The Fractured Land Hypothesis

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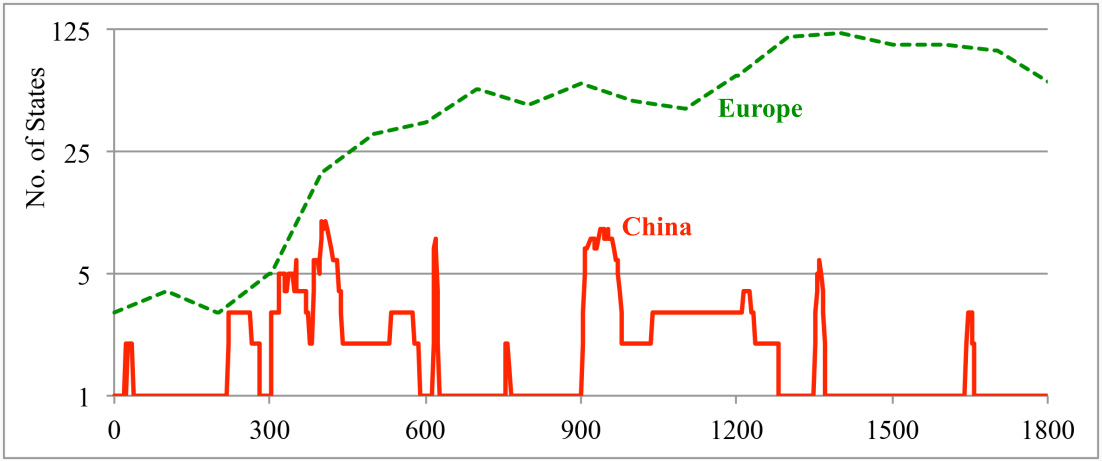
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Unified China, divided Europe

Figure 1: Number of States in China and Europe



Sources: Nussli (2011)

Motivation

- Why?
- And why do we care about the origins of comparative political fragmentation?
  - The economic rise of Western Europe is often attributed to its polycentric and competitive state system: Jones (1981), Mokyr (2016), and Scheidel (2019).
  - Conversely, many explanations of China's comparative failure focus on its long history as a centralized empire.
  - Thus, thinking about the factors that account for the prevalence of political fragmentation in Europe and the prominence of political centralization in China might teach us much about the origins of economic growth.
- Even if you do not embrace the idea that a polycentric state system was behind the great divergence between Europe and China, political unification is a salient observation we want to understand.

"Fractured-land"

- A classic answer by Diamond (1997, 1998): "fractured-land" such as mountain barriers, dense forests, and rugged terrain impeded the development of large empires in Europe in comparison to other parts of Eurasia.
- However:
  - Hoffman (2015): China is, in fact, more mountainous than Europe. Also Turchin (2013) and Greer (2013).
  - Hui (2005): Static idea, contingent outcome.
- To assess the "fractured-land" hypothesis, we build a dynamic spatial model of state formation and match it to rich geographical and agricultural productivity data.

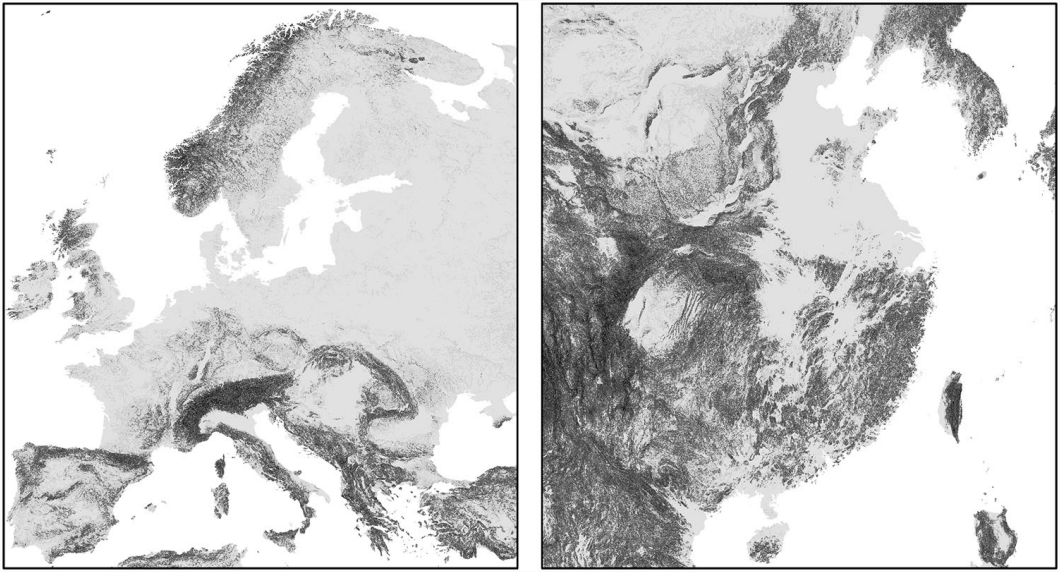


Figure 2: Ruggedness in Europe and China proper.

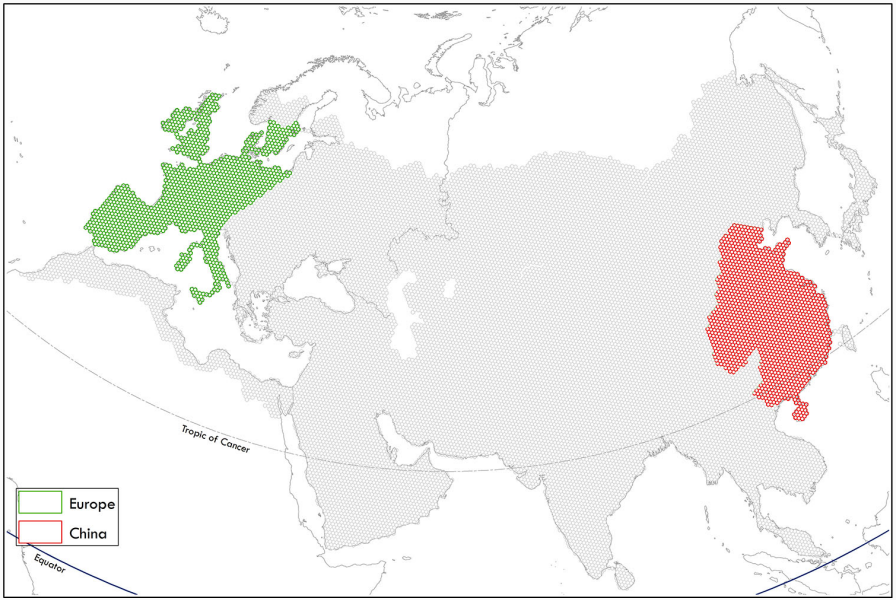
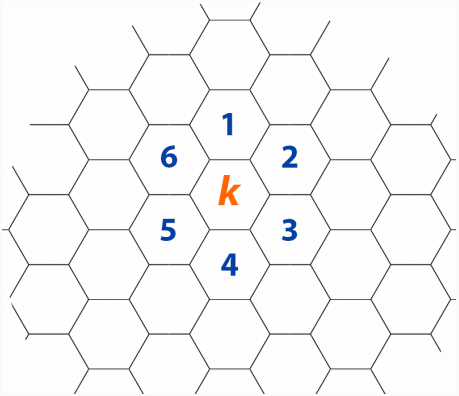


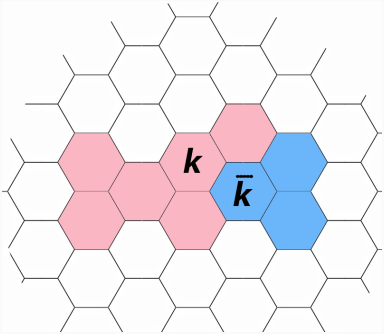
Figure 3: Study Area.

Hexagons

Figure 4: Cell k and adjacent cells.

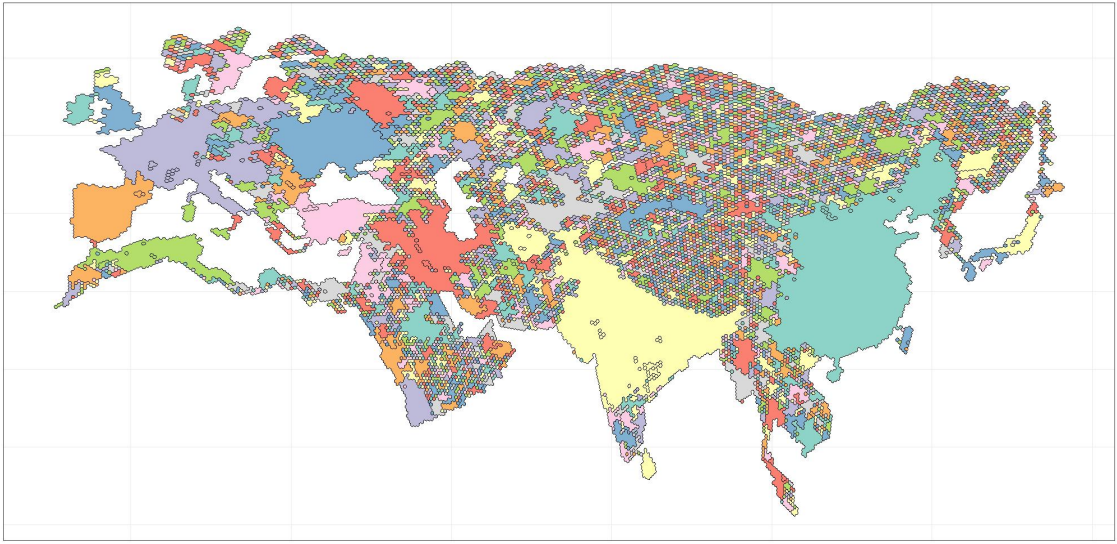


War Example

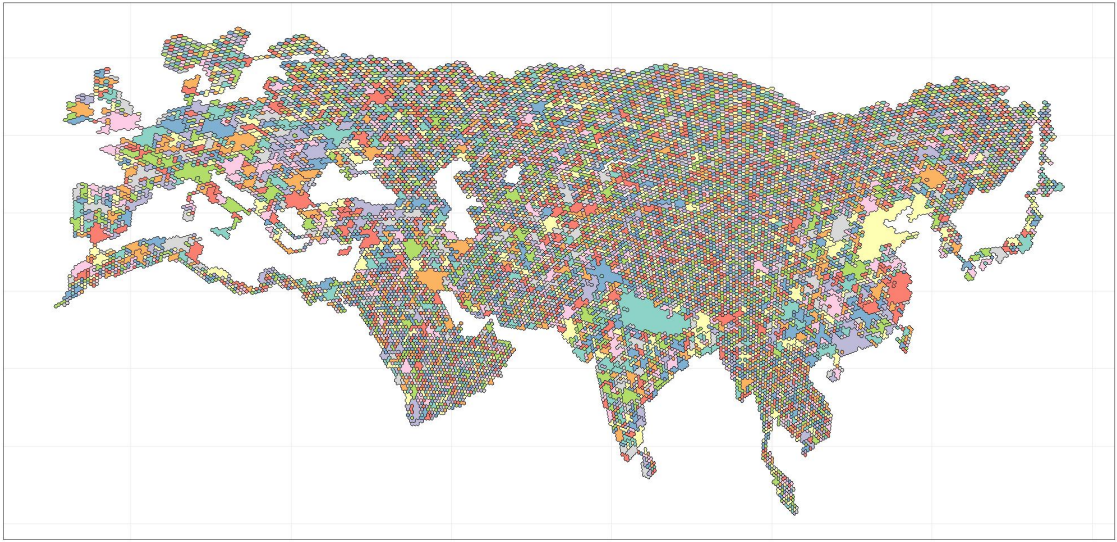


- War between polities i (red) and j (blue) at cells k and $\overline{k}$.
- Three possible outcomes depending on resources and geography:
  1. Polity i annexes cell $\overline{k}$.
  2. Polity j annexes cell k.
  3. No conquest.

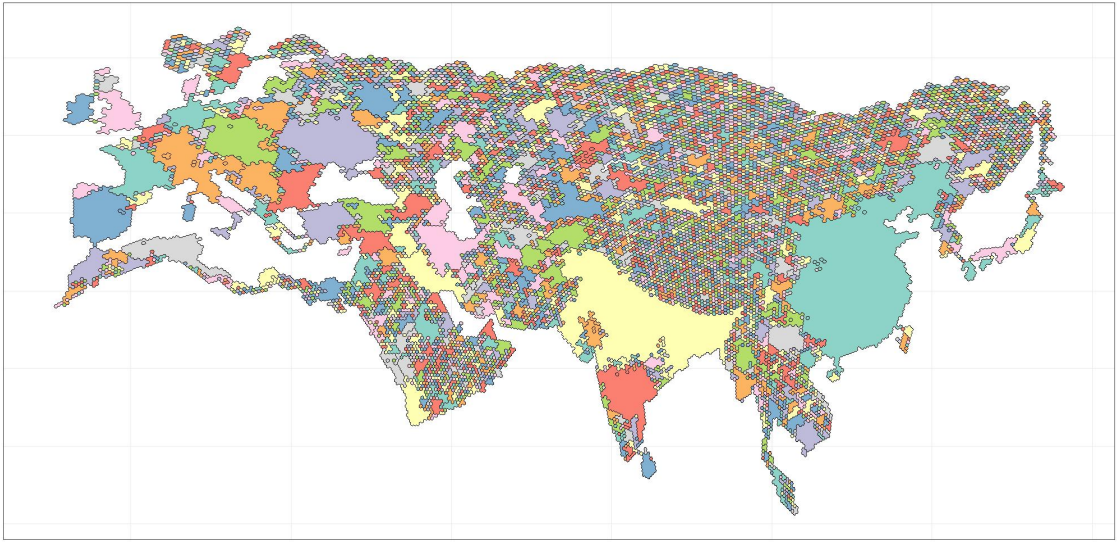
A representative simulation



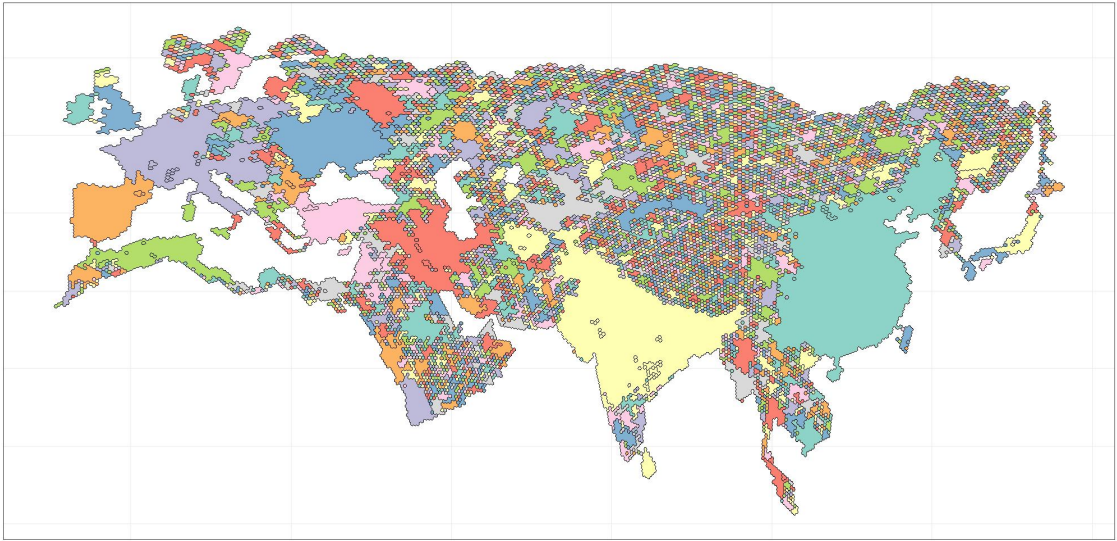
Period 50



Period 300



Period 500



Results: 19 Simulations of Benchmark Model

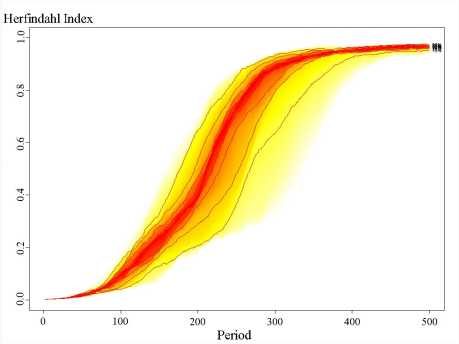


Figure 5: China

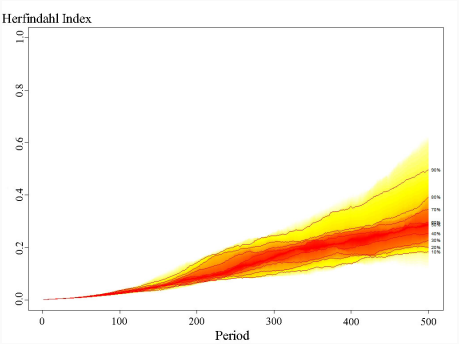


Figure 6: Europe

Our results

- "Fractured-land" provides a robust explanation for the political divergence observed at the two ends of Eurasia: a unified China and a fragmented Europe.
- Two *sufficient* mechanisms:
  1. Topography: The location of Europe's mountain ranges created several geographical cores that could provide the nuclei for European states; China was dominated by a single vast plain between the Yangtze and the Yellow River.
  2. Productive land: The presence of a dominant core region of high land productivity in the North China Plain and the lack thereof in Europe.
- Only when we neutralize both topography and productive agricultural land, Europe and China cease to move at different paces.
- A battery of robustness tests confirm the key role of fractured-land in a broad sense.

Conclusions

- We build a simple dynamic spatial model of state formation.
- We explicitly model the role of terrain in mediating conflict within and among states.
- We demonstrate, through our simulations, that either topography or the location of productive land can generate political unification in China and persistent political fragmentation in Europe.
- Flexible methodological framework to which we can add many extensions (military technology, culture, religion, ...).