

Global Hegemony and Exorbitant Privilege

Carolyn Pflueger Pierre Yared

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 - Will U.S. geopolitical and financial dominance survive China's rise?
- This paper: Link between govt financing and geopolitical rivalry
 - How do global debt markets affect military balance?
 - How does military balance affect global debt markets?
 - How do hegemonic transitions take place?

- Three empirical facts to motivate theoretical exploration
 - Relate interest rates, spreads, devaluation for hegemon/non-hegemon

What We Do

- Three empirical facts to motivate theoretical exploration
 - Relate interest rates, spreads, devaluation for hegemon/non-hegemon
- Simple dynamic two-country model consistent with facts

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 - Relate interest rates, spreads, devaluation for hegemon/non-hegemon
- Simple dynamic two-country model consistent with facts → Results:
 - Low debt capacity → Unique steady state with dominant hegemon
 - Intermediate debt capacity → Two steady states
 - Weaker country can dominate
 - History dependence, **geopolitical hysteresis**
 - High debt capacity → non-monotonic dynamics, **geopolitical fragility**

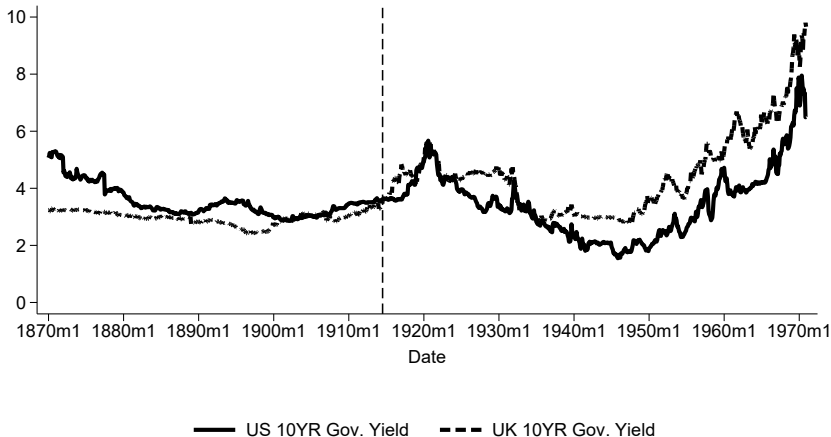
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- Factors enhancing military + financial dominance increase fragility
 - Implication: U.S. debt capacity vs. China crucial for national security

- Armament and conflict
 - e.g., Fearon (95), Powell (93, 99)
 - **This paper:** International debt markets constraining armaments
- Geopolitical risk and trade
 - e.g., Hirschman (45, 58), Clayton et al (23), Broner et al (24)
 - **This paper:** Debt markets and military spending
- Political economy of public debt with multiple countries
 - e.g., Chari-Kehoe (07), Azzimonti et al (14), Aguiar et al (15)
 - **This paper:** Relationship to military spending
- Exorbitant privilege
 - e.g., Eichengreen (11), Farhi and Maggiori (18), Gourinchas and Rey (22), Chen et al (2022), Clayton et al (22), Coppola et al (23), Jiang et al (24)
 - **This paper:** Military dominance as source of exorbitant privilege

MOTIVATING EMPIRICAL FACTS

Fact #1: Hegemon Borrows More Cheaply

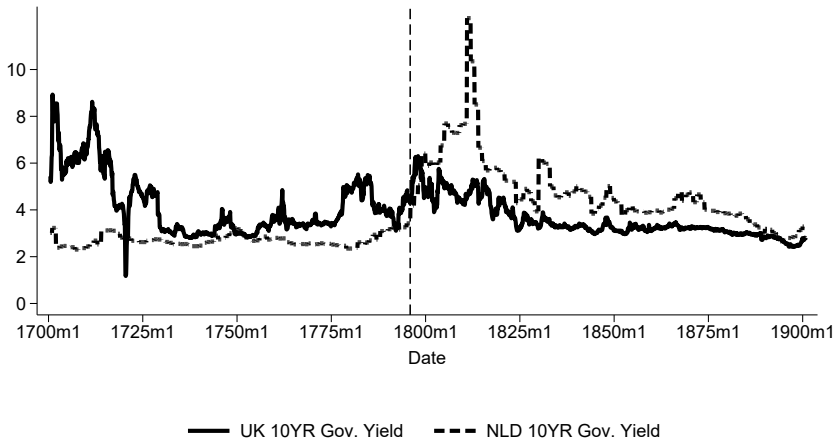
Panel A: U.S./U.K. Bond Yields



Loss of financial dominance after World War II

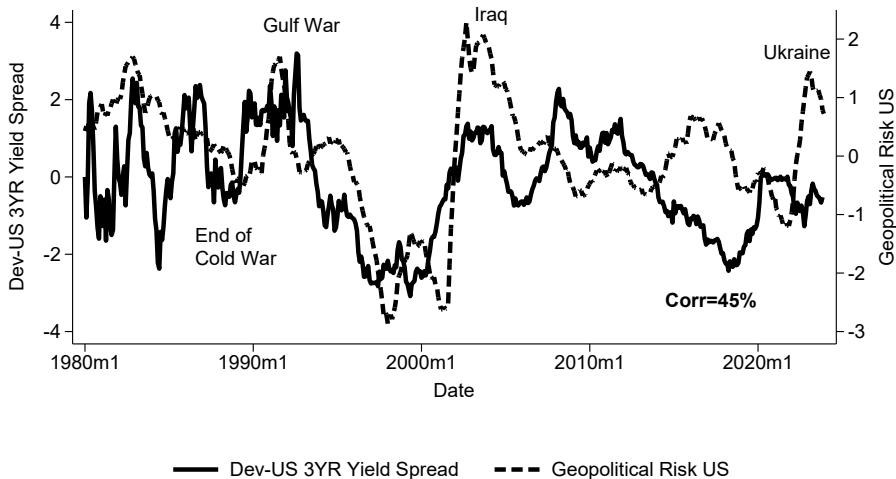
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Panel B: U.K./Netherlands Bond Yields



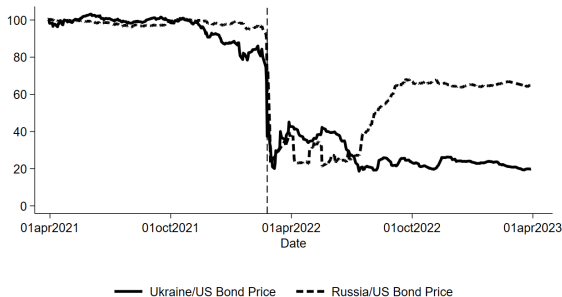
Loss of financial dominance after defeat in Anglo-Dutch wars

Fact #2: Borrowing Advantage Rises with Tensions



U.S. borrowing rates rise less/fall more with tensions

Fact #2: Borrowing Advantage Rises with Tensions



Russian and Ukrainian bond prices fell compared to U.S.

Supporting evidence:

- Barro (2006): U.S. historical borrowing costs typically fall during wars
- Ferguson (2006): U.K. bond prices in 1800s stable during tensions

Fact #3: Defeated Countries Devalue Debts by More

Avg. 10-Year Inflation Rate	post-WWI	post-WWII
U.S.	1.68	4.20
Avg. Defeated Countries	3.84E+08	33.04

Expectation of defeat makes government bonds risky

TWO-PERIOD EXAMPLE

Two Country, Two Period Model

- Government budget constraints:

$$g_{i0} = \tau + q_i b_i - m_i$$

$$g_{i1} = \tau (1 - \chi d_i) - b_i (1 - d_i) \text{ (peace or war with victory)}$$

$$g_{i1} = -b_i (1 - d_i) \text{ (war with defeat)}$$

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- Preferences:

$$\mathbf{E}\{g_{i0} + \kappa g_{i1} - \lambda\} \text{ (government)}$$

$$\mathbf{E}\{c_{i0} + \kappa c_{i1}\} \text{ (investors)}$$

$$\kappa = \{1, \theta\}, \theta > 1 \text{ (war premium)}, \lambda = \{0, \gamma\}, \gamma > 0$$

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- War probability ϕ . Country i wins with probability $w_i(m_i, m_{-i})$

$$w_1(m_1, m_2) = \frac{\exp(A + m_1)}{\exp(A + m_1) + \exp(m_2)} = F(A + m_1 - m_2), A \geq 0$$

- 1 Countries choose g_i and b_i , investors determine bond prices q_i , and military expenditure m_i is determined

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- 2 Nature determines whether war occurs and winner of war
- 3 Countries decide whether or not to default

- Default iff

$$b_i > \tau\chi \text{ (peace or war with victory)}$$

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- Consider limit as $\gamma \rightarrow \infty$ (war infinitely costly). Implications:
 - Always default if war with defeat (**Fact #3**)
 - Set $g_{i0} = 0$ to maximize military spending
 - Set $b_i = \tau\chi$ to maximize borrowing

- Bond prices:

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Proposition 1: Uniqueness and Multiplicity

Proposition 1. $\exists \chi' > 0$ positive function of exogenous advantage A and negative function of war probability ϕ and war premium θ s.t.

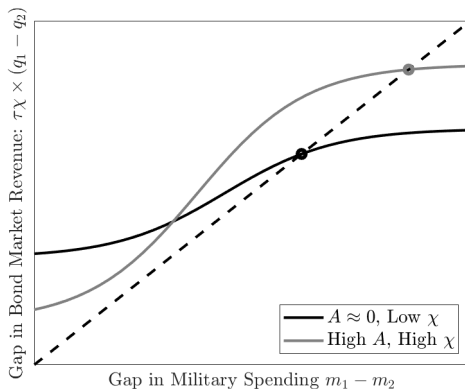
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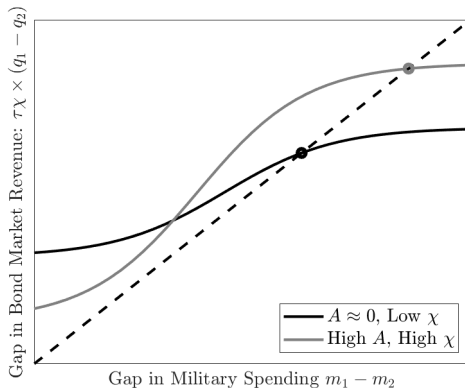
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Unique Equilibrium in Two-Period Model



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Unique Equilibrium in Two-Period Model



- Case $A \approx 0$, Low χ : Bond market revenue gap increases less than one-for one with military spending gap
- Case $A \gg 0$, High χ : Bond revenue increases more than one-for-one with military spending, but exogenous advantage shifts revenue up

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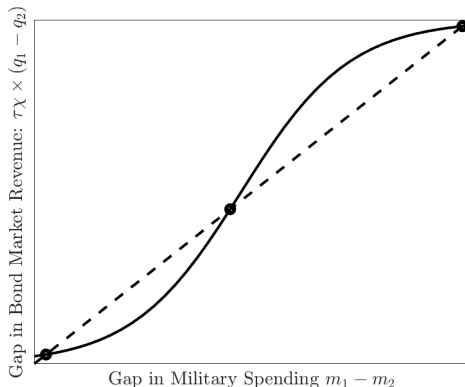
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Multiple Equilibria in Two-Period Model



- Because $\chi > \chi'$, slope of revenue gap curve exceeds one
- Small exogenous advantage A facilitates multiplicity

- Suppose debt capacity is high and exogenous advantage is small
- Weak country can overwhelm strong country with military investment
- Bond markets anticipate higher probability of victory for weak country
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- Suppose debt capacity is high and exogenous advantage is small
- Weak country can overwhelm strong country with military investment
- Bond markets anticipate higher probability of victory for weak country
- Provides country with funding advantage for military investment
- Consistent with empirical facts #1 and #2
 - Country expected to win faces lower funding costs
 - Funding advantage rises with probability of war ϕ and war premium θ

Corollary 1: In neighborhood around stable equilibrium where country i dominates, its probability of winning $w_i(m_i^*, m_{-i}^*)$ and funding advantage $q_i^* - q_{-i}^*$ increase with

- Debt capacity χ
- War probability ϕ
- War premium θ
- Country i 's exogenous military advantage

Hegemon's financial and military dominance amplified by bond market depth and exogenous military advantage

- Complementarity between military strength and funding advantage

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- Market depth that amplifies complementarity also enables multiplicity
 - e.g., debt capacity χ , war likelihood ϕ , war premium θ
- But exogenous military advantage A reduces multiplicity
- What if advantage A is endogenous to past military investments?
- What determines hegemonic transitions?

INFINITE HORIZON ANALYSIS

- Budget constraint under peace:

$$\begin{aligned} g_{it} = & \tau (1 - \chi d_{it}) + q_{it} b_{it} - m_{it} \\ & + \underbrace{(1 - \delta) m_{it-1}}_{\text{Military capital accumulation}} \underbrace{- b_{it-1} (1 - d_{it})}_{\text{Debt repayment}} \end{aligned}$$

Dynamic Model

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- Conditional on war, country i wins with probability $w_i(m_{it}, m_{-it})$

- Simultaneously choose $\{g_{it}, b_{it}, d_{it}\}$
- Financial markets open and clear
- Countries choose m_{it} to satisfy budget constraint
- Again consider limit as $\gamma \rightarrow \infty$ (war infinitely costly)
 - Always default if war with defeat
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Equilibrium: Military Capital Dynamics

- Military spending:

$$m_{it} = \tau + (1 - \delta)m_{it-1} + (q_{it} - 1)\tau\chi$$

- Gap in military expenditure:

$$\underbrace{\mu_t - (1 - \delta)\mu_{t-1}}_{\text{Gap in military expenditure}} = \underbrace{\tau\chi \times \phi\theta (2F(A + \mu_t) - 1)}_{\text{Gap in bond market revenue}}$$

Correspondence $H : \mu_t \rightarrow \mu_{t-1}$ from this equation

Proposition 2: Steady States

Proposition 2. $\exists \chi' > 0$ positive function of exogenous advantage A and depreciation rate δ , negative function of the war probability ϕ and war premium θ s.t.

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 - Steady state is unique
 - If $A > 0$, country 1 wins, borrows more cheaply, larger military

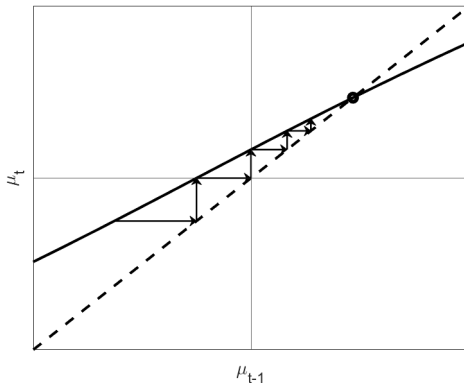
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As before, military strength and funding advantage complementary, amplify dominance

Unique Steady State and Transition Dynamics



- Debt capacity low
- Weaker country unable to overwhelm stronger country

Multiple Steady States and Debt Capacity

- Weak country could overwhelm strong country with enough borrowing

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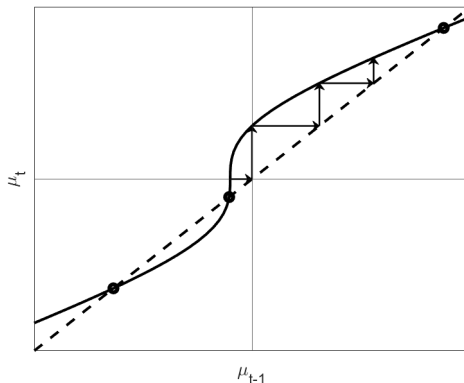
Multiple Steady States and Debt Capacity

- Weak country could overwhelm strong country with enough borrowing
- Lower depreciation makes feasible to accumulate military capital
- Transition dynamics depend on mapping $\mu_{t-1} \mapsto \mu_t$
 - May or may not be one-to-one

Transition Dynamics

- **Proposition 3.** Suppose $\chi > \chi'$, so $\exists$ multiple steady states. Then $\exists$ debt capacity threshold χ'' negative function of war probability ϕ and war premium θ s.t.
 - **(geopolitical hysteresis)** If $\chi < \chi''$ then initial conditions determine steady state and transition path conditional on peace

Intermediate Market Depth: Hysteresis

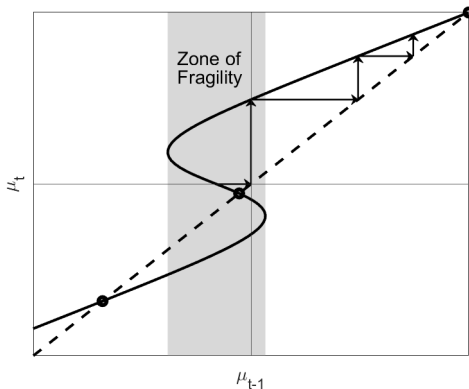


- Unique path: μ_0 determines which country dominates
- Hegemon's military and financial advantage increases over time

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 - **(geopolitical fragility)** If $\chi > \chi''$ then same initial conditions can lead to different steady states even in absence of war

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High Market Depth: Fragility



- Monotonic path towards each stable steady state exists
- But if μ_0 is not too large or too small, correspondence is one-to-many
- μ_t can jump up or down and converge to different steady states

Discussion: History Dependence vs Market Depth

- Historic geopolitical advantage can be persistent (hysteresis)
- High market depth can lead to market led reversals (fragility)
- Higher fragility if war likelihood $\phi \uparrow$ war premium $\theta \uparrow$

- **Definition (hegemonic transition):** A hegemonic transition is a transition path that starts in one monotonically stable steady state and converges to the other monotonically stable steady state

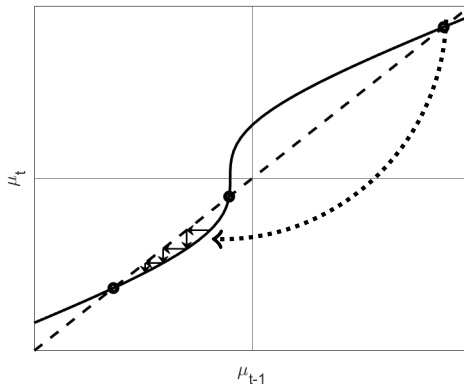
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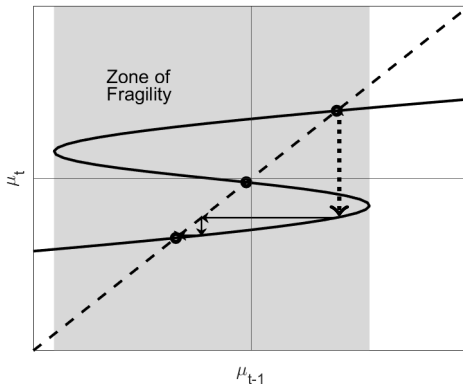
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 - ② If $\chi > \chi''$ then there exists hegemonic transition path that avoids war if depreciation rate δ is sufficiently high

War with Defeat



- War with defeat for hegemon resets balance of power
- Consolidation of power ensues following victory

Peaceful Transition



- Transitions can happen within zone of fragility
- Repeated transitions are feasible

Extension: Asymmetric Market Depth

- Relative military investment dynamics:

$$\begin{aligned}\mu_t - (1 - \delta) \mu_{t-1} &= \phi \left(\frac{\theta}{2} - 1 \right) \tau (\chi_1 - \chi_2) \\ &\quad + \tau \frac{\chi_1 + \chi_2}{2} \times \phi \theta (2F(\mu_t) - 1)\end{aligned}$$

- Proposition 4:** Suppose $A = 0$, $\chi_1 > \chi_2$, $\theta > 2$. $\exists$ threshold η s.t.
 - 1 If $\chi_1 - \chi_2 > \eta$, then steady state is unique and monotonically stable.
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 - If $\chi_1 - \chi_2 < \eta$, then there are two monotonically stable steady states. In second monotonically stable steady state, country 2 expected to win, dominant financially and militarily

- Gap in borrowing capacity analogous to exogenous military advantage
- Financial development enables weak country to dominate
- Hysteresis vs. fragility depends on average debt capacity $\frac{\chi_1 + \chi_2}{2}$

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- National security implications:
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 - Internationalization of RMB