Evaluating Empirical Explanations for State-Sponsored Violence with Ensemble Models[*]

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Abstract

The literature on state-sponsored violence has grown significantly over the last decades. Although scholars have suggested a number of potential correlates of mass killings, it is unclear whether those factors increase our ability to forecast state-led violence. Here we employ ensemble learning algorithms to test the predictive performance of 40 variables on a sample of 177 countries from 1945 to 2013. We find that most variables fail to improve out-of-sample predictive power (*mention opportunity logic*). We also find high-order interactions between the covariates, which the existing literature generally does not account for. We argue that empirical studies on mass atrocities should adopt more flexible modelling techniques and use predictive accuracy to validate theories and inform public policy decisions.

Keywords: ensemble models, genocide, mass killings, random forests, state-sponsored violence

JEL Classification Codes: C52, C53, D74, H56, K10

1 Introduction

Since the end of World War II, mass killings, genocides, and politicides have claimed over 34.5 million lives (Marshall et al. 2017).[1] The international community has responded with an effort to prevent further state-sponsored mass murder by strengthening laws against war crimes, genocide, and crimes against humanity. Furthermore, the United Nations established a Special Adviser on the Prevention of Genocide and recognised its members' responsibility to protect civilian populations within and outside their own borders. Yet, such atrocities still occur. Recently, President al-Assad of Syria has massacred tens of thousands of civilians during the Syrian Civil War (Goldman 2017). Similarly, South Sudan's President Kiir is actively starving and killing civilians from dissident and rival tribes (Nichols 2017). While there is some evidence that such atrocities may be declining since the Cold War (Valentino 2014), the international community has been far from successful in realising slogans like "Never Again" and "Not on My Watch" (Cheadle and Prendergast 2007).

Ultimately, effective prevention requires us to understand why mass killings occur. In this vein, the academic community offers a myriad of explanations as to why governments engage in brutality against their civilian populations. But while scholars have suggested several factors that correlate with state atrocities—such as the size and ethic composition of the population, government characteristics, and economic indicators—current theories have not been followed by systematic evaluations of their relative performance. As the quantitative literature on genocide expands, it is necessary to assess which relationships withstands over time so that the academic community can direct its efforts into more promising areas of research. Moreover, if the predictions the theories generate are unable to explain future events, existing findings offer little guidance to practitioners and policy-makers. Identifying robust predictors of mass killings improves the accuracy of early warning systems, which in turn leads to more effective genocide-prevention strategies.

In this paper, we employ random forests, a machine learning algorithm, to test the predictive ability of 40 variables identified as significant determinants of mass killings. Although a small group of variables increase the predictive accuracy of the models, most of them do not perform well in out-of-sample forecasts. We find that economic variables are the most significant predictors of

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[1]Genocide and politicide are the attempted intentional destruction of communal or political groups, respectively (see Harff and Gurr 1988). Mass killing includes these atrocities, as well as attacks against civilians that result in at least 1,000 deaths but are not intended to destroy a particular group (see Ulfelder and Valentino 2008). While some conflate the logic of these types of atrocities (e.g., Rummel 1995; Valentino et al. 2004), others claim genocide and politicide follow a different logic from other forms of government violence (Kalyvas 2006; Stanton 2015). For discussion on these important differences in conceptualisation see Straus (2007) and Finkel and Straus (2012).

state-sponsored violence, while political and demographic factors fare poorly in our models (*rewrite*). When we assess the marginal effects of the predictors, we also find that they are non-linear, showing high-order interactions and complex prediction patterns. Our results indicate that the literature on mass atrocities would benefit from focusing on a particular set of structural factors and adopting more flexible modelling techniques.

We first present a brief overview of the recent scholarship on mass killings and discuss its main findings. We then

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