SECULAR CYCLES: LONG-TERM OSCILLATIONS IN ECONOMIC AND SOCIAL STRUCTURES OF AGRARIAN SOCIETIES

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One particularly interesting dynamic pattern in history is the oscillation of centralization and decentralization of political power, seemingly affecting all hierarchical macrosystems, from systems of chiefdoms to world empires. What sociopolitical mechanisms may explain these dynamics? I will present some mathematical models and data that address this question.

The decline and fall of the Roman Empire, recurrent collapses of Mesopotamian civilizations, and rise and demise of great powers – such historical events excite lay public's imagination and provide fodder for controversies about possible causes among historians. Explanations range from particularistic, specific for each instance of collapse (e.g., the role of Christianity in the fall of Rome [1]), to very general such as Joseph Tainter's theory that diminishing returns on sociopolitical complexity lead to imperial decline and collapse [2]. Here I focus on one explanation of recurrent waves of state breakdown experienced by the agrarian states and empires, the demographic-structural theory [3, 4].

According to this theory, population growth in excess of the productivity gains of the land has several effects on social institutions. First, it leads to persistent price inflation, falling real wages, rural misery, urban migration, and increased frequency of food riots and wage protests. Second, rapid expansion of population results in an increased number of aspirants for elite positions. Increased intraelite competition leads to the formation of rival patronage networks vying for state rewards. As a result, elites become riven by increasing rivalry and factionalism. Third, population growth leads to expansion of the army and the bureaucracy and rising real costs. States have no choice but to seek to expand taxation, despite resistance from the elites and the general populace. Yet, attempts to increase revenues cannot offset the spiraling state expenses. Thus, even though the state is rapidly raising taxes, it is still headed for fiscal crisis. As all these trends intensify, the end result is state bancruptcy and consequent loss of the military control; elite movements of regional and national rebellion; and a combination of elite-mobilized and popular uprisings that manifest the breakdown of central authority [3].

Sociopolitical instability resulting from state collapse feeds back on population growth. Most obviously, when the state is weak or absent, the populace will suffer from elevated mortality due to increased crime, banditry, and internal and external warfare. Additionally, the times of troubles cause increased migration rate, as refugees flee war-affected areas. Migration may lead to emigration (and we can simply add that to mortality) and to spread of epidemics. Increased vagrancy spreads the disease by connecting areas that would stay isolated during better times. As vagabonds and beggars aggregate in towns and cities, increasing their population size, they may tip the density over the epidemiological threshold (a critical density above which a disease spreads). Finally, political instability causes lower reproduction rates, because during uncertain times people choose to marry later and to have fewer children. People's choices about their family sizes may be reflected not only in birth rates, but also in increased rates of infanticide.

Instability can also affect the productive capacity of the society. First, the state offers protection. In a stateless society people can live only in natural strongholds, or places that can be made defensible. Examples include hillfort chiefdoms in preconquest Peru, and the movement of settlements to hilltops in Italy after the collapse of the Roman Empire [4]. Fearful of attack, they can cultivate only a small proportion of productive area that is near fortified settlements. The strong state protects the productive population from external and internal (banditry, civil war) threats, and thus allows the whole cultivable area to be put into production. Second, states often invest in increasing the agricultural productivity by constructing irrigation canals, roads, and flood control structures. A protracted period of civil war results in a deterioration and outright destruction of this productivity-enhancing infrastructure.

I investigated the theoretical relationships between population numbers and social structures, described above, with a suite of dynamical models, ranging from very simple to moderately complex [4]. The mathematical theory suggests two general insights. First, population numbers should oscillate with a period of roughly two-three centuries. Second, sociopolitical instability also oscillates with the same period, but shifted in phase with respect to population numbers.

The theory, thus, yields quantitative predictions about the dynamical relationship between population and instability. These theoretical predictions are tested with time-series data on population dynamics and sociopolitical instability in early modern England, the Han and Tang China, and the Roman Empire. Statistical analysis of these empirical case-studies, ranging spatially across the breadth of Eurasia and temporally over two millenia, suggests that the demographic-structural theory does an excellent job of capturing dynamical relationships between population change and sociopolitical instability.

References

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