 60. All but one were male. The main thing these victims had in common, besides their address and age group, was that half of them worked in the same industry, including five at the same cooperative association (Artel' "Tekhnokhimik"). Their cases bear all the hallmarks of the NKVD's mass arrest strategy — the "Tekhnokhimik" workers were prosecuted together, and four of them were executed on the same day, March 3, 1938. The remaining worker, the only one in a management position, survived slightly longer, until June 3, 1938. As of today, this building has received five petitions for commemorative plaques, with no denials or removals (so far).

To take another example, the NKVD executed 23 people from 15 Chaplygina street — all males aged 47 to 65, with a similar ethnic breakdown. These victims included 10 workers from the same industry and five from the same enterprise (Artel' "Poligraftrud") — all of whom were processed together and executed on the same day, February 28, 1938. At the time of writing, the building has received three petitions, with no denials or removals.

In each instance, at least one of the petitions was to commemorate a victim from the group cases of "Tekhnokhimik" and "Poligraftrud," and the remainder commemorated other residents of the building. Yet a closer look suggests that very few of these executions were independent, one-off events. Besides the five "Technokhimik" workers, three victims at 37 Pokrovka street were "Poligraftrud" employees, executed on the same day as their co-workers from 15 Chaplygina. Another two victims in each building worked for a third cooperative, Artel' "Khimkraska." The NKVD executed one "Khimkraska" worker on February 28 (same day as the "Poligraftrud" workers from 15 Chaplygina) and another on March 7 (same day as the "Tekhnokhimik" workers from 37 Pokrovka). These examples illustrate the NKVD's efforts to draw connections between cases (usually through residential or workplace association), to simplify paperwork, expedite sentencing, and meet quotas.

While street-level evidence from Russia strongly supports the view that larger-scale state violence casts a more indelible shadow in a city's collective memory, our analysis also raises new questions, which future research will need to more directly confront. First, there is much we do not know about the data-generating process that drives repression, particularly as regards the interdependence of individual cases. The NKVD's mass arrest strategy,

by design, sought to forge connections between cases, creating networks of interdependence that may carry over to the memorialization process. Our results are robust to specifications that account for spatial autocorrelation and fixed differences across jurisdictions, but the structure of interdependence may be more complex than these models assume.

Second, perpetrators can be subjects of memorialization, too. Alongside the *Last Address* project, Russia has seen concerted state and private efforts to rehabilitate the image of Josef Stalin and the NKVD, in part through the installation of monuments. In the context of our theory, we can view these efforts as an aggressive form of counter-memorialization, which can potentially help us uncover equilibria beyond "remembrance" and "erasure."

A related question is that of purges within the security services themselves, which blur the line between perpetrators and victims. For example, the NKVD executed 19 people from 20 Pokrovka street (just a few blocks from 37 Pokrovka). Of these, at least 18 were NKVD officers, seven of whom were executed together on August 25, 1938. The same strategy of group arrests that applied to the repression of civilians extended to internal purges. Whether the same logic of memorialization applies here as to other victims is less clear. Despite the high toll, 20 Pokrovka has received no petitions and hosts no plaques. Commemorating these individuals requires first acknowledging their status as victims, which neither the critics nor the apologists of Stalin's Great Terror seem eager to do.

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Appendices: "Repressed Memories"

Contents

A0. Theoretical Appendix

The following is a formalization of the theoretical argument in the main text. Suppose that there are Y_t historical markers on a city block at time t (e.g. memorial plaques to victims). The number of markers can be as low as 0 and as high as κ, the total number of terror victims who resided on that block (*severity level*). We assume there cannot be more markers than victims.

As actors petition to memorialize victims, the number of markers grows at *recognition rate* $\rho \in (0, \infty)$. Opponents of memorialization deny petitions and remove markers, at *suppression rate* $\theta \in [0, \rho]$. The following equation specifies the change in Y over time, as a function of recognition (ρ), suppression (θ), and severity (κ):

$$\frac{dY}{dt} = \rho Y_t \left(1 - \frac{Y_t}{\kappa}\right) - \theta Y_t \tag{A1}$$

This expression assumes a logistic rate of growth in markers. This rate of growth is highest where relatively few victims have been memorialized, and tapers off as this proportion rises $\left(\frac{Y_t}{\kappa} \to 1\right)$.

Over time, this process converges to one of two equilibria: one where the number of markers falls to zero ($Y_{eq} = 0$, "erasure"), and one where the number is above zero but no larger than κ ($0 < Y_{eq} \leq \kappa$, "remembrance").

Proposition 1. $\forall\ \kappa > 0$, $\exists\ Y_{eq} : Y_{eq} > 0$ *if* $\rho > \theta$ *and* $Y_{eq} = 0$ *if* $\rho = \theta$.

Proof. Define an equilibrium of equation (A1) as a fixed point satisfying $\frac{dY}{dt} = 0$. Setting equation (A1) equal to zero and solving for Y, we obtain:

$$Y_{eq} = \kappa \left(1 - \frac{\theta}{\rho}\right) \tag{A2}$$

This equilibrium exists (i.e. yields non-negative values of Y_{eq}) for all $\kappa \geq 0$, $\rho > 0$ and $0 \leq \theta < \rho$. The expression in (A2) will be equal to zero if either (a) no victims had resided on the block, $\kappa = 0$, or (b) the suppression rate matches the recognition rate, $\rho = \theta$. In order for a non-zero number of markers to remain in equilibrium ($Y_{eq} > 0$), both of the following must be true: (a) at least one victim must have resided on the block, $\kappa > 0$, and (b) the recognition rate must exceed the suppression rate, $\rho > \theta$. □

In any city block where at least one resident had been repressed, memorials to victims will become permanent ($Y_{eq} > 0$) only if the recognition rate exceeds the suppression rate ($\rho > \theta$). Otherwise, memorials — if they do exist — will be only temporary, gradually yielding to a complete erasure of victims' public memories ($Y_{eq} = 0$).

We now turn our attention to how exposure to repression (κ) affects memorialization both in equilibrium, and on the way to the equilibrium.

Predictions. *As the number of victims increases, (1) the observed number of historical markers increases, but (2) the share of markers removed by each point in time decreases.*

Proof. We first derive these results for the "remembrance" equilibrium. To show that the equilibrium number of markers is increasing in exposure, we take the derivative of (A2) with respect to κ, $\frac{dY_{eq}}{d\kappa} = 1 - \frac{\theta}{\rho}$. This expression — marginal effect of κ on Y_{eq} — is positive, increasing in ρ and decreasing in θ.

To show that this result holds at any point in time, we rearrange equation (A1) as an initial value problem:

$$Y_t = \frac{\kappa Y_0(\rho - \theta)}{\rho Y_0 - e^{-t(\rho-\theta)}(\rho Y_0 - \kappa(\rho - \theta))} \tag{A3}$$

where Y_0 is the number of historical markers at time 0. The derivative of this expression with respect to κ $\left(\frac{dY_t}{d\kappa} = \frac{\rho Y_0^2(\rho-\theta)e^{t(\rho-\theta)}\left(e^{t(\rho-\theta)}-1\right)}{\left(\theta\kappa-\rho\left(\kappa+Y_0\left(e^{t(\rho-\theta)}-1\right)\right)\right)^2}\right)$ is positive as long as $\rho > \theta \geq 0$.

To show that $\frac{dY_t}{d\kappa} > 0$ even on the path to the "erasure" equilibrium, let's consider a special case where $\theta = \rho = 1$. Equation (A1) simplifies to $\frac{dY}{dt} = -\frac{Y_t^2}{\kappa}$, and the initial value problem becomes $Y_t = \frac{\kappa Y_0}{\kappa + tY_0}$. Taking the derivative with respect to κ, we obtain $\frac{dY_t}{d\kappa} = \frac{tY_0^2}{(\kappa+tY_0)^2}$, which is positive for all $Y_0 > 0$.

To additionally show that fewer markers will be removed in places with a high number of victims, we investigate the dynamics of memorialization at different values of κ using numerical integration. In so doing, we consider the same "erasure" scenario as before ($\theta = \rho = 1$), where opponents are determined to deny or remove all markers, and where the eventual outcome is an equilibrium with zero memorials.

Figure A0.1 reports the proportion of memorials removed by an arbitrary point in time ($t = 100$), for every value of κ between 0 and 1000. Where κ is closer to zero, almost all memorials will have been removed by this time. As κ rises, the proportion declines.

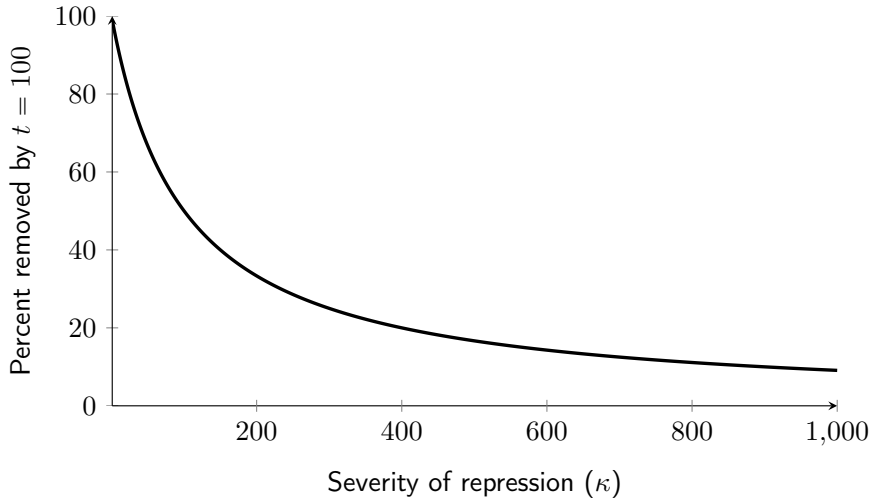
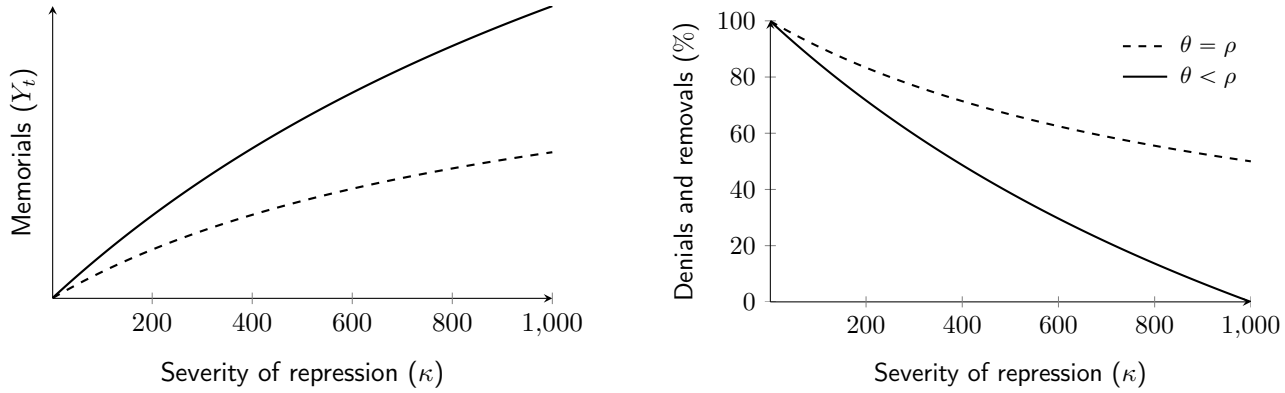


Figure A0.1: **Fewer cumulative removals where there are more victims**. Values reported are $\mathbb{E}\left[100 \cdot \left(\frac{Y_0 - Y_t}{Y_0}\right) \mid \rho = \theta = 1, Y_0 = 1, \kappa\right]$, obtained through numerical integration of differential equation (A1) over time interval $(0, 100)$, iterated across $1 \leq \kappa \leq 1000$.

Because the system proceeds toward an "erasure" equilibrium as $t \to \infty$, the curve in Figure A0.1 will gradually flatten to a horizontal line at 100%. However, convergence is slower at higher values of κ, even when $\theta = \rho$. For example, if we define "convergence" as $|\Delta Y_t| < 0.00001$, a system with $\kappa = 1$ (all else as in Figure A0.1) converges at $Y_t = 0$ at $t = 316$, but a system with $\kappa = 1000$ won't converge until $t = 9001$. □

Figure A0.2 reproduces the predictions in Figure 1 in the main text, with numerical integration details. For the "high suppression-to-recognition" case (dashed line), $\theta = \rho = 1$, as in Figure A0.1. For the "low suppression-to-recognition" case (solid line), $\theta = 0.999, \rho = 1$. All other parameters were the same as in Figure A0.1.



(a) Number of memorials at time $t = 1000$

(b) Percent denied or removed by time $t = 1000$

Figure A0.2: **Interaction between severity and the suppression-recognition ratio**. Values obtained through numerical integration of differential equation (A1) over time interval $(0, 1000)$, iterated across $1 \leq \kappa \leq 1000$. Quantities reported in panel (a) are $\mathbb{E}[Y_t | \rho = 1, \theta = 0.999, Y_0 = 1, \kappa]$ (solid line) and $\mathbb{E}[Y_t | \rho = \theta = 1, Y_0 = 1, \kappa]$ (dashed line). Panel (b) reports $\mathbb{E}\left[100 \cdot \left(\frac{Y_0 - Y_t}{Y_0}\right) | \rho = 1, \theta = 0.999, Y_0 = 1, \kappa\right]$ (solid) and $\mathbb{E}\left[100 \cdot \left(\frac{Y_0 - Y_t}{Y_0}\right) | \rho = \theta = 1, Y_0 = 1, \kappa\right]$ (dashed).

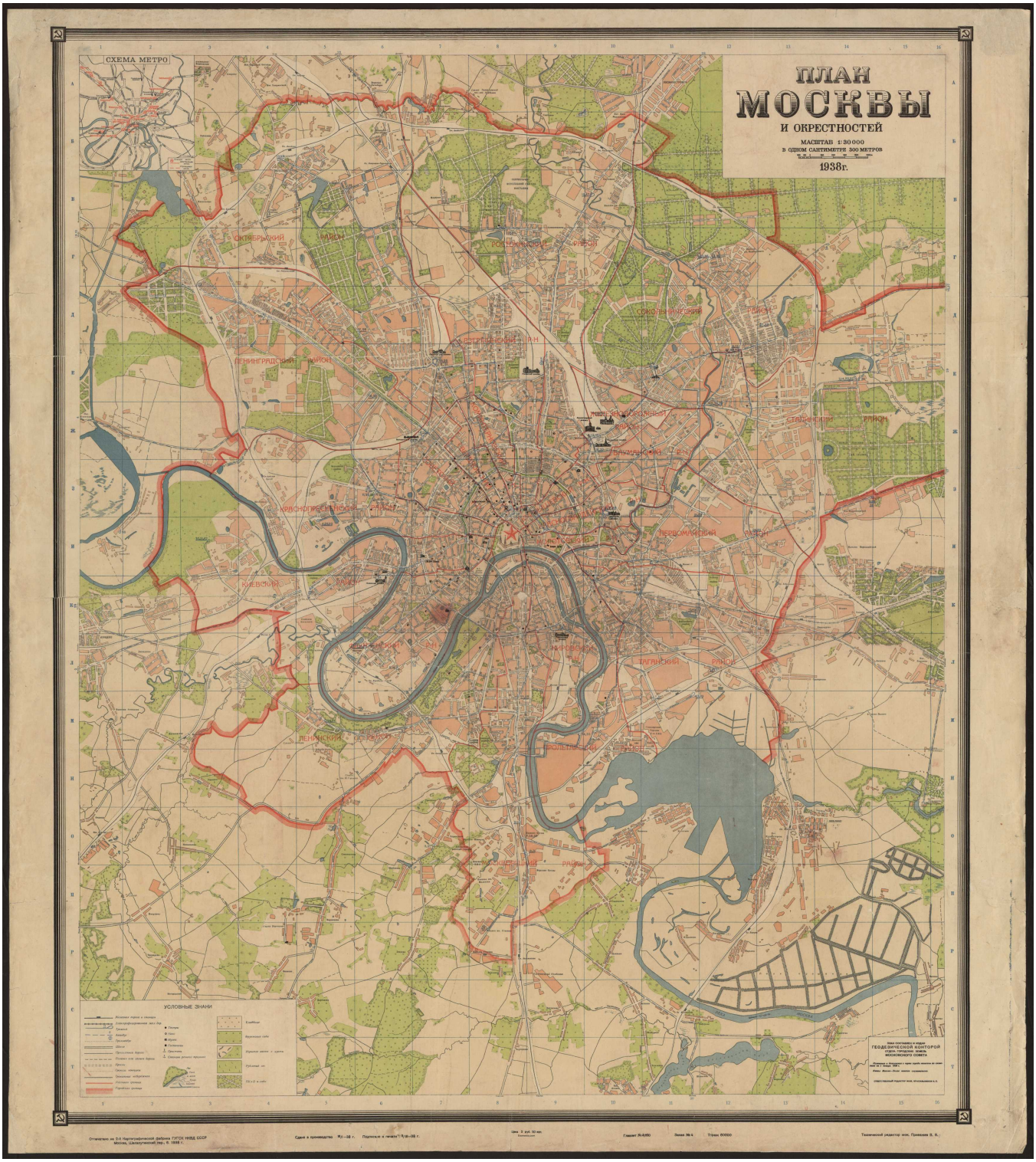
A1. Data on the Great Terror in Moscow

Figure A1.3 shows a scan of the tactical map of Moscow from the NKVD's Main Directorate for Geodesic Surveying and Cartography (Krasil'nikov, 1938).[1] The NKVD map contains detailed, street-level geometries (1:30,000 resolution, or 300 meters on Earth to one centimeter on paper), and is a primary source for our block-level data on Moscow. We supplemented this source with Memorial's *Victims of State Terror in Moscow* database (mos.memo.ru) and *Topography of Terror* (topos.memo.ru). For the former, we scraped the victims' records from the website and geocoded their residential addresses at time of arrest. For the latter, we scraped `json` geometries from the online map interface, along with relevant metadata.

We georeferenced the map image using intersections of graticule lines, and key landmarks and street intersection (Figure A1.4a). We then vectorized, through image tracing, the polygons representing city blocks. Overall, there are 5,400 city blocks in this dataset, including 1646 (30%) in neighboring parts of Pidmoskov'ya that had not yet been incorporated into the city proper. Our geocoded Memorial *Victims of State Terror in Moscow* dataset contains names, residential addresses and biographical information for 11,035 Moscow residents executed by the secret police. By overlaying these polygons with Memorial data, we can see how many people the NKVD arrested and executed from each block (dots and polygons in Figure A1.4c).

[1] For details on our Saint Petersburg data, see Section A4.

Figure A1.3: **Scan of map from** Krasil'nikov (1938).



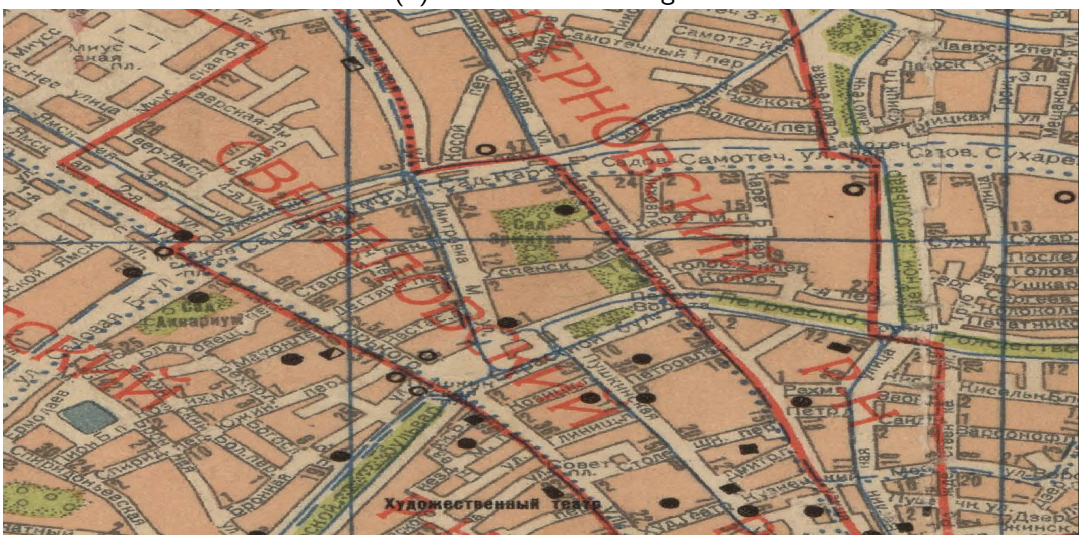
Following the same vectorization procedure, we used the NKVD map to extract the borders of Moscow's city districts as they existed in 1936-1960. In addition to exploiting border discontinuities across RO NKVD jurisdictional boundaries, this last feature allows us to link our block-level data to district-level population counts from the 1939 Soviet Census (Central Statistical Directorate of USSR, 1939). This permits us to measure NKVD

executions not only as raw counts per block, but also as a (rough) proportion of local residents. Because the 1926 census used different, older district boundaries, which were not valid after 1936, we used the 1939 census figures (but see Wheatcroft 1990). We used the district-level counts to estimate block-level population via dasymetric mapping (i.e. excluding non-residential blocks, parks, and other places where people did not live) (Mennis, 2003).

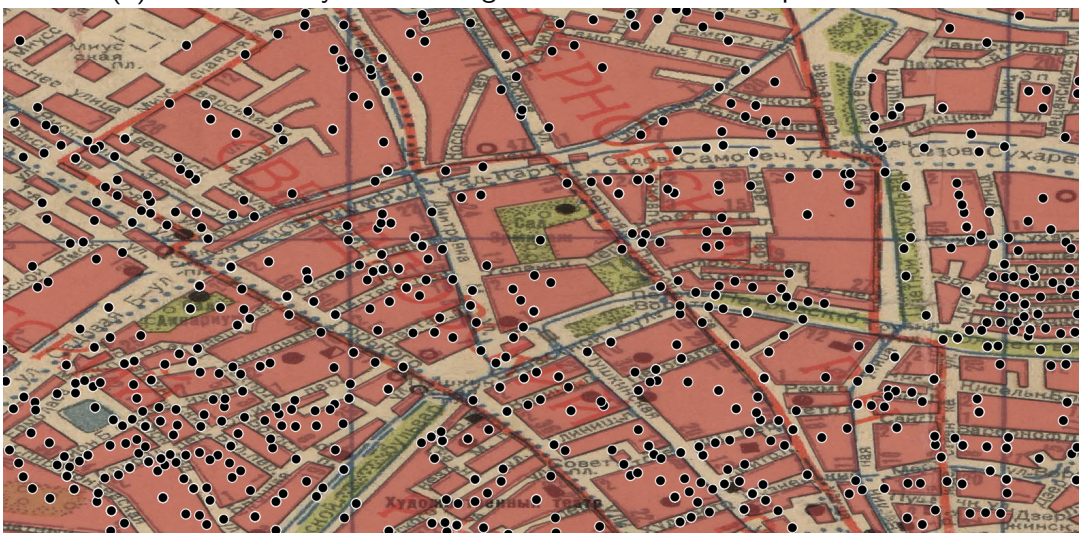
To make dasymetric mapping feasible, we classified the city blocks by zoning/land use, with information from Memorial's *Topography of Terror* (topos.memo.ru) and various supplementary sources. Zoning information allows us to (a) exclude non-residential areas from dasymetric interpolation, (b) include mixed-use zoning fixed effects for the residential blocks in our regression models, and (c) calculate measures like "intra-troika distance."

Figure A1.4: **Close-up of area around Pushkin Square**.

(a) Georeferenced image



(b) Vectorized city blocks and geocoded addresses of repression victims



A2. Robustness Tests

A2.1. Spatial Autocorrelation

To account for spatial dependence in the distribution of commemorative markers over city blocks, we extend our core model specification to accommodate a spatial random effect τ:

$$y_i = g^{-1}\left(\gamma \cdot \log(\text{Repression}_i) + \beta'\mathbf{X}_i + \text{District}_{k[i]} + \text{Zoning}_i + f(\text{Long}_i, \text{Lat}_i) + \tau_i + \epsilon_i\right) \tag{A4}$$

where $\mathbb{E}[\tau] = 0, \text{Cov}(\tau) = \sigma^2\mathbf{R}$, and $\mathbf{R}$ is a matrix that defines the spatial dependence structure. We consider two covariance functions here. The first is a conditional autoregressive (CAR) function, which specifies $\mathbf{R}$ as:

$$\mathbf{R} = (\mathbf{I} - \rho\mathbf{W})^{-1}\mathbf{M} \tag{A5}$$

where $\mathbf{I}$ is an identity matrix, $\mathbf{W}$ is a row-standardized spatial weights matrix, and ρ is a spatial autocorrelation parameter that determines the magnitude and direction of the neighborhood effect ($\rho > 0$ indicates that neighboring observations have similar values, $\rho < 0$ indicates that neighbors have dissimilar values). We define $\mathbf{W}$ through queen contiguity, where $0 < w_{ij} \leq 1$ if blocks i and j are adjacent and $w_{ij} = 0$ otherwise, and $\sum_j w_{ij} = 1$. $\mathbf{M}$ is a symmetry condition matrix, such that $m_{ii} > 0$ and $w_{ij}m_{ji} = w_{ji}m_{ij}$.

The second specification we consider uses a simultaneous autoregressive (SAR) spatial covariance function,

$$\mathbf{R} = [(\mathbf{I} - \rho\mathbf{W})(\mathbf{I} - \rho\mathbf{W})']^{-1} \tag{A6}$$

where, unlike the symmetry requirements in equation (A5), $\mathbf{W}$ is not necessarily symmetric.

Table A2.1 reports estimates from both sets of spatial autogressive models. In the case of petitions, $\hat{\gamma}$ coefficient estimates are numerically close to those in the (non-autoregressive) main specification in Table 1 in the main text, still positive and statistically significant. Our previous specification estimated a 0.3 percentage point (pp) rise in petitions for each percentage-point increase in repression, and the CAR and SAR models both estimate this rise to be 0.26 percentage points. These results, along with the positive estimate for $\hat{\rho}$, suggest that spatial autocorrelation can account for some, although not all, of the estimated repression effect.

In the case of denials and removals, the $\hat{\gamma}$ coefficient estimates are negative, significant, and also numerically close to those in the main text. Previously, we estimated that each percentage point increase in repression yields a 10.3 pp decline in denials or removals; here, as well, the estimate is for an 12 pp decline.

Outcome	Petitions		Denied/Removed (%)	
Model	1. CAR	2. SAR	3. CAR	4. SAR
Estimate	0.26	0.26	-11.9	-11.9
Std. error	(0.01)**	(0.01)**	(1.01)**	(1.01)**
Rayon FE	✓	✓	✓	✓
Zoning FE	✓	✓	✓	✓
$\hat{\rho}$	0.55	0.57	0.52	0.01
Pseudo R^2	0.5	0.5	0.25	0.25
RMSE	0.33	0.33	26.02	26.02
AIC	2100	2098.1	10774.7	10774.7
N	3305	3305	1191	1191

Estimates from model in Equation A4 with conditional (CAR) and simultaneous autoregressive (SAR) covariance functions. Observations (blocks) weighted by population size. Significance levels (two-tailed): $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Table A2.1: **Severity of repression and memorialization**, spatial models.

A2.2. Discontinuities Across District Borders

Our next set of analyses is motivated by the observation that RO NKVD branches — although subject to the same quotas within Moscow's city limits — had some discretion in how they implemented central orders. The junior and mid-level officers who staffed these local units were the ones who translated directives and quotas into the language of criminal investigations, assembled lists of names, detained and interrogated suspects, built the "criminal cases" against them, and — after sentencing — carried out executions. Although we cannot directly observe how zealous or cautious a given NKVD official was, we can observe some of the consequences of this discretion. For example, arrest levels (and quotas) were strongly correlated with local population size and other structural considerations, like logistics and proximity to certain government and industrial sites (Appendix A3). If local levels of repression were significantly higher or lower than these observable factors would predict, administrative discretion may help explain this variation.

To exploit variation across district borders, we implement a fuzzy regression discontinuity design (FRDD), where the forcing variable is distance from a city block to the nearest city district border. Following Rozenas, Talibova and Zhukov (2024), we first estimate how much the level of repression in each district deviated from what we would expect, given observables like population, geographic area, distance to the nearest industrial site, and the average "intra-troika" distance in the RO NKVD's jurisdiction. Our first-stage equation is:

$$\text{Repression}_k = \alpha + \beta_1 \cdot \log(\text{Population}_k) + \beta_2 \cdot \text{Area}_k + \beta_3 \cdot \text{Industry} + \beta_4 \cdot \text{Troika}_k + \epsilon_k \tag{A7}$$

where k indexes city districts. We take the residuals from this model, and select (with replacement) pairs of adjacent districts with highly divergent levels of repression that cannot be explained by these basic background characteristics (i.e. where the absolute difference in average residuals is at least one standard deviation).[2] To ensure that treated and control cases are as similar and proximate to each other as possible, we extract city blocks located within a 100 meter bandwidth of these district borders.

Figure A2.5 shows the 200 city blocks we selected for FRDD analysis. Black blocks are located in high-repression border areas; white blocks are in low-repression areas. Dotted lines represent city district boundaries. The selected blocks are all near the center of Moscow, inside the Garden Ring and (future) Third Ring roads.

We define our forcing variable, d_{ik} as the distance from block i in district k to the border of the neighboring district, such that $d_{ik} < 0$ in lower-repression districts and $d_{ik} > 0$ in higher repression ones. Figure A2.6 plots levels of repression as a function of d_{ik}. On the left are blocks in lower-repression districts ($d_{ik} < 0$), and on the right are blocks in higher-repression districts ($d_{ik} > 0$). In the middle ($d_{ik} = 0$) is a discontinuous rise in executions as one crosses the border from less to more repressive districts.[3] Covariate balance tests (Figure A2.7) suggest that repression is the only observed variable with a statistically significant discontinuity across borders.

Our FRDD estimating equations are the following:

$$\begin{aligned} \log(\text{Repression}_i) &= \alpha \cdot \mathbb{1}\{\delta_{ik} > 0\} + f_1(\delta_{ik}) + \epsilon_{1i} \\ y_i &= \gamma \cdot \log(\widehat{\text{Repression}}_i) + f_2(\delta_{ik}) + \epsilon_{2i} \end{aligned} \tag{A8}$$

where f_1 and f_2 are cubic splines of δ_{ik}, and $\mathbb{1}\{\delta_{ik} > 0\}$ is an instrument for repression.

Table A2.2 reports the FRDD estimates, which align in direction with the fixed effect estimates in Tables 1 and A3.8. According to Model 1, a one percentage point increase in repression is associated with a 1.23 pp increase in petitions, and an 11 pp decline in denials and removals. While the FRDD estimate for denials and removals loses it significance, the magnitude of the first point estimate is three times larger than earlier.[4]

Table A2.5 re-estimates our FRDD models with a per capita measure of repression, adjusting the estimating equations and weights accordingly. These additional estimates are consistent with the results reported here.

[2] We select pairs of adjacent districts (k, k') where $|\bar{\epsilon}_k - \bar{\epsilon}_{k'}| \geq \text{SD}(\epsilon_k)$. $\bar{\epsilon}_k$ is average residual for district k from Equation A7.

[3] Bias-corrected local polynomial estimate (Calonico, Cattaneo and Titiunik, 2015) is 2.09 (S.E.= 0.76).

[4] Note that the FRDD estimate represents a different quantity of interest (i.e. local average treatment effect due to proximity to district borders). This discrepancy may also reflect attenuation bias due to measurement error in the original treatment.

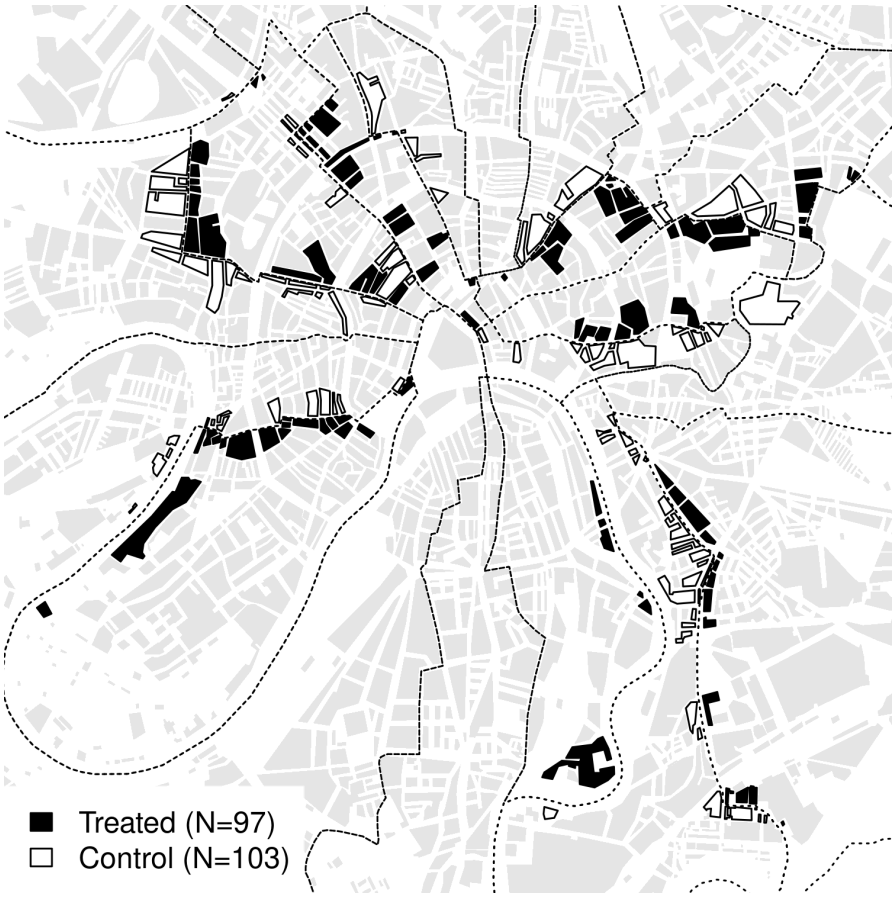


Figure A2.5: **City blocks used in RDD analyses**.

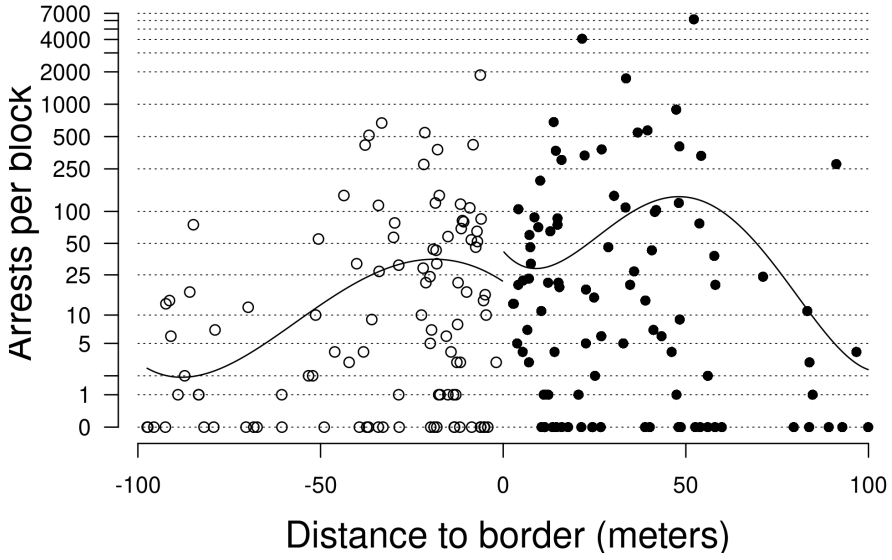


Figure A2.6: **Discontinuity at city district borders**.

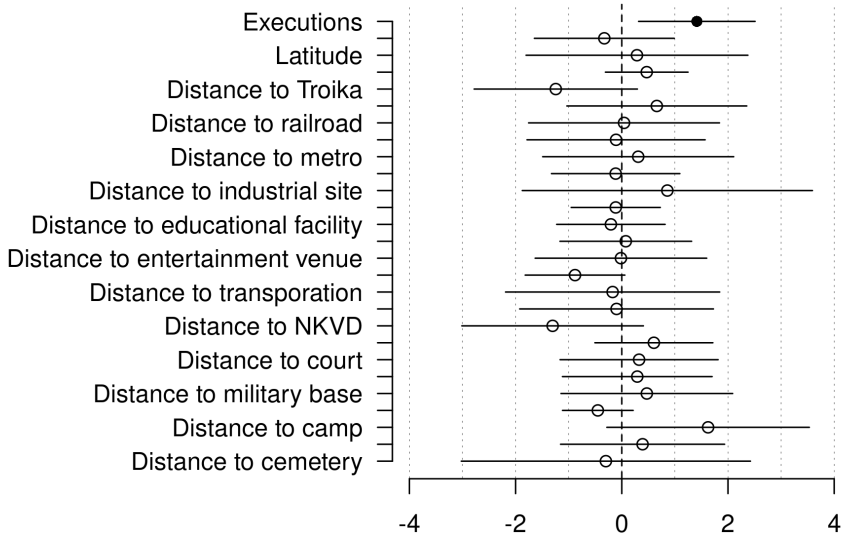


Figure A2.7: **Covariate balance at city district borders**.

Outcome	Petitions	Denied/Removed (%)
Model	1. FRDD	2. FRDD
Estimate	1.23	-11.37
Std. error	(0.49)*	(19.52)
First stage $\mathcal{F}$ score	3.05†	4.75*
Wu-Hausman	5.61*	0
Adj. R^2	0.28	0.18
RMSE	56.54	1927.75
N	200	147

Estimates from fuzzy regression discontinuity design. Treatment is number of city block residents executed (logged). Outcome is log-transformed. Robust standard errors in parentheses, clustered by rayon. Observations (blocks) weighted by population size. Significance levels (two-tailed): $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Table A2.2: **Severity of repression and memorialization**, FRDD estimates.

A2.3. Per Capita Repression

While our main specifications measure exposure to repression as the absolute number of executions per block, we now consider a per capita measure, where repression is the percent of block residents whom the NKVD executed. The denominator is the block-level population estimate we obtained via dasymetric interpolation from the 1939 Soviet census (Appendix A1), and the same measure that we use as weights for our main models in Table 1.

Table A2.3 re-estimates the linear and binomial models in Table 1 with the per capita treatment variable. Table A2.4 re-estimates the CAR and SAR models from Table A2.1 in the previous section. Table A2.5 does the same for our FRDD models from A2.2. Due to re-scaling, these estimates differ from the originals in their numerical magnitude, but not in sign or significance (except Table A2.5, where one estimate regains significance).

Outcome	Petitions	Denied/Removed (%)	
Model	1. Linear	2. Linear	3. Binomial
Estimate	1.13	-21.97	-1.22
Std. error	(0.09)**	(5.64)**	(0.4)**
Rayon FE	✓	✓	✓
Zoning FE	✓	✓	✓
Adj. R^2	0.53	0.25	
Pseudo R^2			0.34
RMSE	17.09	1381.07	0.29
N	3305	1191	1191

Estimates from Linear and Binomial fixed effect regression models. Treatment is percent of city block residents executed (logged). Outcome is log-transformed in Linear model, rescaled as proportion between 0 and 1 in Binomial model. Robust standard errors in parentheses, clustered by rayon. All models include spatial spline and block-level covariates. Observations (blocks) weighted by population size. Significance levels (two-tailed): $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Table A2.3: **Per capita repression and memorialization**.

Outcome	Petitions		Denied/Removed (%)	
Model	1. CAR	2. SAR	3. CAR	4. SAR
Estimate	0.49	0.49	-8.14	-8.14
Std. error	(0.02)**	(0.02)**	(2.21)**	(2.21)**
Rayon FE	✓	✓	✓	✓
Zoning FE	✓	✓	✓	✓
$\hat{\rho}$	0.95	0.56	0.02	0.02
Pseudo R^2	0.4	0.4	0.16	0.16
RMSE	0.36	0.36	27.4	27.4
AIC	2663.7	2664.7	10890.3	10890.3
N	3305	3305	1191	1191

Treatment is percent of city block residents executed (logged). See note under Table A2.1 for details.

Table A2.4: **Per capita repression and memorialization**, spatial models.

Outcome	Petitions	Denied/Removed (%)
Model	1. FRDD	2. FRDD
Estimate	4.22	-40.91
Std. error	(1.97)*	(74.92)
First stage $\mathcal{F}$ score	3.88†	3.89†
Wu-Hausman	4.79*	0.06
Adj. R^2	0.36	0.11
RMSE	58.29	2003.05
N	200	147

Estimates from fuzzy regression discontinuity design. Treatment is percent of city block residents executed (logged). Outcome is log-transformed. Robust standard errors in parentheses, clustered by rayon. Observations (blocks) weighted by population size. Significance levels (two-tailed): $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Table A2.5: **Per capita repression and memorialization**, FRDD estimates.

A3. Additional Analyses

A3.1. Predictors of Repression

Our FRDD analyses exploit differences in repression across city district lines, net of observable predictors of NKVD activity. To establish what some of these observables might have been, we use Bayesian Model Averaging (BMA) (Madigan and Raftery, 1994; Raftery et al., 2022). This approach computes posterior probabilities over models with all possible combinations of relevant covariates, and constructs a weighted average over the model space. Our quantities of interest are model-weighted posterior distributions for coefficients:

$$P(\beta|\text{Repression}, X) = \sum_{m}^{2^K} P(\beta|M_m, \text{Repression}, X)P(M_m|\text{Repression}, X) \tag{A9}$$

where M_m denotes the m-th model, and $P(M_m|\text{Repression}, X)$ are posterior model probabilities (model weights):

$$P(M_m|\text{Repression}, X) = \frac{P(\text{Repression}|M_m, X)P(M_m)}{\sum_{s}^{2^K} P(\text{Repression}|M_s, X)P(M_s)} \tag{A10}$$

where $P(M_m)$ is the prior probability of model m (we use a uniform prior, $P(M_m) = \frac{1}{2^K}$) and $P(M_m|\text{Repression}, X)$ is the marginal likelihood of model m.[5] Our core model specification is the following:

$$\text{Repression}_i = g^{-1}\left(\beta'\mathbf{X}_i + \text{District}_{k[i]} + \epsilon_i\right) \tag{A11}$$

where $g^{-1}(\cdot)$ is an inverse link function. We consider two sets of models: (1) with a Gaussian link function and logged outcome, $\log(\text{Repression}_i)$, and (2) with a quasi-Poisson link function and the outcome on a natural scale. The vector X may contain any combination of: (a) block population (logged), to account for the number of potential targets, (b) intra-troika distance, to account for the logistical cost of repression, (c) distance to the nearest industrial site, to account for ease of targeting by factory lists, (d) longitude and latitude, to account for spatial trends, (e) geographic area, to account for the size of zones of operation, and (f) district fixed effects. The model space includes $K = 28$ covariates and $2^{28} = 268{,}435{,}456$ potential model specifications.

Table A3.6 reports inclusion probabilities and posterior means and standard deviations for the BMA analysis. The strongest predictors of repression are population size, intra-troika distance, distance to industrial site and, to a lesser extent, area. These are the covariates we include in the first-stage FRDD specification (Equation A7).

[5] We use a BIC approximation, $P(\beta_1 \neq 0|\text{Repression}, X) = \sum_{j:\beta_1 \in M_j} \frac{\exp(BIC_j/2)}{\sum_{i}^{K} \exp(BIC_i/2)}$, for inclusion probability priors.

Variable	(1) Gaussian		(2) Quasi-Poisson	
	$P(\hat{\beta} \neq 0)$	Post. Mean	$P(\hat{\beta} \neq 0)$	Post. Mean
Intercept	100	-175.9 (62.2)	100	-179.8 (130.3)
Population (log)	100	0.2 (0.02)	100	0.8 (0.1)
Distance to Troika	100	-0.2 (0.02)	100	-0.9 (0.1)
Distance to industrial site	100	-0.1 (0.02)	99.5	-0.3 (0.1)
Longitude	100	4.1 (0.4)	87.3	5.9 (2.6)
Latitude	18.1	0.4 (1)	18.4	-0.8 (2)
Area	95.6	3.1 (1.1)	75	-4.9 (3.7)
Dzerzhinskiy	1.2	0.0003 (0.01)	29.3	0.2 (0.4)
Frunzenskiy	100	0.4 (0.1)	17.6	0.1 (0.3)
Kievskiy	5.8	0.003 (0.04)	11.2	0.1 (0.2)
Kirovskiy	6	-0.01 (0.05)	78.1	-0.7 (0.5)
Kominternovskiy	95.7	0.5 (0.2)	3.5	-0.0003 (0.1)
Krasnogvardeyskiy	99.9	0.7 (0.2)	8.9	0.04 (0.2)
Krasnopresenskiy	15.2	0.03 (0.1)	75.2	0.4 (0.4)
Kuybyshevskiy	100	1.4 (0.2)	92.3	0.6 (0.3)
Leningradskiy	3.5	-0.004 (0.02)	6.2	0.01 (0.2)
Leninskiy	16.4	0.05 (0.1)	39.6	0.3 (0.4)
Molotovskiy	13.1	-0.04 (0.1)	34.2	-0.3 (0.4)
Moskvoretskiy	96.6	-0.4 (0.1)	80.6	-0.8 (0.4)
Oktyabrskiy	3.7	0.003 (0.02)	10.9	0.1 (0.3)
Pervomayskiy	100	-0.7 (0.1)	78.3	-1.1 (0.7)
Proletarskiy	100	-0.7 (0.1)	99.4	-1.6 (0.5)
Rostokinskiy	100	-0.4 (0.1)	23.3	0.2 (0.3)
Sokolnicheskiy	100	-0.8 (0.1)	78.6	-1.1 (0.6)
Sovetskiy	100	0.7 (0.1)	14.3	0.1 (0.2)
Stalinskiy	100	-0.7 (0.1)	78	-1.1 (0.6)
Sverdlovskiy	100	1.5 (0.2)	16.2	-0.1 (0.2)
Taganskiy	100	-0.6 (0.1)	75.1	-0.7 (0.5)
Zheleznodorozhnyy	12.6	-0.03 (0.1)	68.8	-0.5 (0.4)

$P(\hat{\beta} \neq 0)$ are posterior inclusion probabilities, scaled 0 to 100. Quantities reported under "Post. Mean" are means (standard deviations) of coefficient estimates' posterior distributions. 132 Gaussian models, 1018 quasi-Poisson models selected (28 covariates).

Table A3.6: **Predictors of Repression**, Bayesian Model Averaging

A3.2. Correlates of Rehabilitation

After Stalin's death in 1953, the Soviet Union began to (posthumously) rehabilitate some repressed individuals, clearing them of crimes and providing benefits for relatives (e.g., restoration of property rights, pensions, removal of the stigma of association with "enemies of the people"). This process gained steam after Nikita Khrushchev's secret speech denouncing Stalin's cult of personality at the 20th Party Congress in 1956, and accelerated under Perestroika and following the Soviet collapse. Authorities excluded those accused of serious political crimes from rehabilitation (e.g. Nazi collaboration, insurgency), but the sheer scale of Stalin's repression created practical challenges for sorting through the millions of other cases.

Because only rehabilitated individuals are eligible for *Last Address* petitions, it is worth considering how rehabilitated repression victims differ from the non-rehabilitated. To this end, we analyzed the demographic differences across the 2.85 million individuals included in Memorial (2014)'s *Victims of Political Terror in the USSR* database. Table A3.7 reports coefficient estimates from this model:

$$\text{Rehabilitation}_i = g^{-1}\left(\theta' \mathbf{X}_i + \epsilon_i\right) \tag{A12}$$

where $\mathbf{X}_i$ is a series of biographical attributes, including education, industry of employment, birth year, professional status, and republic of birth. Table A3.7 suggests that ethnic Russians, government workers, high-school graduates, managers and military personnel were the most likely to be rehabilitated.

Table A3.7: **Who was most likely to receive rehabilitation?** Sample includes all repression victims in Memorial's 'Victims of Stalinist Terror' database. Reference categories for education, ethnicity, industry and republic are 'secondary,' 'Russian,' 'government' and 'RSFSR.'

Dependent Variable:	Rehabilitated
Model:	(1)
	Logit
Variables	
Education = Higher	-0.37*** (0.08)
Education = Illiterate	-0.02 (0.34)
Education = Primary	-0.07 (0.50)
Education = Unknown	-1.1*** (0.14)
Ethnicity = Armenian	-0.62*** (0.13)
Ethnicity = Belarusian	-0.27 (0.52)
Ethnicity = Chechen	0.17 (0.30)
Ethnicity = Chinese	-0.47* (0.23)
Ethnicity = Estonian	-0.64*** (0.04)
Ethnicity = German	-0.20 (0.24)
Ethnicity = Greek	-0.65*** (0.05)
Ethnicity = Jewish	-1.6*** (0.38)
Ethnicity = Kabardin	-0.36*** (0.03)
Ethnicity = Kalmyk	-0.64*** (0.03)
Ethnicity = Korean	-0.36 (0.39)
Ethnicity = Latvian	-0.49*** (0.08)
Ethnicity = Lithianian	-0.61*** (0.16)
Ethnicity = Ossetian	-0.09 (0.14)
Ethnicity = Polish	-1.2*** (0.30)
Ethnicity = Tatar	0.20** (0.07)
Ethnicity = Ukrainian	-0.36** (0.13)
Industry = Agriculture	-0.87*** (0.15)
Industry = Commerce	-0.51** (0.19)
Industry = Construction	-0.57*** (0.05)
Industry = Culture/Arts	-0.35*** (0.09)
Industry = Econ/Finance	-0.65*** (0.12)
Industry = Education	-0.53*** (0.07)
Industry = Foreign	-1.1*** (0.16)
Industry = Forestry	-0.26* (0.11)
Industry = Health	-0.37*** (0.09)
Industry = Heavyindustry	-0.45*** (0.08)
Industry = Information/Accounting	-0.20* (0.09)
Industry = Logistics	-0.39*** (0.06)
Industry = Other	-0.47** (0.16)
Industry = Procurement	-0.39** (0.13)
Industry = RealEstate	-0.20 (0.17)
Industry = Residential	-0.70*** (0.16)
Industry = Retail/Food	-0.30*** (0.09)
Industry = Science	-0.60*** (0.03)
Industry = Service	-0.55** (0.17)
Industry = SocialOrganizations	-0.12 (0.25)
Industry = Transport/Communications	-0.55*** (0.08)
Industry = Unemployed	-0.88*** (0.21)
Industry = Unknown	-0.79*** (0.08)
Manager	0.11* (0.05)
Clergy	-0.03 (0.06)
Military	0.15*** (0.03)
Birth year	0.002 (0.006)
Fixed-effects	
Republic of birth	Yes
Fit statistics	
Observations	2,851,928
BIC	3,530,298.6

Clustered (Republic of birth) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05, .: 0.1*

A3.3. Individual-Level Coefficient Estimates

Tables A3.8 and A3.9 report individual-level coefficient estimates, regressing petition (Models 1 and 2) and denial/removal (3 and 4) on the severity of repression and other predictors in Equation 2. Table A3.8 reports

estimates for "repression at home" and Table A3.9 "repression at work." The outcomes are log-transformed for columns 1 and 3 ($g(\cdot)$ is identity link), and binary in the Binomial models in columns 2 and 4 ($g(\cdot)$ is logit link). The predicted probabilities in Figures 4 and 5 in the main text are based on Models 2 and 4.

Outcome	Petition		Denied/Removed	
Model	1. Linear	2. Binomial	3. Linear	4. Binomial
Estimate	0.01	0.21	-0.08	-0.6
Std. error	(0.004)**	(0.07)**	(0.02)**	(0.15)**
Rayon FE	✓	✓	✓	✓
Zoning FE	✓	✓	✓	✓
Ethnicity FE	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓
Adj. R^2	0.03		0.17	
Pseudo R^2		0.06		0.19
RMSE	0.19	0.28	0.3	0.44
AIC	-4627.3	5679.2	564.2	1094.4
N	10121	9699	868	824

Treatment is number of residents from same street address executed (logged). Robust standard errors in parentheses, clustered by rayon. Model specification in Equation 2. Significance levels (two-tailed): $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Table A3.8: **Severity of repression vs. neighbors and memorialization**, individual-level.

Outcome	Petition		Denied/Removed	
Model	1. Linear	2. Binomial	3. Linear	4. Binomial
Estimate	0.03	0.49	-0.02	-0.2
Std. error	(0.003)**	(0.03)**	(0.01)*	(0.07)**
Rayon FE	✓	✓	✓	✓
Zoning FE	✓	✓	✓	✓
Ethnicity FE	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓
Adj. R^2	0.06		0.14	
Pseudo R^2		0.12		0.19
RMSE	0.18	0.27	0.29	0.44
AIC	-4215	4037.4	453.2	822.6
N	7849	7448	636	594

Treatment is number of repression with same employer as victim (logged). See note under Table A3.8 for details.

Table A3.9: **Severity of repression vs. co-workers and memorialization**, individual-level.

A3.4. More Obstacles to Memorialization

The main text examined how several individual and block-level attributes — including victim's identity, political affiliation, social status, and local political opportunity structures — might moderate the relationship between the severity of repression and memorialization. We now present results for alternative measures of these attributes.

First, we consider whether patters for foreign-born victims are similar to those for non-Russian victims. We

expanded individual-level model (2) with interaction term $\log(\text{Repression}_j) \times \text{Foreign-born}_j$, where Foreign-born_j is equal to 1 if j was born outside the original 1922 borders of the USSR, and 0 otherwise. Figure A3.8 reports predicted probabilities for native-born (solid) and foreign-born victims (dashed). The probability of a petition is significantly lower for the latter group, hovering around 0.04, irrespective of the severity of repression. By contrast, native-born victims' probability of petition rises from 0.06 (solitary) to 0.18 (maximum). The probability of denial or removal is consistently higher for foreign-born victims, but the difference is not statistically significant.

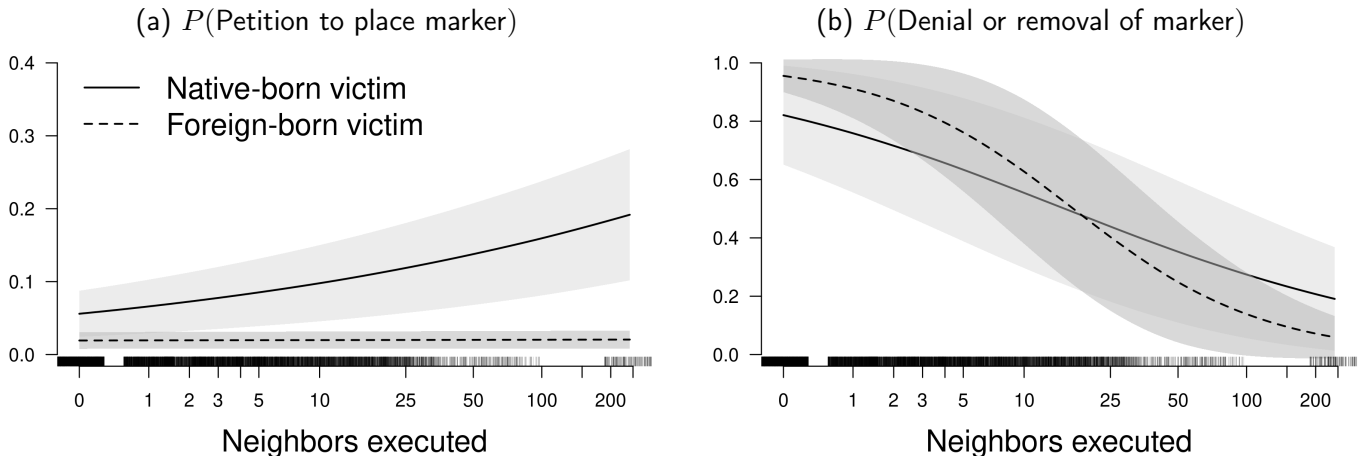


Figure A3.8: **Foreign-born victims' probability of memorialization**. Solid and dashed lines represent point estimates for victims born inside and outside of the USSR's 1922 borders; grey regions are bootstrapped 95% confidence intervals from 1000 simulations.

Second, we consider alternative measures of political affiliation with the Soviet regime. Figure A3.9 reports simulation results from another individual-level interactive model, examining rank-and-file party membership. Formally, the interaction term is $\log(\text{Repression}_j) \times \text{Party}_j$, where Party_j is equal to 1 if j was a VKP(b) member at the time of arrest, and 0 otherwise. Party members' probability of petition is generally lower and less responsive to the local severity of repression, rising from 0.06 (solitary victims) to 0.09 (maximum), compared to 0.04 to 0.25 for non-members. The predicted probability of denial or removal for VKP(b) members is also less sensitive to repression severity — ranging from 0.81 to 0.29, compared to 0.87 to 0.05 for non-members.

We can further expand this analysis to include not only VKP(b) members (43% of victims), but also candidates (0.9%) and youth wing affiliates (0.3%). The results, in Figure A3.10, are nearly identical to Figure A3.9.

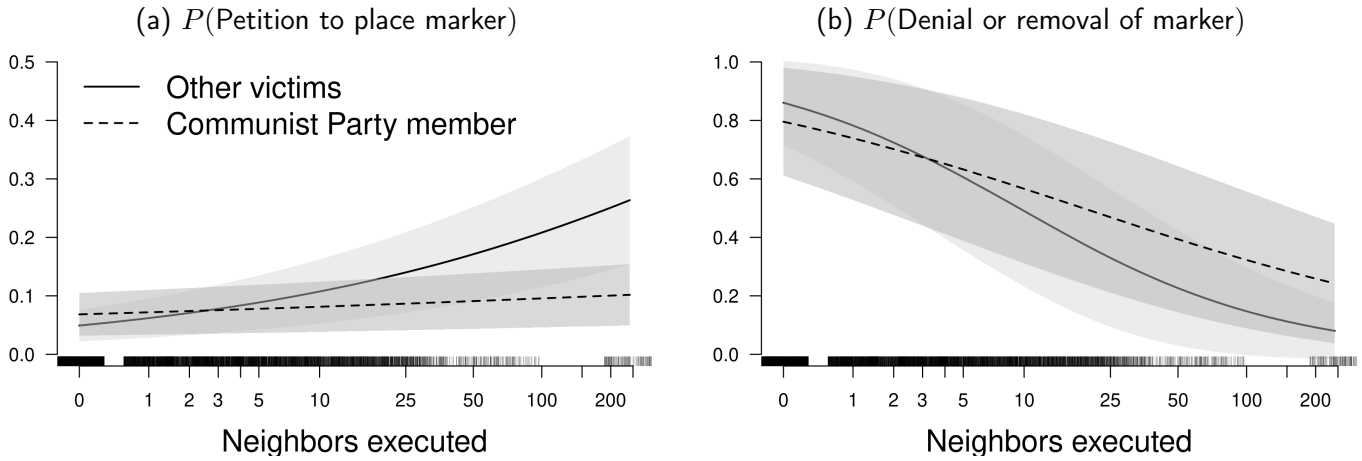


Figure A3.9: **Party membership and memorialization**. See note under Figure A3.8 for details.

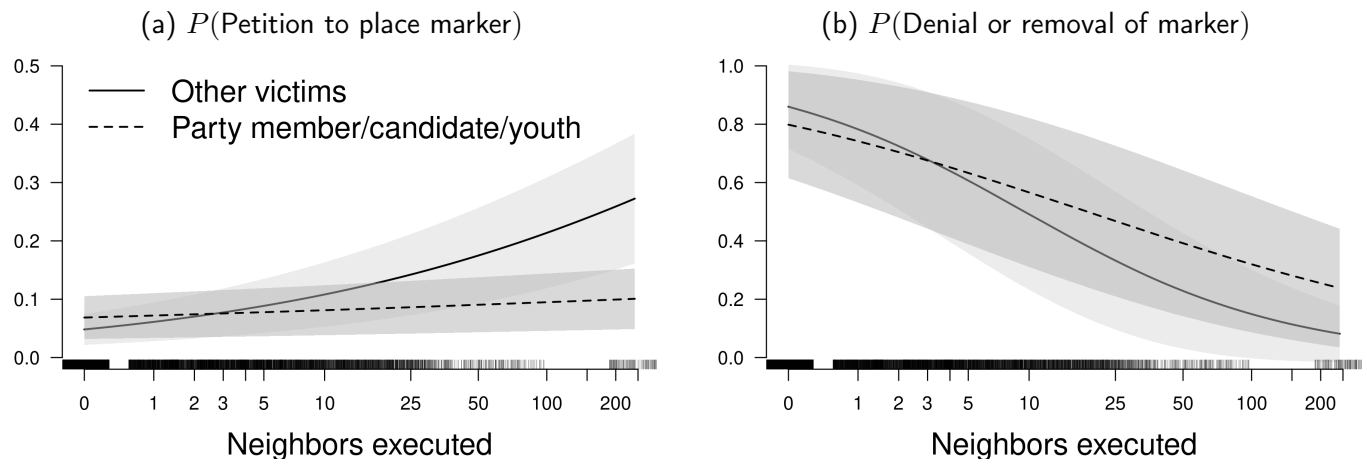


Figure A3.10: **Party membership (expanded) and memorialization**. See note under Figure A3.8 for details.

Figure A3.11 repeats this analysis for NKVD officers.[6] The patterns here are similar to those for the *nomenklatura*. Where they were the sole victims, purged NKVD personnel (dashed) were *more* likely to receive a petition than civilians (solid) (0.12 vs. 0.06), and *less* likely to have plaques denied or removed (0.16 vs. 0.86). These relationships flip as the local severity of repression rises. With 10 repressed neighbors, the predicted probabilities of petition are 0.05 (NKVD) vs. 0.09 (non-NKVD); and probabilities of denial or removal are 0.99 vs. 0.51.

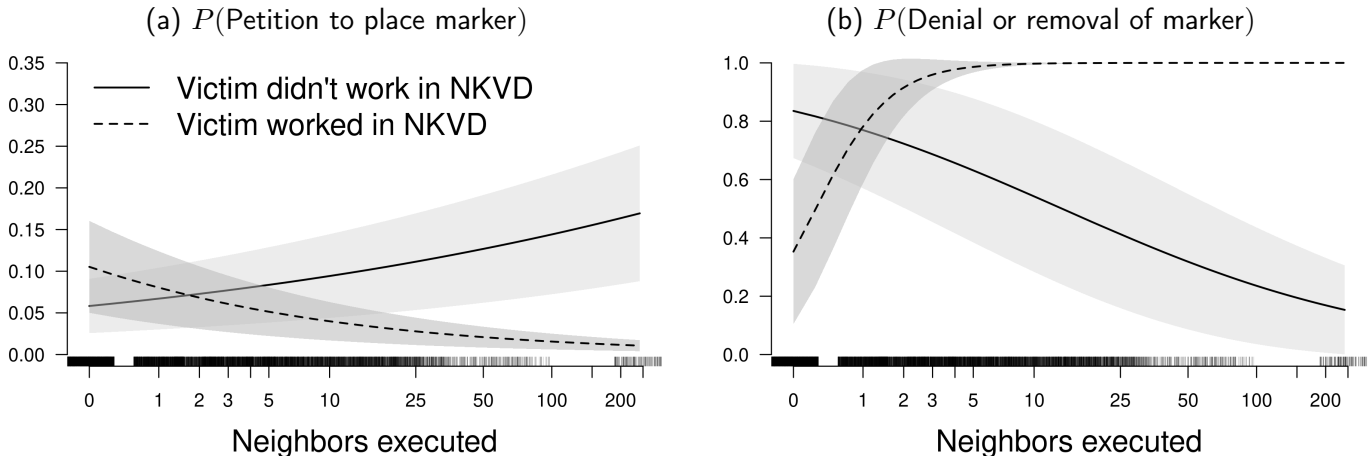


Figure A3.11: **Purged NKVD officers and memorialization**. See note under Figure A3.8 for details.

Third, we consider an alternative measure of social status: whether one belonged to the Soviet professional-managerial class prior to repression. This category includes people with technical expertise and administrative responsibility, who adapted to the Soviet system and achieved a privileged socio-economic position. Professional-managerial positions existed across several organizational layers, including upper management (factory directors, institutional managers), middle management (department heads, workshop managers, section chiefs), and technical specialists (senior engineers, skilled supervisors). These positions required specialized education or technical training, and provided material benefits, like above-average salaries, better housing assignments, and access to special stores and services. Figure A3.12 reports simulation results from these analyses, which align with those for education in Figure 8: the differences appear to be in the expected direction, but are statistically insignificant.

[6] We identified purged NKVD officers by linking our data to Memorial's archive of service histories for NKVD officers (Rachinskiy, 2017), using officers' full names and service locations at the time of the purges (Moscow, Leningrad).

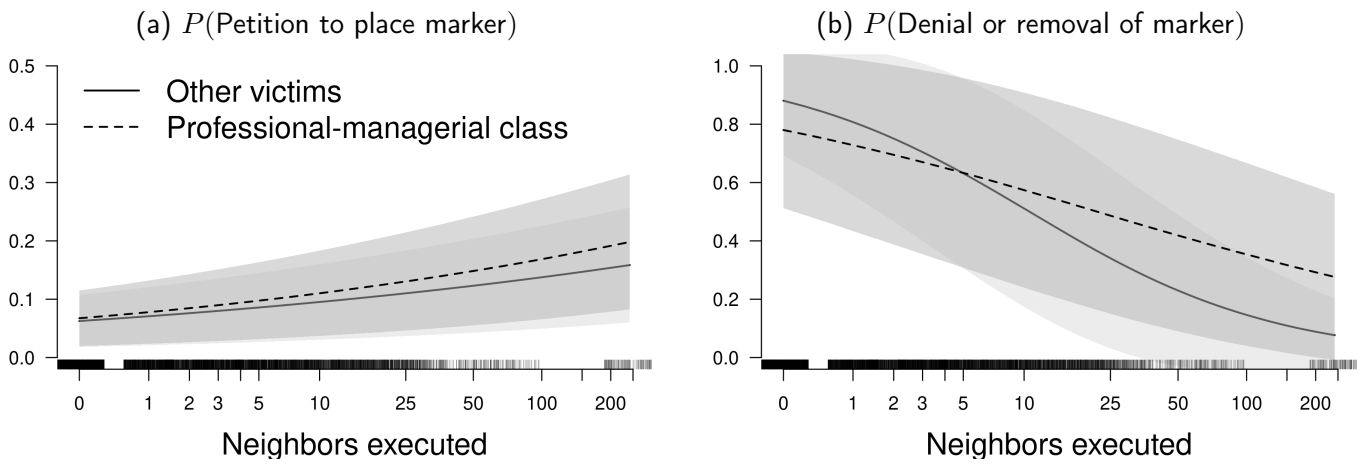


Figure A3.12: **Soviet professional-managerial class and memorialization**. See note under Figure A3.8.

Fourth, we expanded our definition of state security presence to include judicial and defense-related entities. The simulation results, in Figure A3.13, align with to those in Figure 9 in the main text, which includes only public safety and order institutions like the FSB and law enforcement.

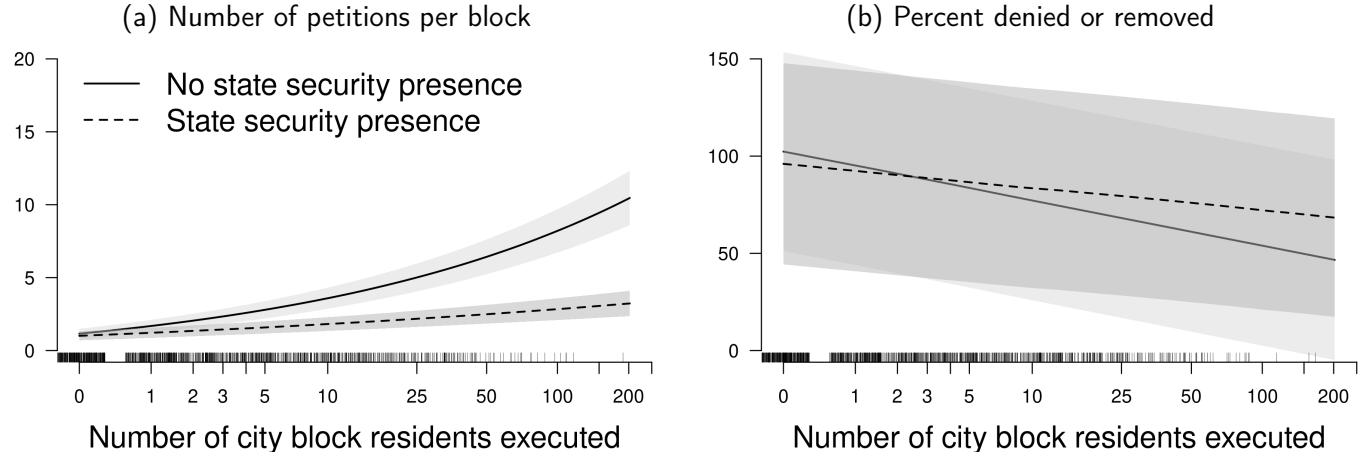


Figure A3.13: **State security presence (expanded) and memorialization**. Block-level estimation.

Fifth, we investigated an additional obstacle to memorialization: the coordination costs associated with securing petition approval. Russian Housing Code gives building owners ultimate approval authority, but the process varies by zoning. In primarily residential buildings, consent from all tenant-owners is required to install markers, increasing the administrative and legal costs of each petition. In non-residential buildings, there are generally fewer owners and veto players, but costs may be higher in buildings owned by larger corporate entities — where multi-level approval by regional management, legal departments and boards of directors may delay the process. Commercial tenants also play a role, if lease agreements include provisions on changes to exteriors.

We used Bureau van Dijk's Orbis database to measure (a) whether a city block hosts primarily residential property, and (b) whether the average enterprises on the block are independently-owned or subsidiaries of larger corporate entities.[7] We expect the suppression-to-recognition ratio to be higher — and the severity effect to be weaker — on residential city blocks and blocks with larger corporate owners. Figures A3.14 and A3.15 report simulation results from block-level models interacting these variables with repression. As expected, the severity effect for petitions is weaker in residential buildings (Figure A3.14a). No other interactions are significant.

[7]The residential category includes some mixed-use buildings, as long as the local businesses are in the service (e.g. retail) or informational sector. 35% of the historical Moscow city blocks in our sample fall in this category. We define "independently owned" as an enterprise that is not part of a corporation with other co-owned businesses. 50% of Moscow city blocks fall into this category.

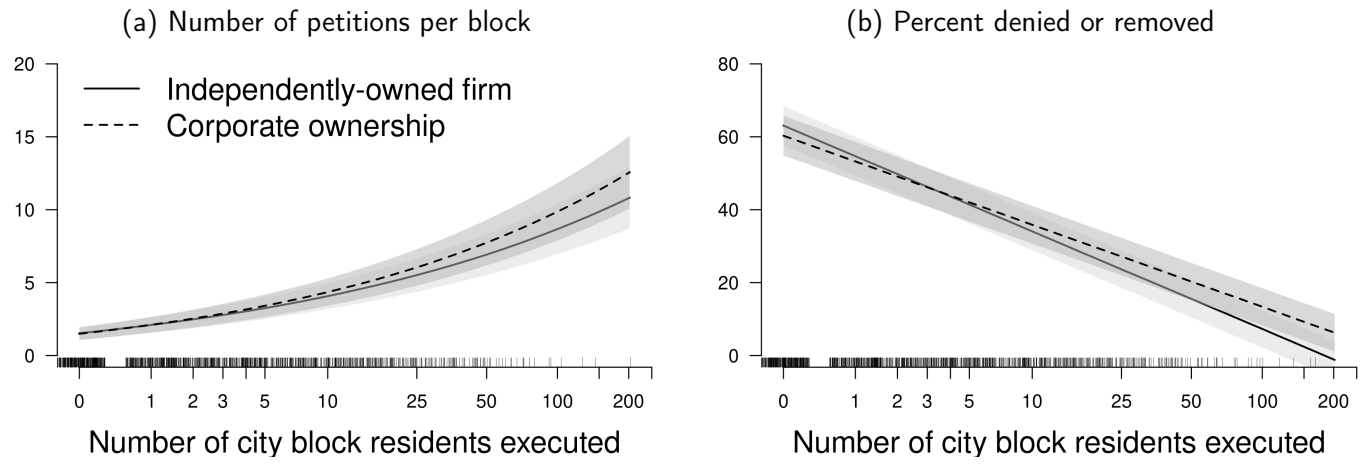


Figure A3.14: **Residential blocks and memorialization**. Lines represent point estimates for city blocks that are currently residential (dashed) or non-residential (solid); grey regions are bootstrapped 95% confidence intervals.

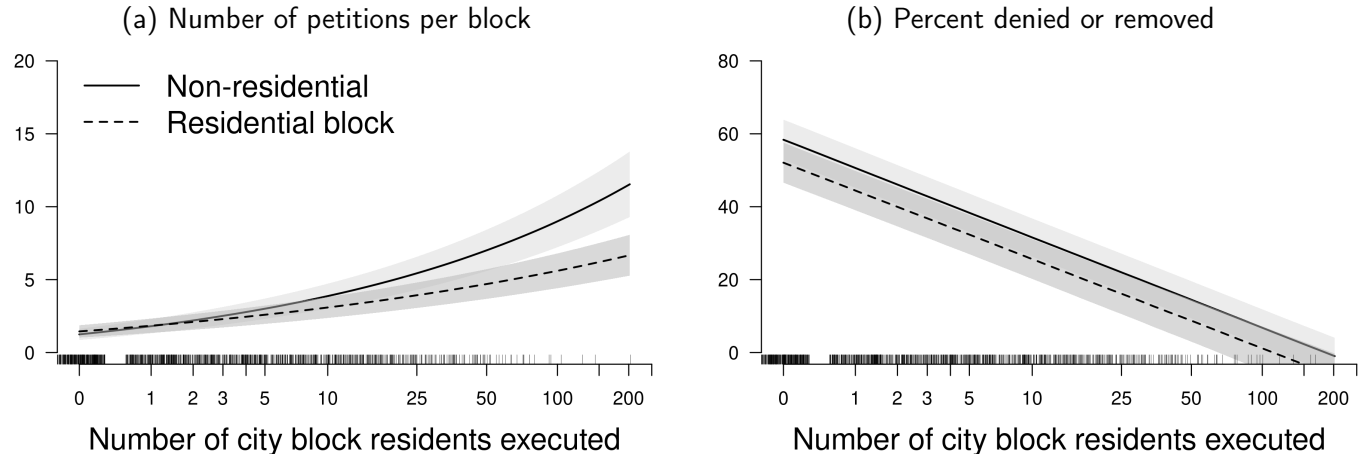


Figure A3.15: **Commercially-owned buildings and memorialization**. See note under Figure A3.14.

A4. External Validation Data and Test: Saint Petersburg

To replicate our analyses in a second Soviet city, we collected block-level and individual data on the Great Terror and *Last Address* memorials in Saint Petersburg.

A4.1. Data Sources

Table A4.10 summarizes differences between the data sources we used for the two cities. Notably, we used a different historical map to construct the block-level data (Figure A4.16), and a different Memorial database to construct the sample of repression victims. Because we could not locate an NKVD map for Leningrad, we used a map of similar scale (1:25,000) from municipal authorities (Russ, 1935). Given the lack of curated Memorial data for Saint Petersburg on rehabilitated repression victims (like *Victims of State Terror in Moscow*) or NKVD infrastructure (like *Topography of Terror*), we used Memorial's much larger *Victims of Political Terror in the USSR* database (lists.memo.ru) to extract repression victims whose residential locations were (a) recoverable with street-address level geoprecision, and (b) within the borders of 1936 Leningrad. We followed the same geoprocessing procedures as those we used for Moscow (e.g. georeferencing, vectorization, dasymetric mapping), and used the same ancillary data sources for key covariates (e.g. 1939 Soviet census, Orbis).

Figure A4.16: **Scan of map from** Russ (1935).

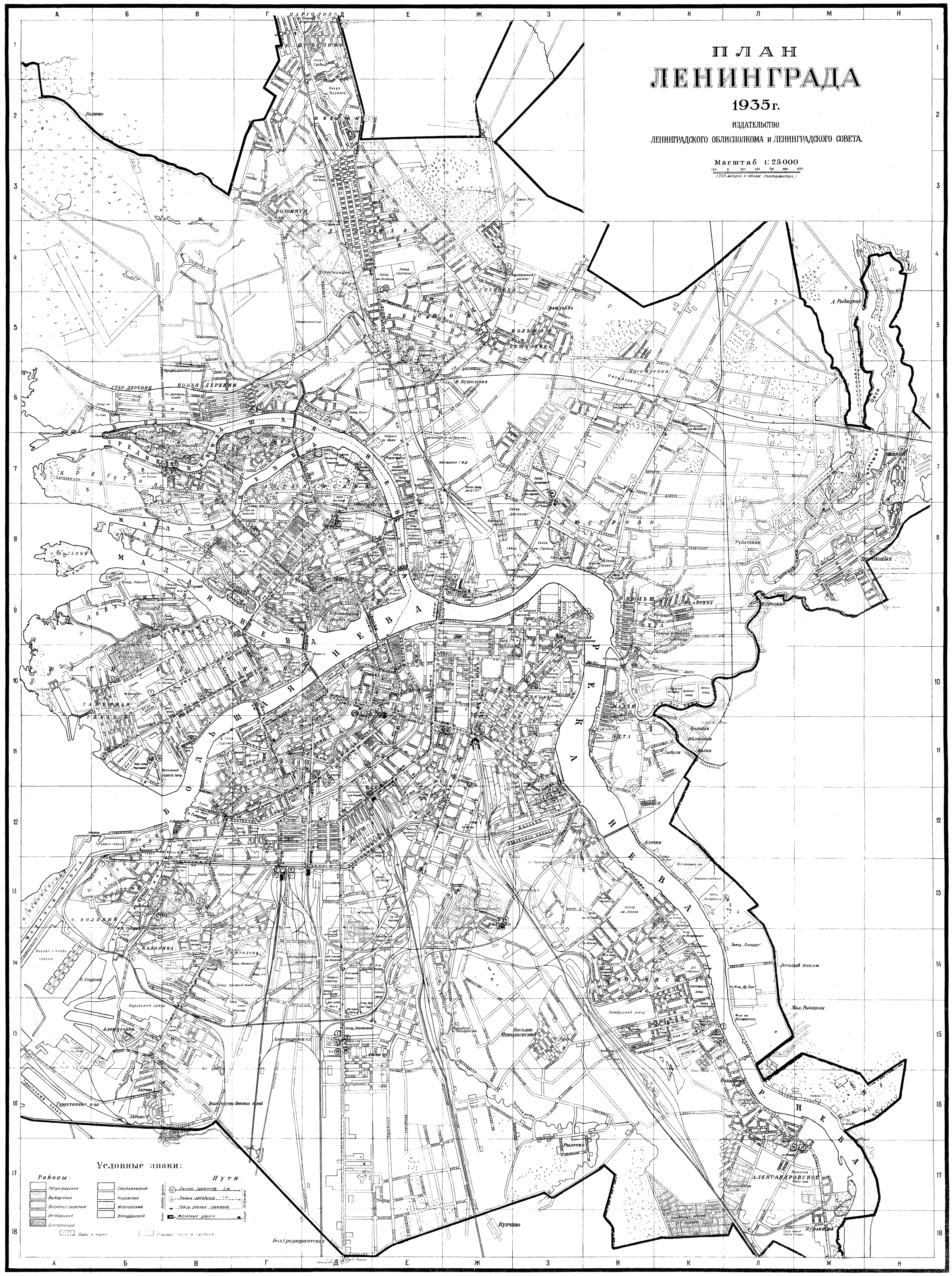
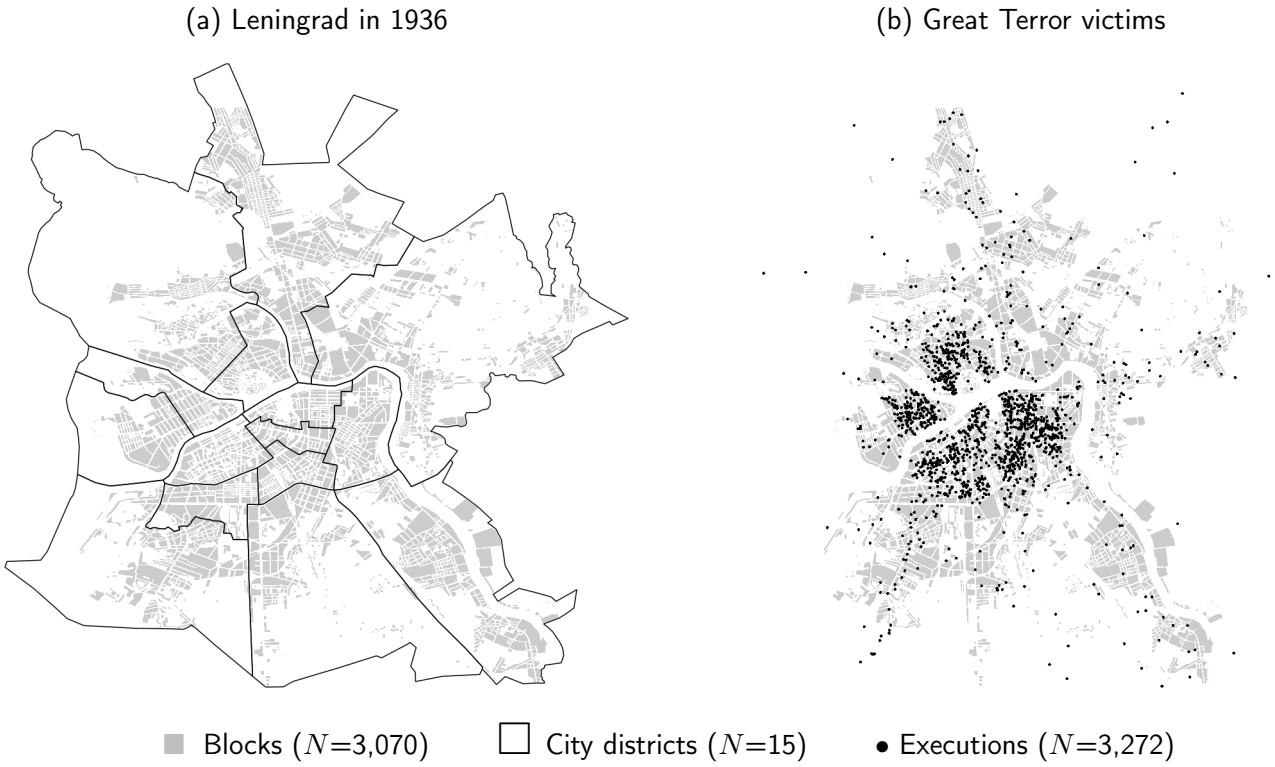


Table A4.10: **Summary of data sources**. Sample sizes reflect individuals and plaques whose locations (a) we could geocode to specific street addresses, and (b) are within the boundaries of 1938 Moscow, 1936 Leningrad.

	Moscow	**Saint Petersburg**
City blocks	Map: NKVD (Krasil'nikov, 1938) Supplement: *Topography of Terror* (Memorial) N: 5,400 blocks (3,305 residential)	Map: Leningrad Soviet (Russ, 1935) Supplement: N/A N: 3,070 blocks (2,689 residential)
Repression	List: *Victims of State Terror in Moscow* N: 10,122 executed, rehabilitated victims	List: *Victims of Political Terror in the USSR* N: 3,272 executed, rehabilitated victims
Memorials	List: *Last Address* N: 868 petitions Soviet-era memorials: Kukina (2018) N: 1221 plaques	List: *Last Address* N: 686 petitions Soviet-era memorials: N/A

Figure A4.17: **Spatial distribution of Saint Petersburg data**. Each polygon in (a) represents a city block. Each point in (b) represents the last known address of a citizen executed by NKVD.



A4.2. Replication of Moscow Analyses

We re-estimated all statistical tests reported in the main text, with four exceptions. First, because Krasil'nikov (1938) and *Topography of Terror* were critical sources for intra-troika distance, and are unavailable here, we omit this covariate from our Saint Petersburg analyses. Second, we lack sufficiently-detailed employment data to analyze the impact of repression against co-workers in Saint Petersburg. Third, we lack sufficient data on party and NKVD membership in Saint Petersburg to re-estimate the interactive analyses with victims' political affiliation. Fourth, we have no data (and no results to report) on Soviet-era building plaques in Saint Petersburg.

In the following, Figure A4.17 corresponds to Figure 3, Table A4.11 corresponds to Table 1, Figure A4.18 corresponds to Figure 4, and Figures A4.19, A4.20 and A4.21 correspond to Figures 6, 8 and 9.

Outcome	Petitions	Denied/Removed (%)	
Model	1. Linear	2. Linear	3. Binomial
Estimate	0.42	-17.01	-0.83
Std. error	(0.04)**	(2.9)**	(0.17)**
Rayon FE	✓	✓	✓
Zoning FE	✓	✓	✓
Adj. R^2	0.59	0.17	
Pseudo R^2			0.31
RMSE	13.1	1837.03	0.37
N	5378	1352	1352

Estimates from Linear and Binomial fixed effect regression models. Treatment is number of city block residents executed (logged). Outcome is log-transformed in Linear model, rescaled as proportion between 0 and 1 in Binomial model. Robust standard errors in parentheses, clustered by rayon. All models include spatial spline and block-level covariates. Observations (blocks) weighted by population size. Significance levels (two-tailed): $^{\dagger}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Table A4.11: **Severity of repression and memorialization** (Saint Petersburg).

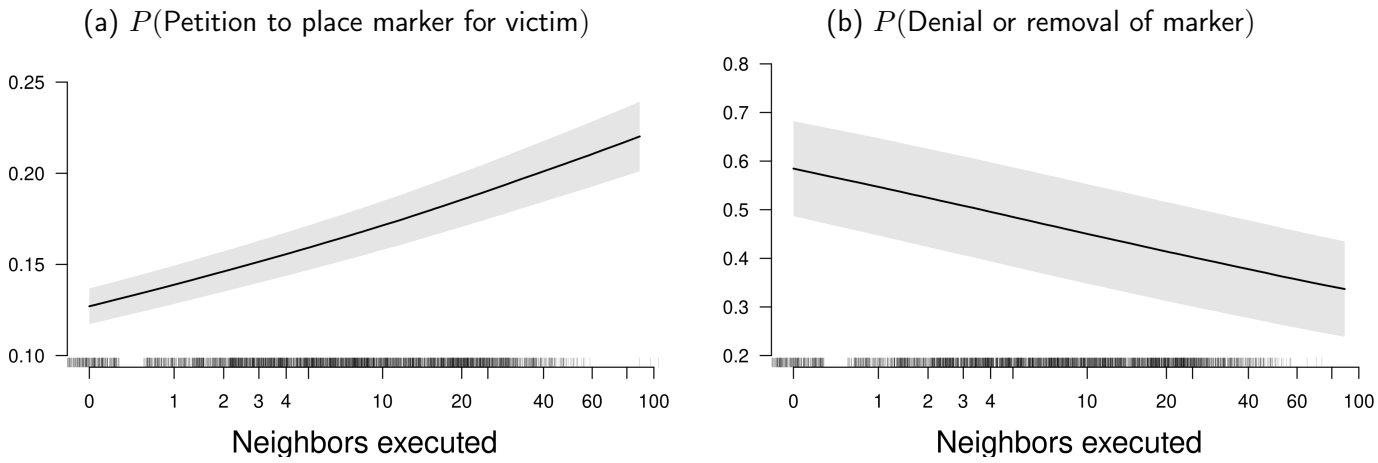


Figure A4.18: **Repression at home and victim's memorialization** (Saint Petersburg). Black lines are predicted probabilities from individual-level model in Equation 2. Grey regions are bootstrapped 95% confidence intervals.

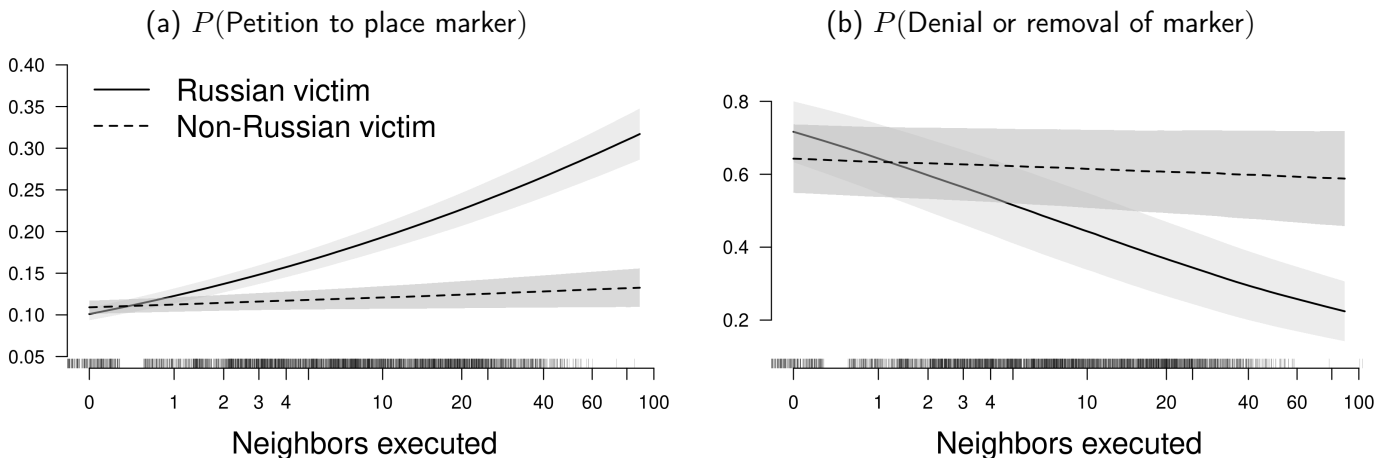


Figure A4.19: **Ethnicity and probability of memorialization** (Saint Petersburg). See note under Figure 6.

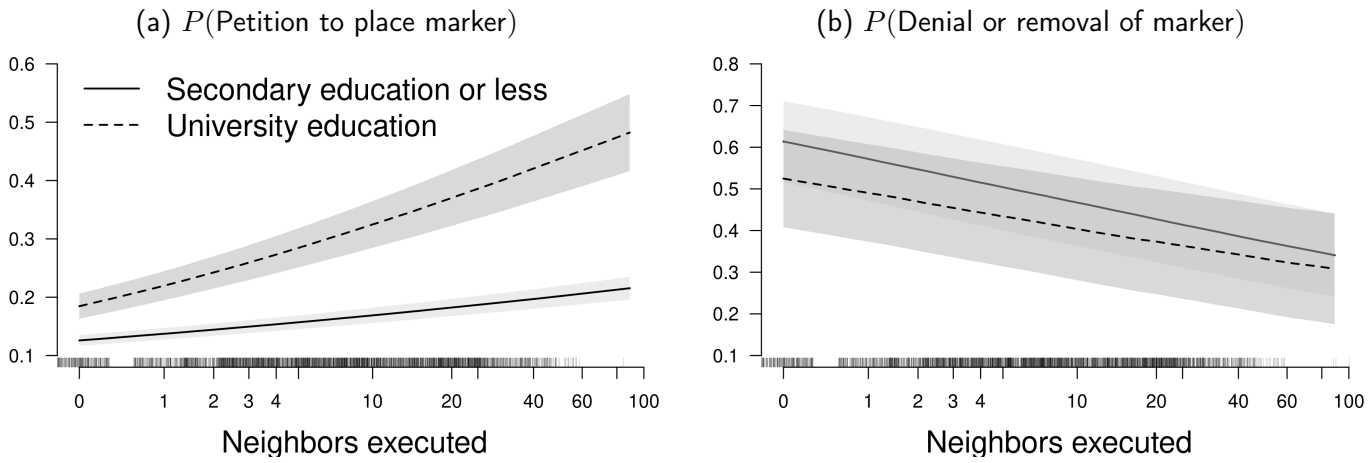


Figure A4.20: **Education and probability of memorialization** (Saint Petersburg). See note under Figure 8.

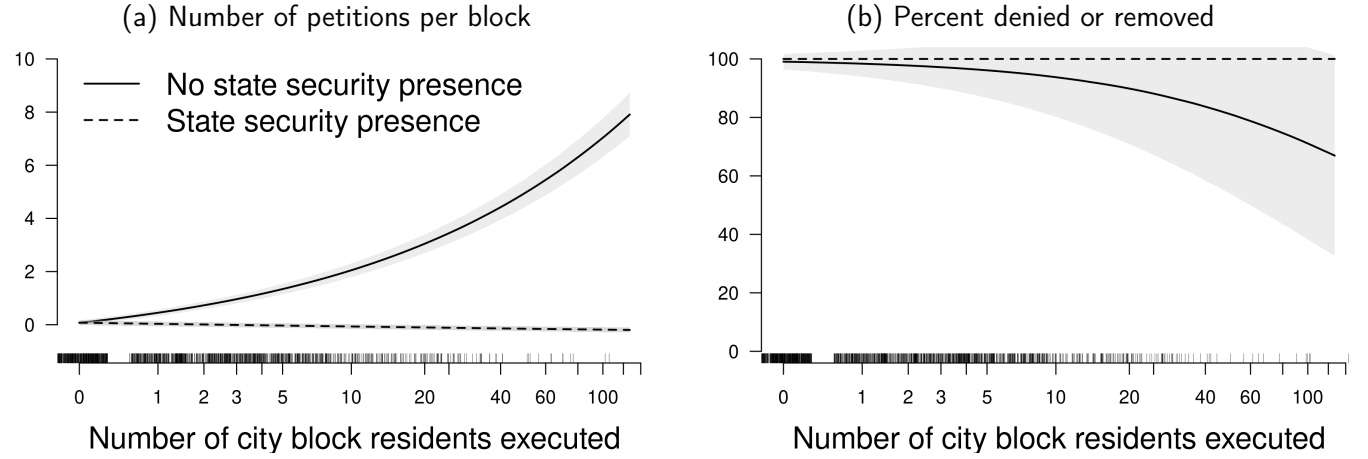


Figure A4.21: **State security presence and memorialization** (Saint Petersburg). See note under Figure 9.

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