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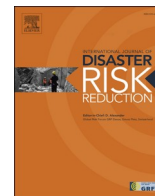
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Assessing the risk of pre-existing grievances in non-democracies: The conditional effect of natural disasters on repression

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ABSTRACT

Every disaster carries the risk of destruction but not every disaster prompts violent political process in a country. This article examines the popular argument that natural disasters can lead to higher state violence if resulting shocks caused by a disaster add to pre-existing grievances. If economic inequality or political instability is prevalent before a disaster occurs, disasters are expected to exacerbate the perceived threat to government's survival in office. Consequently, repression is expected to be higher in the aftermath of a disaster. I test the existence of the expected conditional effect of pre-disaster stability and disasters using cross-national data on natural rapid-onset disasters in non-democracies between 1976 and 2013. As indicators for pre-existing grievances this article focuses on *ex ante* economic inequality and political dissent. While a natural disaster as such is not associated with a violation of human rights, empirical evidence suggests that the probability of an increase in post-disaster repression is higher when a country has previously experienced grievances.

1. Introduction

Natural disasters are most commonly linked with a disruptive impact on infrastructure and economies. In 2014, more than 141 million people were affected by natural hazards and 20 808 fatalities as well as a total damage of approximately US \$ 98 billions have been recorded by the International Disaster Database [1].¹ Due to its destructive potential, a natural disaster can trigger various social and political processes in a country - especially in non-democratic countries. If disasters constitute profound economic shocks and add new grievances to preceding dissatisfaction, governments are prone to resort to repression in order to quiet (potential) political opponents.² Yet, increasingly violating basic human rights of political opponents in the aftermath of a disaster does not belong to the standard response of governments. Similar to Ton et al. [2], who add to the understanding of disaster risk for vulnerable individuals, this article takes a closer look at the economic and political determinants affecting the risk of post-disaster repression in non-democracies.

In line with previous literature, I argue that disasters - especially those affecting a large number of the population - reduce available resources of a government and can provoke repression. However, I do not

propose that every large-scale disaster prompts state violence. Rather the intuition is that marginalized people, who are already aggrieved, are mobilized by the additional inequality created by the damages due to the disaster. I hypothesize that the effect of disasters on repression is a function of the size of the disaster and that it is conditional on preceding economic inequality and political instability measured by previous protest activity. This repressive response is expected to hold for non-democratic countries.

The argumentation builds upon previous studies, which find that resource scarcity caused by natural disasters can increase grievances and competition for resources and spark social conflict (e.g., Refs. [3–8]). With disasters exacerbating existing grievances and inequalities [9–12] and grievances providing a focal point for mobilization and protest against the government [5,13–15], non-democratic incumbents are expected to respond to this threat by increasing repression (e.g., Refs. [16–18]). This paper thus examines whether the likelihood of an increase in repression in the aftermath of a disaster is larger under pre-existing grievances.

I test for the existence of such conditional effects using information on up to 871 natural disasters, different levels of economic inequality, and protest covering repression in the period between 1976 and 2013 for

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¹ In this article, the terms 'natural hazard' and 'natural disaster' are used interchangeably to denote natural exogenous hazards, which affect at least a part of the population. This does not imply that outcome of a natural event should be considered as 'natural'. In contrast, the extent of an event is likely to be a function of capacity and willingness of a state. See, for instance, O'Keefe et al. [69]; Gould et al. [70]; Berrebi and Ostwald [41]:384, or Plümpert et al. [82]:50 for a detailed argumentation regarding the term 'natural disaster'.

² For instance, Gutmann et al. [71] provide empirical evidence for the link between economic shocks and repression. The authors find that respect for physical integrity rights decreases after banking crises; this negative effect is more pronounced in autocracies.

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up to 112 non-democracies. Empirical results of the ordered probit estimation provide empirical support of the theoretical considerations. Natural disasters as such are not associated with a higher probability of an increase in repression. Yet, the predicted probability of an increase in post-disaster repression is larger when political situation of the country has been unstable or if economic inequality increased in the previous period. This effect is statistically significant and robust to an alternative definition of non-democracies.

While the link between climate and political instability has sparked a vivid discussion among researchers (e.g. Refs. [4,6,19]), only few studies examine the implications of disaster-related shocks for basic human rights. These studies have in common that a repressive response is assumed to depend on pre-existing grievances, which are fostered in the onset of disaster-caused resource scarcity [10,20,21]. Yet, some authors find that repression increases after disasters [10,20], whereas others do not find a causal impact on basic human rights [21]. This paper offers a resolution of this tension by explicitly testing whether a disaster's impact is *conditional* on previous grievances presented by economic inequality or the expression of political dissent.

2. Disasters and repression

Existing literature on the effect of disasters largely draws on political-economic theories of exogenous shocks (e.g. Refs. [22–24]), which model an increase in repression as an outcome of negative income shocks. With a constrained government's budget and a limited financial ability to provide rewards to voters and special interest groups, political support of the autocratic government within the entire population suddenly drops [24]. Due to the negative income shock buying political support of the population becomes more expensive. Facing increasingly scarce resources in the aftermath of disasters, grievances can accumulate to dissent (e.g. Ref. [5]). To counteract a decline in political support and stability governments resort to the relatively cheaper option, which often is repressing potential challengers of the government.

The relevance of disaster-caused economic grievances is in detail described by Besley and Pearson [20]. In their empirical analysis, the authors find that exogenous shocks reducing the availability of public goods and resources rents are associated with an increased probability of political violence. However, this effect only occurs for natural disasters occurring in non-cohesive institutions as the use of political violence is inhibited in the presence of higher constraints in the executive. While the argumentation put forward is very detailed and convincing, more refined measures of the key variables could shed more light into the empirical analysis of the disaster-repression nexus. First, measuring natural disasters as the number or the simple occurrence of rapid-onset disasters does not account for the strength of a disaster. Although the many disasters per year can of course put enormous strains on resources, the government is also likely to be overwhelmed and resort to repression if a larger share of its key supporters is affected [25]. Second, when conceptualizing repression as the presence of one-sided violence a lot of information and consequently variance over time and between countries is lost. This can be captured when using more encompassing repression data.

Similar to Besley and Pearson [20], a study by Wood and Wright [10] shows that post-disaster repression in a democratic government differs from non-democracies. As expected, higher levels of institutional democracy go in hand with lower levels of repression. The provision of additional resources in the form of disaster aid decreases repression in disaster-struck democracies as opposed to non-democracies. Their main argumentation is in line with previous work: natural disasters are seen as events, which cause a negative income shock. Due to their adverse effect on both private wealth and public infrastructure, disasters are assumed to be a trigger facilitating mobilization for the expression of *existing grievances* ([10]:7). Provoked by this resource scarcity, increased repression is thus a governmental tool to hold on to power.

Last but not least, based on a principal component analysis Gutmann

and Voigt [21] put forward that only emancipatory rights experience a clear deterioration as a consequence of natural disasters. Comparing pre- and post-disaster first-differenced levels of human rights protection, the authors find stable results when controlling for the level of income and democracy. For respect for basic human rights, which is similar to commonly used measures of state repression, evidence also suggests a significant deterioration in the aftermath of natural disasters. However, the authors are careful in proposing a causal link between disasters and basic human rights as they find a negative trend in human rights protection already before a disaster takes place ([21]:12). It thus remains uncertain whether disasters constitute a shock, which leads a government to repress opponents.

Against the backdrop of these studies, it becomes clear that not every disaster destabilizes a government and leads to a change in repression.³ Constraints on resorting to repression matter: repression is more likely in non-democracies (e.g. Refs. [26–28]) and in countries, in which it is easier to rely on a constitutional emergency provision during a natural disaster [29].⁴ It also matters to what extent a disaster strains a government's resources meaning that the size of the disaster as an indicator for potential disaster-induced grievances is crucial as well. Finally, it has theoretically been suggested that the initial, pre-disaster situation matters and that repression is related to pre-existing grievances.

While the political and social pre-disaster setting of a non-democracy is one of the baseline assumptions for post-disaster repression, this assumption has not explicitly been scrutinized. In other words, previous literature provides no empirical evidence whether repression is in fact conditional on these factors. The lack of accounting for a conditional effect may explain why previous findings are contradictory. Focusing on the conditional effect of pre-disaster inequality, instability, and the size of disasters, this article intends to close this gap.

3. The conditional effect of disasters on repression

This section seeks to identify the conditional effect, which determines whether a natural disaster triggers an increase in political repression. It is based on the above-mentioned theoretical frameworks laying down a government's response to exogenous shocks. Emanating from this literature, the theoretical contribution lies in the argument that the destabilizing effect of a large disaster on a government is stronger the larger the *ex ante* economic inequality and political instability. In other words, the expected effect depends on pre-disaster discrimination of the population and tensions. The main reason is that competition for resources in the aftermath of disasters is higher in the light of pre-existing social tensions. In this case, the threat to the incumbency of the government is heightened which is expected to increase the use of repression in the aftermath of a disaster.

In this theory, I distinguish between three main actors: the government, the elite, and the population. A government is driven by the aim of maintaining political power and increase time in office. To decrease the risk of being deposed, the government invests its available resources in buying political support and by means of repressive coercion [24]. Both the elite and the broader population trade their political support of the incumbent government for the provision of private goods and public goods with the aim of maximizing their utility. A minimum support of both the elite and the broader population is needed to remain in office. Despite this similarity, the main difference lies in their relative political importance to the survival of the government.

While demands of both groups have to be met to remain in power,

³ The current article is primarily interested in the link between natural events and repression. For detailed information on the relationship between climate change and violence, please consider the review provided by Theisen [72].

⁴ This argument builds upon previous research discussing the state practice of derogating from human rights treaties during a state of emergency, for instance, Neumayer, Bjørnskov and Voigt [73,74]; or Sommario [75].

the allocation of resources to the elite and the broader population is chosen in line with the relative influence of these groups. The government allocates available resources for private and public goods either such that both groups benefit equally or such that it discriminates against the broader population in favour of the elite. Governments in more democratic countries generally allocate resources to the benefit of a large share of the population, e.g. in the form of public goods during and after a disaster [30,31]. This is rational as disaster relief in response to natural disasters is positively associated with electoral support (e.g., Refs. [32–34]). Thus, countries with better institutions such as democracies are associated with better risk governance (e.g., Ref. [35]). Autocracies, in contrast, predominantly spent resources on private goods, which benefit a smaller share of the population as this is “good politics” to enhance survival in office [36,37]. The less democratic a regime is the more private benefits are selectively allocated to the elite in the form of private rents to gain its support. This implies that the government will shelter the elite from the negative effects of the disaster as opposed to the broader population. Ignoring the demands of a relevant group leads to a decrease in political support and could lead members of the relevant group to mount a challenge to the political leadership of the government.

A natural disaster results - depending on the severity of the event - in a significant destruction of private wealth and public infrastructure. In this paper, disaster severity is indicated by the number of the affected population. The more people are affected, the higher the severity of a disaster. While the occurrence of disaster is not in the hands of politicians, the way of responding to a disaster or a disaster risk is ([37]:821). New needs of the affected elite and the affected broader population reduce a government’s financial scope for handing out rents and public goods to the unaffected part of the elite and broader population. One common way to address the rebuilding of infrastructure and the provision of assistance to the affected population is the re-allocation of budgetary resources. Although a moderate level of altruism and support of government intervention can be assumed, the unaffected population typically bears the cost of financial transfers - either in the form of higher taxes, debt, or the opening up of domestic markets for reasons of food provision [31]. In addition, the affected population may perceive the impact of a natural disaster as an indicator of government failure and decrease their support of the government, which could lead to the replacement of the government [37,38]. The impact of a disaster thus makes buying political support more expensive so that the government has to determine the degree to which it intends to assist or react.

On the one hand, the government can decide not to respond to the disaster. This can lead to the loss of support of the affected population and the unaffected altruistic population who disapproves of this lack of assistance. Yet, minor natural events put less stress on the economy and are less likely to strain the economic situation. Thus, there is only little competition for resources between the groups of the population provoked by a disaster. The government will not assist the relatively small number of individuals affected by the disaster as more political support would be lost than gained if the government became active and re-allocated resources. This claim is supported by Cavallo et al. [25] who - in contrast to large natural disasters - do not find evidence of a significant impact of milder events on economic growth.

On the other hand, the government may need to respond. The larger the share of the relevant affected population, the more political support would be lost if the government remained inactive. Disaster assistance can be provided either equally in the form of quasi-public goods, which benefit both the broader population and the elite, or unequally in the form of targeted transfers to selected individuals affected by the natural disaster [31]. Quite intuitively, more resources have to be spent the larger the impact of the disaster. Resources spent on mitigating the effects of a disaster for the affected population reflect economic costs to the unaffected population reducing their political support for the incumbent. The government, which wants to remain in office, decides for the resource allocation which is likely to yield the maximum support

from the population and to deter opponents from challenging the regime.

Facing potentially high costs of assistance and the need to deal with increased grievances of the disaster-struck population, a non-democratic government is likely to decide to repress more in the aftermath of a disaster [10]. The larger the pre-disaster discrimination against the broader population in favour of the elite, the larger the frustration of the marginalized group and social tensions if this discrimination is increased. This is likely to happen in the aftermath of a disaster. Disasters can exacerbate existing tensions as they increase competition for scarce resources [10]. Because of an indirect effect on shortages, resource competition, and food price volatility disasters can increase the frustration of a marginalized individual [5,15]. The common experience of an emergency situation can strengthen solidarity and cooperation among individuals, who are affected, as an immediate response (e.g., Ref. [39]) but also go beyond the emergency situation. Marginalized individuals, which share this frustration, may then unite, overcome the collective action problem, and mobilize against the government [13,14]. Such positive association between natural events, scarce resources, and social conflict events like protest or riots has been found in several studies [3–8]. Facing a regime challenge, autocratic governments are likely to respond to this threat by increasing repression [16–18].

At the same time, state capacity is reduced in the onset of disasters. The government’s ability to suppress rebellions in the aftermath of disasters is likely to be reduced due to the destruction of infrastructure relevant for national security, transportation, or communication [5]. Resources and personnel have to be re-allocated from other areas such as security to investments in reconstruction and relief [40]. The government’s capacity to monitor the population, control the region, and provide security in disaster-affected regions can suffer [41]. A possible loss of government control can result in the incapacity to prevent citizens from assembling. It reduces the threat and potential cost for the population associated with mobilization and participation at protests [42]. This leads to a short-term fluctuation in *de facto* political power and incentivizes the opportunity for mobilization.

Both of the aforementioned factors can open a window of opportunity for challenging the government (see Ref. [43]) and can increase the government’s perception of threat. Remaining inactive could incur removal from office due to a loss of political support. However, addressing large inequality and instability is costly. Constraints to the use of repression are comparatively lower in autocracies. The higher the costs of buying political support relative to the costs of repression, the more attractive an increase in repression to ward off challengers. In line with previous studies, this leads to the following hypothesis:

- (1) The larger the share of the population affected by the disaster, the higher post-disaster repression.

Assuming that resource scarcity and competition provokes repression, two factors can intensify a government’s response to a disaster: pre-existing economic inequality and preceding political dissent. Disasters lead to resource scarcity, which can reinforce existing scarcity among individuals. If previous economic inequality and instability have been low, there is little pre-existing grievance and disasters are less likely to act as a catalyst for mobilization. Consequently, there is little additional threat to the incumbency of the government. In the case of a pre-existing unstable situation, however, disasters can exacerbate existing inequality and incentivize mobilization, which makes repression more attractive for an autocratic government.

Unequal treatment is likely to persist in the aftermath of a disaster and likely to widen the gap between the population and the elite needed to secure survival in office. Marginalized individuals, which experience political or economic inequality, are not only more vulnerable to disasters but also less likely to receive government resources in the aftermath of a disaster ([9]:28). In a cross-country panel data analysis, Yamamura [11] finds that natural disasters widen income inequality in

the short-term. This finding is supported by evidence from Kenya, where Kenyan high-income households have been found to be more likely to receive food aid than low-income households [12]. With vulnerable groups being disadvantaged in recovery efforts, this worsening asymmetry in the distribution of scarce resources can additionally destabilize a government ([44]:155; [5]). In other words, disasters can exacerbate previously held dissatisfaction due to marginalization and create an opportunity for challenging the regime [5,44–46]. Situation of resource scarcity are thus more likely to turn violent in the light of political dissent or inequality [47].

In the scenario of pre-existing grievances, the government would thus have to invest more resources to fend off challengers from the broader population. Yet, the government loses relevant political support when relocating resources to the affected population and not to the elite as providing public goods to the population does not increase an autocratic leader's survival in office. This is a trade-off as relocating all available resources away from the affected population to the affected elite is also likely to increase the population's incentives to challenge the government given pre-existing tension. Hence, the government is expected to react with more widespread repression to prevent challenges from both the elite and the broader population.

To sum up, the theoretical framework suggests that the coercive response of a government is conditional on *ex ante* economic inequality and political instability. Adding resource scarcity to prevalent resource constraints promotes an increase in repression as it exacerbates the severity of a threat to government's survival in office. These expectations can be summarized as follows:

- (2) Repression is higher in the aftermath of a disaster when the political situation has previously been unstable.
- (3) Preceding economic inequality reinforces the effect of disasters on repression.

4. Research design

To explore the conditional effect of natural disasters on repression, I use a panel data set in which the unit of analysis is country-year. Given that the theoretical section of this paper describes expected repressive responses to disasters in non-democratic countries, the sample used for the empirical analysis does not include democracies. As opposed to non-democratic countries, democratic governments are more likely to sustain political support through their expenses on public goods and less so by violating physical integrity rights.⁵ Following the commonly used cut-off, a regime is considered as a non-democracy if its level of democracy, i.e. its polity2 value [48], is below 6. For this reason and data availability described below the sample used for regression analysis consists of up to 111 non-democratic countries over the period from 1976 to 2013. The sample includes 871 natural disasters of different severity.

4.1. Dependent variable

Repression measures encompass respect for freedom from political and unlawful imprisonment, freedom from torture and beatings as well as freedom from cruel and inhumane treatment. Also, the concept of repression captures violations in terms of extrajudicial killings and forced disappearances. The variable is taken from the Political Terror Scale (PTS; [49]) which codes human rights information from reports by the US Department of State. The variable is coded as a five-point scale with higher values indicating more widespread violation of physical integrity rights. The following example illustrates the interpretation of

the repression variable: In February 1976, Guatemala experienced a massive earthquake with a magnitude of 7.5 on the Richter scale. In 1976, a repression score of 4, respectively, was noted down for the country which means that “civil and political rights violations have expanded to large numbers of the population” ([50]:4). In this sample, the average score is at approximately 3, meaning that violations are common and political imprisonment is extensive (*ibid.*).

4.2. Independent variables

The main independent variable measures disaster severity. While disasters can also be measured in terms of intensity, e.g. using wind speed or Richter scale of magnitude [51], this paper is interested in the impact of a disaster as perceived by the population, i.e. the number of people affected by a disaster. This information is available from the Emergency Events Database EM-DAT of the Centre for Research on the Epidemiology of Disasters for data [52]. This dataset is based on observations and reports compiled from various sources such as UN agencies, insurance companies, or the International Federation of Red Cross and Red Crescent Societies. It includes events which result in at least ten or more deaths, 2000 affected for droughts and famines or 100 for other disasters, declaration of a state of emergency, or plea for international assistance.

As a government may adapt to disasters, which slowly evolve over time, the focus of this paper lies on rapid-onset natural disasters. This excludes epidemics, droughts, insect and complex disasters. Based on the above mentioned definition of non-democracies the sample used for analysis counts up to 871 rapid-onset disasters. While on average 1 million people were affected by disasters per year, the disaster with the highest impact occurred 1998 in China where more than 238 973 individuals were affected by a flood. As the theoretical section suggests that the adverse effect increases with the severity of disasters in a country, the main independent variable *affected* is used.⁶ This variable is divided by 1000 to facilitate readability in estimation tables. As it can be expected that a disaster exerts a stronger impact in countries with a smaller population size, I add the logarithm of the total population. Population data is available from World Bank [54].

The main independent variables are economic inequality and political instability. To measure economic inequality, I use data on the GINI coefficient as a measure of income inequality which is a normalized measure between 0 and 100. Higher levels indicate a more unequal distribution of net income. Data are available from the World Development Indicators [54]. As the second part of theoretical framework sketches an immediate impact of disasters conditional pre-existing conditions, I include a one-period lag of GINI to account for this temporal dependence. Accounting for prior dissent is important as already mobilized groups may incite more repression than groups which yet have to overcome the collective action problem. As a measure of pre-existing political instability, I thus include anti-government protests as a binary dummy variable indicating whether at least one protest has occurred in the last year [53]. Also, I control for the presence of protest and armed civil conflict leading to at least twenty-five battle-related deaths in a year. This data is taken from the Armed Conflict data set provided by the Uppsala Conflict Data Program and the Peace Research Institute Oslo [55].

As the argument assumes that natural disasters constitute a negative income shock to the economy, which reduces available resources for buying political support, I account for cross-country differences in economic capabilities. I thus include the logarithm of per capita GDP in constant US\$ to capture a country's financial capacity to respond to

⁵ Similarly, research has noted that a population in democracies expresses its grievances in a more peaceful way using, for instance, elections as a forum to punish or reward elected officials instead of contentious actions [33,76–78].

⁶ While disaster severity can be endogenous to institutional of political factors, the number of people affected by natural events presents a more reliable estimate than other available indicators such as the number of individuals killed during a disaster. See also Wood and Wright [10] for a similar argumentation.

rapid-onset disasters. This data is available from the World Development Indicators [54]. In order to capture whether the presence of humanitarian aid mitigated or even intensified a regime’s repressive response to a disaster, disaster aid as a percentage of GDP is included as a control variable.⁷ This variable is taken from the AidData 3.0 dataset [56,81] as this dataset is, firstly, more encompassing as for instance aid data from the OECD. Secondly, it is more detailed than alternative datasets as it identifies a purpose for each activity from 1947 until 2013. For this analysis, disaster aid encompasses only those activities labeled as emergency assistance such as emergency health services and food aid, reconstruction relief, relief coordination, and material assistance and rehabilitation.⁸ A detailed description of summary statistics of these variables is provided in Table 1.

4.3. Estimation

As the dependent variable repression is ordinal on a five-point scale an ordered probit model is used to test the above stated hypotheses. As the inclusion of regional dummies in an ordered probit model can provide inconsistent estimates (e.g., Ref. [57]) and leave standard errors questionable, I refrain from using country-fixed effects. To account for within unit correlation, I cluster standard errors by country. In addition, I include three temporal splines as they allow controlling for unobserved time-varying heterogeneity [58]. As opposed to the inclusion of a lagged dependent variable or a Prais-Winsten (AR1) transformation, which implicitly assume that the variable has the same dynamic function, a model with splines can capture possible heterogeneous effects of shocks and trends caused by a disaster [58,59]. In combination with time dummies, which take the value 1 if a disaster occurred in the current year (*dummy0*) or in the previous 1–3 years (*dummy1* - *dummy3*, respectively), the baseline models in the following analysis accounts both for how disaster prone an area has been in the recent years and the temporal dynamics of disasters.

5. Empirical results

Table 2 depicts the baseline regression results of all models testing hypothesis 1, i.e. whether a larger share of the population affected by a disaster can be associated with higher levels of repression in the same year. As indicated by the non-significant coefficient of the population affected by a disaster, the size of the population affected by a rapid-onset disaster does not seem to have a substantial effect on repression in the

Table 1
Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Repression	1958	3.05	0.99	1	5
Affected	1958	15.30	139.86	0	2549
Fatalities	1958	0.44	6.65	0	222.641
GINI	288	39.52	8.44	16.23	60.79
Protest	1958	0.22	0.41	0	1
Civil conflict	1958	0.26	0.44	0	1
Cold war	1958	0.31	0.46	0	1
GDP per capita (ln)	1958	7.10	1.01	4.75	11.03
Aid (% of GDP)	1958	13.62	3.23	4.14	25.10
Population (ln)	1958	16.20	1.47	12.57	21.03

⁷ As Nunn and Qian [79] find that aid from the US is associated with an increase in civil conflict in aid-receiving countries, I run a separate regression excluding US-aid. Empirical findings remain unaffected by this specification and thus not further discussed below.

⁸ More specifically, aid activities bearing the following purpose codes are included: 70000, 72000, 72010, 72020, 72040, 72050, and 73010.

Table 2
Ordered probit estimates of the effect of disasters on repression.

	Model 1	Model 2	Model 3	Model 4
Affected	-0.000134 (0.000188)	-0.000148 (0.000189)	-0.000169 (0.000193)	-0.000177 (0.000194)
Protest	0.272*** (0.0796)	0.276*** (0.0802)	0.276*** (0.0794)	0.276*** (0.0794)
Civil conflict	1.480*** (0.126)	1.478*** (0.125)	1.481*** (0.126)	1.485*** (0.127)
Disaster aid (%)	0.123*** (0.0240)	0.125*** (0.0235)	0.124*** (0.0235)	0.124*** (0.0236)
GDP per capita (ln)	0.217*** (0.0836)	0.219*** (0.0831)	0.214*** (0.0831)	0.210** (0.0829)
Population (ln)	0.302*** (0.0431)	0.315*** (0.0430)	0.320*** (0.0434)	0.322*** (0.0436)
Cold war	0.0388 (0.174)	0.0301 (0.172)	0.0320 (0.173)	0.0162 (0.174)
Dummy0	-0.0781 (0.0798)			
Dummy1		-0.158** (0.0787)		
Dummy2			-0.191** (0.0895)	
Dummy3				-0.232** (0.0996)
Number of observations	1958	1950	1950	1950
Number of countries	112	112	112	112
Wald χ^2	380.59***	396.29***	385.03***	384.79***
Pseudo R ²	0.2045	0.2058	0.2064	0.2071

Notes: All models include temporal splines. Robust standard errors clustered by country are indicated in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

short run. Other control variables are as expected: the presence of dissent events such as protest or conflict is associated with higher levels of repression. Although the theoretical expectation is that larger disasters lead to higher resource constraints and thus are more likely to prompt repression, the non-significant estimate provides little support for the hypothesis of an unconditional effect of disasters. This finding is in line with Gutmann and Voigt [21] and also Wood and Wright [10] who find an increase in repression for the full sample but not if only non-democracies are considered. When looking at the temporal dummy variables in this sample of autocracies, however, estimates suggest that the occurrence of a disaster in the current or the previous year(s) is associated with lower levels of repression. This implies that the shock of a natural disaster on repression may not be as expected but can persist at least up to 3 years after a disaster.

Table 3 presents estimation results for the empirical models which explicitly account for pre-existing grievances in the form of political instability and economic inequality. More specifically, these specifications attempt to capture the conditional effect of natural disasters on repression. Model 1 in Table 3 presents the results for the interaction effect of pre-existing political instability and disaster strength, i.e. testing hypothesis 2.⁹ As expected by theory, the effect is positive and statistically significant at the 1% level. However, the inclusion of the lagged inequality measure reduces the number of observations and countries in the sample considerably to 94 observations and 20 countries, respectively. To increase parameter certainty by increasing sample size, model 2 in Table 3 therefore only includes the current value for economic inequality, which results in a larger sample of 70 countries. Although this alternation reduces the level of significance is slightly reduced to the 10% level, the conditional effect of pre-existing protest and in the onset of disaster fatalities is still positive. The same holds for hypothesis 3, namely the conditional effect of pre-existing economic inequality and disaster fatalities. All else equal, the interaction effect is

⁹ As the coefficients for the interaction effects are robust to variations in time dummies, i.e. *dummy0* to *dummy3*, only results including a dummy variable for the disaster year is included.

Table 3
Ordered probit estimates of the conditional effect of disasters on repression.

	Model 1	Model 2	Model 3
Affected	-0.00813 (0.00617)	-0.0164** (0.00689)	-0.0217*** (0.00486)
Protest (t)	-0.0319 (0.289)	0.289* (0.164)	0.154 (0.203)
Protest (t-1)	-0.193 (0.291)	-0.333* (0.178)	0.269 (0.164)
Affected x Protest (t-1)	0.0219*** (0.00764)	0.0159** (0.00689)	
GINI (t)	-0.0898* (0.0470)	0.00604 (0.0124)	
GINI (t-1)	0.0636 (0.0500)		0.0163 (0.0113)
Affected x GINI (t-1)			0.000480*** (0.000117)
Disaster aid (%)	0.133 (0.122)	0.172*** (0.0511)	0.203*** (0.0474)
GDP per capita (ln)	-0.0231 (0.237)	0.211 (0.154)	0.388*** (0.133)
Population (ln)	0.812*** (0.303)	0.429*** (0.0875)	0.396*** (0.0802)
Civil conflict	0.812 (0.596)	1.453*** (0.264)	1.335*** (0.240)
Cold war	-10.14*** (3.698)	0.597 (0.552)	0.123 (0.580)
Dummy0	0.501 (0.349)	0.283 (0.177)	-0.0326 (0.151)
Number of observations	94	288	279
Number of countries	20	70	71
Wald χ^2	1409.18***	189.05***	161.99***
Pseudo R ²	0.3599	0.2260	0.2231

Notes: All models include temporal splines. Robust standard errors clustered by country are indicated in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

positive and statistically significant at the 1% level. These signs of these coefficients of interest are as expected, namely positive, suggesting that pre-existing grievances in the form of political protests and economic inequality prompt an increase in repression as the toll of affected persons increases.

To illustrate these conditional relationships, marginal effects are presented in Figs. 1 and 2 since coefficients of interaction terms cannot be interpreted directly [60]. Fig. 1 shows the marginal effect of the number of affected people being conditional on protest as calculated in model 2 from Table 3. Examining this conditional effect more closely, it becomes obvious that this effect is statistically significant for the majority of disasters in the sample. In the light of pre-existing political instability, the probability of an increase in the repression score from a

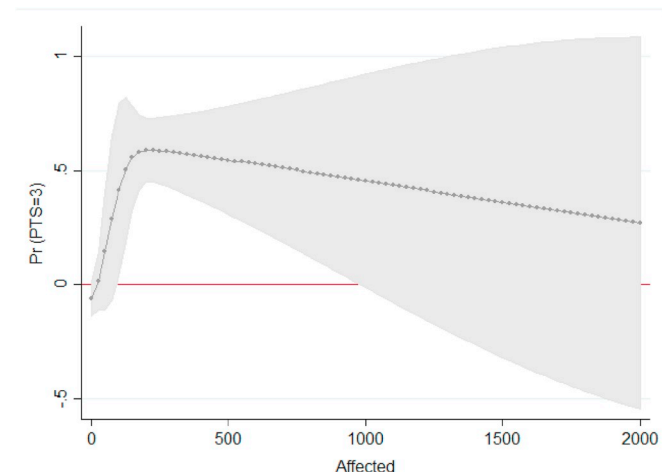


Fig. 1. The conditional effect of disaster and protest on repression.

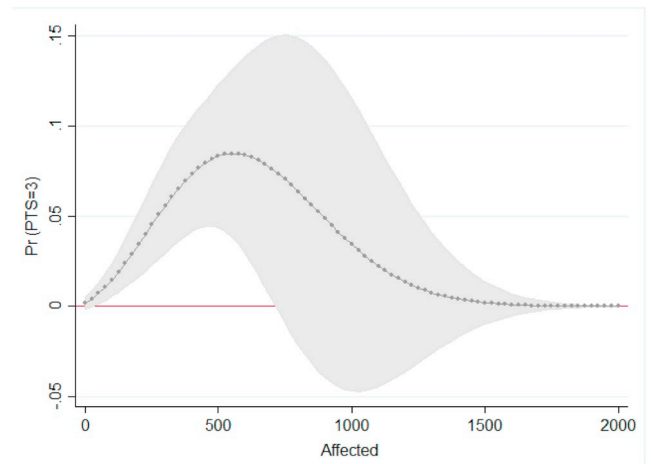


Fig. 2. The conditional effect of disaster and economic inequality on repression.

repression score of 2–3 is higher when more people are affected by a disaster.¹⁰ For example, in the aftermath of disasters, which affected approximately 150 000 persons, the probability of an increase in repression lies at about 50%. This disaster strength is comparable to the losses suffered in countries such as the Philippines, which experienced several high-impact typhoons in 2012. For very small and very large disasters, there is no statistical significant effect on the probability that the repression score increases. This is not surprising as minor natural event would only incur minor resource constraints and tensions. Apodaca [9] notes that in the light of extreme disasters the population is more concerned about surviving and may consequently not present a credible threat to the government.¹¹ Thus in some cases, large disasters - such as the Indian Ocean Tsunami in 2004—may even present an opportunity for conflict-struck societies (e.g., Le Billon et al. [40]) and Kelman0 [61] for a more detailed discussion on disaster diplomacy opportunities).

Fig. 2 depicts the marginal effects of the interaction term in model 3 from Table 3, i.e. it illustrates the predicted effect of an increase in preceding economic inequality by 1% at different numbers of people affected from natural disasters. In line with theoretical expectations, the probability of an increase in the repression score from 2 to 3 is higher when more people are affected by a disaster. With disasters affecting approximately 150 000 persons, the probability of an increase in repression lies at about 2%. Interestingly, data also reflect a pattern which suggests a turning point: the conditional effect is positive and increases up until a total of 575 000 individuals affected and decreases thereafter. Again, it has to be noted that this sum of people affected from natural events is very rare which is likely to be reflected by the greater uncertainty of coefficients as indicated by the spread of the confidence interval. In sum, results yield empirical support in line with both conditional effect hypotheses.

6. Robustness checks and discussion

Several changes in the research design are conducted to ensure the robustness of the previous findings: an alternative indicator for identifying non-democracies and restrictions to the measure of disaster strength and political instability. While previous findings remain

¹⁰ As the sample mean of repression lies between 2 and 3, the predicted effect of the interaction in Figs. 1 and 2 only depicts the probability of observing an outcome of category of 3.

¹¹ This non-significant effect applies to 14 country-years in this sample, in which more than 1 124 000 people were affected by disasters.

unaltered with an alternative decision criterion for the sample, disasters exert a positive effect on human rights protection when the focus lies on the number of fatalities. Pre-existing grievances at a stronger level are not associated with a post-disaster increase in repression. All regression tables of the following robustness checks are reported in the [appendix](#).

The theory focuses on non-democracies as only these regime types are expected to react with the theorized repressive response. Yet, the *polity2* indicator classifies countries according to constraints on the executive, which implicitly may contain elements of physical integrity rights. To check whether this could drive the null finding, I use a regime category variable available from Bjørnskov and Rode [62]. This variable follows the democracy-and-dictatorship data from Cheibub et al. [63], which considers a regime to be (non-)democratic if elections were (not) conducted or not free and fair. Also, a country is considered as non-democratic if there was a non-peaceful turnover following those elections. Following this stricter definition, the number of observations is marginally reduced from 1958 to 1903 for the baseline regression, but from 94 to 80 in [Table A2](#). Except for the model based on this largely reduced sample size, the main findings remain unaltered. There is no unconditional effect and still strong empirical support for both conditional effects in model 2 and model 3 (see [Tables A1 and A2](#) in the appendix).

Also, the main independent variable *Affected* is replaced taking account for the vagueness of the definition of “being affected” by a disaster. According to the EM-DAT glossary, a person is counted as “affected” if he or she requires immediate assistance in the aftermath of a disaster. This is a very broad conceptualization, which is likely to provide an imprecise estimate of the effect of disasters.¹² Therefore, I re-run the regression analysis above using the number of disaster fatalities assuming that it is a more accurate proxy for disaster severity. The sign of the unconditional effect of disaster fatalities is negative and statistically significant suggesting an increase in respect for physical integrity rights (see model 1 in [Table A3](#)). In contrast to previous results, neither the conditional effect for pre-existing instability nor pre-existing inequality is statistically significant (see model 2 and 3 in [Table A3](#) in the appendix). These findings follow an intuitive logic: if more potential political opponents are killed by a disaster, repression can be lower without the threat of losing office. An improvement in human rights outcomes could also be attributed to naming and shaming in press reports and by Amnesty International [64].

Public protests are the most likely but not only possible way in which the population can express their dissent against the government. Pre-existing grievances are also likely to be present if the population decides to riot or mobilizes for a revolution. Similar to information on protests, data on the occurrence of riots and revolutions is taken from Banks [53]. [Table A4](#) in the appendix, however, shows no empirical support for an unconditional effect in the light of riots or revolutions. This may be attributed to regional characteristics and the fact that it is more costly to mobilize a sufficient share of the population for a riot or a large-scale revolution, whereas protests are easier to organize. While protest also occur in rural areas, riots and revolutions are more likely to occur in urban areas. Raleigh et al. [15] suggest that, for instance, reactions to increased price volatility are more pronounced in urban areas. This is intuitive as not all regions suffer equally from a disaster [65]. Future research using geo-coded data on the exact location of dissent events, the economic structure of regions or districts, and the occurrence

of disasters is thus more likely to catch up on these dynamics than analysis at the country-year level.

With respect to future research avenues, it is also worth mentioning that there are possible reasons why human rights could deteriorate not in the same year but in the years after a disaster occurred. Often, the affected population and activists have experienced repressive measures at protests against failure of emergency relief programmes or during their investigations on the government’s response to the disaster which sometimes took place in the year following the disaster (e.g. Ref. [66]).¹³ In fact, empirical evidence finds support for a deterioration of such basic human rights a year after a disaster [21]. A common modeling choice for examining the effects of variables, which “persist into the future” ([67]:189), is to include a lagged dependent variable. Yet, research suggests that this cure can be worse than the disease of incorrectly modeling temporal dynamics (e.g., Refs. [59,68]). It is thus worth looking more into temporal scenarios of post-disaster repression, possibly with a particular focus on the effectiveness of rebuilding programmes.

7. Conclusion

A disaster strains resources and the affected population. A disaster in a situation, in which nerves are already on edge, does not only put additional pressure on resources but also challenges the government to respond. In response to political opposition, non-democracies often resort to repressive measures. In this article, I have analyzed a popular but so far un-tested theoretical claim: natural disasters add new grievances to existing ones. Responding against the backdrop of pre-existing, intensified risk, a government’s reaction is not only prompted but likely to be intensified in the aftermath of a disaster due to concerns for its political survival. This was assessed looking at the conditional effect of disasters and two correlates of grievance: anti-government protests and economic inequality.

Empirical estimations lend support to the theoretical considerations presented in this article. While there is no unconditional effect, i.e. disasters as such not being followed by an increase in repression, preceding political dissent and economic inequality can foster an increase in repression. The effect of economic inequality, however, is not very substantial, which is intuitive as grievances do not necessarily lead to political dissent. So as expected not every disaster incentivizes a leader so engage in repressive activities. If at all, it is rather the size of the disaster and the stability of the country, in which the disaster occurs, that matter. These findings suggest that post-disaster strategies should need to include the protection of human rights, especially in a country neglecting pre-existing grievances. Also, results provide some empirical support for the substantial importance of disaster relief and long-term investment in economic development *with respect to post-disaster repression*. It should be noted, however, that the positive effect of reduced economic inequality on other human rights may be stronger.

The focus of this article was to examine relationship between a rapid-onset disaster and repression while accounting for preceding inequality and instability. According to this setting, the effect of the disaster should be visible in the same period as the disaster occurs. Yet, as highlighted in the discussion of this article, the analysis of temporal dynamics as well as potential peace-promoting opportunities remain important avenues for future research in the field of disaster risk reduction.

¹² See Neumayer and Plümpner [80] for a detailed criticism of the accuracy of disaster variables provided by EM-DAT.

¹³ At the anniversary of the 2008 Sichuan earthquake repression, especially in the form of unlawful detention and beatings, increased preventing activists from giving evidence at trials ([66]:287f).

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Appendix

Table A1
Ordered probit estimates of the unconditional effect of disasters

	Model 1	Model 2	Model 3	Model 4
Affected	−0.000223 (0.000174)	−0.000231 (0.000174)	−0.000250 (0.000176)	−0.000258 (0.000177)
Protest	0.316*** (0.0829)	0.315*** (0.0837)	0.317*** (0.0828)	0.319*** (0.0830)
Civil conflict	1.442*** (0.124)	1.436*** (0.125)	1.440*** (0.126)	1.444*** (0.126)
Disaster aid (%)	0.115*** (0.0230)	0.117*** (0.0223)	0.117*** (0.0223)	0.117*** (0.0225)
GDP per capita (ln)	0.182** (0.0841)	0.185** (0.0833)	0.181** (0.0828)	0.177** (0.0827)
Population (ln)	0.328*** (0.0438)	0.334*** (0.0434)	0.341*** (0.0431)	0.343*** (0.0428)
Cold war	−0.0263 (0.180)	−0.0447 (0.178)	−0.0376 (0.179)	−0.0472 (0.179)
Dummy0	−0.0913 (0.0861)			
Dummy1		−0.116 (0.0857)		
Dummy2			−0.174* (0.0934)	
Dummy3				−0.214** (0.103)
Number of observations	1903	1896	1896	1896
Number of countries	110	110	110	110
Wald χ^2	425.25***	431.73***	430.56***	430.00***
Pseudo R ²	0.2175	0.2179	0.2189	0.2195

Notes: All models include temporal splines. Robust standard errors clustered by country are indicated in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Table A2
Ordered probit estimates of the conditional effect of disasters on repression.

	Model 1	Model 2	Model 3
Affected	-0.0175*** (0.00597)	-0.0145** (0.00706)	-0.0254*** (0.00586)
Protest (t)	0.111 (0.552)	0.350* (0.183)	-0.00722 (0.216)
Protest (t-1)	-0.0501 (0.411)	-0.168 (0.213)	0.414** (0.205)
Affected x Protest (t-1)	-0.0438 (0.0894)	0.0141** (0.00703)	
GINI (t)	-0.0489 (0.0502)	0.00745 (0.00877)	
GINI (t-1)	0.0730 (0.0538)		0.0111 (0.00906)
Affected x GINI (t-1)			0.000549*** (0.000139)
Disaster aid (%)	0.360*** (0.0714)	0.135*** (0.0502)	0.201*** (0.0480)
GDP per capita (ln)	0.0800 (0.199)	0.0456 (0.143)	0.278** (0.135)
Population (ln)	1.586*** (0.314)	0.501*** (0.0754)	0.545*** (0.0803)
Civil conflict	-0.529 (0.781)	1.213*** (0.270)	1.277*** (0.272)
Cold war	-6.256*** (2.064)	0.351 (0.573)	0.422 (0.661)
Dummy0	0.524 (0.527)	0.0903 (0.144)	0.00884 (0.163)
Number of observations	94	266	258
Number of countries	18	67	67
Wald χ^2	na	211.19***	142.61***
Pseudo R ²	0.5836	0.2358	0.2820

Notes: All models include temporal splines. Robust standard errors clustered by country are indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A3
Ordered probit estimates of the effect of disaster fatalities on repression.

	Model 1	Model 2	Model 3
Fatalities	-0.0057*** (0.00157)	-0.0117** (0.00557)	-0.0370 (0.122)
Protest (t)	0.272*** (0.0799)	0.287* (0.169)	0.112 (0.200)
Protest (t-1)		-0.277 (0.178)	0.226 (0.173)
Fatalities x Protest (t-1)		0.00462 (0.0116)	
GINI (t)		0.00749 (0.0126)	
GINI (t-1)			0.0188* (0.0114)
Fatalities x GINI (t-1)			0.000808 (0.00373)
Disaster aid (%)	0.124*** (0.0241)	0.167*** (0.0509)	0.203*** (0.0469)
GDP per capita (ln)	0.219*** (0.0839)	0.2107 (0.156)	0.417*** (0.138)
Population (ln)	0.300*** (0.0392)	0.400*** (0.0879)	0.381*** (0.0760)
Civil conflict	1.487*** (0.123)	1.423*** (0.263)	1.314*** (0.241)
Cold war	0.0440 (0.174)	0.665 (0.572)	0.164 (0.561)
Dummy0	-0.0750 (0.0797)	0.244 (0.174)	-0.0518 (0.151)
Number of observations	1958	288	279
Number of countries	112	70	71
Wald χ^2	378.31***	220.71***	146.31***
Pseudo R ²	0.2049	0.2202	0.2146

Notes: All models include temporal splines. Robust standard errors clustered by country are indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A4
Ordered probit estimates of the conditional effect of riots and revolutions.

	Model 1	Model 2
Affected	-0.000708 (0.000716)	-0.000480 (0.000626)
Protest (t)	0.184 (0.190)	0.176 (0.178)
Riots (t)	0.0696 (0.217)	
Riots (t-1)	0.223 (0.229)	
Affected x Riots (t-1)	0.000482 (0.00104)	
Revolution (t)		0.676*** (0.225)
Revolution (t-1)		0.484*** (0.175)
Affected x Revolution (t-1)		-0.00140 (0.00661)
GINI (t)	0.00848 (0.0121)	0.00330 (0.0126)
Civil conflict	1.385*** (0.273)	1.092*** (0.254)
Number of observations	288	288
Number of countries	70	70
Wald χ^2	143.65***	196.04***
Pseudo R ²	0.2523	0.2183

Notes: Both models include the same control variables as before, including temporal splines.

Robust standard errors clustered by country are indicated in parentheses. *** p<0.01, **

p<0.05, * p<0.1

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