

Prospectus: *Historical Dynamics* by Peter Turchin

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The problem

Many historical processes are dynamic: growth and decline of populations, territorial expansion and contraction of empires, political centralization/decentralization trends, and the spread of world religions, to name just a few examples. A general approach to studying dynamical systems is to advance rival hypotheses based on specific mechanisms, translate the hypotheses into mathematical models, and contrast model predictions with empirical patterns. Mathematical modeling is a key ingredient in this research program because quantitative dynamical phenomena, often affected by complex feedbacks, cannot be fully understood at a purely verbal level. Another important ingredient is the full use of statistical techniques (such as time-series analysis) for quantitative and rigorous comparison between model-predicted and observed patterns. This general approach has proved to be extremely successful in natural sciences. Can it be instrumental in increasing our understanding of historical processes?

Historical Dynamics is an attempt to answer this question. The specific problem chosen for analysis is the territorial dynamics of agrarian states. In other words, can we understand why some polities at certain times expand, while at other times contract? The advantage of focusing on territorial expansion/contraction is that we have reasonably accurate empirical data on this aspect of historical dynamics (historical atlases). The focus on agrarian polities is motivated by the extent of empirical material (roughly, from the 3rd millennium BCE to 1800 CE), and greater simplicity of these societies compared to modern ones, potentially making them easier to understand and model.

From theories to empirical tests

Four theories were used as sources of mechanisms potentially explaining territorial dynamics. The first is the geopolitical model of Randall Collins (geopolitical resources, logistic loads, and the positional “marchland” advantage). This theory has been very clearly formulated and required minimal work to translate into a mathematical model. The second one, by contrast, is an original development. Starting from ideas of the 14th century thinker Ibn Khaldun and recent developments in sociobiology, I advance a theory attempting to explain why the capacity for collective action may vary among different societies. Consideration of factors that are expected to increase or decrease the capacity for collective action leads to the prediction that most aggressive polities (that is, polities characterized by high expansion rates) should originate from areas where frontiers of large empires coincide with intense ethnic boundaries (termed “metaethnic frontiers”). The third theory (really, a collection of alternative models) addresses the issue of ethnic assimilation/religious conversion dynamics. Finally, the fourth theory focuses on the interaction between population dynamics and sociopolitical stability. The connection between population growth and state breakdown is based on the demographic-structural model of Jack Goldstone. To this model, I add the feedback mechanism, postulating how state breakdown and resulting sociopolitical instability negatively affect population numbers. The four theories address somewhat different aspects of historical dynamics, and thus logically are not mutually exclusive. However, alternative hypotheses about particular empirical patterns can be derived from them (for example, the contrast between the “marchland” and the “metaethnic frontier” effects, see below).

Empirical results can be summarized as follows. A comparison between dynamics predicted by geopolitical models and expansion/contraction curves of historical states reveals a qualitative mismatch: geopolitical models predict an abrupt collapse of large empires, but slow declines of more than a century are quite frequent (about half the cases in Rein Taagepera’s database). This notion of the temporal scale of declines is made more precise with the concept of *process order* from dynamical systems theory. The observation that geopolitical models cannot predict the observed slow declines does not mean that mechanisms postulated by these models do

not operate in real societies. Rather, the conclusion is that the pure geopolitical theory provides (at best) a partial explanation of empirical patterns.

The metaethnic frontier model was tested on historical material for Europe between 0 and 1900 CE. Two variables were constructed: (1) the location, duration, and intensity of metaethnic frontiers, and (2) the spatial origin, and timing and rate of expansion of territorial states larger than 0.1 Mm². A statistical test revealed a very high degree of association between the two variables, providing strong empirical support for the metaethnic frontier model. Interestingly, applying the same analytical machinery to test the marchland effect, revealed no statistical association between protected position and propensity to expand.

Models of ethnic assimilation/religious conversion were tested by comparing their predictions to historical rates of expansion of Christianity, Islam, and Mormons. The tests showed that one model fitted all datasets much better than the two alternatives. The “winner” also happened to be the most theoretically sound model. Interestingly, the best model fitted one dataset (conversion to Islam) very well, with better than 99% accuracy, a result quite remarkable for social science applications.

Finally, the predictions of the demographic-structural theory (periodic waves of state breakdown accompanied by oscillations in population numbers) were tested by conducting a survey of long-term fluctuation patterns in historical populations. The results tended to support the theoretical predictions, at least for regions and periods for which we have reasonably detailed data. However, historical reconstruction of population dynamics are notoriously affected by the subjective element, while the majority of archeological data are not yet precise enough to provide a rigorous test of the theory. Nevertheless, interesting results were obtained in one case (China), where data on both population dynamics and sociopolitical instability were available. Formal methods of time-series analysis revealed a strong association between the two variables, supporting the idea that they are dynamically interlinked (as is postulated by the theory).