Conflict, Evolution, Hegemony, and the Power of the State

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Introduction

- game theory: many possible equilibria
- interpretation: many possible stable social norms or institutions
- observation: there is a wide array of different institutions both across space and time
- political systems: from relatively autocratic (exclusive) to democratic (inclusive)

Evolutionary Game Theory

- can evolutionary game theory tell us about the relative likelihood of institutions?
- Individual evolution (Kandori, Mailath and Rob, Young, Ellison) – risk dominance
- But isn't evolution driven by competition between groups? Between societies with different institutions?
- Intuition: efficiency
- Nature of competition between groups over resources?

Resource Competition

- competition through voluntary migration (Ely and some others)
  - efficiency
  - no particular tendency towards large or hegemonic states
- historically institutional success has not been through voluntary immigration into the arms of welcoming neighbors
- people and institutions have generally spread through invasion and conflict – Carthaginians did not emigrate to Rome
- institutional change most often in the aftermath of the disruption caused by warfare and other conflicts
- which institutions are likely to be long-lived when evolution is driven by conflict?

Institutions and State Power

- U.S. institutions – low taxes, high output
- U.S.S.R. Institutions – high taxes, low output
- both generate substantial state power
- we model this trade-off through a theory of why state officials choose to invest in state power rather than keeping the money (swords rather than jewelry)
- our answer: they need the swords to collect the taxes to pay for their jewelry – the external use of state power largely incidental

institutional issue: can state power be used to collect taxes?

- in democracy many checks and balances
- in autocracy few

model institutional differences by ability to use state power to collect taxes

A Static Example

state officials (and their clients) $i = O$, choose state power $a^O \in [0, 1]$, collusive group, moves first

producers $i = P$, choose effort $a^P \in [0, 1]$, representative individual, move second

institutions described by exclusiveness parameter $\chi \in [0, 1]$, fixed in short run, but subject to evolutionary pressures

tax power: $b = \chi a^O$

tax rate: $\overline{\tau} \equiv \min\{1, \tau b\}$

$\tau > 1$ a technological parameter

Preferences and Equilibrium

producers $c(a^P)$ cost of effort

$u^P = (1-\overline{\tau})a^P - c(a^P) + \xi^P a^O < c < 1$

ξ^P measures usefulness of state power in providing public goods

state officials residual claimants

$u^O = \overline{\tau} a^P - a^O + \xi^P a^O$

can be negative for simplicity, $\xi^O < 1$

action profile (a^P, a^O) an *equilibrium* = Stackelberg equilibrium

Producer Optimal Tax Revenue and Profits

(with quadratic effort cost) tax power: $b = \chi a^O$

tax-revenue function

$$G(b) = \tau b \left[1 - \frac{\overline{\tau}}{1-c}\right]$$

profit function of producers

$$\Pi(b) = G(b) + \frac{1-c}{2}\left[1 - \frac{\overline{\tau}}{1-c}\right]^2$$

welfare $W(b) = u^P + u^O$

generalize quadratic case to "properness"

Institutions, State Power and Welfare

Theorem: *In a proper economy there is a unique equilibrium level of state power $a^O(\chi)$, and it is single peaked in χ; so there is a unique argmax $\chi_2 > 0$. There is a unique welfare maximizing level of exclusivity χ_1, and $\chi_1 \leq \chi_2$. There is a $\overline{\xi} \geq 1$ such that if $\xi^P + \xi^O \leq \overline{\xi}$ then $\chi_1 < \chi_2$.*

state power maximization leads to greater exclusiveness than welfare maximization

Theorem: *in a proper economy profits $\Pi(\chi a^O(\chi))$ are decreasing in χ, while tax revenues $G(\chi a^O(\chi))$, tax power $\chi a^O(\chi)$, and the utility of state officials $u^O(\chi, a^O(\chi))$ are all increasing in χ. For $\chi \geq \chi_1$ producer utility is decreasing in χ and if $\xi^P + \xi^O < 1$ so is welfare. If $\xi^P + \xi^O \geq 1$ the welfare is decreasing for $\chi_1 \leq \chi \leq \chi_2$.*

greater exclusiveness means higher extractiveness in the sense of Acemoglu and Robinson

Dynamics with Two Societies

two societies $j = 1, 2$ characterized by χ_j, a_j^O, a_j^P

indicator variable $b_j = 1$ if society is in equilibrium, 0 otherwise

for the purposes of this example: both societies are in equilibrium, both are proper economies and they differ only in their exclusiveness χ_j and the equilibrium satisfies $a_j^O > 0$ and $a_1^O < a_2^O$

societies compete over an integral number L units of land; constant returns to scale in land

L_{jt} land controlled by society j at time t where $L_{1t} + L_{2t} = L$

society active if it has a positive amount of land

a state has a hegemony at j if $L_j = L$

Markovian Dynamics

state variable L_{1t}

transition probabilities determined by conflict resolution function

conflict may result in one of the two societies losing a unit of land to the other: $|L_{jt+1} - L_{jt}| \leq 1$, loss of a unit of land called *disruption*

conflict resolution probabilities depends on power of the two societies, amount of land held, strength of outside forces a_0 and the chance of success in the face of overwhelming odds ϵ (similar to the mutation rate)

probability of disruption (loss by j) $\pi_j(b_j, a_j^O, L_j, a_{-j}^O, L_{-j}, a_0)[\epsilon]$

basic assumption of monotonicity: (weakly) decreasing in a_j, L_j and increasing in a_{-j}, L_{-j}, a_0

Nature of the Parameters

L_{jt} endogenous, a_{jt}^O a characteristic of institutions subject to evolutionary selection

ϵ, a_0 exogenous

we think of ϵ as small and relatively constant over time and space

outside forces a_0 vary over time and space: represent enemies who are protected by asymmetrical geographical barriers

English channel not a barrier given English and Roman technology in Julius Caeser's time

post 1500 period naval technology and standing navies favored strongly the short coastline of England over the long coastline of continental Europe

Conflict Resolution

if $L_{-j} > 0$ then $\pi_j = p$ with $0 < p < 1/2$

conflict between opponents of "similar size" may easily lead one or the other to lose land

example: Alsace-Lorraine in 1871, 1918 shifting from France to Germany and back

conflict against overwhelming odds is different:

but by contrast on December 2, 1913 when the shoemaker Karl Blank laughed at German soldiers he was beaten and paralyzed, and indeed more substantial protests of up to 3,000 people had no consequence for German control over Alsace-Lorraine

Hegemonic Case

when $L_j = L$ then $\pi_j = p\epsilon^{\max\{0, a_j^O - a_0\}}$

the exponent $\rho_j = \max\{0, a_j^O - a_0\}$ is called *resistance*

how many rebels needed to have (limited) success: a measure of how overwhelming the odds are

(implicitly resistance is zero if opponents have some land)

outside forces strong or many black swans $\pi_j = p$

role of outside forces: Battle of Yorktown 1781

> 8,000 French and 11,000 U.S. soldiers with the support of a French naval fleet defeat British forces

if the state is very weak, it doesn't take much: on June 14, 1846 thirty three people took over the Mexican garrison of Sonoma and declared the California Republic; it was annexed by the U.S. 26 days later; there were roughly 500 U.S. soldiers in the general vicinity of California

Markov Analysis

$\epsilon > 0$ all states are positively recurrent so a unique stationary probability distribution representing the frequency with which each state occurs

a simple birth-death chain, ergodic probabilities can be explicitly computed and the frequency of society j having a hegemony is

$$\sigma_j = \frac{1}{1 + (L-2)\epsilon^{\rho_{-j}} + \epsilon^{\rho_{-j}-\rho_j}}.$$

Theorem: *If $a_0 \geq a^O$ or $\epsilon = 1$ the stationary distribution over states is uniform. If $a_0 < a^O$ then $\sigma_2 \to 1$ and $\sigma_1 \to 0$.*

with strong outsiders there is no tendency towards hegemony, with weak outsiders there is and it is a hegemony of the stronger state

Generalized Model

an arbitrary finite list of societies $j = 1, \ldots, M$ that may or may not be in equilibrium

a unit of land that lost is gained by a society chosen randomly according to the function $\lambda(k|j, L_t) > 0$ for $k \neq j$ and $\lambda(j|j, L_t) = 0$

more general conflict resolution function

Assumptions About Conflict

in terms of resistance r_j (rather than probability)

- an unstable society $b_j = 0$ has zero resistance (intentional or learning dynamic – if incentive constraints are not satisfied people try new things)

for stable societies $b_j = 1$

- symmetry $r_j(a_j^O, L_j, a_{-j}^O, L_{-j}, a_0)$ independent of j (names of the societies do not matter)
- monotone and when resistance is non-zero strictly monotone
- an appreciable chance of losing land to a superior opponent:

  lowest resistance (weakest) active society has zero resistance
- better to face divided opponents than unified