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Quantifying the Disaggregated Impact of Atrocities on Socioeconomic Activity

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Our understanding of cruelty's impact on global human security and socioeconomic outcomes is still limited, especially with regard to how these effects unfold at the local, as opposed to the country, level. In this study, I first review literature on the impact of conflict, and violence against civilians specifically, on economic and political development globally, explicating potential adverse impacts, and highlighting the possibility of such violence increasing resilience in the long term. I then identify and discuss pathways linking political violence with lower socioeconomic activity locally. I hypothesize that violence disturbs socioeconomic activity in multiple ways, including by hurting businesses and laborers, scaring away tourists, and decreasing local investment, while additionally arguing that if no new atrocities happen, any impacts generated by these pathways will be relatively short term. Empirically, to operationalize local socioeconomic activity, I rely on nighttime light emissions; to operationalize atrocities, I rely on data from the Worldwide Atrocity Dataset, which measures all events that resulted with at least five civilian deaths by location. To test my expectations, I estimate both ordinary least squares and generalized methods of moments (GMM) models on a grid—(0.5 × 0.5-degree resolution) year level sample for the years 1997–2013. I find that, on average, an additional atrocity event corresponds to a decrease of 3–10 percent in local development levels the following year, compared with the baseline, but that such impacts disappear by the fourth year after the incident. Building on these findings, I discuss in detail research and policy implications.

Notre compréhension de l'impact de la cruauté sur la sécurité humaine et les résultats socio-économiques à l'échelle mondiale est encore limitée, en particulier en ce qui concerne la manière dont ces effets se manifestent au niveau local, par opposition au niveau national. Dans cette étude, je commence par examiner la littérature sur l'impact des conflits, plus précisément de la violence contre les civils, sur le développement économique et politique à l'échelle mondiale. J'explique les impacts négatifs potentiels tout en soulignant la possibilité que cette violence augmente la résilience à long terme. J'identifie et aborde ensuite les voies qui associent la violence politique à une activité socio-économique plus faible au niveau local. J'émets l'hypothèse que la violence perturbe l'activité socio-économique de plusieurs manières, notamment en nuisant aux entreprises et aux travailleurs, en faisant fuir les touristes et en réduisant les investissements locaux. Je soutiens également que si aucune nouvelle atrocité n'est commise, tout impact généré par ces voies sera relativement à court terme. Sur le plan empirique, pour opérationnaliser l'activité socio-économique, je me suis appuyé sur les émissions d'éclairage nocturne, et pour opérationnaliser les atrocités, je me suis basé sur des données issues du Worldwide Atrocity Dataset (jeu de données sur les atrocités dans le monde), qui mesure tous les événements qui ont entraîné au moins cinq décès civils par lieu. Pour mettre mes hypothèses à l'épreuve, je me suis livré à une estimation à la fois par modèles à moindres carrés ordinaires et modèles à méthodes des moments généralisées (GMM) sur une grille (d'une résolution de 0,5 degré × 0,5 degré) d'échantillons annuels pour la période 1997–2013. J'ai constaté qu'en moyenne, un événement d'atrocité supplémentaire correspondait à une diminution de 3 à 10 percent des niveaux de développement locaux l'année suivante par rapport à la référence, mais que de tels impacts disparaissaient la quatrième année après l'incident. Je me base sur ces conclusions pour aborder en détails les implications en termes de recherches et de politiques.

Nuestra comprensión del impacto de la crueldad en los resultados socioeconómicos y de seguridad humana a nivel mundial sigue siendo limitada, particularmente respecto de la forma en que estos efectos se desarrollan a nivel local a diferencia de a nivel país. En este estudio, primero reviso la literatura sobre el impacto del conflicto y la violencia contra civiles, en particular, sobre el desarrollo económico y político a nivel global, y explico los posibles impactos adversos. Además, destaco la posibilidad de que dicha violencia aumente la resiliencia a largo plazo. Luego, identifico y analizo los caminos que vinculan la violencia política con una actividad socioeconómica más baja a nivel local. Hago una hipótesis de que la violencia perturba la actividad socioeconómica de diversas formas, lo que incluye daños a negocios y trabajadores, el alejamiento de turistas y una reducción de la inversión local. Asimismo, argumento que si no ocurren atrocidades nuevas, cualquier impacto que se genere a raíz de estos caminos podría tener una duración relativamente a corto plazo. Empíricamente, para operacionalizar la actividad socioeconómica local, dependo de las emisiones de luz en el período nocturno; para operacionalizar las atrocidades, dependo de datos del Worldwide Atrocities Dataset (Base de datos de atrocidades a nivel mundial), que mide todos los eventos que provocaron al menos cinco muertes civiles por ubicación. Para poner a prueba mis expectativas, estimo tanto mínimos cuadrados ordinarios como modelos de métodos generalizados de momentos (GMM, por sus siglas en inglés) en una muestra anual en cuadrícula (resolución de 0,5 × 0,5 grados) para los años comprendidos entre 1997 y 2013. Descubrí que, en promedio, un evento de atrocidad adicional corresponde a una disminución de entre un 3 percent y un 10 percent en los niveles de desarrollo local para el próximo año, en comparación con la línea base, pero que tales impactos desaparecen el cuarto año después del incidente. Me baso en estos hallazgos para analizar en detalle las consecuencias políticas y de investigación.

On Friday, November 13, 2015, a group of armed assailants conducted several coordinated attacks against civilians in the French capital and its surroundings, killing 130 and injuring 416 people. These attacks exacted major physical and psychological effects on their victims. They also had economic and social impacts. The immediate calculated costs of the attack to the French economy were about two billion Euros, the result of declined economic and tourist activity

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(Karaian 2015). The French experience was not unique. For instance, after India had suffered a similar series of coordinated mass attacks against civilians in November 2008, foreign investors withdrew 13.5 billion dollars from the capital market, contributing to the 56 percent fall in the main Bombay Stock Exchange index and contributing to the fact that the country experiences its slowest economic growth since 2004 (Wood, Webb, and Robinson 2008).

These examples are illustrative of a broader linkage between cruelty, and specifically atrocities—intentional attacks against unarmed civilians resulting in several or numerous deaths—global human security, and socioeconomic downturn. By "socioeconomic," I mean both economic activity—shopping and business activities, growth in local income and GDP, poverty, etc.—and related social factors such as the availability of labor, access to services, and the ability and willingness of individuals to partake in leisurely activities. Because research often focuses on explaining political violence and identifying its causes, our understanding of atrocities as determinants of socioeconomic phenomena, and decline in particular, is still limited.

This study addresses this important issue using geographically disaggregated data on atrocities and socioeconomic activity. It surveys a large body of research on the economic and other impacts of political violence, positing that atrocities, whether perpetrated as single events or as part of an ongoing conflict, cause short-term declines in local socioeconomic activity. Here, I discuss different ways atrocities can disturb socioeconomic activity, for instance by causing physical damage to buildings and infrastructure and hurting workers, the victims of these attacks (e.g., Fielding 2003; Eckstein and Tsiddon 2004; Hodler 2019), increasing their risk of experiencing poverty (Schimmel 2010) and hurting their mental health and ability to work (Koos 2018; Meiches 2021), in addition to reducing the number of tourists who frequent affected locations (e.g., Enders and Sandler 1991; Sandler and Enders 2008) and the level of foreign and domestic investment flows to these locations (e.g., Enders and Sandler 1996; Ito and Lee 2005). I also discuss research that suggests that, over the long term, exposure to violence can facilitate greater social cohesion and improved social and economic activity (e.g., Bellows and Miguel 2009; Bauer et al. 2016; Schaub 2017; Koos 2018).

Having surveyed relevant literature and its implications for my local-level-focused study, I then identify and discuss pathways linking political violence with lower socioeconomic activity locally, providing evidence from specific countries and locations in support of each one. First, I hypothesize that cruelty and atrocities directly disturb, and can even eliminate, socioeconomic activity in a given location: attacks by rebels, militiamen, terrorists, or soldiers kill people and destroy commercial buildings, restaurant and cafés, leaving these businesses out of commission at least until the damage is repaired while adversely affecting workers and the possibility of hiring labor. Second, I hypothesize that atrocities will hurt tourism and reduce associated revenues, causing local "reputational" costs and making both international and domestic tourists less likely to visit these locations to avoid potential future violence. Finally, I argue that a higher incidence of atrocities can reduce foreign and domestic investment by "scaring away" potential investors, who may prefer to direct their money elsewhere.

To operationalize local-level economic output, development, and social activity, a set of related geographically and temporally disaggregated phenomena that—as mentioned above (and defined in the next section)—I refer to in encompassing terms as "socioeconomic activity" throughout this study, I rely on nighttime light (NTL) emissions, which—as past research has shown—are highly correlated with local level economic activity and capacity (e.g., Henderson, Storeygard, and Weil 2012; Weidmann and Schutte 2017; Koren and Sarbahi 2018). To measure atrocities, I rely on data from the Worldwide Atrocity Dataset (WAD) by the Presidential Instability Task Force (PITF). The WAD uses reports by media sources and NGOs to measure all events that resulted with at least five civilian deaths by location (Schrodt and Ulfelder 2016) and is considered one of the best in existence. Considering its focus on severe and observable atrocities against civilians, specifically, and its global coverage, the WAD is especially useful for testing the impact of such attacks on economic and social activity. Importantly, both indicators are available at the geographically disaggregated grid-cell (0.5 × 0.5-degree resolution) year level.

To evaluate any impacts empirically, I estimate both a set of ordinary least squares (OLS) and a set of generalized methods of moments (GMM) models, which account for potential endogeneity between the dependent and independent variables, over the 1997–2013 period, controlling for key socioeconomic and political confounders. The results of this analysis—to the author's knowledge, the first global one to evaluate the effect of atrocities on socioeconomic activity at the local level—provide strong support for the hypothesized impacts of atrocities on socioeconomic outcomes. I find that, on average, an additional atrocity event corresponds to a decrease of ~3–10 percent in local socioeconomic activity levels over the following 2 years, compared with the baseline. The local effects of atrocities on socioeconomic activity, in other words, are significant enough to be observed from space.

Luckily, my analyses also suggest that these effects tend to be relatively short-lived—by year 3 (OLS models) or 4 (GMM models), a history of atrocities does not have noticeable impact on local economic activity. As past research suggests, one explanation for this is the fact that a shared experience of violence fosters within-group cooperation, allowing individuals to overcome the adverse impacts of violence (Bellows and Miguel 2009; Bauer et al. 2016; Schaub 2017; Koos 2018). Building on these findings, I conclude with a detailed discussion of the research and policy implications. For research, my results not only show and quantify the effects of political violence on socioeconomic performance, which helps to substantiate past research on these issues (e.g., Fielding 2003; Eckstein and Tsiddon 2004; Greenbaum and Tita 2004; Sandler and Enders 2008; Robles, Calderón, and Magaloni 2013; Hodler 2019), but also illustrate the importance of theorizing and studying such relationships at the *local* level, delineating new directions of inquiry. For policymakers, the results suggest several ways that could help in mitigating and effectively addressing the local socioeconomic impacts of atrocities.

The Impact of Atrocities on Socioeconomic Activity: Theories and Pathways

Theoretical Motivation

Research on the relationship between political violence and socioeconomic conditions often focuses on how the latter affects the former. While a more thorough discussion of this research is reported in the online appendix, more relevant to the present study is the body of research that links armed conflict to adverse socioeconomic outcomes. Poverty, economic development (including reduced access to

services and other resources), and public health may be impacted by the experience of civil war. Shopping and business activities are harmed; local income and GDP growth are stunted; investment flows, exports, and economic complexity are reduced; and labor supply dwindles as violence destroys the ability to generate economic activity (Greenbaum and Tita 2004; Barros, Caporale, and Gil-Alana 2006; Ríos 2016). Food production can also be adversely affected, leading to higher rates of child malnutrition (Sanchez-Perez et al. 2007) and lower outputs (Bozzoli and Bruck 2009). Socially, individuals may avoid visiting and working in affected areas, while service provision and education in these locations is reduced. These outcomes are all treated here inclusively as declines in socioeconomic activity.

It is important to emphasize that recent research suggests civil war can ultimately lead to socioeconomic improvement. For instance, Bauer et al. (2016) argue that war can foster greater social and institutional cohesions, resulting in improved welfare for individuals. Similarly, Bellows and Miguel (2009) find that individuals who had a greater exposure to conflict are more likely to attend community meetings and more likely to join local political and community groups, a finding echoed by research on interethnic relations (e.g., Schaub 2017). These studies suggest that—at least over the long term—conflict exposure is not an impediment of improved socioeconomic outcomes, which has implications to this study, as discussed below.

Regardless of the useful insights provided by these different strains of research, however, their specific focus on civil war provides a limited evaluation of the effects of political violence, broadly, and violence against civilians particularly, on socioeconomic outcomes. This is especially true for types of violence that—while they may occur more frequently during civil war—are also often perpetrated in non- or low-intensity conflict settings. Indeed, several forms of political violence other than civil war may impact political and socioeconomic outcomes, including mass killing and genocide, political killings, torture, and sexual violence (Valentino 2014). While each of these may be used as a wartime tool—such as mass killing being perpetrated as a "war by other means" (Valentino 2004)—they are nevertheless distinct forms of political violence and can have distinct impacts on social and economic development.

For instance, Cook (2014) studies the impact of white ethnic and political violence by looking at the number of patents issued to African Americans over the 1870–1940 period. The findings suggest not only that the number of patents—a socioeconomic development indicator—respond negatively to rises in violence, but also that the effect is quite staggering: violent acts by whites account for more than 1,100 missing patents compared to 726 actual patents among African-American inventors during this seven-decade period. Other studies find that such "peacetime violence" is associated with a host of adverse socioeconomic outcomes, linking—among others—higher rates of police killings to lower rates of high school completion among African-American and Hispanic students (Ang 2021); domestic violence to a reduction of about 16–23 million Great British Pound (GPB) in UK's GDP (Walby 2009); and violence by gangs and cartels to lower rates of economic output and electricity use (Greenbaum and Tita 2004; Robles et al. 2013).

Focusing on extreme forms of political (that is, not criminal) violence, scholars also find that mass killing and genocide—specific campaigns composed of numerous deadly incidents of intentional killings of civilians (Valentino 2004)—substantially hurt economic development and constrain growth. For instance, Anderson (2014) argues that mass killing produces what he refers to as a "genocide gap." Economic policies intended to produce low per capita income, income inequality, poor access to resources, and exploitative trade may be used as tools of genocide and may precede mass killing (Anderson 2014). Genocide and mass killing may contribute to poor economic performance and low levels of economic development in the short run (Hodler 2019), although it is important to emphasize that while there initially may be significant economic problems following a genocide, the experience of genocide does not prevent economic and social development in post-genocide states over the long term.

While genocide and mass killing are some of the most pernicious organized forms of political violence, incidents of intentional civilian killings can occur on a smaller scale, for example, as part of campaigns waged by terror groups or under the auspices of political repression by government, militias, and rebels (Valentino 2014). Considering their extreme nature, it is unsurprising that the impacts of genocide and mass killing received ample scholarly attention. Yet, less extreme forms of political violence also have potential impacts, similarly to other forms of violence discussed earlier. One such example comes from a study by Balcells et al. (2016), who find that low-intensity intergroup violence, such as the violence in Northern Ireland after the Good Friday Agreement in 1998, is economically disruptive and may prevent the successful implementation of reconciliation policies. Low-intensity political violence has also been linked to mental health issues in bystanders, especially children, similarly to the link between mental health and other forms of political violence (Muldoon 2004). Similarly, scholars linked terror attacks to adverse impacts on tourism, foreign direct and domestic investment flows, etc. (e.g., Enders and Sandler 1991; Ito and Lee 2005; Enders, Sachsida, and Sandler 2006; Sandler and Enders 2008; Singh 2013).

Considering that adverse socioeconomic effects are observed in both cases of extreme and less-extreme cases of political violence, the theoretical and empirical definitions of "atrocities" used here take a broader approach to violence against civilians. Atrocities are hence inclusively defined as incidents perpetrated by armed actors against unarmed civilians, which result in the deaths of at least several civilians.

There are two reasons I seek to capture events that resulted in several (empirically defined as five or more below) deaths. First, such atrocities are more likely to cause significant damage and hence lead to adverse socioeconomic outcomes that are clearly observable, which is important for both theoretical and empirical reasons, considering the proxy used in this study. Second, and related, such attacks are more likely to be observed by individuals not only locally, but also remotely, which can have implications for investment and tourist flows into the region, issues that I cannot directly measure at the local level. Accordingly, my focus on atrocities as incidents resulting in multiple deaths helps to ensure that I focus on a set of events directly relevant to the theoretical expectations of this study. It is important to emphasize, however, that such data may experience measurement-related problems, and that as a result no single dataset provides a fully accurate picture of political violence (e.g., Davenport and Ball 2002; Eck 2012; Ball and Price 2019). Recognizing this issue, I conduct a set of sensitivity analyses that use alternative political violence datasets to ensure my findings are robust across sources, measurement, and coding choices underlying each dataset, as discussed in the Empirical Analysis section.

Empirical Pathways

Scholars identified and confirmed several relevant pathways by which political atrocities can affect socioeconomic development. Here, I discuss three that are particularly relevant. One such pathway relates to the impact of violence as directly disturbing, even eliminating, economic activity in a given location. If rebels, militiamen, or soldiers kill people and destroy commercial buildings, or terrorists attack restaurant and cafés, these businesses will be out of commission at least until the damage is repaired and affected workers have returned to work or replacements have been hired. It may be hard to hire new employees, considering the fears of another atrocity incident, which leads to reduced local economic output (Eckstein and Tsiddon 2004; Hodler 2019). At the same time, if atrocities occur only within particular areas within the country, such adverse outcomes will be less likely in unaffected locations, leading to *local* diminished socioeconomic activity only in these areas that have been—and hence are likely to be again—affected by atrocities.

Evidence from specific contexts supports this direct-damage pathway. For instance, in their examination of five large American cities, Greenbaum and Tita (2004, 2495) suggest that "consumers, employees and entrepreneurs to alter their routine activities in areas that experience a surge in violent activity." They find that higher levels of violent crime are indeed associated with lower levels of economic activity, especially in the services industry. Similarly, Ríos (2016) analyzes criminal activity in Mexico using text analysis, arguing that by limiting economic diversification, increasing market concentration, and diminishing economic complexity, such violence has severe economic implications. Empirically, the study finds that a 9.8 percent increase in the number of gangs or 22.5 percent in the number of homicides can eliminate a whole economic sector. The same finding is echoed by Robles, Calderón, and Magaloni (2013, 1), who analyze the impact of the rise in drug cartels on economic activity (using a similar measure used in the present study) and find that "the drug wars in those municipalities that saw dramatic increases in violence between 2006 and 2010 significantly reduced their energy consumption in the years after the change occurred." This logic can be extrapolated to atrocities by (other) armed actors. For instance, Barros, Caporale, and Gil-Alana (2006) study violence by the extremist group Euskadi Ta Askatasuna (ETA) in Spain. They find that one of the extraneities of ETA violence was a reduction in the stock market index.

A second pathway relates to atrocities' impact on tourism and the associated revenues. For instance, atrocities can cause "reputational" costs to a given area, making tourists—both international and domestic—less likely to go there as to avoid potential future violence. Empirical and anecdotal evidence supports this notion. For instance, Enders and Sandler (1991, 49) find that in Spain, "A typical [terror] incident is estimated as scaring away just over 140,000 tourists when all monthly impacts are combined." In a later study, Sandler and Enders (2008) find that, "the economic influence of terrorism is anticipated to surface in specific sectors that face an enhanced terrorism risk, such as the tourist industry or foreign direct investment" (Sandler and Enders 2008, 30). Similarly, Ito and Lee (2005, 75) find that "September 11 resulted in both a negative transitory shock of over 30% and an ongoing negative demand shock amounting to roughly 7.4% of pre-September 11 demand. . .(as of November 2003)."

A third pathway linking atrocities with adverse socioeconomic outcomes relates to investment and its ability to boost local economic activity. For instance, higher incidence of atrocities can reduce foreign and domestic investment by "scaring away" potential investors, who may direct their investments elsewhere. For example, analyzing terrorism's impact on net Foreign Direct Investment (FDI) (NFDI) in Spain and Greece, Enders and Sandler (1996, 332) find that, "[o]n average, terrorism reduced annual NFDI in Spain by 13.5%, while terrorism reduced annual NFDI in Greece by 11.9%." This finding is supported by Bandyopadhyay, Sandler, and Younas (2014, 42) who find that, depending on the model specified, "[f]or the average (median) country, this [a one standard deviation increase in terrorism] amounts to a FDI loss of US$735.65 (US$110.10), US$296.49 (US$44.37), and US$299.97 (US$44.90) million, respectively." In contrast, analyzing the impact of the September 11, 2011, attacks and other terrorist incidents in other countries on US FDI in Organisation for Economic Co-operation and Development (OECD) states, Enders, Sachsida, and Sandler (2006, 530) conclude that "[e]xcept for Turkey, there was no evidence that 9/11 had a lasting negative influence on US FDI flows" and that "9/11 only slightly interrupted the substantial growth in U.S. FDI flows in the current era of globalization." Similarly, in analyzing the impact of violence against civilians by rebel groups in India, Singh (2013) focuses on rural agricultural districts, specifically. By disaggregating data both by context and spatial level (focusing on districts), Singh (2013, 143) finds that "[t]he presence of a major terrorist incident in a district in a year reduces long-term fixed investment by around 17 percent," which "results in a farmer losing close to 4 percent of his income annually because of the insurgency."

These pathways all suggest an adverse relationship between atrocities and socioeconomic development. Yet, we are still missing a *global* assessment of the effects of atrocities against civilians at *the local level*. Considering that attacks on civilians—even during mass killing campaigns—occur locally and are often constrained to specific areas within the state, assessing their exact geographically disaggregated impacts is of great importance to both researchers and policymakers, as it can lead to improved understanding of these dynamics and suggest effective mitigation strategies. At the same time, assessing any impacts of such violence substantively is also complicated. In some cases (e.g., FDI), the impacts can be assessed in USD, in others (e.g., tourism) in the numbers of people affected. Yet, especially when one moves to the subnational level, assessing these impacts substantively becomes more complicated, considering data on local USD output, flows of people, etc., are often unavailable, especially on a global scale. As I explain in the ensuing section, the present study addresses these limitations empirically using disaggregated data on atrocities and NTL emissions.

It is important to emphasize that—as mentioned above—some studies suggest that violence may lead to greater social bonding and improved economic activity. Bauer et al. (2016), for instance, find that exposure not only to civil war, but also directly to violence can lead to improved economic outcomes over the long term. Similarly, Koos (2018) finds that greater exposure to sexual violence, an especially pernicious type of atrocity, can lead to greater cooperation, community building, and overall great post-conflict resilience. This is in line with Sandler and Enders (2008), Enders, Sachsida, and Sandler (2006), and Hodler (2019), who find that the material socioeconomic effects of even extreme forms of political violence tend to be relatively

short term, even if some of their other implications (such psychological and medical effects) can last much longer (e.g., Schimmel 2010; Meiches 2021). There is therefore a reason to expect that—at least in material terms—the local effect of atrocities should not persist for more than several years, assuming no new attacks occur. Damaged buildings can be repaired and labor can be (re)hired within the span of a few years. FDI and domestic investments will flow back into bustling areas as sufficient time passes, where new business will form. For tourists, the fact that particular areas experienced violence will eventually be forgotten if no new attacks happen. Accordingly, any local level impacts of political atrocities are likely to be short lived and—assuming no new attacks happen—should not persist over the long term.

Overall, then, the research discussed throughout this section and the different implications discussed above suggest following empirical hypothesis:

Hypothesis: *Higher frequency of atrocities should observably reduce local level socioeconomic activity over the short term.*

Accordingly, the next section (1) discusses the data and methods used to test this hypothesis, (2) identifies statistical effects, (3) quantifies these impacts in substantive terms, and (4) conducts different sensitivity analysis to ensure any results are robust.

Empirical Analysis

Data, Variables, and Methods

I test my hypothesis on a geographically disaggregated sample within all countries worldwide (excluding the United States)[1] over a 17-year period (1997–2013). Building on past research that analyzed relationships between development and political violence at the local level (e.g., Koren and Sarbahi 2018), these data are first structured into a cell-year level dataset wherein cells—my cross-sectional unit of interest—are measured at the 0.5 × 0.5 decimal degree resolution (or approximately 55 km × 55 km at the equator, decreasing toward the poles) across the entire terrestrial globe, excluding Antarctica the Arctic (Tollefsen, Strand, and Buhaug 2012). This disaggregated geographical breadth provides an important improvement over previous *global* analyses of atrocities and their socioeconomic impacts, which are often state-centric (e.g., Enders, Sachsida, and Sandler 2006; Sandler and Enders 2008; Bandyopadhyay, Sandler, and Younas 2014) or focus on specific countries (e.g., Eckstein and Tsiddon 2004; Singh 2013; Balcells, Daniels, and Escriba-Folch 2016; Hodler 2019). It is also considered the lowest level of disaggregation recommended for using event data (Weidmann 2015). There are 59,955 cells recorded within each year in my data, with the average country containing 322 cells.

To operationalize the dependent variable and capture local socioeconomic activity levels, I use mean annual levels of NTL in a given cell from the PRIO-Grid dataset (Tollefsen, Strand, and Buhaug 2012). Research shows that NTL emissions are a very effective indicator of economic activity, socioeconomic development (including local infrastructure and telecommunication and electricity), and state capacity (Henderson, Storeygard, and Weil 2012), especially in research on political violence (e.g., Weidmann and Schutte 2017; Koren and Sarbahi 2018). For instance, Koren and Sarbahi (2018) link NTL emissions to state presence and activity at the local levels through pathways such as mobilizing political and economic resources, collecting tax revenues, and developing local infrastructure and economic capacities. Similarly, Weidmann and Schutte (2017) show that NTL emissions are effective predictors of individual household wealth and the degree of profitable economic activity in particular areas, although it is important to bear in mind that such data might not reflect as effectively in remote rural regions.

The NTL data used in all stages of analysis were obtained from the Defense Meteorological Satellite Program (DMSP) Operational Linescan System Nighttime Lights Time Series data series (version 4). The PRIO-Grid includes a calibrated version (where NTL values are standardized between 0 and 1) of this indicator, but for the ease of substantive interpretation, I rely on the non-calibrated version of average annual NTL emissions within a given cell year.[2] The resulting *Socioeconomic Activity*$_{it}$ indicator (where i denotes the grid cell and t denotes the year) hence measures the average total number of illuminated pixels—or squares of 0.008 × 0.008 decimal degrees (approximately 1 km × 1 km around the equator that decrease in size as one moves toward the poles)—within a grid cell observed from space during a given year. Operationalizing my indicator as the count of pixels allows me to quantify any effects of atrocities on the level of illumination within a given cell during a given year. *Socioeconomic activity*$_{it}$ has a mean of 1.192 and a range of 0 ⇔ 61.256 illuminated pixels.

To operationalize my atrocity variables, I use data from PITF Worldwide Atrocities Dataset (WAD) mentioned above, which is specifically designed for the purpose of studying severe and deadly violence against civilians.[3] I operationalize these indicators based on the count of lethal events rather than casualties, considering information on the former is more accurate than exact casualty estimates (Eck 2012; Weidmann 2015; Schrodt and Ulfelder 2016). The WAD uses NGO and international newswire reports to human-code information on atrocities—defined as intentional attacks against civilians that caused five deaths or more—and their perpetrators. For my purposes, the WAD has at least three key advantages over other political violence datasets.

First, it uses a relatively high casualty threshold to define atrocities, which helps to ensure that the resulting independent variables capture acts of deadly violence that are likely to make great socioeconomic impacts, which are in line with the theoretical perspectives and expectations discussed in the previous section. Importantly from a theoretical perspective, which emphasizes the impacts of well-known violence, such atrocities are also more likely to be reported (meaning, counterintuitively perhaps, that reporting bias is less of a concern with these data) and observed by a larger number of individuals, including prospective investors and possible tourist, making them more likely to choose to alter their behaviors. There are also empirical advantages in this regard. Atrocity event datasets may suffer from reporting and other measurement biases, which can affect the results and their interpretation therein (Davenport and Ball 2002; Ball and Price 2019). The relatively high death threshold used by the WAD means that (as mentioned above) it only codes attacks that—due to their lethality—are more likely to be reported in the media or by human rights reports. Moreover, the WAD uses distinguished incidents—atrocities for

[1] The period for which information was available on all variables and key lags. Note that the PITF WAD is funded by US Federal funding, and hence does not code violence within the United State.

[2] The statistical results are robust when the calibrated NTL version is used.

[3] The WAD data are accessible at https://parusanalytics.com/eventdata/data.dir/atrocities.html.

which the date and location are clearly reported—from campaigns, a residual empirical category that includes atrocity incidents without a clear temporal or geospatial categorization. Similar to past studies that relied on the WAD (e.g., Koren 2017), I include only atrocity incidents in constructing my variables, thereby ensuring the relative precision of the information utilized therein.

Second, whereas other political violence datasets focus only on particular countries or have more temporally limited global coverage, the PITF WAD covers all world countries (with the exclusion of the United States) over the years 1995–2020 (although due to limited temporal availability on my *Socioeconomic Activity*$_{it}$ I am forced to omit any years after 2013). Nevertheless, in the online appendix, I show the results are robust to atrocity variables operationalized using the Geolocated Event Dataset (GED) and the Armed Conflict Location and Event Dataset (ACLED).

Third, an important consideration of using political violence data is ethical: collecting information on people affected could induce biases and risk a "statisticalization" of individual suffering (Hoover Green and Cohen 2021). Hoover Green and Cohen (2021) highlight some aspects of such data and recommend including an ethics statement (included at the end of this study), as well as ensuring open and clear coding guidelines, and whether the underlying stories used to compile these data might risk the identity of potential future victims. Importantly, the WAD not only provides a well-defined and transparent codebook (Schrodt and Ulfelder 2016), but also allows researchers to trace specific media stories that might include information on future victims. An anecdotal evaluation of the underlying reports used to code these data suggests that while some information was available on the victims who died in the attacks, as far as could be ascertained no information that could place living individual at risk was included.

Using these WAD data, I create two indicators to account for the short-term effects of atrocities on socioeconomic activity. Here, building on past research (e.g., Enders, Sachsida, and Sandler 2006; Singh 2012; Bandyopadhyay, Sandler, and Younas 2014), I define "short-term" as the span of two years. It is important to emphasize, however, that considering the time the effect of atrocities might take until it is recorded by satellites, observing such impacts using a contemporaneous atrocity indicator (that is, violence occurring during in year *t*) is unlikely.[4] Accordingly, to test my hypothesis I rely on 1- and 2-year lags of the count of all atrocities perpetrated within a given grid cell.[5] These indicators, *Atrocities*$_{it-1}$ and *Atrocities*$_{it-2}$ have means of 0.006 and 0.005, respectively, and both have a range of 0 ⇔ 231.

My models also include different variables, similarly measured at the 0.5 degree cell level, accounting for alternative explanations. Note that, considering the potential biases that may arise from including too many such controls (e.g., Schrodt 2014), I account in my main models only for the key confounders, while reporting models that add a large number of controls in the online appendix. In my main models, I include controls for (1) population densities within a given grid cell, information on which is included in the PRIO-Grid dataset for the years 1995, 2000, and 2005 and then interpolated to the yearly level using a last value carried forward approach; (2) ethnic exclusion, defined as the number of distinct ethnic groups excluded from power within a given grid cell during a given year; and (3) a 1-year lag of the dependent variable (*Socioeconomic activity*$_{it-1}$). My models also include country-level variables to account for broad socioeconomic and political confounders, including (4) political openness (operationalized using the Polity2 indicator created by Marshall, Gurr, and Jaggers (2014); (5) military expenditure and (6) GDP per capita (both from the World Development Indicators (World Bank 2021); and (7) oil and (8) gas production (from Ross 2011). Summary statistics for all variables (including those used in my sensitivity analyses) are reported in Table A1 in the online appendix.

Because my dependent variable, *Socioeconomic activity*$_{it-1}$, is continuous, I rely on an OLS estimator for statistically assessing my hypothesis. Additionally, recall that one potentially confounding relationship within my data relates to the fact that while atrocity events might affect socioeconomic activity in a given location, higher socioeconomic activity levels might also reflect greater presence of the state and its forces, which helps in deterring and preventing atrocities and other attacks. Although lagging my atrocity variables helps to reduce the risk of such simultaneous relationship, it does not fully solve it. Accordingly, to ensure that any observed associations are robust to these issues, I additionally estimate generalized method of moment (GMM) models (discussed below), which rely on past values of the endogenous dependent variable to "exogenize" its relationship with counterterrorism and development (Arellano and Bond 1991).

Considering my argument is specifically focused on within-grid cell impacts over time, I estimate each OLS model with fixed effects by grid cell (my physical unit of analysis) and year (my temporal unit of analysis), as recommended in extant research (e.g., Angrist and Pischke 2008). To account for heterogeneities within cells, especially considering that the values for some variables are duplicated over time, standard errors in all models are clustered by grid cell. The relationship between atrocities and socioeconomic activity at the local level is hence identified using the following equation:

$$\boldsymbol{y}_{it} = \beta_1\, \boldsymbol{a}_{it-1} + \beta_2 \boldsymbol{a}_{it-2} + \beta_3 \boldsymbol{p}_{it-1} + \beta_4 \boldsymbol{y}_{it-1} + \beta_{5-k} \boldsymbol{X}_{i/jt} + \boldsymbol{\Theta}_t + \boldsymbol{\Phi}_i + \epsilon_{i.} \quad (1)$$

Here, $\boldsymbol{y}_{it}$ is a vector denoting socioeconomic activity (measured by average total NTL emission in pixels) in grid cell i in year t; $\boldsymbol{a}_{it-1}$ and $\boldsymbol{a}_{it-1}$ are vectors denoting the number of atrocities that have occurred within cell i during the preceding year $(t-1)$ and the year before that $(t-2)$, respectively; $\boldsymbol{p}_{it-1}$ is a vector denoting population density in the grid cell the previous year to ensure the number of lagged atrocities is not driven by the number of people residing in a cell i when attacks happened; $\boldsymbol{y}_{it-1}$ is the1 year lag of the dependent variable to account for continuous variations in NTL emissions over time; $\boldsymbol{X}_{i/jt}$ is a matrix of control variables accounting for potential contemporaneous cell- and country-level confounders that might affect socioeconomic activity in year t; $\boldsymbol{\Theta}_t$ and $\boldsymbol{\Phi}_i$ are fixed effects by year t and country i, respectively; and ϵ_i denotes standard errors clustered by grid cell.[6]

Additionally, as mentioned above, socioeconomic activity may exhibit serial correlations over time and/or endogeneity with lagged atrocities due to endogenous policy responses, omitted variable effects, or persistent policies designed to preempt violence. To address this concern, I also employ a series of robust difference GMM dynamic models where the necessary instruments are "internal" and

[4] As illustrated in Table A3 in the online appendix.

[5] As Table A3 additionally illustrates, deeper lags do not have any effects on socioeconomic activity in year *t*.

[6] Note that the model does not include an intercept due to the reliance on a method designed to expedite the estimation of these grid-cell fixed effects model, which otherwise is computationally very intensive.

Table 1. The local impact of atrocities on socioeconomic activity

	OLS			*GMM*		
	(Baseline)	*(Medium)*	*(Full)*	*(Baseline)*	*(Medium)*	*(Full)*
$Atrocities_{it-1}$	-0.032^{***}	-0.042^{*}	-0.030^{**}	-0.056^{***}	-0.106^{***}	-0.116^{***}
	(0.007)	(0.025	(0.013)	(0.010)	(0.037)	(0.032)
$Atrocities_{it-2}$	−0.003	0.002	-0.038^{***}	0.114^{***}	0.153^{***}	0.157^{***}
	(0.007)	(0.034)	(0.014)	(0.007)	(0.009)	(0.009)
$Population_{it-1}$[a]	0.226^{***}	0.310^{***}	0.206^{***}	0.114^{***}	0.153^{***}	0.157^{***}
	(0.015)	(0.018)	(0.008)	(0.007)	(0.009)	(0.009)
$Exclusion_{it}$		0.099^{***}	0.040^{***}		0.021^{***}	0.018^{***}
		(0.010)	(0.004)		(0.006)	(0.006)
$Polity2_{jt}$		-0.019^{***}	-0.008^{***}		-0.009^{***}	-0.006^{***}
		(0.001)	(0.001)		(0.001)	(0.001)
NTL_{it-1}			0.658^{***}			-0.409^{***}
			(0.007)			(0.004)
Military exp$_{jt}$[a]			-0.054^{***}			-0.023^{***}
			(0.005)			(0.005)
GDP PC$_{jt}$[a]			0.307^{***}			0.450^{***}
			(0.011)			(0.020)
Oil prod$_{jt}$[a]			-0.013^{***}			-0.002^{***}
			(0.0004)			(0.001)
Gas prod$_{jt}$[a]			-0.006^{***}			0.057^{***}
			(0.003)			(0.004)
Observations	979,534	769,811	738,880	979,534	769,811	738,880
Grid cells	58,552	46,630	46,259	58,552	46,630	46,259
R^2	0.952	0.952	0.972			
Adjusted R^2	0.949	0.949	0.971			
Sargan				141.97^{***}	143.83^{***}	149.24^{***}
AR(1)				-46.825^{***}	-43.628^{***}	-3.403^{***}

Note: Values in parentheses are robust standard errors clustered by grid cell. [a]In natural log form. $^{*}p < .1$; $^{**}p < .05$; $^{***}p < .01$.

rely on lagged values of the potentially endogenous atrocity-independent variables to "exogenize" the relationship between atrocities and socioeconomic activity (Arellano and Bond 1991). The model is specified as a system of (per period) equations, where the instruments applicable to each equation differ because additional lagged values of the instruments exist in later time periods. Note that including too many internal instruments relative to the cross-sectional sample size (i.e., including deep lags) can aggravate finite-sample biases in the coefficient and standard error estimates (Roodman 2009).

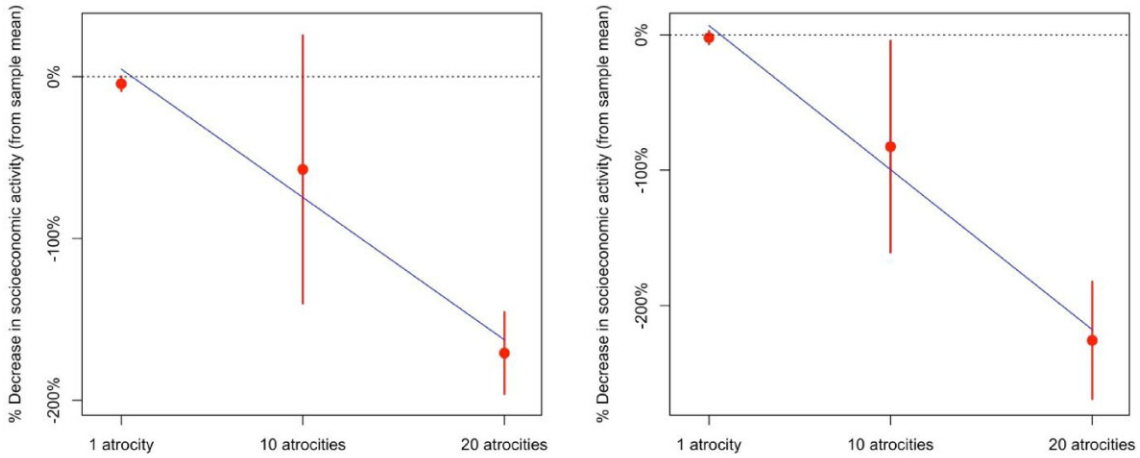
Accordingly, for these instruments, I include two-to-seven-period (year) lags of $Atrocities_{it-1}$ (i.e., going back 3 to 8 years from time t), capturing variations in this variable at time $t-1$ based on changes from past periods. In doing so, I account for any potential impacts of my dependent variable (*Socioeconomic activity*$_{it}$) on not only one but both my atrocity lags ($Atrocities_{it-1}$ and $Atrocities_{it-2}$) over the period of analysis, although it is important to emphasize that such model might still suffer from sensitivity regarding specification choices. Since I am considering panel models with two-way effects, cell and year fixed effects are canceled out, providing a straightforward instrumental variable estimator. In these GMM models, I also estimate two-step robust standard errors, corresponding to robust standard errors within the OLS framework, to account for cell-level heterogeneities within my GMM models.

Results

Table 1 first reports a baseline model of *Socioeconomic activity*$_{it}$, which includes only my 1- and 2-year atrocity lags, lagged population, and cell and year fixed effects. This baseline model is followed by a medium specification, which adds all the controls discussed above, and then by corresponding baseline and full specifications that add relevant controls to arrive at the fully specified model. The next three columns then report the corresponding GMM models, which account for potential simultaneous relationships between my dependent and independent variables.

All results strongly support the hypothesized short-term effect of atrocities on socioeconomic activity at the local level. In particular, $Atrocities_{it-1}$'s coefficient is statically significant across all OLS and GMM models suggesting that, in line with my theoretical expectations, recent atrocities indeed reduce socioeconomic activity (after providing sufficient time for said effects to be reflected by NTL emissions). In substantive terms, one atrocity incident is associated with a decrease of ∼0.03–0.04 lighted pixels in NTL emissions in the OLS models and by ∼0.06–0.12 lighted pixels in the "exogenized" GMM models, on average. In percents, these coefficients correspond to an expected decrease of ∼3.5 percent (OLS) and ∼10 percent (GMM) from *Socioeconomic activity*$_{it}$'s mean (1.192 lighted pixels). These effects are rather substantial, especially considering the wide range of $Atrocities_{it-1}$ ($0 \Leftrightarrow 231$).

Moving to consider $Atrocities_{it-2}$'s effects, the evidence is less conclusive, at least in the OLS models, where its coefficient is only statistically significant in the full model. Again, a one-incident increase in the number of atrocities 2 years prior is associated with a slightly smaller decrease (compared with $Atrocities_{it-1}$) in the degree of socioeconomic activity in time t of about 0.04 lighted pixels (approximately 3.5 percent). In the GMM models, in contrast, $Atrocities_{it-2}$ is



(a) $Atrocities_{it-1}$ (b) $Atrocities_{it-2}$

Figure 1. The change in 1- and 2-year atrocity lags on socioeconomic activity by different thresholds.

statistically significant (to the $p < 0.01$ level) across all models, with a substantive impact on reducing socioeconomic activity at time t by about 0.04–0.110 lighted pixels (~2.5 percent–9 percent). Additionally, Sargan test scores in the GMM models suggest the models are robust, although potentially weakened by the number of instruments, and that the results should be interpreted with care. Nevertheless, overall, then, the results not only support the argument that attacking civilians can indeed reduce socioeconomic activity, but also provide a spectrum for quantifying these impacts, while controlling for a variety of potential confounders.[7]

Auxiliary Analyses

Next, my argument and the logic of atrocity's intensifying impact advocated therein suggests that locations that experienced more atrocities will, all else being equal, experience stronger declines in socioeconomic activity compared with areas that experienced a smaller number of atrocities. Accordingly, to evaluate how the effects of both 1- and 2-year lag atrocities vary across the number of atrocities perpetrated therein, Figure 1 plots the percent change in both $Atrocities_{it-1}$'s and $Atrocities_{it-2}$'s effects on *Socioeconomic activity*$_{it}$ compared with the latter's mean, where these atrocity indicators are each operationalized using three different dichotomous thresholds, namely whether a given cell experienced at least (1) 1 atrocity, (2) 10 atrocities, and (3) 20 atrocities during a given $t - 1$ and $t - 2$ year, respectively (each given a score of 1, 0 otherwise). To make sure that if I err it would be on the conservative side, I relied on the smaller OLS model coefficients (the estimates of each model are reported in Table A2 in the online appendix). As the trend line in Figure 1 illustrates, the size of both $Atrocities_{it-1}$'s and $Atrocities_{it-2}$'s coefficient indeed increases with higher numbers of atrocities being perpetrated during a given cell year. This evidence suggests a strong additive effect of atrocities on socioeconomic activity at the local level.

An additional aspect of my argument relates to the effect of contemporaneous atrocities as well as deeper atrocity lags. As mentioned above, I suggested that any contemporaneous (i.e., occurring at time t) effects of atrocities are unlikely to be observed from space considering the time it takes the impacts of such attacks to be recorded by satellites, while the effects of any atrocities that occurred further back in time are likely to be ameliorated over a sufficiently long period. Accordingly, I estimate several sets of both OLS and GMM models corresponding to the full specifications from Table 1, including the following atrocity lags as independent variables: (1) $Atrocities_{it} - Atrocities_{it-1}$; (2) $Atrocities_{it} - Atrocities_{it-2}$; (3) $Atrocities_{it-3}$; (4) $Atrocities_{it-4}$; (5) $Atrocities_{it-1} - Atrocities_{it-3}$; (6) $Atrocities_{it-1} - Atrocities_{it-4}$; and (7) $Atrocities_{it} - Atrocities_{it-3}$.[8] The resulting estimates of these 14 models are reported in Table A3 in the online appendix. In general, the OLS estimates are more conservative and suggest that the coefficients of $Atrocities_{it-1}$ and $Atrocities_{it-2}$ are both the only ones that are statistically significant and the smallest (i.e., the largest in absolute value terms). The GMM estimates, in contrast, identify a statistically significant effect for the coefficient of almost every atrocity term in every model, with the largest substantive effects being of $Atrocities_{it-3}$. It is important to note, as mentioned above, that due to the inclusion of deeper lags (both as instruments and as independent variables) in some of these specifications, the GMM estimators might be slightly overestimating the statistical and substantive effects of atrocities compared with the OLS models (Roodman 2009).

Nevertheless, the results of these temporal sensitivity analysis support the notion that atrocities tend to have, on average, a short-term impact on socioeconomic activity, which disappears over the short term. For illustration, Figure 2 plots the averaged coefficient sizes for $Atrocities_{it}$, $Atrocities_{it-1}$, $Atrocities_{it-2}$, $Atrocities_{it-3}$, and $Atrocities_{it-4}$ across the seven specifications, once for the OLS estimators and again for the GMM estimators. In the first (OLS) case, the effects of atrocities on socioeconomic activity increase until 2 years in the past, after which it is nullified, with $Atrocities_{it-1}$, $Atrocities_{it-2}$ reducing local socioeconomic activity by about 4–5 percent. In the GMM models, which account for endogeneity, the impacts are more pronounced: while $Atrocities_{it}$ does not have a noticeable impact, $Atrocities_{it-1}$, $Atrocities_{it-2}$, and $Atrocities_{it-3}$

[7] I do not discuss the effects of other variables in our models considering the interpretation of such "controls" outside of purely experimental setting is problematic (Keele, Stevenson, and Elwert 2020).

[8] For GMM instruments I used 2- to 7-year lags of the last lag included as an independent variable in the model.

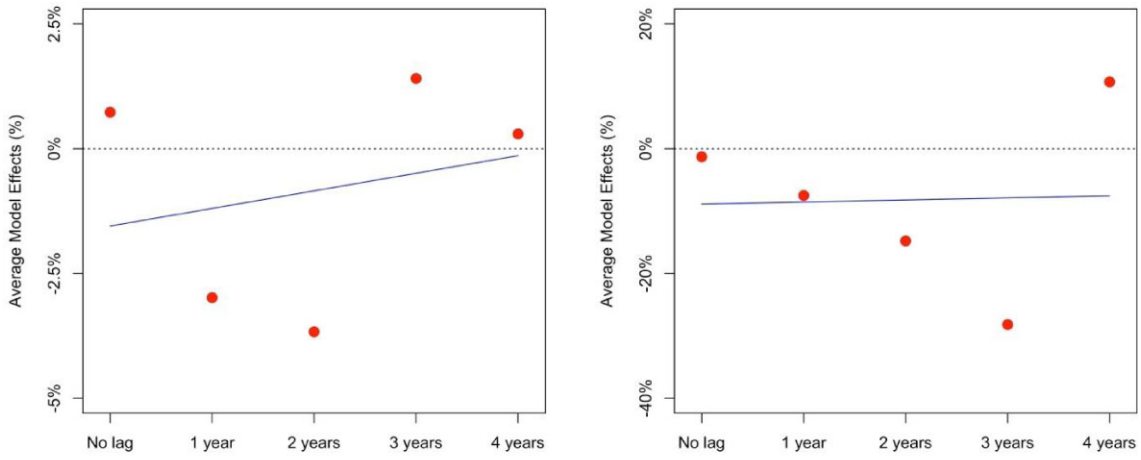


Figure 2. Average coefficient estimate sizes for $Atrocities_{it} - Atrocities_{it-4}$.

reduce socioeconomic activity by ~10 percent, 15 percent, and 30 percent, respectively. By the fourth lag, however, atrocities no longer have a negative impact on socioeconomic development.

These results are in line with studies that find that conflict and violence might ultimately lead to improved socioeconomic outcomes, at least of the medium and long term (Bellows and Miguel 2009; Bauer et al. 2016; Koos 2018). In both OLS and GMM cases, as the trend line illustrates, over the 4-year period, the effect of atrocities is at least nil, while socioeconomic activity may actually increase by year 4. Adding both contemporaneous and deeper atrocity lag terms therefore illustrates that while atrocities can have substantive effects in the short term, after 3 to 4 years, these effects subside.

A final set of auxiliary analyses is intended to test heterogeneous effects across areas that might be especially sensitive to atrocities and hence especially appealing to potential perpetrators. Research suggests that (big) cities, and capital cities in particular, are one important example of such locations for different reasons. Key decision-makers reside in these areas, making atrocities more likely to affect negotiations with armed actors. Big cities often attract higher influx of tourists and are where most industry and business headquarters are located (for a detailed discussion of these issues, see, e.g., Koren 2017). Accordingly, to evaluate whether these issues matter, I conduct three auxiliary analyses using my full specifications (in both OLS and GMM forms) on three distinct subsamples: (1) only urban areas (identified using the relevant indicator from PRIO-Grid); (2) only big cities with 10,000 or more residents (operationalized as areas within 2-hour travel from the city center using the relevant PRIO-Grid indicator); and (3) only capital city territories (operationalized as areas within 100 km distance from the city center).

The results from these analyses are reported in Table A4 in the online appendix. For illustration, Figure 3 plots the coefficients for $Atrocities_{it-1}$ and $Atrocities_{it-2}$ for the full, urban, big city, and capital samples, again based on the more conservative OLS model estimates. As the trend lines illustrate, there is little difference in how atrocities affect socioeconomic activity across different location types. In terms of average effect size, urban areas experience slightly stronger decrease compared with the full sample and big cities slightly more so than urban areas. As for capitals, it appears that these locations are slightly more adversely affected in the case of $Atrocities_{it-1}$, but they also appear to "bounce back" more effectively compared with other locations, as illustrated by the $Atrocities_{it-2}$ plot. Nevertheless, the absolute size of these substantive effects is about 0.2 percent, suggesting that atrocities have a rather uniform effect on socioeconomic development globally.

Sensitivity Analyses

In addition to disaggregating my findings by the numbers of attacks, atrocity lag choices, and strategic heterogeneity, I also conducted numerous additional robustness tests, reported in Tables A5–A8 in the online appendix. Each of these robustness models is estimated twice, once using OLS and again using GMM estimators, and each corresponds to the full model specifications from Table 1. These models include the following specifications: (1) adding controls for temperature, drought, and precipitation in year t, as well as whether the country was experiencing civil war (defined as a conflict with at least 25 combatant deaths; Gledtisch et al. 2002 and Pettersson et al. 2021) in both year t and $t-1$; (2) adding contemporaneous controls for distance to capital from cell i and country level variables accounting for arms imports, life expectancy at birth, and physical integrity; (3) omitting all grid cell years that did not have any levels of NTL emissions; and separately (4) keeping only cells that experienced civil war; (5) keeping only incidents denoted as perpetrated by state actors and (6) only incidents perpetrated by non-state actors, in coding $Atrocities_{it-1}$ and $Atrocities_{it-2}$ variables; and (7) using one-sided violence data from the GED (Sundberg and Melander 2013) and (8) violence against civilians data from the ACLED dataset (Raleigh et al. 2010),[9] operationalized using a five-casualty threshold, in coding $Atrocities_{it-1}$ and $Atrocities_{it-2}$; and (9) models that include only grid cell fixed (OLS) and one way (GMM) effects. Crucially, my findings hold in every case but two (atrocities' coefficients are statistically insignificant in

[9] Note that I use ACLED information only for Africa, considering that data availability on other world regions does not exist or exists only for some of the years. Additionally, as ACLED begins in 1997, the inclusion of a 2-year lag means I lose 2 years (i.e., the sample is available only from 1999 onward). Finally, considering that ACLED records many incidents of violence that had no casualties, I include only incidents with at least five deaths, which corresponds to the WAD's coding guidelines.

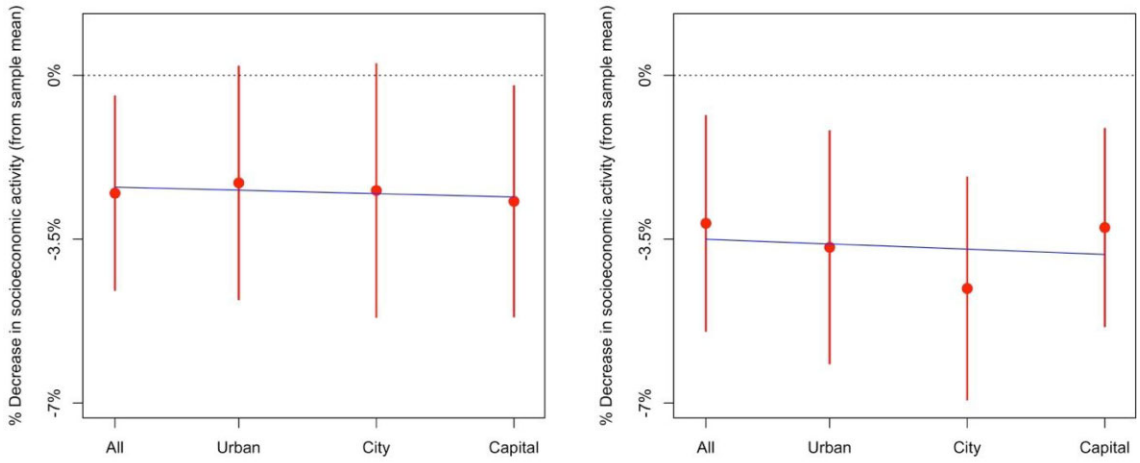


Figure 3. Change in coefficient size across full, urban, big city, and capital city samples for $Atrocities_{it-1} - Atrocities_{it-2}$.

the state atrocities and year FEs only OLS models), lending overall support to my original findings from Table 1 and argument that atrocities (at the very least by non-state forces) decrease socioeconomic activity in the short term.

Discussion

What are the implications of my findings for international relations scholars and policymakers? To date, few studies have analyzed these impacts at the subnational as opposed to the country level and none (to the author's knowledge) have assessed such geospatially disaggregated impacts on a global scale. I showed that atrocities have a strong (~3–10 percent) effect on reducing local socioeconomic activity over the short term, but—due to my reliance on NTL emissions—I am unable to show which socioeconomic activities are particularly impacted and which activities are more robust. It is important to emphasize that while MODIS data are the best currently available at the same PRIO-Grid level as my other indicators, such data are likely to under-reflect true economic activity in remote and underdeveloped regions, especially compared to later satellite systems such as VIIRS, potentially leading to biased inference, especially in regions such as Africa (Li et al. 2020). It is also important to emphasize that such bias leads to *under* rather than *over*-estimating of atrocities' impacts, considering their effects will be underrepresented in the sample, but this issue should be nevertheless considered when interpreting this study's findings. Future research can deploy VIIRS-based indicators, as well as more specific data (e.g., surveys, local economic, and statistical reports) to identify susceptible economic activities at the local level.

A second, related research implication concerns the differences in atrocity's effects across urban and rural areas. Moving to the subnational level is the first step in elucidating some of these impacts and indeed, due to their ability to effectively reflect socioeconomic activity, NTL emissions can also be used to construct proxies of urbanization (Weidmann and Schutte 2017; Koren and Sarbahi 2018). A fruitful research trajectory is therefore to examine where atrocities are more disruptive and where their effects last longer. I have explored one pathway in Figure 3, showing that—at least in the case of urban areas—atrocities' effects are surprisingly consistent across more and less dense areas.

More generally, my findings lend additional support to research that argues that both state and nonstate forces perpetrate atrocities where such attacks maximize the costs suffered by supporters of the other side (e.g., Valentino 2004, 2014; Koren 2017). By illustrating that such atrocities have a notable impact on socioeconomic activity at the local level, my results are in line with research that argues that such violence is often perpetrated strategically to weaken the enemy. While my findings do not negate alternative claims, they do suggest that atrocities indeed provide perpetrators with measurable socioeconomic "bang for buck," and hence explain why they perpetrate such violence in the first place.

For policymakers, my analysis and findings offer lessons for mitigation and response. In terms of mitigating the effects of atrocities, creating financial means to quickly address the direct impacts can help affected areas to recover at a faster-than-average (i.e., in less than 2 years) pace. For example, both public and private actors can create saving funds to expeditiously pay for the reconstruction of destroyed property, compensate affected individuals, and provide financial incentives for workers to go (back) to work. Another, albeit more complicated, possibility is for governments—those that are not complicit in the atrocities—to address the indirect impacts of atrocities. For instance, governments and central banks can provide tax credits and other incentives to encourage investment by both foreign and domestic actors in affected locations. They may even try to subsidize tourism, or at least compensate businesses that depend on tourism for loses. It is important to highlight that at least when governments are concerned, the need to compensate for the costs of attacks will affect GDP and consumption levels, which amounts—in-and-of-itself—to a cost incurred from violence (Eckstein and Tsiddon 2004). Nevertheless, such measures will be fruitful in addressing the *local* socioeconomic costs of atrocities, and as such can hasten recovery, allowing affected locations to overcome these adverse impacts.

Ethics Statement

To the author's knowledge, no individuals were harmed or placed at the risk of being harmed due to creation of the data employed in this study, which were compiled using secondary sources. The author acknowledges the

complexities of using data on deadly attacks against civilians and the sufferings such violence caused to numerous individuals and families, while also recognizing the importance of using these data to better understand, and ultimately prevent, future atrocities.

Supplementary Information

Supplementary information is available at the *ISAGSQ* data archive.

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