

Agent-Based modeling of time-dependent relative deprivation and social unrest

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June 7, 2017

Abstract

The study of social conflict is a topic of central importance in social sciences. Classical theories on the causes, mechanisms and outcomes of social conflict processes, have been presented by important theorists like Karl Marx, Max Weber, Georg Simmel, Lewis Coser [2] and Ralph Dahrendorf [3]. These theories highlighted key elements of large-scale conflict processes such as inequality and stratification (“class”) as causes of deprivation, as well as legitimacy and the nature of goals (“material” or “transcendental”) [16]. Later theories introduced the concept of illegitimate “relative deprivation” (RD), defined as the gap between value expectations (perceived as legitimate) and value capabilities, as the key variable associated with the potential for conflict [17, 11]. Frustration-aggression [5, 11] and “cascades of preference revelation” [12, 13] have been postulated as key mechanisms for large-scale social conflict. In his frustration-aggression theory on the likelihood and magnitude of civil violence, Ted Gurr considered three different patterns of time-varying RD, namely decremental, aspirational and progressive, that can lead to sudden bursts of social unrest [11].

Recently, social conflict has been studied by means of simulation, using Agent-based models (ABM) [7]. Epstein et al. [9] and Epstein [6] introduced an ABM of civil violence against a central authority, with an extension to ethnic conflict, which describes many features of

real conflict processes, particularly punctuated equilibrium (intermittent bursts of rebellion). The strength of Epstein’s model lies in its simplicity (only two types of agents, “citizens” and “cops,” with just two simple rules for each type), the relevance of the variables chosen, the soundness of the formulation, and its explanatory power. However, in Epstein’s original model also has limitations. For example, the citizens’ grievance is not expressed as a function of RD. Lemos extended Epstein’s model by introducing sensitivity-dependent RD, and compared simulation results with patterns of size, duration and recurrence of conflict events in countries affected by the “Arab Spring” [14]. However, the influence of time variations of RD on the onset of social unrest was not simulated.

The purpose of the present study was to demonstrate how the “J-curve hypothesis” of Davies [4], according to which revolutions are likely to occur when a prolonged period of development is followed by a short and sharp decline, can be simulated using ABM. The model used is an extension of Epstein’s ABM, in which the hardship of agents representing citizens in a population is expressed as a function of RD and the legitimacy of the central authority depends on the proportion of citizens that do not rebel [14]. To represent the time-dependent patterns of RD, the citizens’ individual “value” and “expectation” were made variable to represent the decremental, aspirational and progressive patterns of RD in Ted Gurr’s frustration-aggression theory of civil violence. Three sets of simulations were performed to show the model’s ability to represent the sudden burst of social unrest when the gap between the medians of “expectation” and “value” widens, in otherwise stable conditions, for the three patterns of RD. International indicators [1, 15] and databases of conflict events [18, 19] for some countries affected by the “Arab Spring” were used to obtain plausible estimates for the input parameters and analyze the simulated patterns of size, duration and recurrence of conflict events, as done in Lemos [14].

Acknowledgments Funding by the Research Council of Norway (grant #250449) is gratefully acknowledged.

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