Equilibrium Trade Regimes: Power- vs. Rules-Based

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January 2026

The GATT/WTO system and its achievements

- The GATT/WTO is a **multilateral trading system based on rules**
  - Built on the principles of reciprocity and nondiscrimination, together with a dispute settlement procedure
- Bargaining based on these rules has fostered an unprecedented **reduction** of **trade barriers** and of **tariff volatility**
- Theoretical and empirical literature shows that bargaining based on these rules yields **efficient outcomes** for governments; unconstrained bilateral negotiations do not
- Literature also shows that the **rules constrain** the **exercise of power** by individual countries; unconstrained bilateral negotiations do not

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  - Protectionist measures spreading worldwide trade measures
  - Increased hostility in WTO disputes hostility
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∗ The world seems to be **transitioning from a rules-based to a power-based** system

Lack of a hegemon

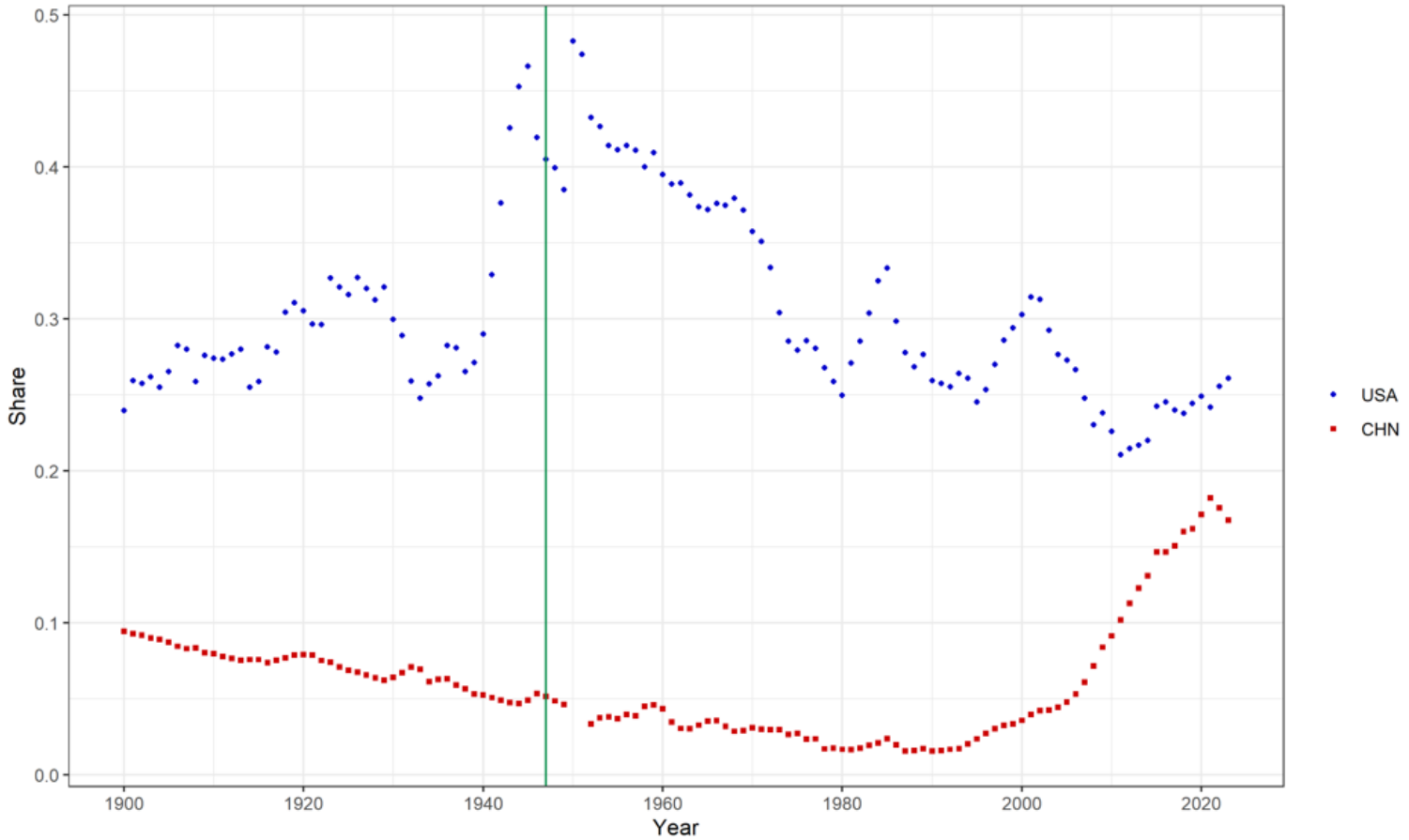

Figure: Share of world GDP (1900 - 2023, current prices)

- *Hegemonic Stability Theory*: presence of a hegemon is key for maintaining stability and rules in international relations

Our questions

- → *Can a rules-based system be maintained in the long run?*
  - → *If so, under what conditions?*
  - → *Are hegemons necessary/sufficient to sustain it?*
- → *If the world turns to a power-based system, is there a turning back?*
- → *What if the world moves to a bipolar – or a multipolar – state?*
- → *Could different rules help to sustain the system?*

Our approach

A framework to understand the evolution of the world trading system:

- Leading country is key to determine the trade regime
- A rules-based regime is always preferred by smaller countries, but some large countries benefit from a power-based regime
- Adopting/restoring a rules-based regime is costly
- The identity of the leading country changes over time

Literature

- Mattoo-Staiger 2020
  - Rationalization of Trump I's trade war with one-period game (in words)
- Hegemonic Stability Theory – Kindleberger 1974; Keohane 1984; Snidal 1985
  - World needs a hegemon to sponsor a rules-based system
- Accomplishments of the multilateral rules-based system – Bagwell-Staiger 1999; Maggi 1999; Ludema-Mayda 2013; Ossa 2014; Bagwell-Staiger-Yurukoglu 2021
  - Rules of the GATT/WTO system are politically efficient
  - WTO's disupute resolution system helps support cooperation
- Rules to encourage participation in trade agreements – McLaren 1997; Goldstein-Joanne 2002
  - Fear of holdups can prevent participation in TAs; rules can neutralize that effect
- New research on geopolitical rivalry, economic coercion and the role of hegemons
  - Becko-Grossman-Helpman 2025; Broner-Martin-Meyer-Trebesch 2025; Clayton-Maggiori-Schreger 2024; Mattoo-Ruta-Staiger 2025

Benchmark model

- Infinite-horizon problem
- N countries
- States of the world: $\Omega = \{h_1, d_1, h_2, d_2, ..., h_N, d_N\}$
  - At any state, **one country is leader** (either **hegemon** or **dominant**) and $N-1$ countries **are subordinate**
  - h_j: country j is hegemonic and all other countries are subordinate
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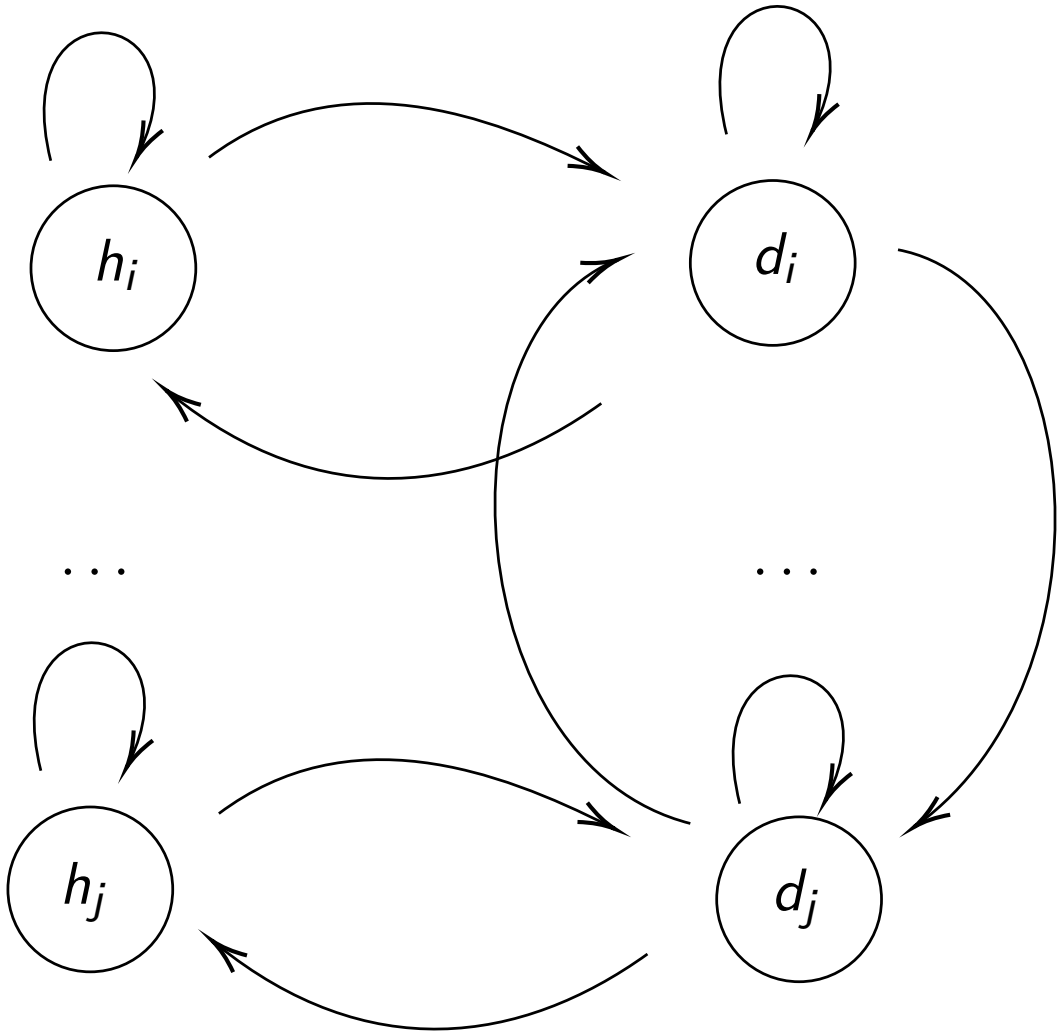
- Transition between states: exogenous Markov matrix Q; element $q_{\omega,\omega'}$ is the probability of moving from state ω to state ω'
  - Later: allow Q to depend on the trade regime

Changing worlds: Markovian Matrix

- Smooth: $q_{h_i,h_j} = q_{h_i,d_j} = q_{d_i,h_j} = 0, \forall i,j \in \Omega, i \neq j$
- No absorbing set of states: $\Pr(\omega \to \omega') > 0, \forall\, \omega, \omega' \in \Omega$



Trade regimes: "Power-based" and "Rules-based"

- Trade regime: $\rho \in \{P, R\}$; $\rho_0 = P$
- The **leading** country determines the trade regime for the current period; this defines the status quo for the subsequent period
- When a country is **subordinate** – i.e., neither hegemonic nor dominant – it does not take any action w.r.t. the trade regime
- If the status quo regime is P, then moving to R implies cost $c > 0$ to the country making the change
- Moving from R to P, or keeping the regime unchanged, is costless

Short-run payoff assumptions

(Bagwell & Staiger, 1999; Mattoo & Staiger, 2020; McLaren, 1997)

$u_i(\omega, \rho)$: stage-game payoff of country i when state of the world is $\omega \in \Omega$ and the leader chooses regime $\rho \in \{P, R\}$

- **Subordinate** (small) countries prefer regime R
  - Small countries benefit from rules that limit power in negotiations

$$u_i(\omega, R) > u_i(\omega, P), \forall \omega \in \Omega \setminus \{d_i, h_i\}$$

- **Dominant** ("large") countries prefer regime P
  - Large countries benefit from exploiting their stronger bargaining power when asymmetry is not too high to prevent participation

$$u_i(d_i, R) < u_i(d_i, P)$$

- **Hegemonic** ("very large") countries prefer regime R
  - Rules as a commitment device to induce participation of others when power asymmetry is very high

$$u_i(h_i, R) > u_i(h_i, P)$$

short run in pictures

Symmetric Markovian Equilibria

Definition 1 (Symmetric Markovian Strategies).

A Markovian strategy is described by $\sigma : \Omega \times \{P, R\} \mapsto \{P, R\}$*, where* $\sigma(\omega, \rho)$ *is an element of that strategy that specifies a regime choice in state* ω *when the status quo regime is* ρ*. A strategy profile is symmetric if* $\sigma(h_i, \rho) = \sigma(h_j, \rho)$ *and* $\sigma(d_i, \rho) = \sigma(d_j, \rho), \forall i \neq j$ *and* $\forall \rho$*.*

Definition 2 (Symmetric Markovian Equilibria).

A strategy profile is a Symmetric Markovian Equilibrium if it induces a subgame perfect equilibrium and strategies are symmetric and Markovian.

Equilibrium payoff functions

Classes of equilibria

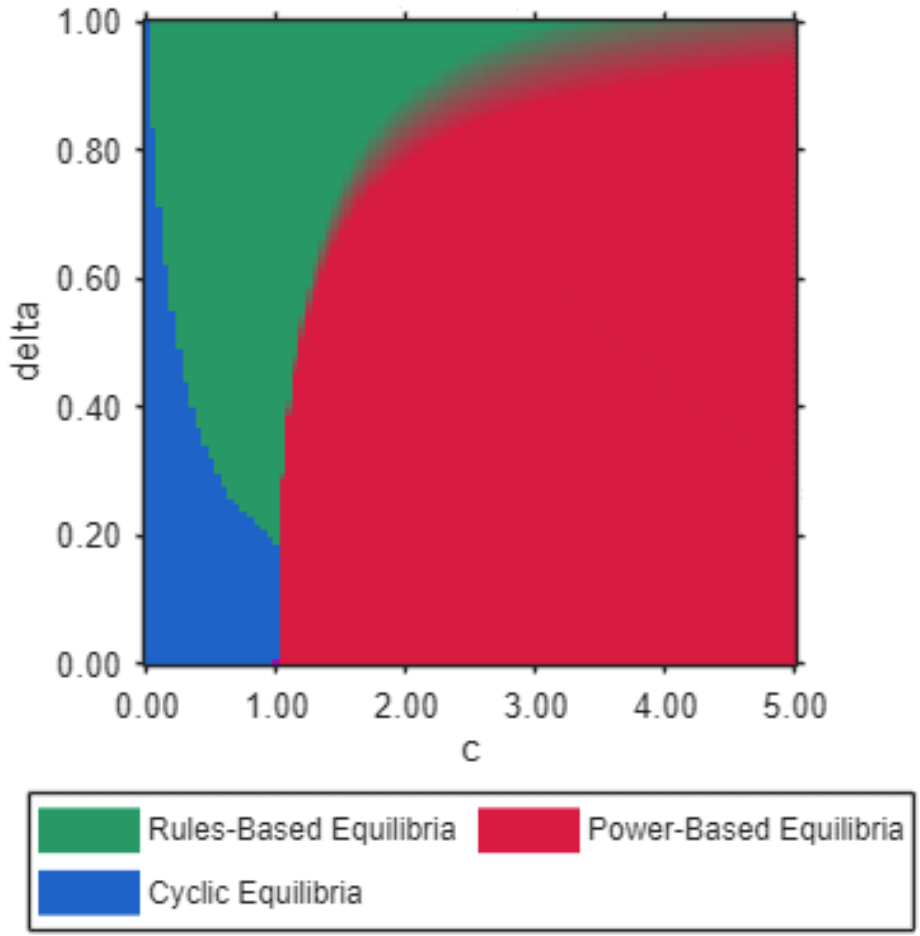
Definition 3 (Classes of Equilibria).

A symmetric Markovian equilibrium in pure strategies is denoted by:

1. **Rules-based equilibria**: *hegemon and dominant countries choose rules on the equilibrium path.*
2. **Power-based equilibria**: *hegemon and dominant countries choose power on the equilibrium path.*
3. **Cyclic equilibria**: *hegemon countries choose rules and dominant countries choose power on the equilibrium path.*

Proposition: necessary conditions for R

Pure-strategy equilibria: cyclic, rules- or power-based



$q_{h_1,h_1} = q_{d_1,d_1} = q_{h_2,h_2} = q_{d_2,d_2} = 0.1$, $q_{h_1,d_1} = q_{h_2,d_2} = 0.9$, $q_{d_1,h_1} = q_{d_1,d_2} = q_{d_2,h_2} = q_{d_2,d_1} = 0.45$, and $q_{h_1,d_2} = q_{h_1,h_2} = q_{d_1,h_2} = q_{d_2,h_1} = q_{h_2,h_1} = q_{h_2,d_1} = 0$.
$u_i(h_i, R) = u_i(h_j, R) = u_i(d_i, R) = u_i(d_j, R) = 1$, $u_i(h_i, P) = u_i(h_j, P) = 0$, $u_i(d_i, P) = 1.1$ and $u_i(d_j, P) = 0.8$.

Weakly better to inherit status quo R than P

Lemma 1.

$V_i(\omega, R) \geq V_i(\omega, P), \ \forall \omega \in \Omega, \ \forall i \in \{1, 2, ..., N\}.$

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Follows from two observations:

1. i as a **leading country**: if it inherits R, choosing P or keeping R is costless; if it inherits P, switching from P to R is costly. Thus, it is better to inherit R, as it would never need to incur any regime costs

2. i as a **subordinate country**: prefers that the leading country inherits R, since it may be discouraged to switch from P to R when it inherits P because $c > 0$, but not when it inherits R

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*** Does it follow that it is "easy" to sustain R?**

No hard choices: keep myopically optimal status quo

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In any symmetric Markovian equilibria, $\sigma(h_i, R) = R$ *and* $\sigma(d_i, P) = P$, $\forall i \in \{1, 2, ..., N\}$.

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In this case, short-run optimal choices are also optimal in the long run:

- **Hegemon:** inheriting R and keeping it is better in the short-run (by assumption) and it is always weakly better to enter any state under regime R than under regime P (Lemma 1)

- **Dominant:** suppose that it were optimal for dominant i to switch to R; then, it would also be optimal for any $j \neq i$ to switch to R when j becomes dominant; but then i would want to deviate by keeping P and waiting for the next dominant to switch to R — a contradiction

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Corollary 1.

The world can switch from **power** *to* **rules** *only in a hegemonic state.*

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- Regardless of how forward-looking countries may be, and of how low c may be, dominant countries never introduce *rules* in equilibrium

$\Rightarrow$ Once the system turns to P, it can switch to R only if the world returns to a hegemonic state

Yet *rules* does not require a recurrent hegemonic state

- Hegemons are required to initiate rules-based regimes (Corollary 1)
- But their **prevalence is not essential** for long-run sustainability

$\mapsto$ High leadership turnover can substitute for hegemonic frequency

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$\mapsto$ High leadership turnover can substitute for hegemonic frequency

$*$ Challenges conventional Hegemonic Stability Theory narrative

Rare hegemons

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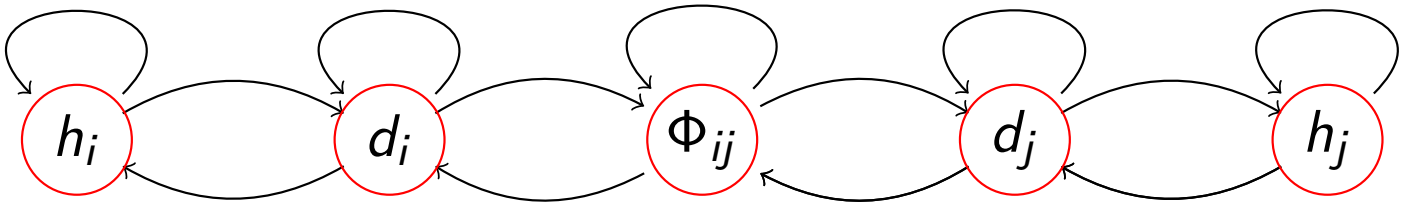
Efficiency | Maintaining rules | Endogenous transitions

A **bipolar** world



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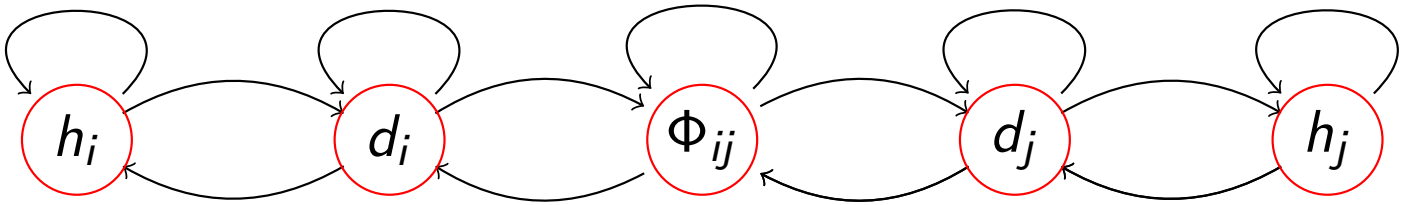

Assumptions on state Φ_{ij}:

- Switching $P \rightarrow R$ has cost c for each supporting country
- The 2 dominant countries play a simultaneous regime-choice game
- Stage-game in Φ_{ij} has prisoner's dilemma structure: outcome under (R, R) is better for both than outcome under (P, P), but it is individually better if rival supports R alone:

$$u_i(\Phi_{ij}, (P, R)) > u_i(\Phi_{ij}, (R, R)) > u_i(\Phi_{ij}, (P, P)) > u_i(\Phi_{ij}, (R, P))$$

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3. Free-riding
   - If one dominant country is able to support *rules* alone, the other may free ride

Bipolar world – summary

Bipolar analysis

- Strategic coordination is not a fundamental threat to the sustainability of *rules*
- Market power *is* a fundamental threat to the sustainability of *rules*
  - The greater it is, the harder to sustain *rules*
  - Even at its minimal level, it can undermine *rules* if coupled with the possibility of free-riding
- We could still have a rules-based regime when not in the bipolar state, but only if dominant countries expect to become hegemons with a high probability

A multipolar world

Reforming the system

- Suppose the system is threatened by a dominant country that has become intent on changing the regime to *power*

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$\rightarrow$ *What can be done?*

1. Increase the efficiency of the rules-based system
2. Exclude the disruptive dominant from the system
3. Reshape the system to induce the dominant to keep *rules*

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- Theoretically simple, but practically difficult
- Yet important to point out that:

Proposition 2 (Efficiency and Sustainability Go Together).

If the payoff of all countries under R, $u_i(\omega, R), \forall i$, increases (resp. decreases), then a rules-based equilibrium becomes possible under a larger (resp. smaller) set of parameters.

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- ∗ Reforms that improve payoffs for all countries under *rules* both raise global welfare and make the system easier to sustain

* Increasing $u_i(\omega, R)$

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   * Trade-off:
     - If the world becomes multipolar under *WTO - 1*, it neutralizes the incentives to undermine the system by the disruptive dominant
     - But by forgoing the gains from trade with the largest economy, it risks undermining the very system it seeks to preserve

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Consider:

$$u_i(\omega, RL) = \begin{cases} u_i(\omega, R) + \gamma, & \omega \in \{h_i, d_i\}, \\ u_i(\omega, R) - \lambda\gamma, & \omega \in \{h_j, d_j\},\ j \neq i, \end{cases}$$

$\gamma \in [0, \bar{\gamma}]$, with $\bar{\gamma} \equiv u_i(d_i, P) - u_i(d_i, R)$

$\lambda \in [1, \bar{\lambda}]$, $\bar{\lambda} \equiv \frac{u_i(d_j,R) - u_i(d_j,P)}{u_i(d_i,P) - u_i(d_i,R)}$

Optimal Appeasement

Proposition 3 (Optimal Appeasement).

Consider a symmetric world and an equilibrium in which a dominant country chooses power upon receiving rules. There exists a unique threshold $\gamma^\star$ such that rules-lite is sustained by all leaders in their dominant states if and only if $\gamma \geq \gamma^\star$.

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- With $\gamma = \gamma^*$, the concession to dominant countries is the minimum needed to ensure sustainability
- It comes with lower payoffs for small countries and possibly with inefficiencies

Conclusion

- We find that there is a fundamental fragility in the system
  - Once the rules-based regime is dismantled, we either never revert back to it or will need a hegemon to restore it
    - ★ This could take a long time...
  - In a bipolar world, keeping *rules* becomes even harder due to free-riding and market-power incentives

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- In light of our model:
  - Hegemon U.S. sponsored and supported the GATT/WTO for decades
  - Overtime, its hegemony eroded and it has become a dominant with little prospect of regaining hegemony
  - Meanwhile, the rise of China has made a bipolar state increasingly likely

  $\Rightarrow$ As a non-hegemonic dominant, and also anticipating the difficulties under a bipolar state, the U.S. faces strong incentives to move to *power*

Trade measures $\times$ # of countries affected – world

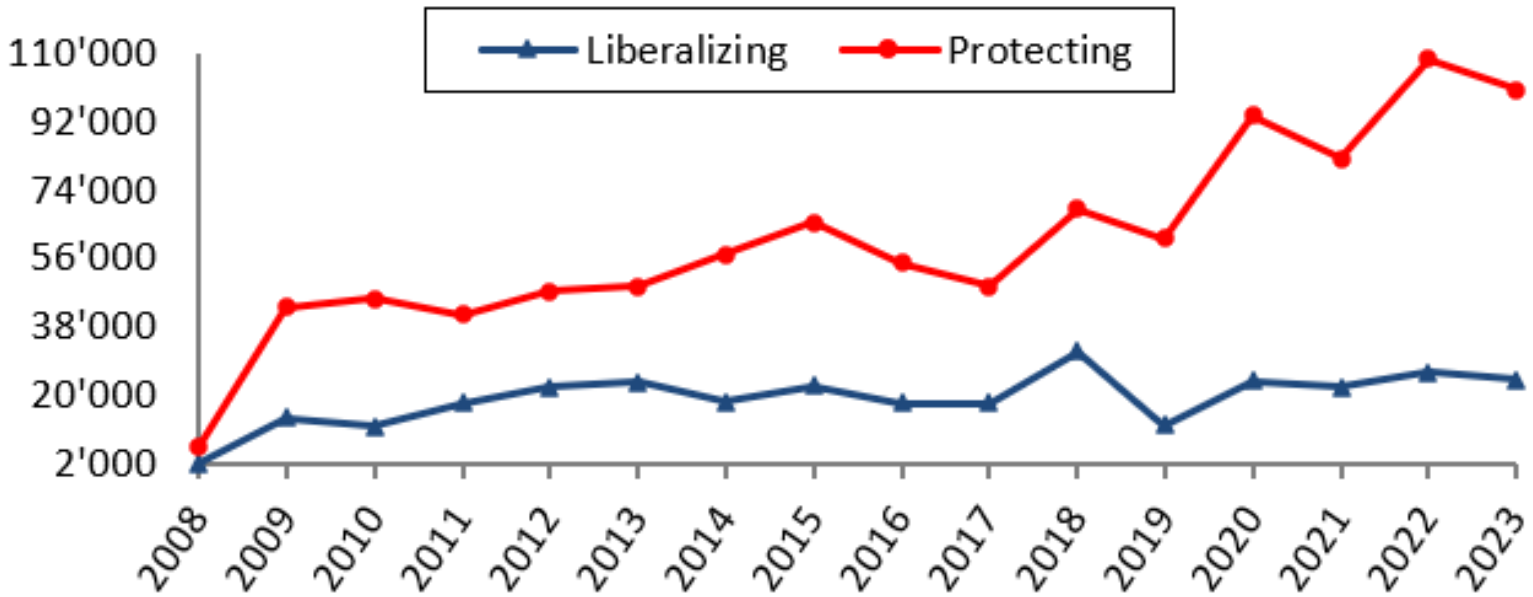
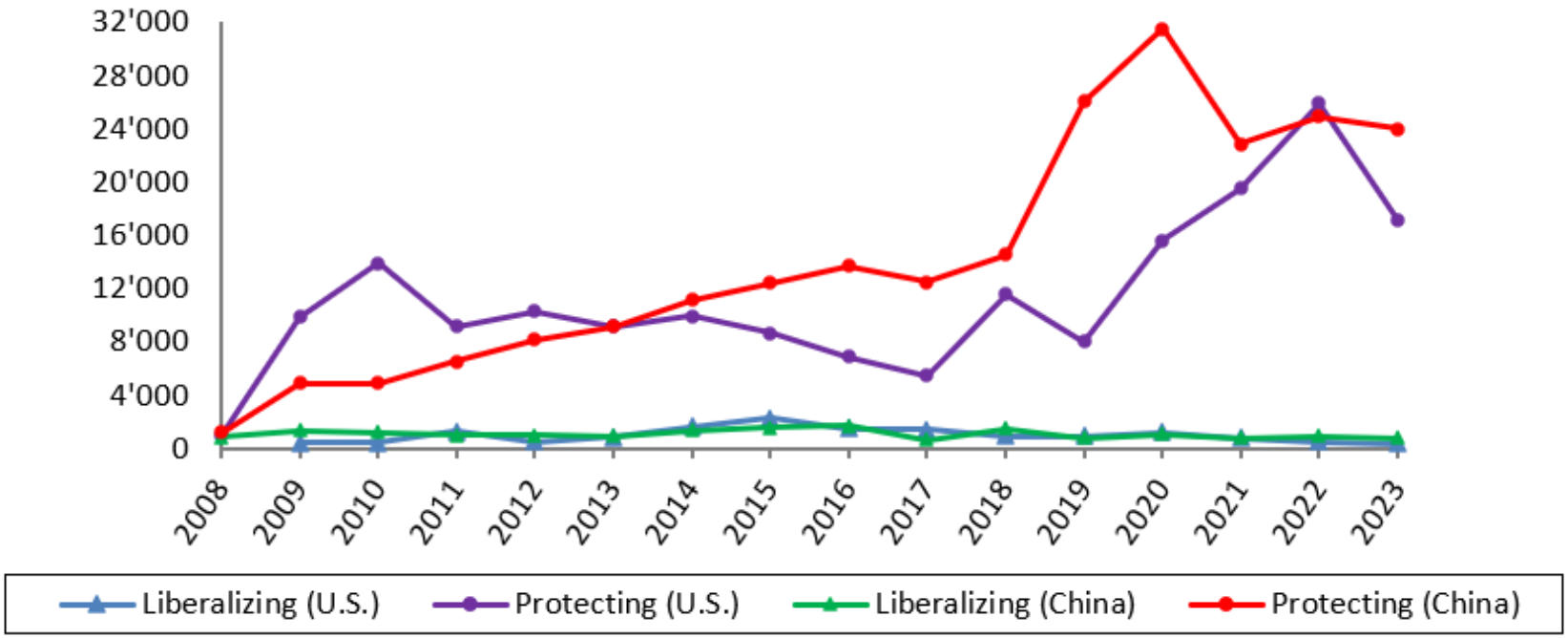


Figure: World trade policy interventions (2008 - 2023)

Source: Global Trade Alert database, 2024

Trade measures $\times$ # of countries affected – US & China



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Back

"Hostility" in WTO disputes

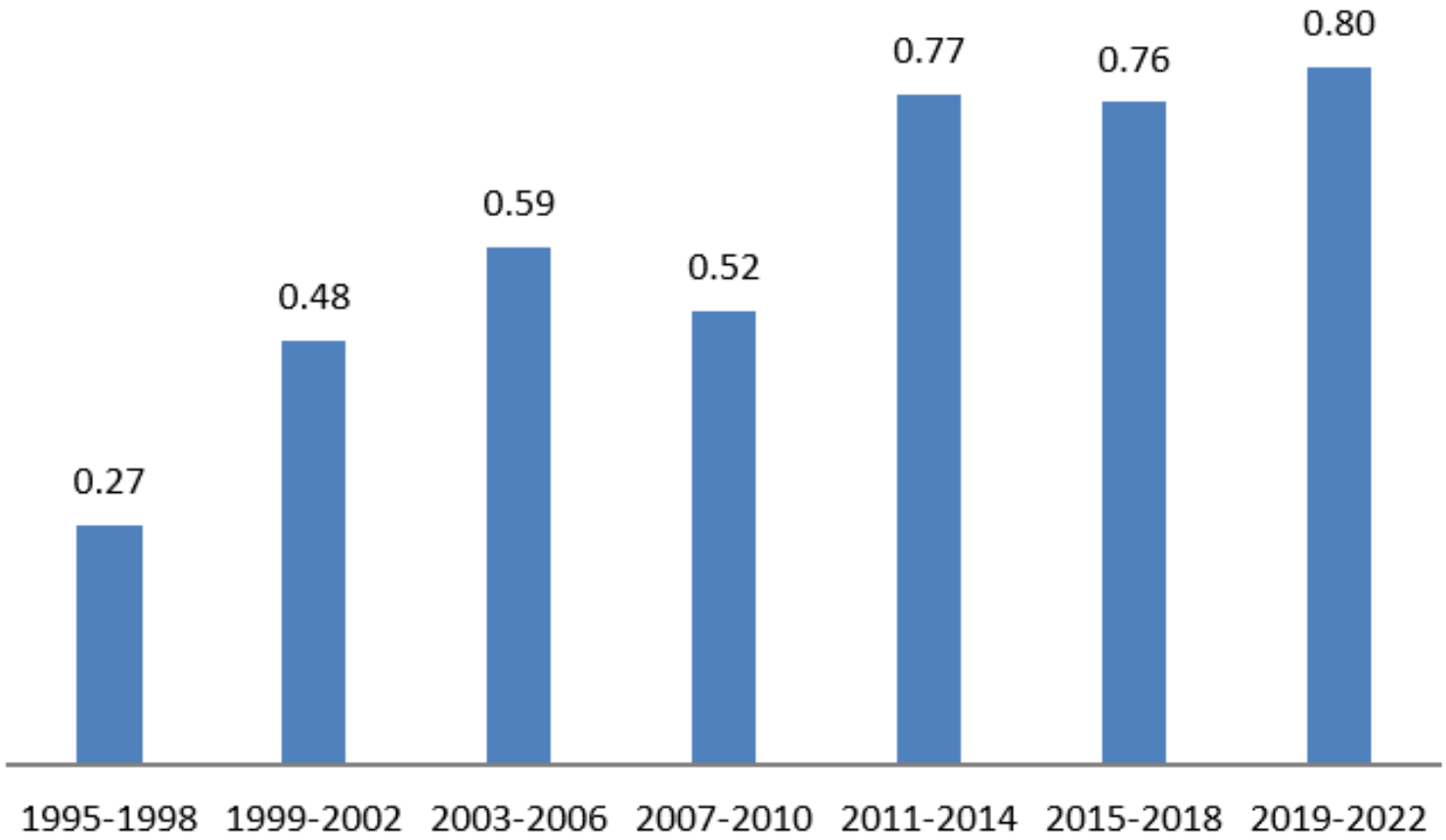

Figure: Average of DSP consultations moved to panels (1995 - 2022)

Source: WTO Annual Report, 2023

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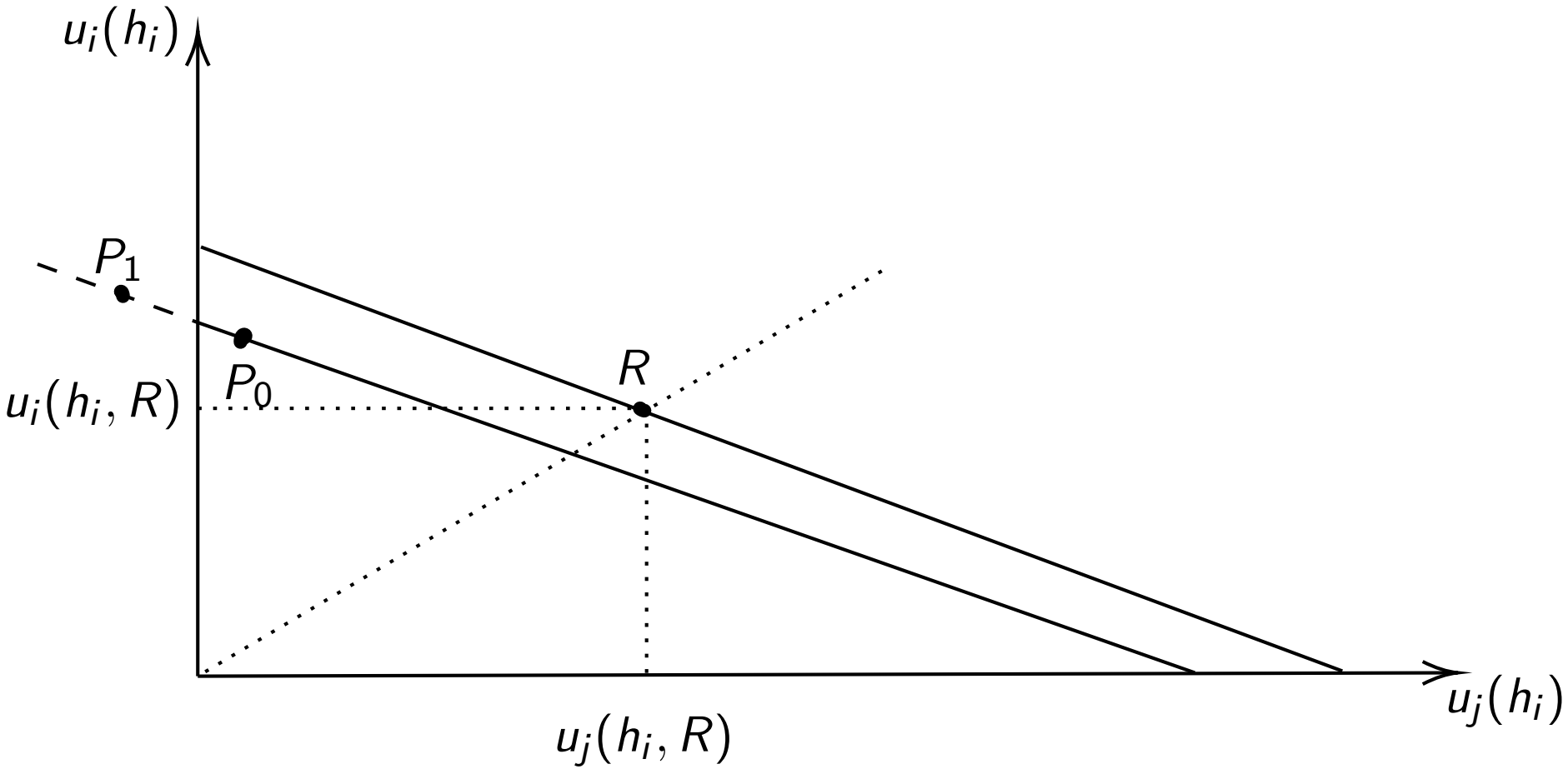

Figure: Stage-game payoffs - Hegemon case

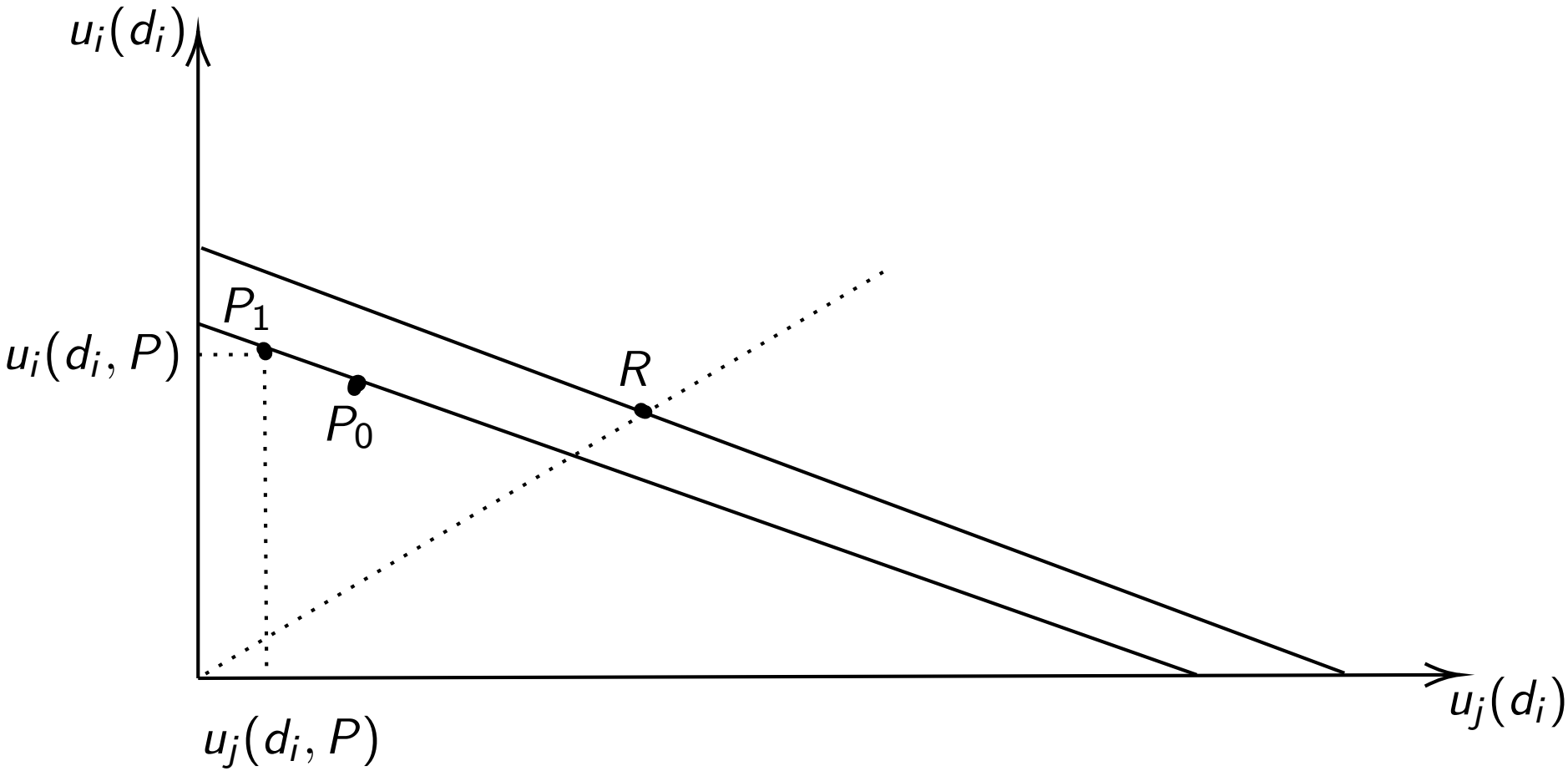

Figure: Stage-game payoffs - Dominant case

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Equilibrium payoff functions

- For $\omega \in \{h_i, d_i\}$ [i.e., when i is the leader]:

$$V_i(\omega, \rho) = \max_{\{P,R\}} \{u_i(\omega, P) + \delta \sum_{\omega' \in \Omega} q_{\omega,\omega'} V_i(\omega', P),$$
$$u_i(\omega, R) - 1_{\{\rho=P\}} c + \delta \sum_{\omega' \in \Omega} q_{\omega,\omega'} V_i(\omega', R)\}$$

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- For $\omega \in \Omega \setminus \{h_i, d_i\}$ [i.e., when i is subordinate]:

$$V_i(\omega, \rho) = \begin{cases} u_i(\omega, P) + \delta \sum_{\omega' \in \Omega} q_{\omega,\omega'} V_i(\omega', P) & \text{if leader chooses } P \\ u_i(\omega, R) + \delta \sum_{\omega' \in \Omega} q_{\omega,\omega'} V_i(\omega', R) & \text{if leader chooses } R \end{cases}$$

Back

Necessary conditions for rules-based equilibria

Proposition 4.

A. *There are* $\bar{c} > \underline{c} > 0$ *such that a rules-based equilibrium can exist only if* $c \in (\underline{c}, \bar{c})$.

B. *There exists* $\underline{\delta} > 0$ *such that, if* $\delta < \underline{\delta}$, *a rules-based equilibrium does not exist.*

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B. *There exists* $\underline{\delta} > 0$ *such that, if* $\delta < \underline{\delta}$, *a rules-based equilibrium does not exist.*

- If the cost to establish a rules-based trading system is very small, only the short run matters, since future leading countries can easily shift between regimes
  - In that case, the trade regime loses its role as a state variable
- If the cost to establish a rules-based trading system is very large, no leader will ever want to incur that cost
- With myopic governments, *rules* are doomed as well

Back

Are frequent hegemons necessary?

- Hegemons are essential to establish rules-based regimes
- But does their *frequency* matter for long-run sustainability?

- We examine two cases where **hegemons are rare**:
  1. **Enduring Dominance**: Low leadership turnover
  2. **High Turnover**: Many countries, frequent leadership change

$\rightarrow$ Can a rules-based regime survive in either case?

Enduring dominance

Definition (Informal). Dominant countries retain power for long periods.

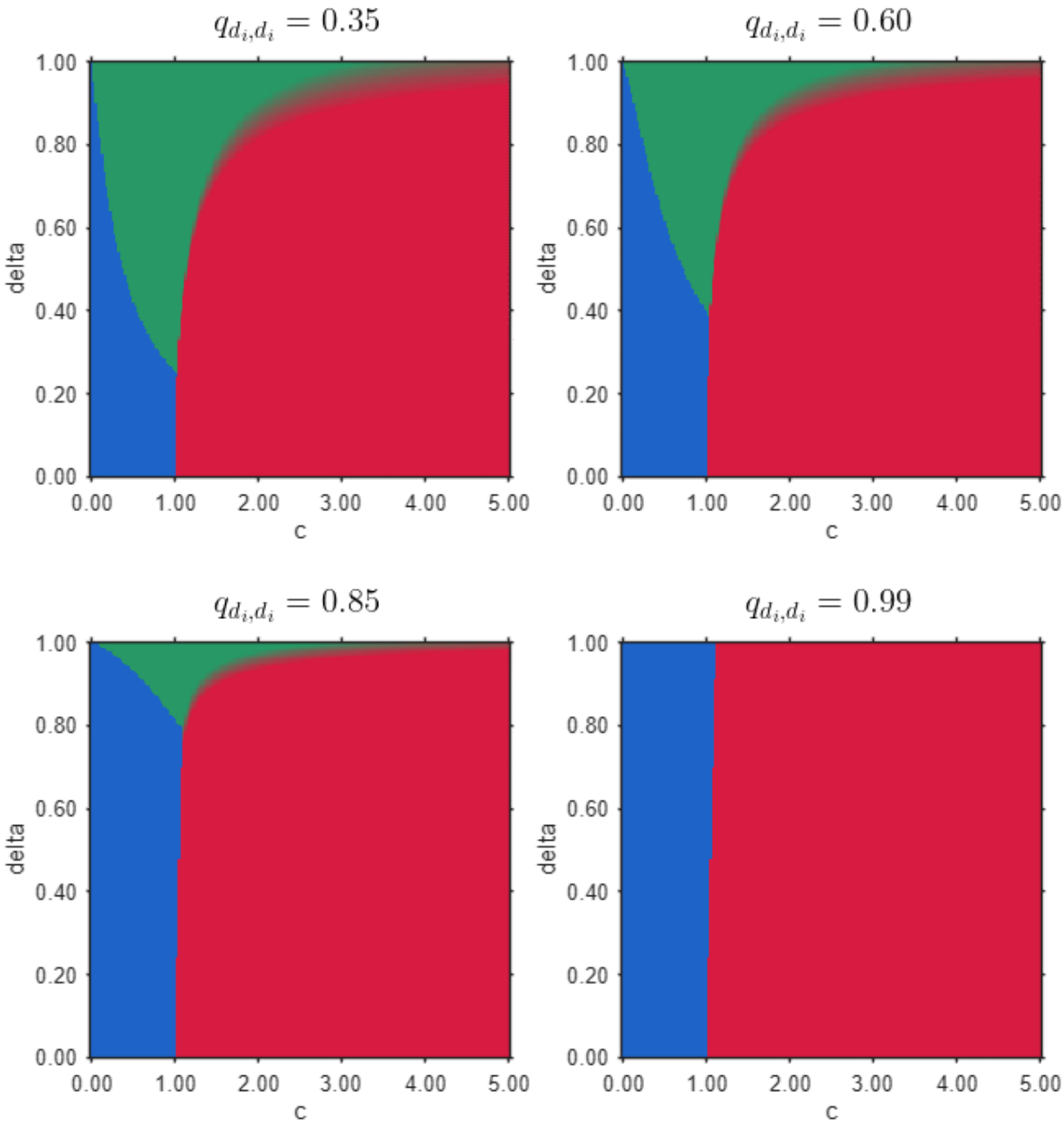
With *enduring dominance*, rules-based equilibria may not exist:

Proposition 5.

For any given $\delta < 1$, there exists $\bar{q} < 1$ such that if $q_{d_i,d_i} > \bar{q}$ for any i, then a rules-based equilibrium cannot exist.

- If individual countries remain dominant for too long, no chance for a permanent rules-based system

Increasing probability of dominant state



Rare hegemons with high turnover

- Consider a world with high leadership turnover ($N = 2$):

$$\begin{cases} q_{d_i,d_i} = 0 & \forall\, i \\ q_{d_i,d_j} = 1-\varepsilon & \forall\, i \neq j \\ q_{d_i,h_i} = \varepsilon & \forall\, i. \end{cases} \tag{HLT}$$

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Proposition 6 (Rules-based with Rare Hegemons and High Leadership Turnover).

Consider a transition matrix Q that satisfies HLT and that rules is efficient. Then, for ϵ small enough, a rules-based equilibrium exists.

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Efficiency

- Is the decentralized equilibrium efficient?

Efficiency

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- We need a proper definition of *efficiency* to answer this question
- Consider the problem of a hypothetical "global social planner" with the authority to select the trade regime in every state, aiming to maximize the total payoff across all countries:

$$\max_{\{\rho_t(\omega_t)\}_{t=1}^{\infty}} \mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} \{ \sum_{i \in \mathcal{I}} u_i(\omega_t, \rho_t) - \mathbb{1}_{\{\rho_t = R \,\&\, \rho_{t-1} = P\}} c \} \tag{SP}$$

Efficient solution

- Define $S \subset \mathbb{R}^2$ as the set of parameters (δ, c) such that the efficient solution induces *power* at every period and state
- Assume that aggregate welfare in all states is higher under a rules-based regime than under a power-based regime

Efficient solution

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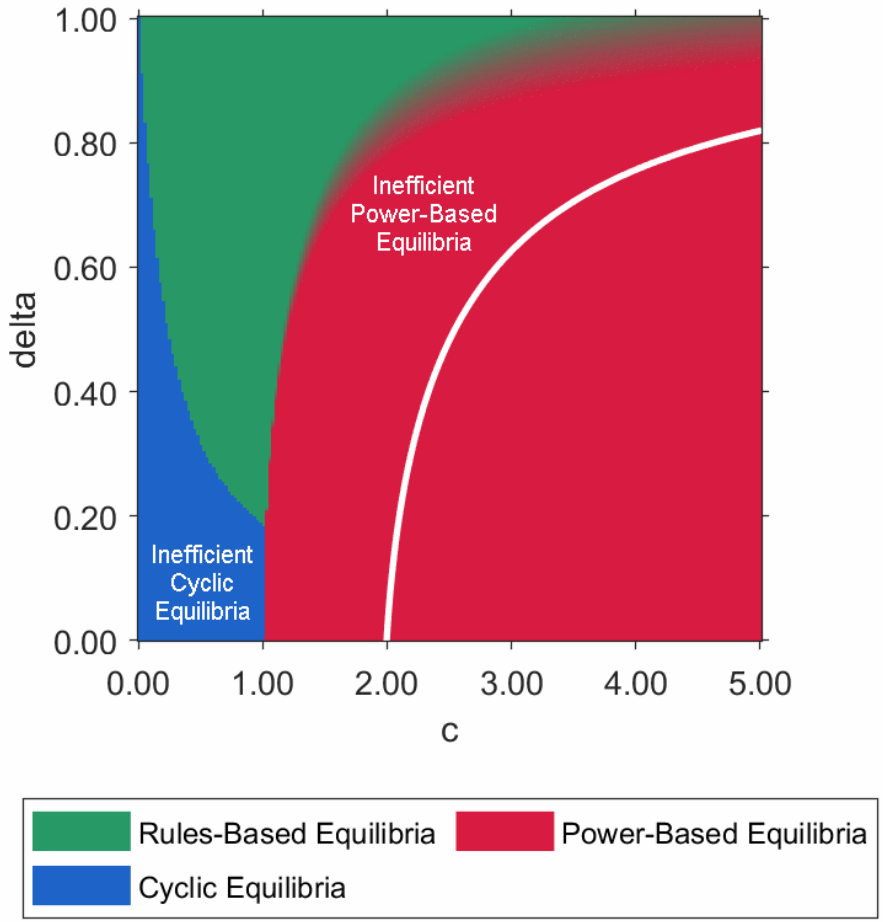
- Assume that aggregate welfare in all states is higher under a rules-based regime than under a power-based regime
- Then:

Proposition 7.

The solution $\{\rho_t(\omega_t)\}_{t=1}^{\infty}$ that solves (SP) involves either the permanent choice of power or the permanent choice of rules. Moreover, S is non-empty and satisfies the following properties:

1. *If $(\delta, c) \in S$, then every point (δ', c') with $\delta' \leq \delta$ and $c' \geq c$ also belongs to S.*
2. *For any $(\delta, c), (\delta', c') \in S$, then $\lambda(\delta, c) + (1 - \lambda)(\delta', c')$, $\forall \lambda \in (0, 1)$, also belong to S.*

Decentralized equilibrium vs Social Planner's choice



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Maintaining *rules*

Large area of *inefficient* power-based equilibria:

- No single country is willing to unilaterally incur in cost c
- But suppose that, for some exceptional historical circumstance, R is put in place

$\rightarrow$ *Can rules be sustained?*

  - If so, a rules-based system would become viable once in place

Classes of power-based equilibria

1. **Rules-Resistant Power-Based (RRP)**: a rules-based regime is not created, and if it were, it would not persist

2. **Rules-Compatible Power-Based (RCP)**: a rules-based regime is not created, but if it were, it would persist
   - A world where there is a desire to maintain *rules*, but the cost of creating it is too large

A collective-action problem

Consider the situation in which RRP and RCP equilibria are inefficient

- *Inefficient RRP equilibrium*: R is efficient, but even if R is put in place, it would not endure
- *Inefficient RCP equilibrium*: R is efficient and if R is put in place, it would endure

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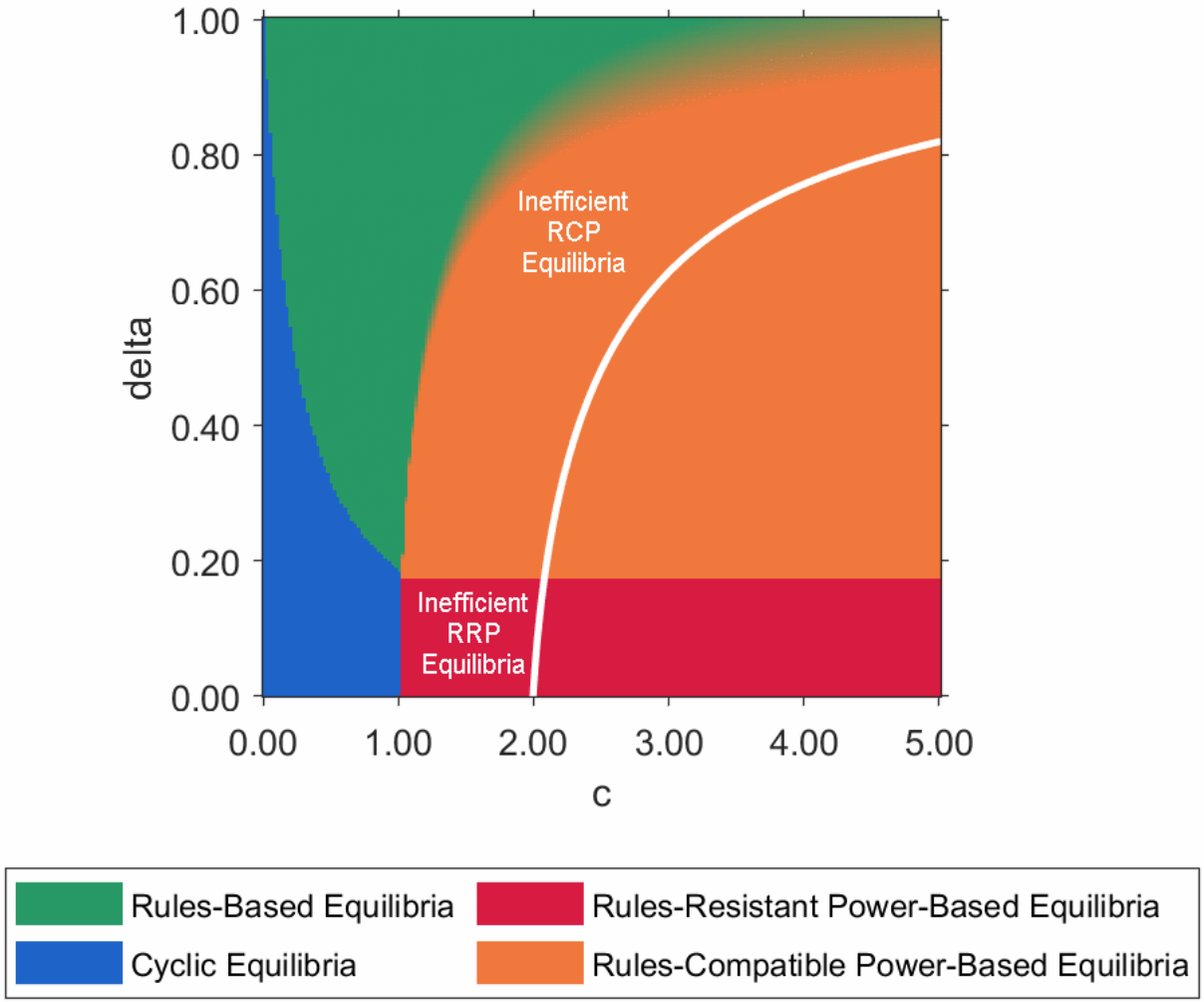
  $\rightarrow$ Inefficiency due to a collective action problem, in which leader countries do not want to bear the cost to implement R alone (and coordination to split the costs with other countries is not possible)


1.00
0.80
0.60
0.40
0.20
0.00
delta
0.00
1.00
2.00
3.00
4.00
5.00
c
Inefficient
RCP
Equilibria
Inefficient
RRP
Equilibria
Rules-Based Equilibria
Rules-Resistant Power-Based Equilibria
Cyclic Equilibria
Rules-Compatible Power-Based Equilibria

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Endogenous transitions

$\rightarrow$ *What if the transition out of leadership depends on the trade regime?*

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- Consider that, when a dominant country chooses P, it reduces its probability of losing leadership:

$$\tilde{q}_{d_i,d_i} = q_{d_i,d_i} + \eta \quad \text{if } \sigma(d_i, \rho) = P,\ \eta > 0$$

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  - Loss of leadership becomes rarer, but also more costly

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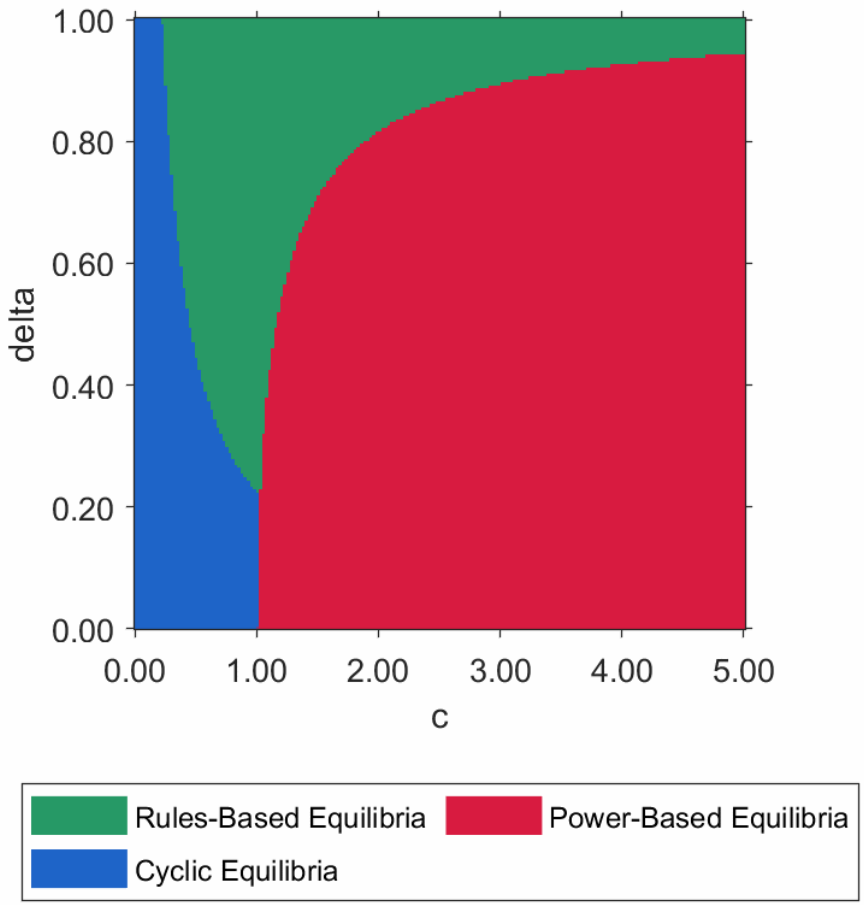
∗ $\eta > 0$ does *not* necessarily make *rules* less likely

$\eta = \bar{\eta}$: when dominants ensure leadership with *power*



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Strategic coordination

A1 R requires support from both dominant countries.

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Proposition 8.

Under A1, there can be rules-based equilibria in pure strategies.

* The need for strategic coordination does not eliminate the possibility of a rules-based equilibrium

Market power

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Proposition 9.

Assume A1 and suppose that there is a rules-based equilibrium. Then decrease $u_i(\Phi_{ij}, (P, R))$. A rules-based equilibrium also exists under this new structure of payoffs.

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* Large short-run gains from exploiting market power can render a rules-based equilibrium unviable

Free-riding

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Proposition 10.

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This holds even when market-power incentives are minimal, i.e.:

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with $\epsilon \to 0$

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with $\epsilon \to 0$

* Free-riding incentives *eliminate* the possibility of a rules-based equilibrium in pure strategies
* *Rules* may still be possible, but only in a probabilistic sense

Does free-riding at Φ_{ij} undermine *rules* entirely?

In a world with a bipolar state, under A2:

- At the bipolar state, no hope for a rules-based regime in pure strategies
- If c is low, we know that hegemons will play *rules*
- But what about dominants? Could they support a rules-based regime (upon receiving R) knowing that, at Φ_{ij}, *power* would be reinstated?

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$\mapsto$ Is an equilibrium with $\{h \to R, d \to \text{status-quo}, \textit{bipolar} \to P\}$ possible?

Hegemonic Stability Theory with a bipolar state

Proposition 11.

Under A2, a pure strategy symmetric Markovian equilibrium where dominant countries choose R upon receiving R exists only if the probability that dominant countries become hegemons is sufficiently high.

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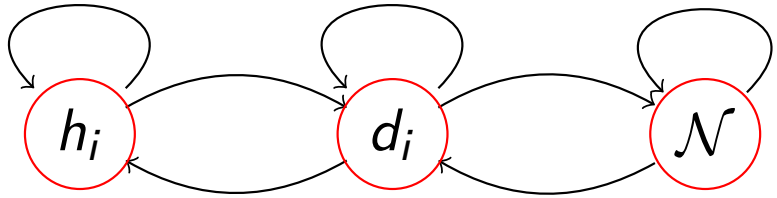
A **multipolar** world

What if the world enters a state $\mathcal{N}$ without a hegemon/dominant country?



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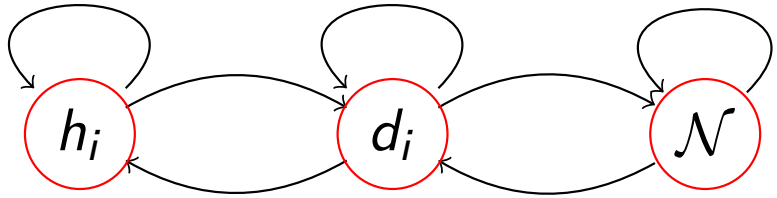

In state $\mathcal{N}$, the regime depends on the actions of many of the N countries

Assumptions on state $\mathcal{N}$:

- A group of $n > 2$ countries play a simultaneous regime-choice game, *without* a prisoner's dilemma structure
- Unanimity within this group is needed to have R (to make coordination essential)
- Switching $P \to R$ has cost $c' \leq c$ for each country
- $u_i(\mathcal{N}, R) > u_i(\mathcal{N}, P)$, $\forall i$

stage-game and status quo result

Multipolar vs bipolar state

Proposition 12.

If there is a rules-based equilibrium when the world has a bipolar state, then there is also a rules-based equilibrium when the world has a multipolar state.

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- Key: deviation is more lucrative in a bipolar than in a multipolar state

* It is easier for many small countries without market power to coordinate on R than for a few countries with market power to do so

$\Rightarrow$ Difficulty of agreement in the WTO not because there are too many small member countries, but b/c there are a few large ones

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Stage game in multipolar state, 2-country version

	R	P
R	$u_i(\mathcal{N}, R) - c'$, $u_j(\mathcal{N}, R) - c'$	$u_i(\mathcal{N}, P) - c'$, $u_j(\mathcal{N}, P)$
P	$u_i(\mathcal{N}, P)$, $u_j(\mathcal{N}, P) - c'$	$u_i(\mathcal{N}, P)$, $u_j(\mathcal{N}, P)$

Table: multipolar state with status quo regime P

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Maintaining status quo at multipolar state helps *rules*

4 action profiles at $\mathcal{N}$ consistent with symmetric Markovian equilibria:

1. **[Rules breakdown]** $\sigma(\mathcal{N}, P) = P$ and $\sigma(\mathcal{N}, R) = P$
2. **[Coordination on R]** $\sigma(\mathcal{N}, P) = R$ and $\sigma(\mathcal{N}, R) = R$
3. **[Regime reversal]** $\sigma(\mathcal{N}, P) = R$ and $\sigma(\mathcal{N}, R) = P$
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Lemma 2.

If there exists a rules-based symmetric Markovian equilibrium in which the strategy specifies action profiles 1, 2 or 3 in state $\mathcal{N}$, then there also exists an equilibrium that specifies profile 4. The converse is not true.

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