

Steven Davis Remarks on

The Ecological Origins of Economic and Political Systems

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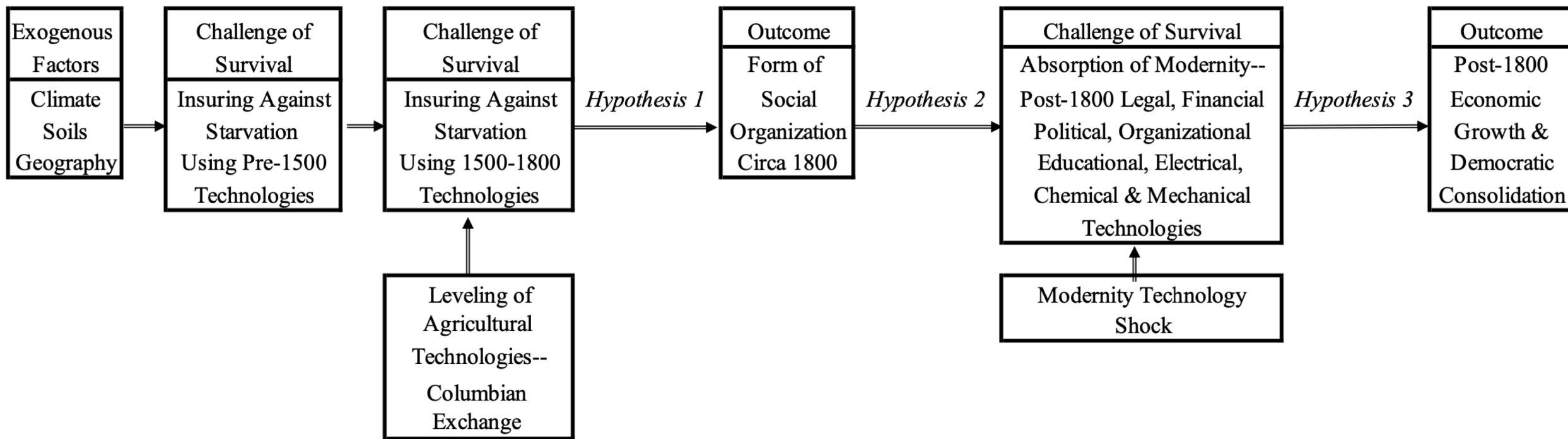
Stanford University

Make no little plans. They have no magic to stir men's blood and probably will not themselves be realized.

Credited to Daniel Burnham, an architect, who (along with John Root) planned the World's Columbian Exposition in Chicago in 1893 – a world's fair with participation from 46 countries to celebrate the 400th anniversary of Christopher Columbus's arrival in the Americas.

Write no little papers.

Economic Origins of Economic and Political Systems



A largely implicit aspect of the theory: Modern (and even pre-modern) states often encompass multiple city-hinterland pairs with different theory-predicted ecologies. States are not smaller and more finely tailored to local environmental conditions, because they wage war to expand/maintain their territory, and the victors impose their social systems on the defeated. **Hence, the analysis relates the social organization of the state to the theory-predicted ecology of its largest-city hinterland, NOT to some (weighted) average of the predicted ecologies for the various city-hinterland pairs encompassed by the modern-day state.**

First Hypothesis

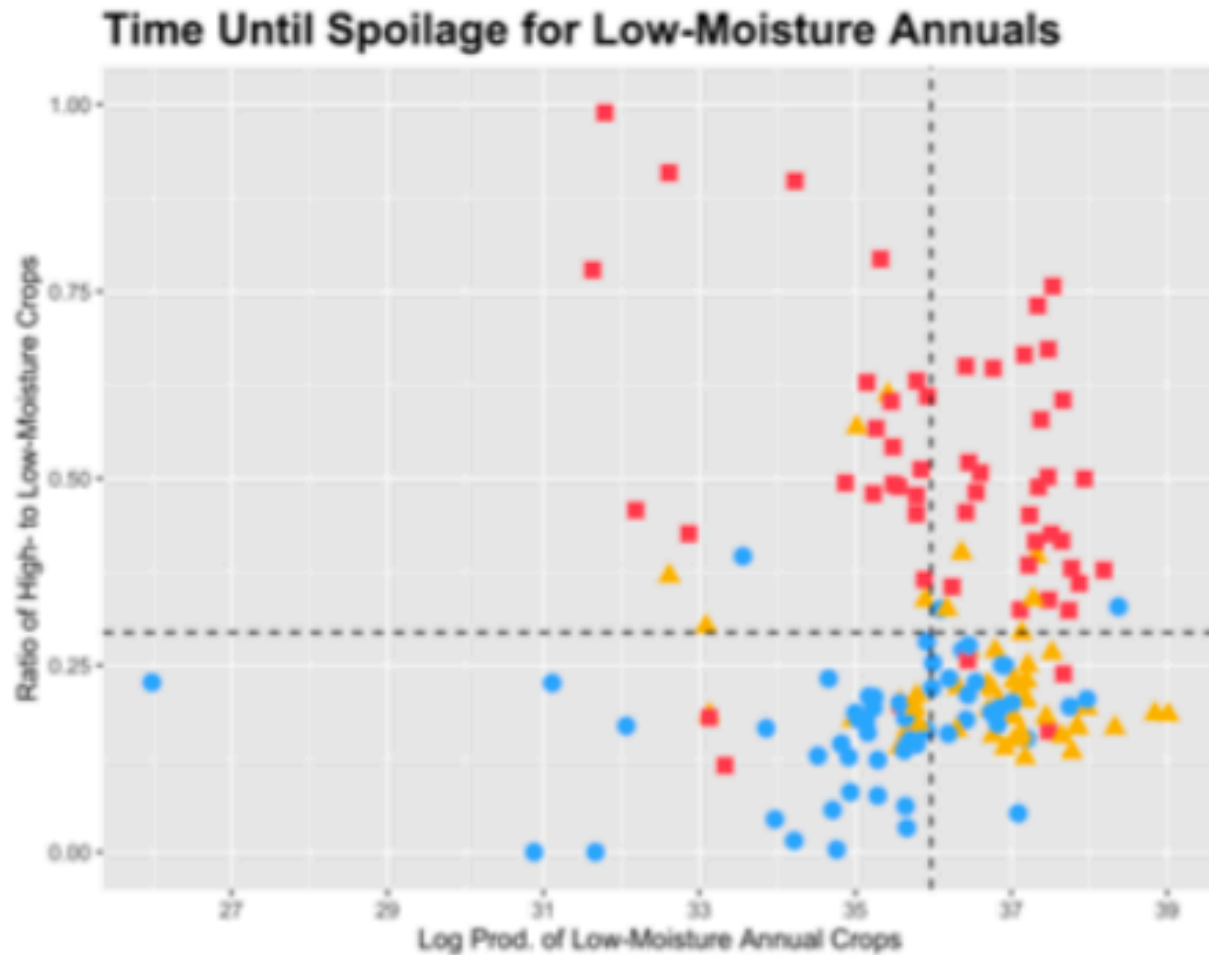
“Agents met the fundamental challenge of insuring against starvation in an incremental, uncoordinated, and protracted manner.... Because complex combinations of factor endowments varied, social and institutional adaptations varied.”

1. Social: behaviors and plans, expecting others to behave and plan.
2. Institutional: systems of property rights, taxation, governance.

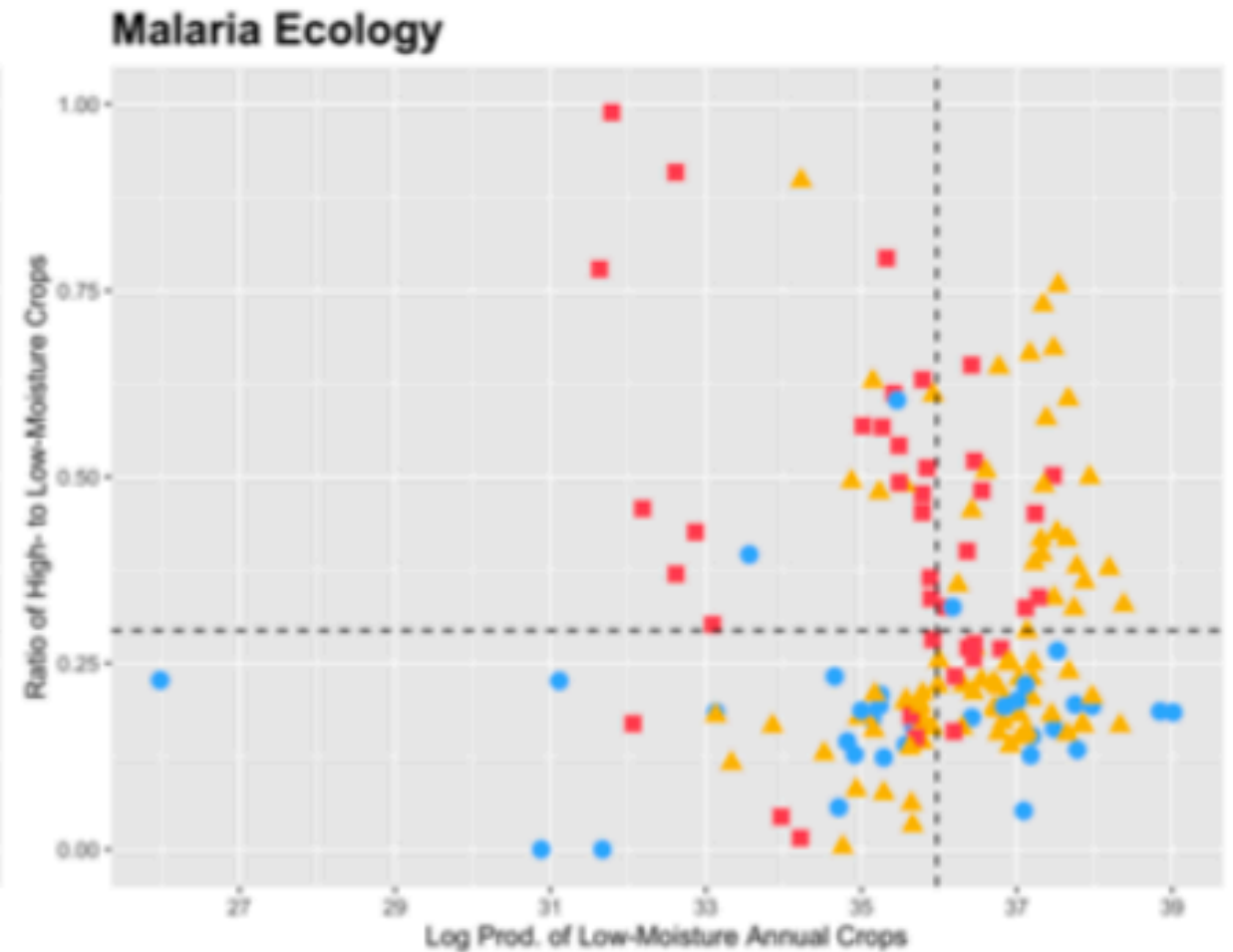
Taxonomy of pre-modern social organizations (and ecologies):

1. **Transactional**: easy-to-store, easy-to-trade crops with low moisture content led to decentralized decision-making coordinated through markets.
2. **Risk-pooling** (forced sharing): Same crops but spatially and temporally correlated droughts inhibited the usefulness of local trade as an insurance mechanism. Centralized decision making emerged in response.
3. **Self-Sufficient**: Local environment featured production and consumption of difficult-to-store and, hence, difficult-to-trade perennial crops with high moisture content. Decentralized but uncoordinated decision-making by households.
4. **Pastoral**: Crop production infeasible, reliance on large herbivores that converted wild grass into milk and meat. Decentralized, but uncoordinated decision-making by mobile bands.

Figure 3 Excerpt:



Category of Grain Storage: ■ Below 72 days ▲ 72-150 days ● Above 150 days



Malaria Ecology Index: ● 0-0.05 ▲ 0.06-7 ■ More than 7

Suggestions, 1

1. Create beautiful, reader-friendly versions of Figures 3 and 4. Put them on the web, and make them interactive. Put analogs to Figure 5 on the web for every city-hinterland pair.
2. Report model-predicted Ecology classifications for each city-hinterland pair on the web. Invite commentary.
3. Outsource the Ecology classifications – or perhaps just the social organization aspect – to (hundreds of) expert specialists:
 - Explain purpose in invitation letter. Succinctly define ecologies and social organizations. Elicit classifications for expert-specific city-hinterland pairs in specified periods. Start with 10-20, get input, refine letter, iterate.
 - Experts can go beyond single-type classifications and offer richer, more nuanced characterizations of social organizations.
 - A cross-check on, complement to, and extension of algorithm-based classifications.

Suggestions, 2

4. Subject the algorithm-based classifications to a broader set of evaluations. More on that shortly.
5. Expand the set of city-hinterland pairs in the data by classifying their ecologies in pre-modern and pre-colonial periods, before nation-states absorbed and colonized many of them. I believe this is feasible when relying on expert classifications.
 - Currently, the statistical analysis considers 163 modern states and their largest-city hinterland pairs.
 - Is it possible to double or triple the number of observations that can be brought to bear on the First Hypothesis (and the Second)?

Remarks on the Classifications, 1

“The [Naïve Bayes] algorithm yields four distinct bins: 135 of the 163 hinterlands are placed into a single bin at greater than 95 percent probability, 141 at greater than 90 percent, and 150 at greater than 75 percent; there are no hinterlands that are placed into more than two bins at a probability of greater than five percent.”

This is a very confident set of classification predictions. How do the algorithm-generated classifications compare to the actual outcomes as of 1500 or 1800? Is the confidence fully warranted? I suspect not.

Remarks on the Classifications, 2

“Ecologies are not reified entities with sharp boundaries but are continua; adjacent cases might be only marginally different from one another,...” That would be my view as well, but it’s at odds with the highly confident predictions generated by the classification algorithm.

Which performs better in explaining real GDP per capita after 1800? Algorithm-based classifications or expert-based classifications? This is more than a horse race, because the results would help assess whether the “exogenous factors” work for the reasons articulated by the theory.

Other Implications of the Theory

1. Empirically, do we see more unexplained variability/less predictability in the pre-modern social organization of the "adjacent" areas as compared to the extreme cases?
2. Do we also see more unexplained variability/less predictability in real GDP per capita after 1800 for the adjacent cases?
 - In Table 1, for example, is there a negative relationship between $|\text{residuals}|$ and $\max(\text{type probability})$, as the theory implies?

Second Hypothesis

“The form of social organization that emerged after the Columbian Exchange, but before it became feasible to transport staple foods long distances in the 19th century, conditioned how societies could respond to a new great challenge of survival—the technology shock of modernity.”

”Rates of absorption of the technologies of modernity varied because societies could not jettison their pre-existing forms of social organization overnight without cost. They inherited stocks of human capital, systems of law, forms of contract and property rights, moral codes, lifeways, and distributions of power that had coevolved over the course of centuries. Societies therefore responded differentially to the shock of modernity.”

Absorption Capacity of Ecologies

1. **Transactional ecologies** were better suited than the others to absorb the new technologies as a broad suite because they could do so organically, from below; a dense network of markets that had already emerged endogenously could coordinate the activities of agents that had already been incentivized to invest in transaction-specific human capital, such as literacy, numeracy, and fluency with complex contracts.
2. **Risk-pooling ecologies** could not absorb the new technologies in this organic, bottom-up manner, but had to do so by engineering their absorption from the top down—in ones and twos, in fits and starts—because a centralizing authority, populated by agents that had been incentivized to invest in human capital related to administration and coercion, had already emerged endogenously to manage a system of enforced sharing.
3. **Self-Sufficient and Pastoral Ecologies** had neither the dense markets nor the centralized authority that enable effective absorption of the technologies associated with modernity.

Raising A Big Question (for this Group as Much as the Authors)

If these characterizations of ecologies are largely correct, why has virtually every successful Transactional society moved in the direction of more centralized authority and more compulsory risk sharing and redistribution since WW II or earlier?

Here, I refer to the rise of the social welfare state and the regulatory state, accompanied by enormous increases in the scale and scope of governments and an attendant curtailment of and interference with market forces?

This development finds no ready explanation in the factors stressed by the authors' theory of how and why distinct ecologies emerge.

Third Hypothesis

Today's cross-country distributions of prosperity, human capital, democratic consolidation and more are joint outcomes of development paths set in motion by pre-1800 local factor endowments and the social organizations to which they gave rise. (My paraphrasing)

Predictions about:

- The timing of divergence across countries in economic development, **democratic consolidation**, technological absorption, investments in trade-related human capital, and the growth of markets.
- Which countries were colonizers and which were not.
- Geographic clustering of economic development.

On Risk-Pooling Ecologies

Why were the centralized authorities in risk-pooling ecologies so unable to accommodate markets and their benefits? The benefits must have been deeply non-obvious, highly inimical to the survival of the central authority, or highly detrimental to the interests of other parties with close links to the central authority.

The paper offers a partial answer: “The logic inherent in this government-run risk pooling system required that it repress private market intermediaries; arbitrage opportunities by private agents were effectively taken off the table. As Li (2007: 161-164, 175-180) documents, government officials forced merchants to sell their grain to state granaries at below market prices and limited the size and location of grain shops.”

Remarks about Risk-Pooling Ecologies, 2

But why not foster private markets for everything else?

- “During the Song dynasty (960-1279 CE) a growing commercial economy powered numerous innovations, such as the use of coal in iron and steel smelting, water-powered clocks, gunpowder, and the cannon....
- “During the Qing dynasty (1644-1911), “the emperor discouraged the emergence of a robust and independent merchant class by forcing all foreign trade to go through Canton, where it was handled by merchant guilds that had exclusive trading rights (Meyers and Wang 2002), and a legal system built around the idea that business enterprises were outgrowths of families, owned by lineage trusts (a legal maneuver to prevent state expropriation by holding title to property in the spirit of an ancestor), limited the mobilization of impersonal sources of capital for large-scale business enterprises.”
- “The Qing economy boasted a broad range of private banks, some of which specialized in financing long distance trade and others of which focused on agricultural credit. Underpinning these banks, as well as the *zihao*, was a legal system that respected private property and enforced contracts.”

Remarks about Risk-Pooling Ecologies, 3

“The best estimates suggest that China’s per capita GDP fell by roughly 40 percent from 1700 to 1850, at which point it was only one-fifth that of Great Britain (Broadberry, Guan, and Li 2018). That divergence in economic development was reflected in crushing defeats in the Opium Wars of 1839-42 and 1856-60. Those losses induced Chinese elites to take note of the broad suite of new technologies that comprised modernity. China’s “Self Strengthening Movement” was, however, perfunctory when compared to Japan’s response.”

Why the lethargy in societal adaptation/state responses to profound external threats?

Remarks about Risk-Pooling Ecologies, 4

Another partial answer: “A Risk-Pooling Ecology did not foreclose the emergence of markets, but it did create a counterweight to them. Arbitrage opportunities generated by local comparative advantages or idiosyncratic weather events continued to exist, and surpluses not allocated to the centralized hoard were available to finance non-agricultural activities. An authority with considerable power and discretion, that by design stood above any coalition of private agents, could, however, suffocate markets—and it would have been common knowledge that it could do so.”

Comparisons to Other Theories

Table 8: Random Forests, Incorporating Variables from Other Theories

Percent Urban 2000	Latitude OLS	Base RF	RF w/ Latitude	Sugar OLS	Base RF	RF w/ Sugar	Euroshare OLS	Base RF	RF w/ Euroshare	Mortality OLS	Base RF	RF w/ Mortality
Pseudo- R^2	0.137	0.327	0.338	0.114	0.327	0.33	0.222	0.404	0.412	0.177	0.308	0.313
Model MSE	0.189	0.166	0.165	0.192	0.166	0.166	0.175	0.152	0.151	0.175	0.159	0.159
N	163	163	163	163	163	163	58	58	58	60	60	60
GDP/c 2014												
Pseudo- R^2 1	0.373	0.63	0.671	0.228	0.63	0.632	0.388	0.519	0.567	0.45	0.662	0.667
Model MSE	0.951	0.728	0.687	1.059	0.728	0.726	0.835	0.734	0.696	0.783	0.609	0.605
N	152	152	152	152	152	152	56	56	56	59	59	59
Durable Polity 2017												
Pseudo- R^2 2	0.081	0.273	0.316	0.061	0.273	0.28	0.072	0.147	0.117	0.113	0.215	0.208
Model MSE	7.396	6.559	6.36	7.499	6.559	6.524	6.137	5.83	5.932	5.942	5.54	5.566
N	158	158	158	158	158	158	57	57	57	60	60	60

On Thought Experiments in a Complex System

“It is not therefore meaningful to identify the marginal effect of the features on one another. An example from evolutionary biology illustrates the intuition. For most biologists, it is not meaningful to ask how much of rabbit speed is caused by the fact that coyotes hunt them, and how much is caused by living on a grassland.”

To continue the analogy from evolutionary biology, one can ask:

1. Within an existing complex system, what are the effects on rabbit speed of cross-breeding the coyotes with greyhounds?
2. How might rabbit speed have evolved differently had their chief predators been greyhounds from the outset?

These are well-posed questions we can put to a theory of evolutionary biology, even if they are not the most interesting questions.