Dissertation Précis

Leviathan in the Tropics? Environment, State Capacity, and Civil Conflict in the Developing World

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Summary:

Though the origins, capabilities, and scope of the modern state are among the most studied topics in political science, sociology, and history, the link between the environment and state capacity has become a significant topic of concern only in the past fifteen years. During this time, two ostensibly new, nontraditional threats to human security have emerged: failed states and global climate change. Though our awareness of the connection between the viability of human societies and the sustainability of our environment may be in its relative infancy, the position of this dissertation is that environmental and geographic factors have conditioned the institutional development of the modern state.

Specifically, I investigate the long term effects of the environment and geography on the capacity of states to generate revenue in the form of taxation and to deter violent, internal challenges to their authority. Expanding on the demand side, war-driven explanation for the form of state institutions, I focus on the economic incentives for state-building actors to invest in the capacity to tax their citizens. I contend that current differences in the capacity of states were determined historically by 1) the economic resource bases available during the preindustrial period of state formation, and 2) the problems of enforcing tax compliance in areas where traditional military forces have had difficulty projecting power.

The labor and capital concentration of preindustrial agriculture varied according to agroclimatic conditions: in tropical zones, agricultural production was comparatively concentrated, whereas temperate agriculture was comparatively diffuse. Where production was more concentrated, states developed without heavy investments in mechanisms for identifying, monitoring, and coercing economic actors into complying with state-building actors' tax efforts. Where production was more diffuse, state-building actors had to invest more in developing these mechanisms. Because these institutions were costly, state-building actors expanded their territorial
rule to draw more taxpayers into the system and enjoy economies of scale. Moreover, the prevailing terrain, whether open or relatively impenetrable, determined the relative costs to developing this capacity. Jointly, the diffuseness of preindustrial resource bases and terrain determined the incentives to develop state capacity.

Further, I argue that the primary effects of environmental and geographic factors on civil conflict are mediated by their effects on the capacity of state institutions, specifically, the ability to tax and the development of coercive power to enforce it. This insight is broadly in line with the demand side story common to war-driven arguments for state formation in early modern Europe, as well as opportunity models of civil conflict. Such arguments are linked conceptually but heretofore have not been unified under a common theoretical framework, or subjected to tests that adequately account for the effects of the environment and geography on state capacity.

I present evidence for the impact of environmental and geographic factors on state capacity in three empirical chapters. First, I address the ability of the state to levy taxes. As predicted, preindustrial resource diffuseness, measured by climate suitability for temperate, cold-season cereal agriculture (climate scale), is positively and strongly associated with the tax/GDP ratio, while terrain impenetrability, measured as mountainous terrain, is negatively and strongly associated. Moreover, the relationships are very robust and model independent, even in the presence of endogenous indicators typical of the taxation literature and dummy variables for geographic regions.

Second, I estimate the indirect effect of geography—as mediated through taxation—on the incidence of violent internal conflict. Using two-stage probit models to estimate the indirect effects of climate and geography on conflict incidence, as mediated by my preferred measure of state capacity (the tax/GDP ratio), I find that the mediated effects of the environment and geography on conflict incidence are strong and trump that of more common explanatory variables and the direct, tactical effect of geography.

Finally, I address the conventional wisdom relating climate change to conflict. I argue that the effects of climate change on the onset of conflict can be conceived of as 1) long term trends that may lead to a higher baseline probability of conflict, and 2) short term triggers that affect the interannual variability in that probability. I estimate the impact of both long term trends and short term triggers on the onset of civil conflict in Sub-Saharan Africa. I find that both operationalizations have a significant impact on the likelihood of conflict onset, even in the presence of controls typical of the conflict literature. An analysis of marginal effects leads me to
conclude that interannual variability matters more than the specter of changes in overall climate that take place over long time periods.

This dissertation makes two principal contributions. First, in contributing a theory linking the environment and geography to resource mobilization strategies of state-building actors, and testing this argument empirically, it contributes to both the theoretical and empirical literatures on comparative political economy and state development. Second, it makes valuable theoretical and empirical contributions to the study of the environment, geography and conflict.

Chapter-by-Chapter Abstracts

Chapter Two: Literature Review and Theory

Chapter two provides a review of the parallel literatures on civil conflict and environmental impacts on the developmental trajectories of states, as well as a discussion of some of the particular theoretical and methodological issues, endogeneity and instrumental variables regression, that complicate the testing of arguments that hinge on “deep” determinants. Building on this foundation, I contend that current differences in the capacity of states were determined historically by 1) the economic resource bases available during the period of state formation, and 2) the problems of enforcing tax compliance in areas where traditional military forces have had difficulty projecting power. Though institutions may be changed over time, their persistence can be explained by the creation of winners and losers, which endow winners with specific interests in maintaining the status quo (Acemoglu and Robinson 2006). This insight helps to explain institutional persistence despite the existence of seemingly Pareto-superior alternate institutional frameworks.

Chapter Three: Taxation in the Tropics

Chapter three addresses the massive cross-country disparities in the degree to which the state is able to access the economic resources of society via taxation. Using data on 157 countries over the time period 1980-2002, I estimate the impacts of climate and geography on the tax/GDP ratio. As predicted, climate scale is positively and strongly associated with the tax/GDP ratio, while mountainous terrain is negatively and strongly associated. Moreover, the relationships are robust and model independent, even in the presence of controls for wealth, regime type, inequality, patterns of employment and dummy variables for geographic regions. Most striking, however, is
that a simple model of total tax share as a function of climate and geography outperforms several more nuanced models in the extant literature.

Chapter Four: “Head for the Hills!” Or This Hard Land?

In chapter four, I challenge the conventional discourse relating the environment and geography to civil conflict. I argue that in emphasizing only direct, strategic and tactical effects, we are not casting our nets sufficiently widely. I argue that states, as fiscal-military institutions, are also products of their environment. In accordance with my theoretical model, I argue that the primary effect of geography on conflict may be indirect, mediated by its effect on the capacity of states against which insurgents rebel, rather than a direct, strategic and tactical effect. I use two-stage probit models to estimate the indirect effect of geography on conflict as mediated by the tax/GDP ratio. In the first stage, I use three instruments for the tax/GDP ratio: climate scale, which proxies resource diffusion; mountainous terrain, which proxies terrain penetrability; and the percent of land area in malarious zones, which controls for the potential confounding effect of disease environment. In the second stage, I estimate the effect of the instrumented taxation variable on the incidence of civil conflict from 1970-2002. I find that, once properly instrumented, the tax/GDP ratio is strongly and negatively associated with the incidence of conflict: as taxation increases as a share of national economic output, conflict becomes less likely. Moreover, once the climatic and geographic effects on state capacity are accounted for, several of the most widely accepted explanatory variables in the conflict literature (GDP per capita, the coherence of political institutions, and oil export dependence) do not affect the incidence of conflict, apart from their indirect effects on the tax/GDP ratio. In a like manner, the direct effect of geography on conflict disappears. Thus, I conclude that, at the state level, environment and geography affect conflict incidence more by determining the capabilities of states that populate the international system than by affecting the physical, tactical environment in which potential insurgents operate.

Chapter Five: Trends and Triggers: Climate, Climate Change and Civil Conflict in Sub-Saharan Africa

Chapter five addresses the conventional wisdom relating climate change to conflict, which focuses on long term trends in temperature and precipitation that define climates and their subsequent impacts on access to renewable resources, from two complementary perspectives. First, the effects of climate change on the onset of conflict can be conceived of as 1) long term
trends that may lead to a higher baseline probability of conflict, and 2) short term triggers that affect the interannual variability in that probability. I estimate the impact of both long term trends (operationalized as climate suitability for cold-cereal grain-producing agriculture, land degradation, and freshwater availability per capita) and short term triggers (operationalized as the lagged percent change in annual rainfall) on the onset of civil conflict in Sub-Saharan Africa. I find that both operationalizations have a significant impact on the likelihood of conflict onset, even in the presence of controls typical of the conflict literature. An analysis of marginal effects leads me to conclude that interannual variability matters more than the specter of changes in overall climate that take place over long time periods. Second, I assess the outlook for the future based on an analysis of projected changes in precipitation means and variability from a general circulation model. Using simulated values for precipitation over the period 2000-2099, I find that total annual precipitation flux is expected to increase in western Africa and the Sahel while decreasing in southern Africa. Moreover, few significant trends are found in my measure of interannual variability throughout the region. These findings point to two conclusions. The first is that the future for Africa will not necessarily be marked by increasingly variable rainfall, the most significant climatic variable in my analysis of conflict onset. The second regards policy. The findings suggest that reducing dependence on rainwater for agriculture may mitigate conflict, even as rainfall variability is not predicted to increase over time.

Chapter Six: Concluding Remarks

Chapter six offers some concluding remarks about the relationship between the environment, geography, and state capacity. In addition to identifying and recapping the major findings of the project, the chapter offers some informed conjectures regarding the prospects for environmental factors affecting the composition of the state system in the future. I argue that conceptualizing short term environmental stresses as trigger mechanisms, rather than deep causes of conflict, will help political scientists identify the climatic factors that are most likely to tip precarious situations into open conflict or state failure.