

Equilibrium Trade Regimes: Power- vs. Rules-Based ^{*}

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Abstract

We study the sustainability of a rules-based trade regime in a dynamic model in which the leading country chooses the regime and leadership changes over time. We show that a hegemon is required to establish a rules-based regime, but not to sustain it: once in place, rules may be upheld even by non-hegemonic leaders that would otherwise prefer a power-based system, especially if they anticipate losing dominance. A rules-based equilibrium exists, however, only under restrictive conditions: the costs of establishing it must be moderate, countries sufficiently patient, and leadership turnover frequent. In a bipolar state, free-riding and market-power forces pose additional challenges to sustaining rules-based equilibria. We also characterize reforms that can preserve the system when a shortsighted leader is tempted to dismantle it. Sustaining a rules-based order may then require a more efficient system, greater discretion for the leader, or exclusion of the disruptive country.

Keywords: Hegemonic Stability Theory; World Trade Organization; Trade Agreements

JEL classification: F02; F13; F53

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1 Introduction

Led by the United States, the multilateral trading system has operated under a rules-based regime since the late 1940s, culminating in the creation of the World Trade Organization (WTO) in 1995. Today, the WTO comprises 166 member countries accounting for roughly 98% of world trade. Despite its apparent complexity, the system functioned remarkably well until recently, with members largely adhering to established rules and complying with dispute settlement rulings. In the past 10-15 years, however, the system has exhibited growing signs of strain: rules are increasingly disregarded, disputes remain unresolved, and major economies have resorted to unilateral trade actions. The erosion of U.S. hegemonic power, alongside the rise of China, has further heightened uncertainty about the future of the rules-based system.

We develop a dynamic framework to study the sustainability of rules-based trade regimes when leadership evolves over time. We model the choice of the trading system – whether based on rules or on power – as the prerogative of the world’s largest economy, whose identity evolves stochastically. The current leader inherits the prevailing regime and decides whether to maintain or change it. While moving away from a rules-based regime is relatively frictionless, (re-)establishing one entails a nontrivial cost. We analyze this environment in a many-country, infinite-horizon stochastic game with asynchronous moves and focus on symmetric Markovian equilibria, which capture the dynamic strategic trade-offs faced by successive leaders.

Our analysis delivers three main results. First, a rules-based regime can emerge only in the presence of a hegemon willing to bear the cost of establishing it. Second, a hegemon is not required to sustain such a regime: with sufficient turnover in leadership, non-hegemonic leaders may preserve it to avoid future exploitation once they lose power. Third, the viability of a rules-based regime depends on a delicate set of conditions. In particular, it requires that the cost of establishing it be neither too small nor too large, that countries be sufficiently patient, and that leadership turnover be sufficiently frequent. When these conditions fail, the world may instead cycle between regimes or become locked into a power-based equilibrium. This perspective helps rationalize both the long period during which a U.S. in relative decline continued to underwrite the multilateral system and its recent shift away from it.

To understand the forces underlying these results, we first turn to static incentives. This requires imposing structure on short-run preferences over regimes. We follow the existing literature to link these preferences to country size. Large, “dominant” countries prefer a power-based system, because it allows them to extract greater gains from trade

by leveraging their size in negotiations. This presumes that smaller countries are willing to participate. However, as size asymmetries increase – and the leading country becomes a “hegemon” – smaller countries may come to expect ex-post exploitation to such an extent that they prefer to abstain from power-based arrangements. Thus, to secure participation, hegemons tend to favor a rules-based regime.¹

Those static regime preferences align with the core message of the *Hegemonic Stability Theory* (HST), originally proposed by Kindleberger (1973). According to the HST, the provision of international public goods is generally inefficiently low because of coordination failures across countries. This changes when there is a hegemon – an economy significantly larger than all others. Because it captures a larger share of the gains from providing the public good than the total cost of doing so, the hegemon is willing to bear those costs. As a result, the presence of a hegemon fosters the establishment and maintenance of a rules-based international regime, yielding collectively desirable outcomes that smaller countries enjoy without sharing the costs. The HST therefore predicts that a rules-based trade regime will endure if and only if there is a hegemon to sponsor it. On that basis, it links the liberal trade regimes of the mid-19th and mid-20th centuries to British and American hegemony, respectively, and the interwar turn to protectionism to the absence of a hegemon. However, this view is overly deterministic. It cannot explain, for example, why a declining U.S. continued to support multilateral rules for several decades before abandoning them.²

While the HST offers a useful static benchmark, it abstracts from the dynamic incentives that are central to our analysis. This is crucial, as the possibility of future changes in the structure of the world economy may lead a dominant country to preserve an inherited rules-based system despite its short-run incentive to replace it with a power-based one. The reason is that reestablishing a rules-based system after it has been abandoned is costly, so keeping it today can help sustain it in the future. This benefits the current leader if it later loses its dominance.

More specifically, we show that a hegemon that inherits a rules-based regime will always keep it. While the short-run benefit of rules for hegemons is assumed, the long-

¹This could occur, for example, when production requires irreversible investments, and the private sector allocates resources to export-oriented sectors in anticipation of a liberal trading environment (as in McLaren, 1997). This weakens the ex-post bargaining power of smaller countries to the point where, anticipating such outcomes, they are better off opting out of power-based deals altogether.

²In our working paper, Carvalho et al. (2025), we highlight the common features of our model and of the Hegemonic Stability Theory, as well as their differences. A key distinction is that ours is a formal model of the long-run sustainability of trade regimes that explicitly considers dynamic trade-offs, whereas the HST is fundamentally a heuristic static theory. Our model extends the reach of the HST by formalizing some of its results, substantially qualifying others, and significantly broadening its scope.

run benefit is not – it is derived from the equilibrium strategies of all future leaders. More strikingly, a dominant country inheriting a power-based regime will never create a rules-based regime, regardless of how small c is or of the degree of leadership turnover. One might expect the prospect of future subordination to induce dominant countries to establish rules preemptively, but this logic fails, as we show that a dominant country prefers instead to let another country incur the cost (or incur it itself when it becomes hegemon). This yields several important implications. In particular, it implies that once a power-based system is in place, the world can switch back to a rules-based regime only if it returns to a hegemon state. Put differently, a rules-based trading system can emerge *only* when there is a hegemon to sponsor it. However, contrary to the HST, hegemons are not necessary to *maintain* a rules-based regime. With sufficient leadership turnover, dominant countries uphold such a regime to avoid entrenching a power-based system that would later disadvantage them.

We also show that the conditions required to sustain a rules-based equilibrium are quite restrictive. In particular, an equilibrium with a permanent rules-based regime can exist only if the cost to establish it is *not too small*. Intuitively, if the cost to establish a rules-based trading system is very small, then only the short run matters, since future leaders can switch regimes at negligible cost. In that case, the trade regime loses its role as a state variable and the world exhibits a cyclical equilibrium, transitioning between rules-based (under a hegemonic leader) and power-based (under a dominant leader) over time. Conversely, if the cost to establish a rules-based system is very large, then not even a hegemon would be willing to bear it, and the world will be permanently under a power-based regime. Thus, the existence and endurance of a rules-based system require the cost to reestablish it to be neither too large nor too small. Countries must also be sufficiently forward-looking, or else the equilibrium will be either cyclic or power-based. Furthermore, since the key reason dominant countries may uphold a rules-based regime is to avoid future losses once they become subordinate, a rules-based equilibrium also requires large enough turnover in world leadership.

We demonstrate that the decentralized equilibrium is often inefficient, as it fails to maximize the present value of the world's aggregate payoff. In particular, every cyclic equilibrium is wasteful, as the repeated transitions between rules-based and power-based regimes impose unnecessary costs. Additionally, many power-based equilibria are inefficient because dominant leaders do not fully internalize the losses they impose on other countries.

In the discussion above, we consider that there is a single leading country. We also extend the model to allow for a bipolar state in which the decision about the trade

regime may depend on both leaders. We consider that, in such a state, the two dominant countries play a simultaneous game to define the current trade regime, and the short-run payoffs have a prisoner’s dilemma structure. This reflects the idea that a large country can benefit from exploiting its market power in international markets. In this context, we identify additional challenges to the sustainability of a rules-based trading system. First, a dominant country’s incentive to exploit market power vis-à-vis the other creates additional obstacles to sustaining a rules-based equilibrium. Second, there will be an incentive to free-ride. We show that market power and free-riding incentives undermine the sustainability of a rules-based equilibrium.³ There are two caveats to this strong verdict, though. First, a rules-based regime can still be maintained in non-bipolar states, provided that dominant countries expect to become hegemonic with a high enough probability. This does not characterize a permanent rules-based equilibrium, but allows for rules to be maintained in some states of the world. Second, if both leaders are needed to sustain the rules-based regime in the bipolar state, in general coordination can still be achieved to sustain a rules-based equilibrium.

These results have direct implications for the design and reform of the multilateral trading system. Indeed, several scholars have proposed reforms of the WTO (Grossman and Sykes, 2025; Mavroidis, 2025; Stiglitz and Rodrik, 2024). Our analysis provides a framework for evaluating the key trade-offs that any successful reform of the rules-based system would face. In particular, can the rules be redesigned to prevent a dominant leader from dismantling the entire system?

A first lesson is straightforward but important: if the system becomes more efficient and the resulting gains are shared between leading and non-leading countries, then sustaining it becomes easier. Indeed, recent studies show that the scope for cooperation under the WTO is far from exhausted (Nicita et al., 2018; Adão et al., 2026; Ritel, 2026). If such an arrangement proves infeasible, another possibility is to exclude the disruptive dominant from the system. While this may increase resilience, the lower gains from trade in such a “WTO-1” regime could undermine sustainability. A third possibility is to replace the current system with a “rules-lite” alternative that grants additional short-run gains to dominant countries, thereby increasing their incentive to preserve it. We show that an “optimal appeasement” reform provides the minimum additional gains required to induce leaders to keep the system in place, while minimizing the losses of non-leading countries.

³Although the settings are quite different – see footnote 7 – this finding resonates with the analysis of Becko et al. (2025) in their calibrated exercise, where they conclude that there is less global openness in a bipolar world than in a unipolar world.

Our study is motivated by Mattoo and Staiger’s (2020) heuristic analysis of the recent shift in U.S. trade policy, which seeks to explain both its timing and its implications for the multilateral trading system. They argue that the U.S. has moved from rules-based to power-based tariff bargaining as its hegemonic position has eroded. They warn that this transition poses a threat to the sustainability of the rules-based trading system. However, their analysis does not provide a framework to study the dynamic implications of changing leadership. This is precisely what we develop in this paper. Building on their insights, we construct a formal dynamic model to analyze how evolving leadership and agenda-setting power shape the long-run sustainability of trade regimes. To our knowledge, this formal dynamic modeling is novel in both the trade policy and international relations literatures.⁴ The recent erosion of multilateral cooperation and the uncertainty surrounding the sustainability of a rules-based trade regime make these questions especially timely.

Most of our results are valid regardless of the ranking of aggregate welfare under rules- and power-based regimes, but for some results we consider the world to be better-off under a rules-based regime, an assumption that is grounded on established research. Bagwell and Staiger (1999) analyze tariff negotiations under the institutional setting of the General Agreement on Tariffs and Trade (GATT) and show that the principles of reciprocity and nondiscrimination can guide governments in implementing trade agreements that are immune from the terms-of-trade inefficiency that arises with unilateral trade policies, while mitigating the effects of bargaining power on negotiations.⁵ Quantitative models have provided a better understanding of the magnitudes involved. Ossa (2014) shows that cooperative tariffs, obtained through multilateral trade negotiations, yield large welfare gains. Naturally, a rules-based system has value only if there is a mechanism to enforce the rules. The GATT/WTO system has an explicit mechanism for dispute resolution. Maggi (1999) develops a model that emphasizes the roles played by this mechanism in promoting multilateral trade negotiations and in informing third

⁴In a recent, complementary study, Broner et al. (2025) develop a model linking the presence of a hegemon to the degree of globalization through a trade-off between policy alignment and cross-country heterogeneity. While related in spirit, our analysis differs in both focus and approach, and yields distinct insights.

⁵Several studies provide empirical support for the claim that the GATT/WTO key principles encourage multilateral trade liberalization. For instance, Ludema and Mayda (2013) develop and estimate a model showing that trade agreements based on GATT/WTO rules can neutralize the terms-of-trade externality and induce lower average applied tariffs. Bagwell et al. (2021) evaluate the impacts of the principle of nondiscrimination. Through counterfactual analysis, they find that tariff negotiations during GATT’s Uruguay Round resulted in increased global welfare compared to counterfactual discriminatory negotiations, and that nondiscrimination was particularly beneficial for countries in weak bargaining positions. Broner et al. (2025) show, using a sample spanning 180 years, that hegemonies are associated with more – and more effective – trade agreements.

countries about violations of the agreement.

At a broader level, our paper also relates to the burgeoning research in geoeconomics (Clayton et al., 2026). A key contribution of our analysis is the incorporation of an explicit dynamic component, which is essential for understanding the long-term prospects of the rules-based world trading system. At the same time, we abstract from other important issues that could be related to the trade regime, such as geopolitical rivalry due to countries’ relative economic positions (Mattoo et al., 2025); concerns over economic security (Clayton et al., 2024; Mayer et al., 2025); economic dependence shaping political alignment (Kleinman et al., 2024) and countries’ actions to shape policy beyond their borders (Antràs and Padró i Miquel, 2011, 2025; Becko and O’Connor, 2025; Broner et al., 2025; Camboni and Porcellacchia, 2025).⁶

We also abstract from the possibility that a subset of countries could form exclusive rules-based agreements – like the free trade agreements that have sprung out in the last 30 years (for surveys of that literature, see Freund and Ornelas, 2010; Limao, 2016; Maggi, 2014). Historically, these agreements have operated within the WTO framework, which allows their formation under specific conditions. By contrast, a world with bilateral trade agreements but without multilateral rules could be significantly different.⁷

The remainder of the paper is organized as follows. In section 2, we provide a brief institutional background. In section 3, we develop the benchmark model. In section 4, we allow for a state where there are two leading countries. In section 5, we briefly introduce extensions we pursue in the appendix. We discuss the trade-offs behind a possible reform of the rules-based system in section 6. We conclude in section 7.

2 Institutional Background

The establishment of the GATT in 1947 represented a notable shift in the governance of international trade. It is built on the principles of reciprocity and nondiscrimination, together with a dispute settlement mechanism. Reciprocity specifies that bargains and concessions should be balanced. For this reason, it mitigates the exercise of power in tariff bargains. Nondiscrimination specifies that bilateral changes in trade policies should be extended to all other WTO members. This mitigates a powerful country’s ability to

⁶See Aidt et al. (2021) for an insightful survey of the different ways countries use to exert foreign influence.

⁷Becko et al. (2025) study the related situation in which a hegemon (or two competing hegemon) chooses optimal tariffs based on terms-of-trade considerations and on the desire to align smaller countries geopolitically. The hegemon secures geopolitical alignment by offering participation in free trade agreements.

capture the gains from bargaining down the tariffs of a weaker partner.⁸

In turn, the dispute settlement procedure (DSP) is a mechanism for disciplining and resolving trade disputes when governments consider that their rights under the GATT/WTO agreements are being violated. Thus, even though the GATT/WTO system lacks the power to directly enforce agreements, the DSP, guided by the principles of reciprocity and nondiscrimination, facilitates the enforcement of the rules of the multilateral trading system.

Despite its historical success, the GATT/WTO trading system has faced a series of challenges in recent decades. In our working paper, Carvalho et al. [2025], we show that the global number of protecting measures since 2008 has been consistently higher than the number of liberalizing measures, and that the difference between them has widened since 2017.

Related to this trend, Colantone et al. (2022) document a shift of voters toward more isolationist views since the early 1990s, and especially since the financial crisis, using data from 23 developed economies. They show that this change in voters' preferences has been accompanied by analogous changes in government positioning. Goldberg and Reed (2023) make a similar point.

Another sign of the erosion of the system is the collapse of the WTO's Appellate Body. The Obama Administration started the practice of blocking some reappointments and new appointees, and since 2017 the U.S. has systematically blocked every appointment or reappointment. As a result, since 2019 the Appellate Body has had fewer than three members (it currently has none), thereby becoming unable to consider any case. This implies that the WTO's formal enforcement mechanism has become literally inoperative.

Staiger (2022) highlights other challenges for the rules-based multilateral trading system, but focuses on the decline of U.S. hegemonic power and its potential implications for the sustainability of the world trading system. By the end of World War II, the U.S. had become an international hegemonic power, and its leaders have strongly supported and committed to the rules-based international trading system. This hegemony lasted uncontested for several decades, but the country has faced a slow but steady decline in its economic power over that period. In parallel, in the last decades, the world has witnessed the rise of China, which became the second-largest economy in the world in 2010. Although the U.S. remains the leading economic force, the rise of China implies that it no longer holds the unchallenged hegemony it once did.

⁸Bagwell and Staiger (1999, 2004, 2010, 2018) provide thorough theoretical treatments for the benefits of the reciprocity and nondiscrimination principles. Bagwell et al. (2020) provide empirical evidence based on detailed tariff bargaining data from an early GATT round of negotiations.

Figure 1 illustrates these trends. It shows the evolution of the U.S. and China’s share of world GDP at current prices since 1900. The U.S. emerged as the dominant global economic power in the early 20th century, a position it consolidated after World War II, when it reached a world share of GDP above 45%. This post-war peak coincides with the creation of the GATT in 1947 (represented by the vertical green line), which institutionalized American-led trade liberalization. However, from the late 1960s onward, the U.S. share of global GDP shows a steady decline.

Meanwhile, China’s trajectory follows a different path. After maintaining a relatively low and decreasing share of global GDP until the early 1980s, it began to show a rapid rise in the late 20th century. This growth accelerated significantly after China joined the WTO in 2001, marking its deeper integration into global markets. The gap between the two economies has narrowed significantly since then, with the U.S. share of world GDP at 26% and China’s at 17% in 2023. Although the U.S. remains the leading economic force, the rise of China implies that it no longer holds the unchallenged hegemony it once did.

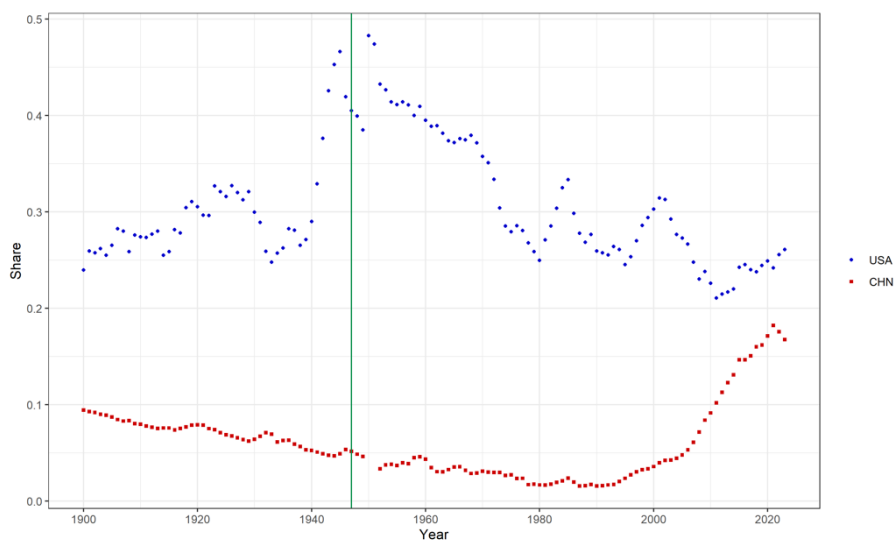


Figure 1:
Share of world GDP (1900 - 2023, Current Prices)

Source: 1900-1949 data from Klasing and Milionis, 2014; 1950-1959 data from Penn World Tables 10.01 (Feenstra et al., 2015); 1960-2023 data from the World Bank’s World Development Indicators, 2025 (<https://databank.worldbank.org/>)

Mattoo and Staiger (2020) argue that, with the decline of its relative economic importance, the U.S. no longer perceives the benefits of committing to a system of rules that restricts its power. As a result, it has been moving away from “rules-based” tariff negotiations to engage in “power-based” negotiations. The purpose is to make its

partners reduce their bilateral tariffs vis-à-vis the U.S., in a way that departs from the GATT's principles of reciprocity and nondiscrimination, and instead rests on countries' bargaining power.

Will that change of behavior by the leading economy undermine the long-run sustainability of the rules-based multilateral trading system, or could they be regarded as transitory disturbances? Our model answers this and other questions.

3 Benchmark Model

3.1 Preliminaries

We consider an environment where there are N countries and $2N$ states of the world. Denote the set of countries by $\mathcal{I} = \{1, 2, \dots, N\}$, and the set of states of the world by $\Omega = \{h_1, d_1, h_2, d_2, \dots, h_N, d_N\}$. State h_i represents the state where country i is a *hegemon*, and d_i represents the state where country i is *dominant*. We denote by ω a typical element of Ω .

When a country is either a hegemon or a dominant, we call it the *leader*. As such, it chooses the trade regime for the current period.⁹ Specifically, in states h_i and d_i country i chooses a trade regime ρ from the set $\{P, R\}$, where P stands for “power-based” and R stands for “rules-based.” When a country is neither a hegemon nor a dominant, we say it is *subordinate*. As such, it does not take any action concerning the trade regime in those states. At any state, one country is the leader (either hegemon or dominant) and $N - 1$ countries are subordinate.

Let $u_i(\omega, \rho)$ denote the stage-game payoff of country i when the state of the world is $\omega \in \Omega$ and the leader chooses regime $\rho \in \{P, R\}$. Our parsimonious framework relies solely on the following assumptions on stage-game payoffs:

$$\begin{aligned} u_i(\omega, R) &> u_i(\omega, P), \quad \forall \omega \in \Omega \setminus \{d_i\}, \forall i; \\ u_i(d_i, P) &> u_i(d_i, R), \quad \forall i. \end{aligned} \tag{1}$$

The first set of inequalities indicates that when i is hegemonic or subordinate, its static

⁹As Norrlof (2015) defines, “in international relations, hegemony refers to the ability of an actor with overwhelming capability to shape the international system.” Here, ‘to shape the international system’ means choosing the trading regime for the current period. We give this prerogative to the leader, be it hegemon or ‘simply’ dominant. This is similar to the assumption used by Aghion et al. (2007), where the leading country decides between multilateral and sequential bargaining when negotiating preferential trade agreements. It is also in the same spirit as the approach of Farhi and Maggiori (2018), who study the properties of the international monetary system with and without a hegemon that is the sole issuer of international reserve assets.

gains are higher under regime R than under regime P . In turn, the second inequality says that when i is dominant, its static gains are higher under regime P .

In Appendix A, we provide a rationale for this ordering. We construct a simple two-country, two-period Ricardian model in which the surplus from trade negotiations is allocated according to relative size. The key mechanism is intertemporal and operates through specialization: trade induces small countries to exit production in some sectors, and the resulting decline in productivity in these idle sectors weakens their autarky outside option. With sufficiently large size asymmetries, the smaller country anticipates that this erosion will leave it worse off under repeated power-based negotiations than under permanent autarky, and therefore opts out of negotiations altogether. In this case, the large country prefers to commit to a rules-based arrangement that precludes renegotiation in order to sustain cooperation. By contrast, when size asymmetries are moderate, the smaller country's participation constraint is satisfied even under power-based bargaining, rendering rules unnecessary. This distinction underlies the static incentives captured in inequalities (1). Thus, *subordinate* countries prefer R to P because R protects them from exploitation in tariff negotiations; *dominant* countries prefer P to R because they benefit from their superior bargaining power; and *hegemons* prefer R to P because it serves as a commitment device to secure the participation of subordinate countries.

The ordering in inequalities (1) is also consistent with the previous literature. Mattoo and Staiger (2020) provide a detailed micro-founded discussion, based on an extensive literature, of how countries would fare under different trade regimes depending on their economic sizes. Their main point is that the mitigation of the power of larger countries in tariff bargaining due to the reciprocity and nondiscrimination rules encourages the participation of weaker countries in the system. Without those rules, weaker countries may fear excessive exploitation and choose to avoid any type of bargaining. This scenario could arise in the presence of sunk investments and holdup problems, as shown by McLaren (1997) and discussed by Bagwell and Staiger (1999). These ideas are behind the simple model in Appendix A. In a different context, Clayton et al. (2024) also build on the idea that a hegemon can improve its own welfare by tying its own hands through a commitment device, like the creation of an international organization such as the WTO.¹⁰

¹⁰In a similar vein, Goldstein and Gowa (2002) argue that one of the reasons why the U.S. encouraged the formation of the current multilateral trading system was the existence of large power asymmetries in the postwar period. They argue that the rules-based system allowed weaker countries to effectively discipline the behavior of the U.S. in trading relations, and that empowerment encouraged their participation in the system. The assumption that rules help weak countries relative to strong countries in tariff negotiations is supported by the empirical analysis of Bagwell et al. (2021). This rationale parallels the

It is worth stressing that inequalities (1) do *not* imply that hegemons will necessarily want to introduce *rules*. In particular, they may not be willing to incur the cost c . Moreover, even when a hegemon is willing to bear cost c , the result that only hegemons — and never dominant countries — will create rules is not assumed but proven: it follows from the strategic structure of the dynamic game, as Proposition 1 establishes. In fact, the assumption that hegemons prefer *rules* in the short-run is neither necessary nor sufficient for the persistence of a rules-based regime. We return to this point in section 5.1, when we discuss rules-based equilibria when hegemons prefer P to R in a static sense.

3.2 Dynamic Model

We now construct a dynamic model of trade regimes to study the conditions for the sustainability of a rules-based system when dominant countries have an intrinsic static incentive to favor a power-based system.

The initial state and the initial trade regime, at period $t = 0$, are exogenously set to (ω_0, ρ_0) . Since we are concerned with a model that can account for the creation of the rules-based regime, we consider the case in which $\rho_0 = P$.¹¹ For concreteness, we set $\omega_0 = h_1$.

From period $t = 1$ onward, the transition between states is governed by a Markov matrix Q , in which element $q_{\omega, \omega'}$ is the probability of moving from state ω to state ω' . We impose four restrictions on these probabilities that will induce smooth and full support leadership transition: (i) there is no absorbing state – i.e., $q_{\omega, \omega} < 1$ for all $\omega \in \Omega$; (ii) the transition probabilities from a hegemon state to another where a different country becomes the leader, and from a dominant state to another where a different country becomes the hegemon, are zero: $q_{d_i, h_j} = q_{h_i, d_j} = q_{h_i, h_j} = 0$ for all $i, j \in \{1, 2, \dots, N\}$ with $i \neq j$; (iii) full support on leadership transition, i.e., $q_{d_i, d_j} > 0$, $\forall i \neq j$; and (iv) any dominant has positive probability of becoming hegemon $q_{d_i, h_i} > 0$, $\forall i$. The first assumption implies simply that there is no “final state” of the world. The second assumption captures the idea that the transition to and from a hegemon state is “smooth,” in the sense that a country becomes dominant before (possibly) turning hegemonic, and a hegemon first becomes dominant before (possibly) losing its leadership.¹² The third

reasoning developed by Maggi and Rodriguez-Clare (1998, 2007) – whereby trade agreements are used as a *domestic* commitment device against lobbying by firms – to an international environment.

¹¹The case in which $\rho_0 = R$ is qualitatively similar, the main difference being that this case allows for an equilibrium in which *rules* is always chosen on the equilibrium path even if no country is willing to incur the cost to introduce it.

¹²The smoothness restriction on Q plays two roles in the analysis. The first is descriptive. Smoothness

assumption ensures that all countries in $\mathcal{I}$ have a positive probability of becoming leaders at some point. The fourth restriction guarantees that dominant countries might become hegemon. Note that (i) and (ii) imply that $q_{h_i, h_i} + q_{h_i, d_i} = 1, \forall i$. Figure 2 presents a visualization of this transition rule.

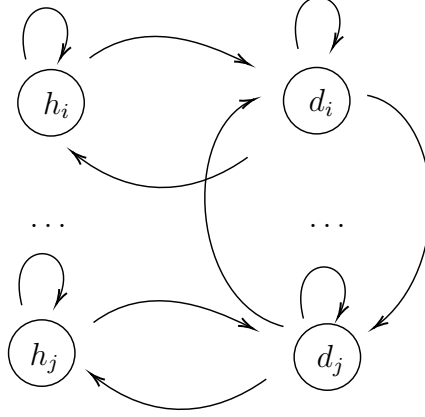


Figure 2: Transition between states

The matrix Q induces a unique stationary probability distribution over the states in Ω . Let $\mu_t \in \Delta(\Omega)$ denote the probability distribution over states at time t , with an initial distribution $\mu_0 = (1, 0, 0, \dots, 0)$. The distribution evolves according to $\mu_{t+1} = \mu_t Q$, so that in general $\mu_t = \mu_0 Q^t$. The stationary distribution, denoted by μ , is given by $\mu \equiv \lim_{t \rightarrow \infty} \mu_1 Q^t$, and can equivalently be found by solving $\mu = \mu Q$.

Once the leading country chooses a trade regime, the subsequent period starts with that regime as the status quo. If the status quo regime is P , moving to R implies a cost $c > 0$ to the country making the change. On the other hand, moving from R to P is costless. Keeping the regime unchanged is also costless. The rationale is that putting in place a rules-based system is more costly because it requires establishing a series of institutional rules and procedures and putting together a bureaucracy to set and enforce them, as in the WTO, in addition to coordinating with the other countries to bring them to participate in the system. Conversely, as argued by Keohane (1984), keeping it in place is significantly less costly once it is already established. Similarly, reversing

captures the natural idea that geopolitical power shifts gradually: a hegemon cannot be displaced directly by the rise of another country, but must first recede into dominance; conversely, a country can attain hegemony only if it was already dominant in the preceding period. This rules out discontinuous jumps in the global balance of power. The second role is analytical. Without smoothness, a new class of equilibria becomes conceivable in which a dominant country creates *rules*, despite preferring *power* in the short run, while a hegemon does not, even though hegemons prefer *rules* both statically and (as we will see) dynamically. Such equilibria would lack economic intuition; smoothness rules them out.

to/maintaining a power-based system is relatively less costly, as it does not require an institutional structure to guide and enforce it, or any multilateral coordination.¹³

We study symmetric Markovian equilibria, i.e., strategy profiles that induce subgame perfect Nash equilibria and are Markovian and symmetric. Symmetry focuses on equilibria in which countries that find themselves in a leadership position under a particular trade regime behave similarly. The Markovian restriction captures the idea that the payoff-relevant state – current leadership status and inherited regime – disciplines behavior. Formally, we define:

Definition 1 (Symmetric Markovian Strategies) *A Markovian strategy profile 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 $\forall \rho \in \{P, R\}$.*

We define symmetric Markovian equilibria as:

Definition 2 (Symmetric Markovian Equilibria) *A strategy profile is a symmetric Markovian equilibrium if it induces a subgame perfect Nash equilibrium and strategies are symmetric and Markovian.*

Since we focus on symmetric Markovian equilibria, which are stationary by definition, we omit time subscripts in our exposition.

We now describe the recursive equations representing country i 's payoff functions. We denote by $V_i(\omega, \rho)$ country i 's expected discounted continuation payoff at state $\omega \in \Omega$ and received status quo trade regime $\rho \in \{P, R\}$. For $\omega \in \{h_i, d_i\}$, country i 's payoff is:

$$V_i(\omega, \rho) = \max\{u_i(\omega, P) + \delta \sum_{\omega' \in \Omega} q_{\omega, \omega'} V_i(\omega', P), u_i(\omega, R) - \mathbb{1}_{\{\rho=P\}}c + \delta \sum_{\omega' \in \Omega} q_{\omega, \omega'} V_i(\omega', R)\}. \quad (2)$$

Essentially, the leader compares the discounted payoffs of choosing P or R today, taking into account that switching from P to R has cost c , and that today's regime choice affects the regime choice in the next period.

In contrast, at any state h_j or d_j , $\forall j \neq i$, country i is subordinate and does not choose the regime, so its value functions at those states depend on the continuation strategies

¹³Assuming that the regime transitions $\{R \rightarrow P\}$, $\{R \rightarrow R\}$ and $\{P \rightarrow P\}$ imply the same cost, as we do, is a simplifying restriction. Given this assumption, however, normalizing the common cost to zero is without loss of generality. That is, if we assumed instead that the regime transitions $\{R \rightarrow P\}$, $\{R \rightarrow R\}$ and $\{P \rightarrow P\}$ implied cost $c' \in (0, c)$, our analysis would remain unchanged. The reason is that all that matters for the regime choice is the difference in the cost of adopting one regime relative to the other, not their absolute cost.

and the regime choice of their opponents at that period. For $\omega \in \Omega \setminus \{h_i, d_i\}$, country i 's payoff function is:

$$V_i(\omega, \rho) = u_i(\omega, \sigma(\omega, \rho)) + \delta \sum_{\omega' \in \Omega} q_{\omega, \omega'} V_i(\omega', \sigma(\omega, \rho)). \quad (3)$$

We now turn to the characterization of equilibrium trade regimes. The key preliminary step is to understand how dynamic considerations shape players' incentives. We begin by showing that, for any player, arriving at any state ω under the status quo regime R is always weakly better than under P . All proofs are in Appendix B.

Lemma 1 (Rules-Based Regimes are Preferred as Status Quo) *In any pure strategy symmetric Markovian equilibrium, every country weakly prefers to enter every state under regime R :*

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

This result follows from two observations. First, whenever country i is the leader, switching to P is costless, unlike switching from P to R . Second, whenever country i is subordinate, it weakly prefers that the leader starts at regime R , because the cost c may discourage a leader from switching from regime P to R (recall that R would be beneficial to all subordinate countries), but the opposite does not happen.

Lemma 1 may be interpreted as suggesting that it may be “easy” to sustain regime R . As we will see, that interpretation is not correct. A key result is that, in any symmetric Markovian equilibrium, when inheriting their myopically optimal status quo, leading countries always choose to keep it.

Proposition 1 (No Hard Choices: Countries Keep Myopically Optimal Status Quo) *In any pure strategy symmetric Markovian equilibrium, $\sigma(h_i, R) = R$ and $\sigma(d_i, P) = P$, $\forall i \in \{1, 2, \dots, N\}$.*

The first part of Proposition 1 holds because, when there is a hegemon, if it inherits a rules-based regime, there is no short-run gain from replacing it, and there is no long-run gain either. The latter follows because it is always weakly better to enter a state under regime R than under regime P (Lemma 1), so passing R on to the next period is weakly preferred to passing P .

To see why the second part of Proposition 1 holds, suppose, by contradiction, that $\sigma(d_j, P) = R$ instead of $\sigma(d_j, P) = P$. First, note that when a dominant country inherits a power-based regime, in the short run it is better off maintaining P , by assumption.

Second, we will show that in this case, the dominant leader has no strict long-run gain from switching to R either. To see this, consider all possible transitions in the subsequent period. The possibilities are the following: the dominant country j may (i) remain dominant, (ii) become a hegemon, or (iii) another country may become dominant. If j remains dominant in the subsequent period, it would have benefited from keeping P . If j becomes a hegemon, it would again have benefited from keeping P (and potentially choosing R only after becoming a hegemon). Finally, if country j becomes subordinate, the new dominant country $k \neq j$ will switch to R under the proposed alternative strategy, and j would have been better off benefiting from P while leader. Thus, from all possibilities we conclude that country j is better off keeping P ; this contradicts $\sigma(d_j, P) = R$, $\forall j \in \{1, 2, \dots, N\}$. Thus, it must be true that $\sigma(d_j, P) = P \forall j \in \{1, 2, \dots, N\}$.

Thus, while Lemma 1 says that it is weakly better to inherit R , Proposition 1 is telling us that dominant countries that inherit P will find it optimal to maintain it rather than paying a cost to create R .

An important lesson follows directly from Proposition 1: a rules-based system must be created by a hegemon. It shows that, regardless of any long-run strategic motive, and regardless of how small c may be, dominant countries will not introduce rules in equilibrium. Therefore, it implies a pivotal role for hegemons in creating a rules-based regime:

Corollary 1 (Indispensable Hegemon) *The world can switch from regime P to regime R only when it is in a hegemon state.*

This result emphasizes the fundamental role played by hegemons in creating rules-based regimes. In that sense, Corollary 1 offers support for the main premise of Kindleberger’s (1973) Hegemonic Stability Theory, along the lines argued by Brooks and Wohlforth (2016), that a hegemon is needed to establish a rules-based system. However, unlike what that theory prescribes, it does not imply that a hegemon is needed to *keep* a rules-based system in place. Instead, the rules-based regime’s long-term stability requires compliance from *both* hegemon and dominant countries. Dominant countries face immediate incentives to dismantle rules in favor of power-based systems, but these short-run incentives are countered by two long-term strategic forces. First, a dominant country must consider its potential future return to hegemony – abandoning rules today would force it to bear the costs of recreating it later. Second, the transient nature of leadership means that today’s dominant power could soon find itself subordinate in a power-based system it helped create, leaving it worse off than under a rules-based order. These dynamics create conditions where, despite short-term advantages, dominant countries may choose to preserve rules for their long-term benefit.

Another direct implication of Proposition 1 is that it significantly narrows the set of possible pure strategy symmetric Markovian equilibria. In fact, it reduces this set to only four elements.¹⁴

Corollary 2 (Rules, Power or Cyclic Equilibria) *Any symmetric Markovian equilibrium in pure strategies must be one of the following classes of equilibria:*

1. *Rules-based equilibria: hegemon and dominant countries choose rules on the equilibrium path $[\sigma(d_i, R) = \sigma(h_i, R) = \sigma(h_i, P) = R, \text{ and } \sigma(d_i, P) = P, \forall i \in \mathcal{I}]$.*
2. *Power-based equilibria: hegemon and dominant countries choose power on the equilibrium path $[\sigma(d_i, P) = \sigma(h_i, P) = P, \text{ and } \sigma(h_i, R) = R, \sigma(d_i, R) = \rho', \text{ with } \rho' \in \{P, R\}, \forall i \in \mathcal{I}]$.*
3. *Cyclic equilibria: hegemon countries choose rules and dominant countries choose power on the equilibrium path $[\sigma(d_i, \rho) = P, \sigma(h_i, \rho) = R, \forall i \in \mathcal{I}, \forall \rho \in \{P, R\}]$.*

We show that there are strict limits on the conditions under which rules-based equilibria can exist. Since dominant leaders have a static incentive to choose *power*, countries must be sufficiently forward-looking so that dominant leaders perceive a long-term benefit in maintaining regime *R* despite it not being their most advantageous static choice.¹⁵

Proposition 2 (Necessary Condition for Rules-Based Equilibrium: Patience) *There exists $\underline{\delta} > 0$ such that a rules-based equilibrium can exist only if $\delta \geq \underline{\delta}$.*

A high discount factor does not, however, ensure the existence of rules-based equilibria. Another necessary condition is that the cost to create it cannot be too small or too large.

Proposition 3 (Necessary Conditions for Rules-Based Equilibria: Costs) *The following conditions are necessary for the existence of rules-based equilibria. Fix a $\delta > \underline{\delta}$, then:*

- A. *There exists $\underline{c}_\delta > 0$ such that a rules-based equilibrium can exist only if $c \geq \underline{c}_\delta$.*
- B. *There exists $\bar{c}_\delta > \underline{c}_\delta$ such that a rules-based equilibrium can exist only if $c \leq \bar{c}_\delta$.*

¹⁴There are $4^2 = 16$ possible pure strategy symmetric Markov strategy profiles, so our result reduces the set of possible classes of equilibria from 16 to 4.

¹⁵For clarity, we assume that the discount factor δ is common across countries, but it would be straightforward to consider the situation where countries are heterogeneous in that dimension. In this case, the condition in Proposition 2 would need to be satisfied for all countries that could at some point become leaders, so the necessary condition would become $\min_i \{\delta_i\} \geq \underline{\delta}$.

The intuition for part A is as follows. When c is very small, the regime ceases to be a meaningful state variable. A dominant country that dismantles *rules* today can reintroduce them later at negligible cost, so there is no dynamic penalty from switching to P . One may think a dominant country could still preserve *rules* to avoid future losses as a subordinate. But if that force were sufficiently strong, then starting from P , countries would also be willing to incur the negligible cost of establishing R for future gains. But by symmetry, each prefers to let others pay that cost and instead take advantage of P while a dominant. The decision therefore collapses to the static one, under which a dominant strictly prefers P . Hence, *rules* cannot be sustained in this case. Part B of Proposition 3 shows that the cost of establishing a rules-based regime cannot be too high either, as no country would ever pay for it, and the system would remain indefinitely at the initial status quo, P .

Although there is no rules-based equilibrium for very small or very large values of c , an equilibrium of a different nature exists in each case: a cyclic equilibrium for small values of c , and a power-based equilibrium for large values of c .

Proposition 4 (Existence of Equilibrium for Small and Large Values of c) *Fix any given discount factor $\tilde{\delta} < 1$. Then, we have that:*

- A. *For c sufficiently small, there is always a cyclic equilibrium (and it is the unique pure strategy symmetric Markovian equilibrium). Moreover, for such values of c , a cyclic equilibrium will also exist for $\forall \delta < \tilde{\delta}$.*
- B. *For c sufficiently large, there is always a power-based equilibrium (and it is the unique pure strategy symmetric Markovian equilibrium). Moreover, for such values of c , a power-based equilibrium will also exist for $\forall \delta < \tilde{\delta}$.*

Intuitively, if the cost to establish a rules-based trading regime is very small, then only the short run matters, precisely because switching across regimes requires little cost. Therefore, with c small, when the world has a dominant leader (which prefers P in the short run), the regime is P ; when the world has a hegemon leader (which prefers R in the short run), the regime is R . If instead c is very large, since the initial regime is P , the world will never get away from P , as not even a hegemon will be willing to incur the cost to change the regime.

The results in this section can be illustrated with a numerical example. We simulate a two-country system that satisfies the assumptions on the static payoffs $u_i(\omega, \rho)$ described in equation (1). For simplicity, we consider a symmetric transition matrix Q .¹⁶ Moreover,

¹⁶A symmetric transition matrix Q is such that $q_{h_i, d_i} = q_{h_j, d_j}$, $q_{d_i, h_i} = q_{d_j, h_j}$ and $q_{d_i, d_j} = q_{d_k, d_l}$, $\forall i, j, k, l \in \mathcal{I}$, with $i \neq j \neq k \neq l$.

in line with the theoretical and empirical evidence discussed in section 2, we consider that static aggregate welfare (net of c) is higher under *rules* than under *power*.¹⁷ We then check for which values of (δ, c) the system has a rules-based symmetric Markovian equilibrium. The result of this simulation is shown in Figure 3. In line with Corollary 2, the figure shows that all symmetric Markovian equilibria in pure strategies are rules-based, power-based or cyclic.

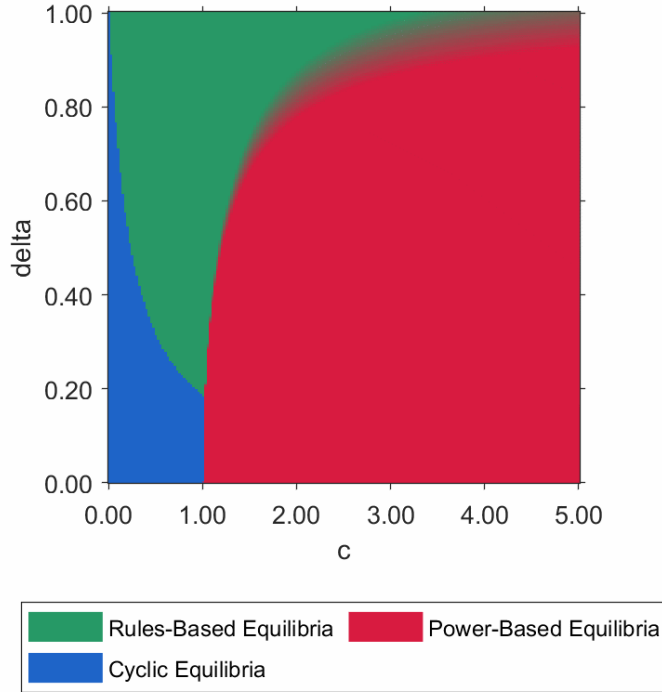


Figure 3: Symmetric Markovian equilibria

We confirm that, for sufficiently small c , a rules-based equilibrium does not exist (Proposition 3.A). Instead, there are cyclic equilibria (Proposition 4.A). For higher val-

¹⁷Specifically, the transition probabilities used for this numerical exercise are: $q_{h_1, h_1} = q_{d_1, d_1} = q_{h_2, h_2} = q_{d_2, d_2} = 0.1$, $q_{h_1, d_1} = q_{h_2, d_2} = 0.9$, $q_{d_1, h_1} = q_{d_1, d_2} = q_{d_2, h_2} = q_{d_2, d_1} = 0.45$, and $q_{h_1, d_2} = q_{h_1, h_2} = q_{d_1, h_2} = q_{d_2, h_1} = q_{h_2, h_1} = q_{h_2, d_1} = 0$. The resulting stationary distribution of this parametrization is $(\frac{1}{6}, \frac{1}{3}, \frac{1}{6}, \frac{1}{3})$, meaning that the long-run probability of being at a dominant state is $\frac{2}{3}$, while the probability of being at a hegemon state is $\frac{1}{3}$. For the static payoffs, we use: $u_i(h_i, R) = u_i(h_j, R) = u_i(d_i, R) = u_i(d_j, R) = 1$, $u_i(h_i, P) = u_i(h_j, P) = 0$, $u_i(d_i, P) = 1.1$, and $u_i(d_j, P) = 0.8$. Hence, global payoff is maximal under R , in which case the gains from trade are split evenly between the two countries; is minimal when a hegemon chooses P ; and is intermediate when a dominant chooses P , in which case the dominant country obtains a larger share of the gains than the subordinate country.

ues of c in the frontier between cyclic and rules-based equilibria, there is a negative relationship between δ and c , illustrating that the minimum cost that sustains a rules-based equilibria is a negative function of the discount factor – that is, with a higher δ , the cutoff $\underline{c}$ that makes a rules-based equilibrium unviable is lower. The reason is that a greater value for future payoffs makes a dominant country more willing to keep R when it receives R .

For each level of δ , if c is sufficiently high, a rules-based equilibrium does not exist (Proposition 3.B). Instead, there is power-based equilibria (Proposition 4.B). The kink at $c \approx 1$ illustrates the point at which it ceases to be myopically optimal for a hegemon to switch to R . At that point, a hegemon must exhibit sufficient foresight to be willing to transition to regime R . That explains why the relationship between the cost $\bar{c}$ and the discount factor δ that defines the region where there is a rules-based equilibrium becomes positive after that point – that is, with a higher δ , the cutoff $\bar{c}$ that makes a rules-based equilibrium unviable is larger (Proposition 4.B). Furthermore, the figure shows that, if countries are very myopic (very low δ), then a rules-based equilibrium cannot exist (Proposition 2).

Interestingly, for a range of costs close to the threshold $\bar{c}$ that makes hegemonic countries indifferent, when the status quo is P , between keeping P and replacing it with R , a rules-based equilibrium exists only in mixed strategies. This corresponds to the shaded region between the rules-based (green) and power-based (red) regions, where the colors are mapped into the strategies so that the “greener” is the area, the higher the probability that the hegemon switches to R if it receives P . A rules-based equilibrium in mixed strategies is one in which play at all states h_i , $\forall i$, involves mixing. In that equilibrium, any hegemon, upon receiving P as the status quo trade regime, randomizes between keeping P and switching to R . To see the intuition for a mixed strategy equilibrium, start with a set of parameters that yields a power-based equilibrium – in which case hegemons that receive P keep P . Then reduce c . Eventually, c will become small enough such that a hegemon that receives P will want to incur c to implement R . This may resemble a rules-based strategy. However, at the c that makes the current hegemon just indifferent between P and R upon receiving P , $\tilde{c}$, there is a discontinuity. This happens because we are focusing on symmetric equilibria, so that, for c just below $\tilde{c}$, if we consider that the current hegemon chooses R upon receiving P , we are also considering that other potential future hegemons will behave in the same way. But that will increase the continuation payoff of the current hegemon. The reason is that there is strategic substitutability, where the incentive to create *rules* diminishes as others become more likely to do so. As a result, there is a range of c (given other parameters) for which the

only equilibria have every hegemon randomizing their regime choice upon receiving P .

3.3 Rare Hegemons

Although hegemons are indispensable for implementing a rules-based regime, the *frequency* in which hegemons arise is not as critical for its sustainability. On the one hand, because hegemons benefit from *rules*, their rarity may make sustaining *rules* more difficult. On the other hand, the frequency of leadership turnover is also a key force for maintaining *rules*; if hegemons are rare but leadership changes are frequent, a rules-based system may still be sustained. To examine these two forces separately, we compare two distinct cases in which hegemons are *rare* (i.e., when their frequency in the long-run is sufficiently close to zero).

3.3.1 Enduring Dominance

First, we study the case in which there is “enduring dominance,” i.e., once a country becomes dominant, it remains dominant for an arbitrarily long time. In this case, hegemons are rare (the steady state probability of a hegemon is close to zero) and there is very little leadership turnover. As a result, as we shut down the two channels that favor the sustainability of rules-based regimes, rules-based equilibria do not exist.

Proposition 5 (Enduring Dominance) *For any $\delta < 1$, there exists $\bar{q} < 1$ such that, if $q_{d_i, d_i} > \bar{q}$, for any i , then there is no symmetric Markovian equilibrium in which regime R is chosen on-equilibrium path by dominant countries. In particular, rules-based equilibria do not exist.*

The intuition behind Proposition 5 is simple. The only reason why a dominant country may be willing to keep $\rho = R$ is to induce the sustainability of R in future states in which it is no longer dominant. Now, if its probability of losing dominance is very small, then this long-term motive becomes too remote, while its short-term benefit from P becomes enduring. As a result, a rules-based equilibrium becomes impossible to sustain.

Hence, if hegemons are rare (in a probabilistic sense) and leadership turnover is low, it is impossible to sustain a rules-based system.

3.3.2 High Leadership Turnover

We now study the case of rare hegemons coupled with high leadership turnover. Our goal is to show that it is possible to have rules-based equilibria even when hegemons are

rare.

To do so, we focus on the two-country symmetric case and consider a special class of symmetric transition matrices,¹⁸ which we refer to as high-leadership-turnover (*HLT*) matrices. These matrices feature very high transition probabilities out of dominant states into all other dominant states. Formally:

Definition 3 (High Leadership Turnover) *A transition matrix Q for a two-country symmetric world is an HLT matrix if*

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

Hegemons are rare when the long-run probability of a hegemon is close to zero. Thus, hegemons are rare in the long-run if ε is small, since, under HLT, we have that

$$\lim_{\varepsilon \rightarrow 0} \mu_H = 0,$$

where $\mu_H \equiv \sum_{i=1,2} \mu_{h_i}$.¹⁹

We make the following three assumptions on payoffs. First, we assume symmetry: $u_i(d_j, \rho) = u_j(d_i, \rho)$, $u_i(h_j, \rho) = u_j(h_i, \rho)$, $\forall i, j$ and $u_i(d_i, \rho) = u_j(d_j, \rho)$, $u_i(h_i, \rho) = u_j(h_j, \rho)$, $\forall i, j$. Second, we assume that imposing *rules* is efficient for every state.

Assumption (Efficiency). For any $\omega \in \Omega$:

$$\sum_{i=1}^N u_i(\omega, R) > \sum_{i=1}^N u_i(\omega, P). \quad (\text{EFF})$$

For ease of notation, let $\Delta u_i(\omega) := u_i(\omega, R) - u_i(\omega, P)$ and $\Delta V_i(\omega) := V_i(\omega, R) - V_i(\omega, P)$

for any $\omega \in \Omega$. A consequence of (EFF) in our setting is that

$$\Delta u_i(d_i) + \Delta u_i(d_j) > 0.$$

Third, we assume that imposing *rules* under hegemony benefits the hegemon more than the average improvement of imposing *rules* under dominance between the leader

¹⁸See footnote 16 for the definition of a symmetric transition matrix Q .

¹⁹For the two-country case, this steady state distribution is simply $\mu_H = \frac{\varepsilon}{1 - q_{h_i, h_i} + \varepsilon}$.

and the subordinate.

Assumption (Hegemon benefits are large). For any i ,

$$\Delta u_i(h_i) > \frac{\Delta u_i(d_i) + \Delta u_i(d_j)}{2}. \quad (\text{HBL})$$

We show that it is possible to have rules-based equilibria even when hegemons are rare:

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

Consider a transition matrix Q that satisfies (HLT) and suppose that assumptions (EFF) and (HBL) hold. Then, for ε small enough, there exists $\delta \in (0, 1)$ and $c > 0$ such that a rules-based equilibrium exists.

Proposition 6 makes clear that a rules-based equilibrium can exist even if hegemons are rare, provided that leadership turnover is high enough. Thus, while hegemons are indispensable to create rules-based regimes, in line with the HST, their long-run sustainability does not hinge on the prevalence of a hegemon state, in contrast with the main thrust of the HST.

3.4 Efficiency

An important question is whether/when inefficiencies arise in the choice of international trade regimes. For example, since the only payoff restrictions are those in equation (1), our previous results show that a rules-based equilibrium may not exist even in a world in which aggregate welfare under a rules-based regime is higher than aggregate welfare under a power-based regime in *every* state of the world – i.e., when condition (EFF) is satisfied – and the cost c to introduce *rules* is relatively small. Would that be an inefficient outcome?

We formalize the problem of finding the efficient solution as follows. Consider 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. The transition matrix Q induces a probability distribution over the sequence of possible states. The efficient solution is given by the choice of a trade regime at every period, possibly as a function of all previous states and choices. With slight abuse of notation, we say that

the efficient solution is the sequence $\{\rho_t\}_{t=1}^\infty$ that solves:²⁰

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

In this subsection we focus on the case where aggregate welfare in all states is higher under a rules-based regime than under a power-based regime (EFF), as this is the most natural and interesting case. Then an important conclusion quickly emerges. The social planner will either never pay the cost c or it will pay it once and keep the rules-based regime thereafter. In particular, the social planner will not replicate the cyclic equilibria, as these involve incurring the cost c repeatedly. Using this insight, we can construct a function $\delta(c)$, increasing in c , such that for any pair (δ, c) with $\delta \geq \delta(c)$, the efficient solution is rules-based. In contrast, for any pair (δ, c) with $\delta < \delta(c)$, the efficient solution is power-based.

To formalize the efficient solution, it is convenient to 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. The next result establishes that the efficient solution is binary: under the maintained assumption that aggregate welfare is strictly higher under R in every state, the social planner either never pays cost c (choosing *power* forever) or pays it exactly once and maintains *rules* thereafter.

Proposition 7 (Efficient Solution) *Under (EFF), the solution $\{\rho_t\}_{t=1}^\infty$ of (SP) involves either the permanent choice of P or the one-time payment of R and its permanent maintenance thereafter. Thus, the cost of creating rules is either paid once and rules are maintained thereafter, or is never paid. Moreover, S is non-empty and satisfies these 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 $(\delta, c), (\delta', c') \in S$, $\lambda(\delta, c) + (1 - \lambda)(\delta', c')$, $\forall \lambda \in (0, 1)$, also belong to S .*

Figure 4 illustrates Proposition 7 by replicating Figure 3 while adding a white curve that represents the function $\delta(c)$ that defines the contour of the set S . The social planner chooses *rules* in the region to the left of $\delta(c)$ and *power* to its right. When we compare the equilibria in the decentralized game with the social planner's solution, there are multiple sources of inefficiencies. First, when countries are not very patient, hegemons avoid paying the cost of constructing a rules-based regime, knowing that future dominant countries will dismantle it. Second, when the cost c is very small, dominant countries

²⁰The social planner is choosing a map from each history to a trade regime.

are tempted to move to power-based regimes, knowing that hegemons will revert back to *rules* (the cyclic equilibria). Third, for intermediate values of c , inefficient power-based equilibria may arise because dominant countries prioritize their own interests, neglecting the losses they impose on subordinate countries when maintaining *power*.

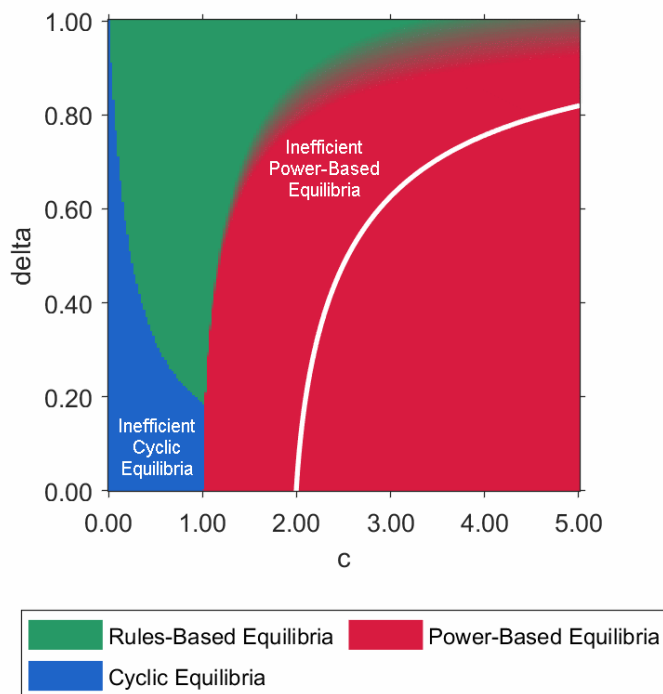


Figure 4: Efficient and inefficient equilibria

Could a rules-based equilibrium be inefficient? That is, could the decentralized game sustain a rules-based regime in circumstances where the social planner would prefer *power*? The answer is no. Whenever a rules-based equilibrium exists, the efficient solution prescribes the permanent choice of *rules* – the decentralized equilibrium and the efficient benchmark coincide in that direction.

Proposition 8 (Rules-Based Equilibria Are Efficient) *Suppose (EFF) holds. Then, if a rules-based equilibrium exists, the efficient solution prescribes the permanent choice of R .*

Proposition 8 thus establishes an important asymmetry: the only source of inefficiency in this model is *insufficient* rule adoption, never *excessive* rule adoption. Dom-

inant countries may dismantle a rules-based system to extract short-run rents – as illustrated by the power-based and cyclic regions in Figure 4 where the efficient solution prescribes R – but no decentralized equilibrium ever sustains *rules* when the planner would prefer *power*. The cost c acts as a natural filter: it discourages socially wasteful regime changes towards R , so that the inefficiency of the decentralized equilibrium runs only in the direction.

4 A Bipolar World

We now extend the model to incorporate a state with two leading countries rather than one. In this extension, a dominant country that loses its sole leadership position moves into a state in which it shares leadership with another country: the equivalent of having two dominant countries simultaneously. We denote this extra state by Φ_{ij} . Thus, in a two-country version, we now have $\Omega = \{h_1, d_1, \Phi_{12}, d_2, h_2\}$. We maintain the assumption that the transitions are smooth, that is, all transitions to neighbor states are positive and $\forall i, q_{h_i, h_i} + q_{h_i, d_i} = 1, q_{d_i, h_i} + q_{d_i, d_i} + q_{d_i, \Phi_{ij}} = 1$ and $q_{\Phi_{ij}, d_1} + q_{\Phi_{ij}, \Phi_{ij}} + q_{\Phi_{ij}, d_2} = 1$. Figure 5 illustrates this situation. In the general N -country case, there are also states $\Phi_{13} \dots \Phi_{1N}, \Phi_{23} \dots \Phi_{2N}, \dots \Phi_{N-1, N}$, and the smoothness assumption is adapted accordingly.

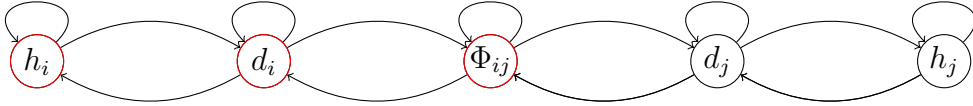


Figure 5: Transition between states; bipolar world

Whenever the system reaches state Φ_{ij} , dominant countries i and j play a simultaneous regime-choice game. In this game, each dominant simultaneously chooses between *rules* or *power*. As before, when the status quo is *rules*, there is no cost in maintaining it; when the status quo is *power*, if a dominant country chooses to support *rules*, it pays cost c . Thus, when the status quo is P , if both countries coordinate on *rules*, their static payoff is $u_i(\Phi_{ij}, (R, R)) - \mathbf{1}_{\{\rho=P\}}c$, where i 's (j 's) regime choice is indicated by the first (second) element of (ρ_i, ρ_j) . If they coordinate on *power*, they each get $u_i(\Phi_{ij}, (P, P))$. The matrix below represents these payoffs. When the status quo is R , the only difference is that there is no need to pay c when choosing R .

Due to their ability to influence world prices, each dominant country has a short-run incentive to exploit its market size through power-based trade policies. We capture this

	R	P
R	$u_i(\Phi_{ij}, (R, R)) - c, u_j(\Phi_{ij}, (R, R)) - c$	$u_i(\Phi_{ij}, (R, P)) - c, u_j(\Phi_{ij}, (P, R))$
P	$u_i(\Phi_{ij}, (P, R)), u_j(\Phi_{ij}, (R, P)) - c$	$u_i(\Phi_{ij}, (P, P)), u_j(\Phi_{ij}, (P, P))$

Table 1: Payoffs in bipolar state with status quo regime P

force by assuming that, for all $i, j, i \neq j$,

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

These payoffs imply a standard prisoner's dilemma in the stage game: each country has a dominant action, choosing *power*, yet the outcome (P, P) is Pareto dominated by (R, R) . Intuitively, a rules-based regime is jointly efficient for the two leaders, but each leader prefers to free ride on the other's restraint by choosing *power* when the opponent chooses *rules*.²¹

Following our benchmark model, a natural assumption about the agenda-setting in this bipolar state is that it requires a single leader's effort to sustain or create *rules*.²²

Assumption A1. Only one leader is needed to maintain or establish a rules-based regime. Thus, if the choice of the leaders were (P, R) or (R, P) , next period's status quo will be R .

At first glance, Assumption A1 seems favorable to *rules*, because only one leader is needed to preserve or re-establish it. In equilibrium, however, A1 generates a strong free-riding problem: a pure-strategy rules-based equilibrium cannot exist. The logic is straightforward. If one dominant country chooses R , the other can choose P without triggering a long-run collapse of *rules*, since one supporter is sufficient under A1. As a result, any strictly positive short-run gain from choosing P induces deviation. Because the argument applies to both leaders, *rules* cannot be sustained in pure strategies at the bipolar state under A1.

Now, a mixed strategy equilibrium in which each dominant country chooses rules with a positive probability smaller than one may exist. Still, even in this case, there is always a positive probability that, upon reaching state Φ_{ij} , a world under a rules-based regime will switch to a power-based system.

²¹This illustrates a recurrent complaint of the U.S. government about China's policies, particularly its opaque system of domestic subsidies. See Boullenois et al. (2025) for a detailed account of China's subsidy and other state-support policies.

²²At the end of this section, we consider an alternative assumption under which a rules-based regime requires both leaders to choose *rules*. If only one leader – or neither – does so, the status quo regime in the following period is power-based.

Proposition 9 (Free-riding in Bipolar State Begets Power) *Under A1, a pure-strategy rules-based equilibrium does not exist. Consequently, $Pr(\sigma(\Phi_{ij}, \rho) = (P, P)) > 0$, $\forall \rho \in \{P, R\}$, in any symmetric Markovian equilibrium.*

Thus, given the market-power motives for trade policies and free-riding incentives, a rules-based regime remains possible only in a probabilistic sense. That is, in any symmetric Markovian equilibrium, *rules* is displaced with positive probability at the bipolar state.

Observe that this negative result holds even when we isolate free-riding forces by setting market-power incentives to a minimum. To see that, consider that the following holds for $\epsilon \rightarrow 0$:

$$u_i(\Phi_{ij}, (P, R)) = u_i(\Phi_{ij}, (R, R)) + \epsilon > u_i(\Phi_{ij}, (P, P)) = u_i(\Phi_{ij}, (R, P)) + \epsilon.$$

This preserves the prisoner's dilemma structure for the short-run payoffs, but sets the differences in payoffs to nearly zero. And yet Proposition 9 still holds, highlighting the fragility of rules-based equilibria when there is a bipolar state.

Although there is no pure-strategy equilibrium in which *rules* is chosen in every state, a natural question is whether *rules* can at least be maintained whenever the world is not in the bipolar state. In other words, is there an equilibrium in which hegemonic and dominant leaders keep *rules*, even though leaders in the bipolar state do not? We establish the following necessary condition for such an equilibrium.

Proposition 10 (Rules Outside Bipolar State) *In a bipolar world, under A1 and under a symmetric Q , a pure strategy symmetric Markovian equilibrium where hegemon countries create and maintain R and dominant countries maintain R exists only if the probability that a dominant country becomes hegemon is sufficiently high.*

Proposition 10 implies that, with a bipolar state, dominant countries sustain R only when the transition probability to hegemony is sufficiently large. The mechanism is intertemporal. While in the dominant state, a country prefers P to R in current payoffs. If it loses leadership and the system enters the bipolar state, Proposition 9 implies that R is not sustainable in pure strategies. Therefore, the main continuation-value benefit of preserving R comes from becoming hegemon in the future. If that prospect is too unlikely, support for R unravels.

At a broader level, this result helps rationalize the evolution of U.S. support for the GATT/WTO system. As a hegemon in the 1940s-1960s, the U.S. had strong incentives to maintain *rules*. In the 1970s-1990s, as a dominant country with a realistic prospect

of regaining hegemonic status, it continued to support the multilateral trading system. Since the 2000s, however, as the prospect of a bipolar world has grown and a return to hegemony has become increasingly unlikely, U.S. incentives have shifted toward a power-based regime.

This discussion also motivates considering an alternative modeling assumption for the bipolar state. As we have shown, the nonexistence of a symmetric pure-strategy equilibrium with *rules* in the bipolar state is driven by free-riding incentives. We therefore move away from the benchmark assumption that a single leader is sufficient to maintain or create *rules* (A1), and instead consider a setting in which *rules* survives only if both leaders support it:

Assumption A2. Maintaining or establishing a rules-based regime requires the joint support of both leaders.

Under A2, unilateral free-riding no longer preserves *rules*: a one-sided deviation triggers a switch to *power*. This creates a coordination problem, but does not rule out a pure-strategy rules-based equilibrium. In other words, when both leaders are required to sustain institutions, an enduring rules-based regime can be supported for some parameter values, as illustrated in Figure 6.²³

²³We use the same parameters as in our benchmark simulations while adding the bipolar state. The transition in and out of this state is symmetric and equal to 0.45, whereas the utility of both countries choosing *power* is assumed to be 0.95.

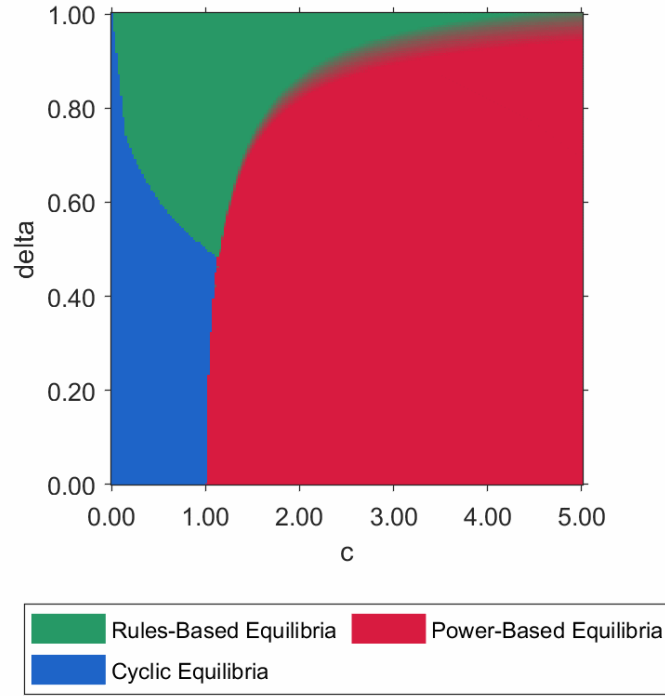


Figure 6: Rules-Based Equilibria in Bipolar World

The key enforcement mechanism is that a unilateral deviation pushes the system to *power*, reducing continuation payoffs (Lemma 1). When this loss is large relative to the one-period gain from deviating, both leaders keep supporting *rules* in the bipolar state.

Finally, we show that, even under A2, market-power incentives make it harder to sustain a rules-based equilibrium by amplifying the short-run gains from not cooperating.

Proposition 11 (Market Power Hinders Rules-Based Equilibria in Bipolar World) *Assume A2 and suppose that there is a rules-based equilibrium. In particular, at state Φ_{ij} , both leaders choose R when the status quo is R . Then decrease $u_i(\Phi_{ij}, (P, R))$. A rules-based equilibrium also exists under this new structure of payoffs. Moreover, for sufficiently high $u_i(\Phi, (P, R))$, a rules-based equilibrium cannot exist.*

5 Extensions

We discuss below three extensions of our benchmark framework. Their analyses are developed in our working paper, Carvalho et al. [2025].

5.1 Maintaining a Rules-Based Regime

A hegemon is necessary to create a rules-based regime (Corollary 1) and no hegemon will do so if the cost is too high (Proposition 3). But if a rules-based system were established due to an exceptional historical event – such as a rare moment of multilateral cooperation after a global war – would countries at least be willing to maintain it? If so, then although countries may resist incurring the initial cost, the regime becomes self-enforcing. We show that this depends solely on countries’ discount factor, δ .

This is useful for analyzing one-off, unexpected shocks to δ . Suppose the world is initially in a rules-based equilibrium and experiences a permanent drop in δ , making governments less forward-looking. If the reduction in δ is “moderate,” *rules* would still be upheld, as the new, lower δ would still be high enough to satisfy the incentive constraint for maintaining *rules*. Only when the decline in δ is sufficiently large does the system shift toward *power*. This highlights that, once a rules-based equilibrium is established, it is resilient to unanticipated changes in governments’ planning horizons – unless the shock is severe.

5.2 Endogenous Transitions

We first relax the assumption that the states of the world evolve exogenously by allowing dominant leaders to extend their dominance when choosing a power-based regime. We show that this does not alter the fundamental trade-offs of the benchmark model, and may not even make a power-based equilibrium more likely.

Although the direct “endogenous dominance effect” surely makes a power-based regime more appealing for dominant countries, there are indirect effects that can offset it. By choosing *power*, a leader also raises the future cost of losing leadership: subsequent dominants become more likely to inherit and perpetuate *power*, thereby locking in a regime that will ultimately disadvantage today’s leader once it becomes subordinate. This entrenchment effect can outweigh the temporary appeal of prolonging dominance, and thus may lead dominant countries to preserve a rules-based system despite their immediate incentives to abandon it.

5.3 A Multipolar World

Second, we allow for the possibility of a multipolar state, where leaders are “small.” To capture the idea that, in the absence of a dominant leader, a cooperative regime requires coordination efforts from multiple players, we assume that establishing *rules* requires support from a group of countries, and each incurs a cost from doing so. Consistent with the literature, we assume that, net of the implementation cost, each country in the multipolar state prefers *rules* over *power*. We show that it is easier to sustain a rules-based equilibrium when the world has this multipolar state than when the world has a bipolar state. The main reason is that, in the former, market-power incentives are weaker.²⁴

6 Reforming the System

So far we have taken the existing set of “rules” – which we interpret as those established under the GATT/WTO framework – as given. This helps us identify when a rules-based equilibrium is sustainable, but offers no guidance on how to reform the system when it is not. In practice, as the global economy evolves, so too must the rules governing it. Reform thus requires alternative frameworks that can address modern challenges while remaining both politically and economically feasible. We can formalize this in our model.

We consider three broad types of reforms, all motivated by an initial situation in which a dominant country receives *rules* but wishes to change the regime to *power*. The challenge is to design reforms such that the dominant country (as well as any future dominant) finds it optimal to maintain *rules* rather than abandon them. Against this backdrop, we study the effects of: (i) increasing the efficiency of the rules-based system; (ii) excluding the current dominant country from the rules-based system; and (iii) reshaping the system into a modified rules-based regime that redistributes the gains between leading and non-leading countries.

6.1 Improving the Current System

The first type of reform is theoretically the simplest. Few would argue that the WTO, its accomplishments notwithstanding, has exhausted all the gains from trade cooperation (Nicita et al., 2018). Indeed, recent proposals (e.g., Grossman and Sykes, 2025;

²⁴Carvalho et al. (2026) also consider a setting with a multipolar state, but eliminate dominant states. They show that the sustainability of *rules* in the multipolar state hinges on the interaction between the level of fragmentation and the persistence of the multipolar state.

Mavroidis, 2025) highlight new frameworks for WTO rules and disciplines that would presumably increase the efficiency of the system. We show here that efficiency and sustainability do move together:

Proposition 12 (Efficiency and Sustainability Move 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.*

Proposition 12 establishes a simple but important link: reforms that improve payoffs for all countries under *rules* both raise global welfare and make the system easier to sustain. Such Pareto-improving reforms are surely desirable, but may be difficult to design and implement in practice.

6.2 WTO - 1

A second type of reform presumes that the current dominant country is disruptive (e.g., because it has an idiosyncratically low discount factor) and seeks to dismantle the system. The proposal is then to exclude that country from the system, in the hope that the remaining countries would uphold the rules-based regime. This could be thought of as a “WTO - 1” system.²⁵

Replacing a leader that is determined to undo the rules-based system would, by design, increase the likelihood that the system is preserved. However, excluding a large country from the multilateral trading system would reduce the gains under the system for all remaining countries – that is, $u_i(\omega, R)$ would fall for all remaining countries. It then follows from Proposition 12 that such a reform would also weaken sustainability.

To make the analysis concrete, consider that initially the world is under a rules-based equilibrium, with all countries sharing the same discount factor, $\delta > 0$. Then, unexpectedly, the current dominant country i suffers an idiosyncratic shock that lowers δ_i to a level that makes R unsustainable.²⁶ Let us assume that excluding this *disruptive dominant* from the rules-based system has two implications: (I1) the transition matrix changes from Q to Q' , with a new country becoming the leader; (I2) $u_j(\omega, R)$ decreases,

²⁵We are not the first to raise this possibility. Indeed, Horn and Mavroidis (2025) compellingly argue that, against the backdrop of the U.S.’s protectionist rules-less turn, the best alternative available would be a WTO without the U.S., even considering that rejoining in the future would require the U.S. to undergo the standard accession procedures. Krueger (2025) also endorses this approach, referring to it as the MUTO, or the “Minus U.S. Trade Organization,” framework. In the policy arena, Mark Carney, Canada’s Prime Minister, has similarly raised the possibility of a rules-based system that excludes the U.S. (*The Economist*, October 9, 2025).

²⁶Using the same logic as in Proposition 2, we know that there exists a low δ that makes R unsustainable.

$\forall j$. Assumption (I1) simply indicates that the probabilities for each state of the world are reconfigured, unconstrained, once one country exits the system. Assumption (I2) states that the gains under *rules* decrease if the number of participants falls. We then have the following.

Proposition 13 *Consider that the current equilibrium is rules-based and the dominant country is excluded from the system, generating implications (I1) and (I2). Then, if $u_j(\omega, R)$ decreases enough $\forall j$, the rules-based equilibrium breaks down.*

Proposition 13 highlights the limits of the *WTO - 1* proposal. By forgoing the gains from trade with the largest economy, it cannot guarantee the sustainability of the system it seeks to preserve.

6.3 Optimal Appeasement

A third type of reform involves changing the distribution of gains. This is related to a recurring theme in reform proposals (e.g., Rodrik, 2024; Stiglitz and Rodrik, 2024), which is that a more flexible system could improve long-term viability.

A key reason why a rules-based system may fail is that dominant countries obtain higher static payoffs from *power* than from *rules*. A natural reform response is to redesign the regime to narrow this payoff gap, making *rules* more attractive to dominants in the short run. This comes at a cost, however: it is natural to assume that improving the static gains of dominant countries will come at the expense of subordinates. At first, this may seem innocuous for sustainability, since subordinate countries do not choose the regime, but it is actually very relevant. Dominant countries tolerate short-term losses under a rules-based system precisely because they anticipate future gains once they lose dominance and become subordinate themselves. A reform that reduces subordinate payoffs therefore shrinks exactly the future gains that make *rules* worth preserving today. Whether the short-run gain to the dominant outweighs this long-run cost is, a priori, ambiguous.

Ultimately, a successful reform should seek the optimal balance between appeasing a dominant that threatens to dismantle the system and ensuring the system’s sustainability. We now establish that such an “optimal appeasement” indeed exists. In addition to the assumptions maintained throughout the paper, we impose two further conditions. The first is symmetry in payoffs, that is, payoffs depend only on a country’s role and the regime, not on its identity. For all $i \neq j$ and all ρ , $u_i(d_i, \rho) = u_j(d_j, \rho)$, $u_i(h_i, \rho) = u_j(h_j, \rho)$, $u_i(d_j, \rho) = u_j(d_i, \rho)$, $u_i(h_j, \rho) = u_j(h_i, \rho)$. The second is stated below:

Assumption (Subordinate Benefit Monotonicity)

$$u_i(h_j, R) - u_i(h_j, P) \geq u_i(d_j, R) - u_i(d_j, P), \forall i \neq j. \quad (\text{SBM})$$

Assumption SBM states that the subordinate's gain from *rules* relative to *power* is at least as large when the leader country is hegemonic as when it is merely dominant. This captures the idea that hegemonic leadership involves greater market-power exploitation under *P*, so the benefit of constraining it via *rules* is correspondingly larger.

We consider a redesigned system of rules, denoted by *rules-lite* (*RL*), which replaces *R*. That is, under the reform, the regime options become *P*, as before, and *RL*, which is defined as follows. For any country *i*,

$$u_i(\omega, RL) = \begin{cases} u_i(\omega, R) + \gamma, & \omega \in \{h_i, d_i\}, \\ u_i(\omega, R) - \lambda\gamma, & \omega \in \{h_j, d_j\}, j \neq i, \end{cases} \quad (4)$$

where $\gamma \in [0, \bar{\gamma}]$, with $\bar{\gamma} \equiv u_i(d_i, P) - u_i(d_i, R)$ and $\lambda \leq \bar{\lambda}$, $\bar{\lambda} \equiv \frac{u_i(d_j, R) - u_i(d_j, P)}{u_i(d_i, P) - u_i(d_i, R)}$. The payoffs in (4), under SBM, imply that *rules-lite* never gives dominant countries more than they would receive under *power*, nor gives subordinates less than they would receive under *power* (both possibilities would make little economic sense). Parameter λ is a structural parameter that governs the degree of inefficiency of the reform. If $\lambda = \frac{1}{N-1}$, the reform simply redistributes surplus from subordinates to leaders.²⁷ If $\lambda > \frac{1}{N-1}$, the reform is also wasteful. Here we take λ as exogenous and restrict attention to the cases in which $\lambda \in [\frac{1}{N-1}, \bar{\lambda}]$.

We now turn to the existence of an optimal appeasement threshold. By payoff equivalence, the $\{P, RL\}$ game at $\gamma = 0$ is identical to the original $\{P, R\}$ game. By assumption of the starting equilibrium – either cyclic or rules-resistant – dominant countries choose *P* upon receiving *R*, so there is no *RL*-equilibrium at $\gamma = 0$. At the other extreme, when the appeasement is large enough to eliminate the dominant country's static incentive to switch to *power*, then *rules-lite* is self-sustaining. That is, if $\gamma = \bar{\gamma}$, we prove in Lemma 4 in the Appendix that an *RL*-equilibrium exists. This establishes the two boundary conditions needed for the existence result below.

Proposition 14 (Optimal Appeasement) *Consider a symmetric world satisfying SBM and a symmetric Markovian equilibrium of the original $\{P, R\}$ game in which a*

²⁷Observe that worldwide aggregate static payoff changes with *RL*, relative to *R*, by $\gamma - (N-1)\lambda\gamma$: how much more the dominant country earns minus how much less each of the $(N-1)$ subordinates earn under *RL*, relative to *R*. This is negative if $\lambda > \frac{1}{N-1}$, zero if $\lambda = \frac{1}{N-1}$, and positive otherwise.

dominant country chooses power upon receiving rules. Suppose R is replaced by RL . Then there exists a threshold $\gamma^* \in [0, \bar{\gamma}]$ such that for all $\gamma \geq \gamma^*$, rules-lite is sustained by all leaders in their dominant and hegemon states.

The optimal appeasement reform corresponds to choosing $\gamma = \gamma^*$, which ensures that dominant leaders are willing to maintain *rules-lite* at the minimum efficient cost (important whenever $\lambda > \frac{1}{N-1}$) and with minimum redistribution, relative to the equilibrium with the original rules-based system R . Appeasement (*rules-lite*) can thus improve sustainability, but only by shifting surplus toward leaders and away from subordinates.

Figure 7 simulates our benchmark model using the parameterization from Figure 3 for a given c , which yields $\bar{\gamma} = 0.1$, and with a reallocation of payoffs as in equation (4), with $\lambda = \bar{\lambda} = 2$ and $\gamma \in [0, \bar{\gamma}]$. At $\gamma = 0$, we recover the benchmark case. As γ rises, the leader's payoffs increase while subordinates' fall by twice as much, making RL inefficient relative to R . At $\gamma = 0.1$, the system replicates the payoff under *power* in dominant states while improving on *power* in hegemon states. In this limiting case, rules-resistant equilibria disappear: *rules-lite*, once adopted, is always sustained. For intermediate γ , sustainability depends on the discount factor δ . As the figure illustrates, the lower is δ , the more generous with dominant leaders the optimal appeasement reform must be.

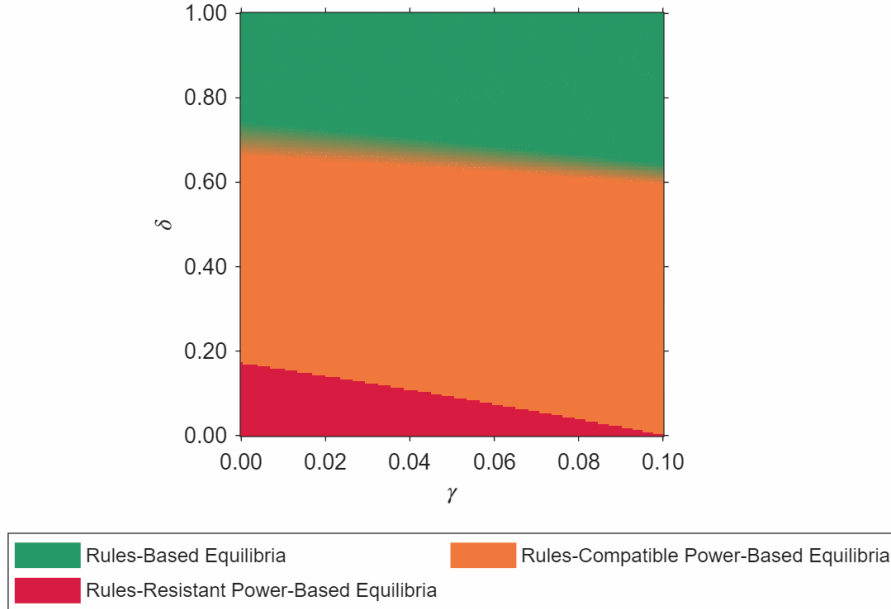


Figure 7: Sustainability of a Rules-Lite Regime with $c = 1.5$

7 Conclusion

Over the last decade, the rules-based multilateral trading system has shown growing signs of strain, as countries increasingly disregard established rules and rely more heavily on economic power in managing trade relations. This trend intensified during the second Trump administration. This is concerning, as the system is widely believed to have generated substantial gains from trade since the late 1940s. Moreover, once dismantled, it may be difficult to rebuild.

One possible explanation is the erosion of hegemonic leadership, historically provided by the United States. To assess how the absence of a hegemon affects the viability of a rules-based system, we develop a dynamic framework in which the incentives of the leading country depend on the degree of power asymmetry and on the evolution of leadership over time.

We show that the long-run viability of a rules-based regime is fragile. Once the world transitions to a power-based regime, reverting to a rules-based alternative requires the presence of a hegemon. By contrast, maintaining a rules-based system does not require a hegemon, but depends on sufficiently frequent turnover in leadership. More generally, sustainability hinges on a delicate set of conditions. In particular, the cost of establishing a rules-based regime must be neither too small nor too large. If it is too small, regimes can shift easily and the world exhibits cyclical dynamics. If it is too large, even a hegemon will not establish it, and the world remains stuck in a power-based regime. These challenges are further amplified when the world features two large countries of similar size. In such a setting, incentives to exploit market power and to free ride make sustaining a rules-based regime even more difficult.

Our findings underscore the risks posed by the ongoing deterioration of the WTO system and its long-term consequences. They can also rationalize recent shifts in multilateral trade cooperation. In the decades following the 1940s, the U.S. was a clear hegemon. Over time, it lost its hegemon status and its dominance has gradually eroded. Despite this, it upheld the rules-based regime until recently. In terms of our framework, the U.S. established the GATT at the height of its hegemony and maintained it for an extended period as a dominant leader facing a meaningful prospect of regaining hegemonic status. Today, however, it is better characterized as a dominant country with limited prospects of returning to hegemony. At the same time, the rise of China has increased the likelihood of a bipolar world. In such an environment, market power and free-riding forces make sustaining *rules* more difficult. Anticipating this shift, the U.S. has faced growing incentives to move away from *rules*.

These findings naturally raise the question of whether the system can be redesigned to enhance its resilience. Our analysis clarifies what a successful reform of the rules-based system must accomplish to enhance its long-term viability, but each of the three reform proposals faces challenges of their own. A WTO reform that benefited both leading and non-leading countries would also enhance sustainability. While desirable, such reforms may be difficult to implement. Another possibility is to simply exclude the disruptive dominant from the system. If such a *WTO - 1* regime succeeds in preserving a rules-based regime, such a coalition would avoid the costly outcome of requiring a future hegemon to rebuild it from scratch. However, our analysis reveals that this is not a panacea, because excluding a large country from the system would lower the gains from trade and thus also risk the sustainability of the system.

A third possibility highlights a fundamental trade-off in WTO reform: balancing concessions to leading countries against the costs borne by non-leading economies. An “optimal appeasement” reform would grant the minimum additional gains required to induce leaders to preserve the system, while minimizing losses for others. The central design problem is therefore to maximize global welfare subject to sustainability constraints. This may require accepting a more unequal distribution of gains from trade, and potentially some efficiency losses, in order to preserve the system itself.

Ultimately, our analysis suggests that the future of the multilateral trading system depends less on the presence of a hegemon per se than on the dynamic incentives created by leadership turnover and institutional persistence. Designing institutions that align those incentives is therefore central to sustaining cooperation in a changing global economy.

References

- R. Adão, J. S. Becko, A. Costinot, and D. Donaldson. A world trading system for whom? evidence from global tariffs. *Becker Friedman Institute for Economics Working Paper*, (07), 2026.
- P. Aghion, P. Antràs, and E. Helpman. Negotiating Free Trade. *Journal of International Economics*, 73:1–30, 2007.
- T. S. Aidt, F. Albornoz, and E. Hauk. Foreign influence and domestic policy. *Journal of Economic Literature*, 59(2):426–487, 2021.
- P. Antràs and G. Padró i Miquel. Foreign influence and welfare. *Journal of International Economics*, 84(2):135–148, 2011.
- P. Antràs and G. Padró i Miquel. Exporting ideology: The right and left of foreign influence. *Quarterly Journal of Political Science*, 20(1):33–70, 2025.
- K. Bagwell and R. Staiger. An Economic Theory of GATT. *American Economic Review*, 89(1):215–248, 1999.
- K. Bagwell and R. Staiger. Multilateral Trade Negotiations, Bilateral Opportunism and the Rules of GATT/WTO. *Journal of International Economics*, 63(1):1–29, 2004.
- K. Bagwell and R. Staiger. Backward Stealing and Forward Manipulation in the WTO. *Journal of International Economics*, 82(1):49–62, 2010.
- K. Bagwell and R. Staiger. Multilateral Trade Bargaining and Dominant Strategies. *International Economic Review*, 59(4):1785–1824, 2018.
- K. Bagwell, R. Staiger, and A. Yurukoglu. Multilateral Trade Bargaining: A First Look at the GATT Bargaining Records. *American Economic Journal: Applied Economics*, 12(3):72–105, 2020.
- K. Bagwell, R. Staiger, and A. Yurukoglu. Quantitative Analysis of Multi-Party Tariff Negotiations. *Econometrica*, 89(4):1595–1631, 2021.
- J. S. Becko and D. O’Connor. Strategic (dis) integration. *Mimeo*, 2025.
- J. S. Becko, G. Grossman, and E. Helpman. Optimal tariffs with geopolitical alignment. *Mimeo*, 2025.

- C. Boullenois, A. Kratz, and D. H. Rosen. Far from normal: An augmented assessment of China’s state support. Technical report, Rhodium Group, 2025.
- F. Broner, A. Martin, J. Meyer, and C. Trebesch. Hegemonic globalization. *CEPR Discussion Paper DP20339*, 2025.
- S. G. Brooks and W. C. Wohlforth. *America Abroad. The United States’ Global Role in the 21st Century*. Oxford University Press, 2016.
- M. Camboni and M. Porcellacchia. Spheres of influence. *Mimeo*, 2025.
- C. Carvalho, D. Monte, and E. Ornelas. Equilibrium trade regimes: Power- vs. rules-based. *CESifo Working Paper No. 12203*, 2025.
- C. Carvalho, N. Goulart, D. Monte, and E. Ornelas. Sustaining international rules in a multipolar world. *AEA Papers and Proceedings*, 116:127–132, 2026.
- C. Clayton, M. Maggiori, and J. Schreger. A theory of economic coercion and fragmentation. *NBER Working Paper No. 33309*, 2024.
- C. Clayton, M. Maggiori, and J. Schreger. A framework for geoeconomics. *Econometrica*, 94(1):105–136, 2026.
- I. Colantone, G. Ottaviano, and P. Stanig. The backlash of globalization. In *Handbook of international economics*, volume 5, pages 405–477. Elsevier, 2022.
- E. Farhi and M. Maggiori. A Model of the International Monetary System. *Quarterly Journal of Economics*, 133(1):295–355, 2018.
- R. C. Feenstra, R. Inklaar, and M. P. Timmer. The Next Generation of the Penn World Table. *American Economic Review*, 105(10):3150–3182, 2015.
- C. Freund and E. Ornelas. Regional Trade Agreements. *Annual Review of Economics*, 2:139–167, 2010.
- P. Goldberg and T. Reed. Is the global economy deglobalizing? *Brookings Papers on Economic Activity Spring*, (2), 2023.
- J. Goldstein and J. Gowa. US national power and the post-war trading regime. *World Trade Review*, 1(2):153–170, 2002.
- G. Grossman and A. Sykes. Industrial policy and subsidies: Assessment of current rules and possible reforms. *Journal of World Trade*, 59(4):531–578, 2025.

- H. Horn and P. C. Mavroidis. Why the US and the WTO should part ways. *VoxEU* (25 June, 2025).
- R. O. Keohane. *After Hegemony: Cooperation and Discord in the World Political Economy*. Princeton University Press, 1984.
- C. Kindleberger. *The World in Depression, 1929-1939*. Berkeley and Los Angeles: University of California Press, 1973.
- M. J. Klasing and P. Milionis. Quantifying the Evolution of World Trade, 1870–1949. *Journal of International Economics*, 92(2):185–197, 2014.
- B. Kleinman, E. Liu, and S. J. Redding. International friends and enemies. *American Economic Journal: Macroeconomics*, 16(4):350–385, 2024.
- A. O. Krueger. Trump’s tariff chaos could reverse 80 years of economic progress. *Project Syndicate* (23 April), 2025.
- N. Limao. Preferential Trade Agreements. In K. Bagwell and R. W. Staiger, editors, *Handbook of Commercial Policy*, volume 1-B, pages 279–367. North-Holland, Amsterdam, 2016.
- R. D. Ludema and A. M. Mayda. Do Terms-of-Trade Effects Matter for Trade Agreements? Theory and Evidence from WTO Countries. *Quarterly Journal of Economics*, 128(4):1837–1894, 2013.
- G. Maggi. The Role of Multilateral Institutions in International Trade Cooperation. *American Economic Review*, 89(1):190–214, 1999.
- G. Maggi. International trade agreements. In *Handbook of international economics*, volume 4, pages 317–390. Elsevier, 2014.
- G. Maggi and A. Rodríguez-Clare. The value of trade agreements in the presence of political pressures. *Journal of Political Economy*, 106(3):574–601, 1998.
- G. Maggi and A. Rodríguez-Clare. A political-economy theory of trade agreements. *American Economic Review*, 97(4):1374–1406, September 2007.
- A. Mattoo and R. W. Staiger. Trade Wars: What do they mean? Why are they happening now? What are the costs? *Economic Policy*, 35(103):561–584, 2020.
- A. Mattoo, M. Ruta, and R. Staiger. Geopolitics and the World Trading System. *NBER Working Paper No. 33293*, 2025.

- P. C. Mavroidis. *End of the Line? Industrial Policy, National Security, and the Perilous Plight of the WTO*. New York: Oxford University Press, 2025.
- T. Mayer, I. Mejean, and M. Thoenig. The fragmentation paradox: De-risking trade and global safety. *CEPR Discussion Paper 20564*, 2025.
- J. McLaren. Size, Sunk Costs, and Judge Bowker’s Objection to Free Trade. *American Economic Review*, 87(3):400–420, 1997.
- A. Nicita, M. Olarreaga, and P. Silva. Cooperation in WTO’s Tariff Waters? *Journal of Political Economy*, 126(3):1302–1338, 2018.
- C. Norrlof. *Hegemony*. New York: Oxford University Press, 2015.
- R. Ossa. Trade Wars and Trade Talks with Data. *American Economic Review*, 104(12): 4104–4146, 2014.
- M. Ritel. A quantitative analysis of trade cooperation over three decades. *Mimeo*, 2026.
- D. Rodrik. How to smooth US-China economic relations for the benefit of the global economy: A light model of global economic governance. *Journal of Government and Economics*, 13:100097, 2024.
- R. Staiger. *A World Trading System for the Twenty-First Century*. MIT Press, 2022.
- J. Stiglitz and D. Rodrik. Rethinking global governance: Cooperation in a world of power. *Mimeo*, 2024.

Appendix

A Microfoundation of Static Payoffs

We provide here a simple rationalization of the period payoffs we assume in the benchmark model. We consider that countries bargain to define the equilibrium trade policies. The main ingredient is that, when a country does not produce a good in one stage, it loses productivity in that sector in the subsequent stage. This generates an intertemporal vulnerability from specialization, which can make free trade undesirable for a small country.

Specifically, we consider a two-stage, two-country, two-good Ricardian model with Cobb-Douglas preferences and a possible transitory productivity shock in stage 2. The two stages here correspond to a single period in our dynamic game in the main text. Once the two stages end, countries reorganize their productive capabilities and their fundamental productivities are restored. That is, in every period of the dynamic game, countries start with the same productive capacity.

We focus on the equilibrium in which Home (H) remains diversified (produces both goods) while Foreign (F) specializes (produces only good 2). In each stage, the two countries decide their trade policies, then production and consumption take place. Trade policy comprises both the definition of trade barriers and a possible transfer between the countries.

We start with the static setting, which corresponds to stage 1 in the two-stage setting.

A.1 Environment

There are two countries $i \in \{H, F\}$, two goods $g \in \{1, 2\}$, and labor as the only factor. Country i is endowed with $\bar{L}_i > 0$ units of labor. Technology is linear, with unit labor requirements $a_{ig} > 0$:

$$q_{ig} = \frac{L_{ig}}{a_{ig}}, \quad L_{i1} + L_{i2} \leq \bar{L}_i, \quad L_{ig} \geq 0. \quad (5)$$

Markets are competitive. Let w_i denote wages and p_g denote goods prices.

Preferences are Cobb-Douglas:

$$U_i(c_{i1}, c_{i2}) = \sqrt{c_{i1}c_{i2}}. \quad (6)$$

Given prices (p_1, p_2) and income Y_i , indirect utility is

$$\begin{aligned} v_i(p_1, p_2, Y_i) &= \max_{c_{i1}, c_{i2}} \sqrt{c_{i1}c_{i2}} \text{ s.t. } p_1c_{i1} + p_2c_{i2} = Y_i \\ &= \frac{1}{2} \frac{Y_i}{\sqrt{p_1p_2}}. \end{aligned} \quad (7)$$

A.2 Equilibrium with H diversified and F specialized

We consider the free-trade equilibrium in which H is large enough, so that it produces both goods, while F produces only good 2. This equilibrium arises under the following comparative-advantage ordering:

$$\rho_H \equiv \frac{a_{H1}}{a_{H2}} < \rho_F \equiv \frac{a_{F1}}{a_{F2}}. \quad (8)$$

World prices. Since H produces both goods, zero-profit conditions in both sectors imply

$$p_1 = w_H a_{H1}, \quad p_2 = w_H a_{H2} \quad \Rightarrow \quad \frac{p_1}{p_2} = \rho_H. \quad (9)$$

Throughout we use good 2 as numeraire: $p_2 = 1$, hence $p_1 = \rho_H$ and $\sqrt{p_1p_2} = \sqrt{\rho_H}$.

Autarky. In autarky, both goods are produced in each country, so

$$v_i^A = \frac{1}{2} \frac{\bar{L}_i}{\sqrt{a_{i1}a_{i2}}}. \quad (10)$$

Free trade without transfers. Under the partial-specialization equilibrium, F produces only good 2. With $p_2 = 1$, F 's wage is $w_F = 1/a_{F2}$ and income is $Y_F = \bar{L}_F/a_{F2}$. Therefore, using (7),

$$v_F^T = \frac{1}{2} \frac{Y_F}{\sqrt{p_1p_2}} = \frac{1}{2} \frac{\bar{L}_F/a_{F2}}{\sqrt{\rho_H}}. \quad (11)$$

Since H remains diversified, trade prices coincide with H 's autarky relative price and H 's welfare is unchanged by trade:

$$v_H^T = v_H^A. \quad (12)$$

A.3 Gains from trade in income (EV) units

Because transfers are naturally denominated in value units, we measure gains from trade using equivalent variation (EV) at the equilibrium trade prices. Using (7), we have that

an income transfer ΔY changes welfare by

$$\Delta v = \frac{1}{2} \frac{\Delta Y}{\sqrt{p_1 p_2}}, \quad \Rightarrow \quad \Delta Y = 2\sqrt{p_1 p_2} \Delta v. \quad (13)$$

Thus, country i 's EV gain from trade is

$$EV_i \equiv 2\sqrt{p_1 p_2} (v_i^T - v_i^A). \quad (14)$$

In the present equilibrium, (12) implies $EV_H = 0$, so world gains from trade (GFT) satisfy

$$GFT \equiv EV_H + EV_F = EV_F. \quad (15)$$

Using $p_2 = 1$, $p_1 = \rho_H$ and (11)-(10), we obtain

$$GFT = 2\sqrt{\rho_H} \left(\frac{1}{2} \frac{\bar{L}_F / a_{F2}}{\sqrt{\rho_H}} - \frac{1}{2} \frac{\bar{L}_F}{\sqrt{a_{F1} a_{F2}}} \right) = \bar{L}_F \left[\frac{1}{a_{F2}} - \frac{\sqrt{\rho_H}}{\sqrt{a_{F1} a_{F2}}} \right]. \quad (16)$$

It is convenient to express the (gross) trade gain for F relative to its autarky welfare:

$$\frac{v_F^T}{v_F^A} = \frac{\frac{1}{2}(\bar{L}_F / a_{F2}) / \sqrt{\rho_H}}{\frac{1}{2} \bar{L}_F / \sqrt{a_{F1} a_{F2}}} = \sqrt{\frac{\rho_F}{\rho_H}} > 1. \quad (17)$$

A.4 Size-based gain sharing via transfers

Starting from autarky, countries bargain over trade policy. The bargain is cooperative and efficient. It follows that the equilibrium outcome has free trade.

Another issue is related to how the GFT are distributed between the two countries. It is reasonable to assume that bargaining powers are related to the relative sizes of the two economies. We consider that they are proportional to population sizes, but results would be similar if we assumed instead population weighted by productivity, for example.

Let population shares be

$$s_H \equiv \frac{\bar{L}_H}{\bar{L}_H + \bar{L}_F}, \quad s_F \equiv \frac{\bar{L}_F}{\bar{L}_H + \bar{L}_F} = 1 - s_H. \quad (18)$$

Since transfers are such that the two countries split the total gains from trade (in EV units) in proportion to population sizes, we have that:

$$Ev_H^{net} = s_H GFT, \quad Ev_F^{net} = s_F GFT. \quad (19)$$

Since $EV_H = 0$ in this equilibrium, the transfer from F to H equals H 's share of total gains:

$$T = s_H GFT. \quad (20)$$

Using (16), the transfer (in income/value units at trade prices) is therefore

$$T = \frac{\bar{L}_H}{\bar{L}_H + \bar{L}_F} \bar{L}_F \left[\frac{1}{a_{F2}} - \frac{\sqrt{\rho_H}}{\sqrt{a_{F1}a_{F2}}} \right]. \quad (21)$$

Net welfare under trade with transfers. By (13), EV net gains translate into welfare net gains as

$$v_i^{T,net} = v_i^A + \frac{EV_i^{net}}{2\sqrt{p_1 p_2}} = v_i^A + \frac{s_i GFT}{2\sqrt{\rho_H}}, \quad i \in \{H, F\}. \quad (22)$$

A.5 Two-stage model

We now extend this canonical model to two stages, where productivity in $\tau = 2$ may be affected by the production patterns in $\tau = 1$. Specifically, we assume that, if a country does not produce in a sector in $\tau = 1$, in stage $\tau = 2$ its productivity declines by a factor $k > 1$ in that sector.

In our case, since in stage $\tau = 1$ Foreign does not produce good 1 under free trade, in $\tau = 2$ its unit labor requirement becomes:

$$a_{F1}(\tau = 2) = k a_{F1}, \quad a_{F2}(\tau = 2) = a_{F2}, \quad k > 1. \quad (23)$$

Clearly, this does not change the equilibrium production pattern: H remains diversified and F remains specialized in good 2. Hence, trade prices and v_F^T are unchanged from stage 1.

Autarky welfare in stage 2. Although the free trade equilibrium is unchanged, the autarky equilibrium in F is now different, yielding a lower level of utility. Using (10) and (23),

$$v_F^A(\tau = 2) = \frac{1}{2} \frac{\bar{L}_F}{\sqrt{a_{F1}(\tau = 2)a_{F2}}} = \frac{1}{2} \frac{\bar{L}_F}{\sqrt{k a_{F1}a_{F2}}} = \frac{1}{\sqrt{k}} v_F^A(\tau = 1). \quad (24)$$

Gains from trade and transfers in stage 2. We first consider that bargaining happens again in stage 2. In our dynamic game, this is the equivalent to a *power-based regime*.

Now, since the autarky equilibrium is different, so are the gains from trade. And

since GFT increase, the transfer from F to H also rises. Replacing a_{F1} by ka_{F1} in (16) yields

$$GFT(\tau = 2) = \bar{L}_F \left[\frac{1}{a_{F2}} - \frac{\sqrt{\rho_H}}{\sqrt{k} a_{F1} a_{F2}} \right] = \bar{L}_F \left[\frac{1}{a_{F2}} - \frac{1}{\sqrt{k}} \frac{\sqrt{\rho_H}}{\sqrt{a_{F1} a_{F2}}} \right], \quad (25)$$

which satisfies $GFT(\tau = 2) > GFT(\tau = 1)$ for $k > 1$. The stage-2 transfer is therefore

$$T_2 = s_H GFT(\tau = 2) = \frac{\bar{L}_H}{\bar{L}_H + \bar{L}_F} \bar{L}_F \left[\frac{1}{a_{F2}} - \frac{\sqrt{\rho_H}}{\sqrt{k} a_{F1} a_{F2}} \right]. \quad (26)$$

A.6 Can F be worse off in stage 2 than in stage-1 autarky?

Even though F benefits from trade relative to stage-2 autarky, it may be worse off in stage 2 under trade (net of transfers) than it was under stage-1 autarky, because (i) its autarky benchmark deteriorates with $k > 1$ and (ii) it transfers part of the gains to H .

Using (22), and recalling that $\sqrt{p_1 p_2} = \sqrt{\rho_H}$, F 's net welfare in stage 2 satisfies

$$v_F^{T,net}(\tau = 2) = v_F^A(\tau = 2) + \frac{s_F GFT(\tau = 2)}{2\sqrt{\rho_H}}. \quad (27)$$

A convenient closed form arises by expressing trade welfare relative to stage-1 autarky welfare. From (17), define

$$A \equiv \frac{v_F^T}{v_F^A(\tau = 1)} = \sqrt{\frac{\rho_F}{\rho_H}}. \quad (28)$$

Let $m \equiv \bar{L}_H / \bar{L}_F$ so that $s_F = 1/(1 + m)$. Combining $v_F^A(\tau = 2) = v_F^A(\tau = 1)/\sqrt{k}$ from (24) with (27), one can write

$$\frac{v_F^{T,net}(\tau = 2)}{v_F^A(\tau = 1)} = \frac{m}{1 + m} \frac{1}{\sqrt{k}} + \frac{1}{1 + m} A. \quad (29)$$

Therefore, F is worse off in stage 2 under trade-after-bargaining than under stage-1 autarky if and only if

$$\frac{v_F^{T,net}(\tau = 2)}{v_F^A(\tau = 1)} < 1 \iff A - 1 < m \left(1 - \frac{1}{\sqrt{k}} \right), \quad (30)$$

or equivalently,

$$\frac{\bar{L}_H}{\bar{L}_F} > \frac{\sqrt{\rho_F / \rho_H} - 1}{1 - 1/\sqrt{k}}. \quad (31)$$

Condition (31) shows that such an intertemporal welfare reversal is more likely when

H is large relative to F (so F retains a small share of the gains), as well as when the productivity loss k is sufficiently large (so stage-2 autarky is substantially worse than stage-1 autarky).

A.7 Trade-with-transfers vs. autarky in both stages

We now compare Foreign's undiscounted (for simplicity) two-stage welfare under (i) free trade with transfers in both stages and (ii) autarky in both stages.

The productivity loss in stage 2 affects the sector that F did not produce in stage 1 under free trade. Since under autarky in stage 1, F produces both goods, it does not incur this loss. Thus, the two-stage autarky benchmark equals $2v_F^A(\tau = 1)$.

Net welfare under trade with transfers in each stage. Because EV gains are shared proportionally to population size, F 's net welfare in stage t can be expressed as a convex combination of its autarky welfare in that stage and its (gross) trade welfare:

$$v_F^{T,net}(t) = \frac{m}{1+m} v_F^A(t) + \frac{1}{1+m} v_F^T, \quad t \in \{1, 2\}. \quad (32)$$

In stage 1, $v_F^A(\tau = 1)$ applies, hence

$$\frac{v_F^{T,net}(\tau = 1)}{v_F^A(\tau = 1)} = \frac{m}{1+m} + \frac{1}{1+m} A = \frac{m+A}{1+m}. \quad (33)$$

In stage 2, Foreign's autarky welfare is $v_F^A(\tau = 2) = v_F^A(\tau = 1)/\sqrt{k}$ by (24), while v_F^T is unchanged. Therefore,

$$\frac{v_F^{T,net}(\tau = 2)}{v_F^A(\tau = 1)} = \frac{m}{1+m} \cdot \frac{1}{\sqrt{k}} + \frac{1}{1+m} A. \quad (34)$$

Participation constraint. Foreign will want to engage in bilateral negotiations with Home in stage 1 if its overall welfare increases. We have that F is worse off under trade-with-transfers over the two stages than under autarky in both stages if and only if

$$v_F^{T,net}(\tau = 1) + v_F^{T,net}(\tau = 2) < 2v_F^A(\tau = 1). \quad (35)$$

Dividing by $v_F^A(\tau = 1)$ and using (33)–(34), condition (35) is equivalent to

$$\frac{m+A}{1+m} + \left(\frac{m}{1+m} \cdot \frac{1}{\sqrt{k}} + \frac{1}{1+m} A \right) < 2, \quad (36)$$

or

$$\frac{m \left(1 + \frac{1}{\sqrt{k}}\right) + 2A}{1 + m} < 2. \quad (37)$$

Rearranging yields the following threshold condition:

$$\frac{\bar{L}_H}{\bar{L}_F} > \frac{2 \left(\sqrt{\rho_F/\rho_H} - 1\right)}{1 - 1/\sqrt{k}}. \quad (38)$$

Condition (38) mirrors the one-stage comparison in (31), but with a factor of 2 in the numerator: to make F worse off relative to *two* stages of autarky, Home must be sufficiently large (so that F retains a sufficiently small share of the gains in each stage) and the depreciation factor k must be sufficiently large.

Since Foreign anticipates the stage 2 equilibrium, it agrees to engage in bilateral negotiations with Home in stage 1 if and only if inequality (38) does not hold.

A.8 Equilibrium under *rules*

The analysis above applies under a power-based system, where countries negotiate unrestricted in each stage. In a rules-based regime, the natural assumption in this context is to consider that, in stage 1, the two countries negotiate free trade (which maximizes aggregate welfare gains) and a fixed transfer for *both* stages, which is not renegotiable.

In particular, let the transfer that F pays to H be $\Psi = 2s_H GFT(\tau = 1)$. This simply replicates stage-1 gains over both stages. Country F will then keep strictly positive net gains under this scenario despite the loss in productivity in stage 2.

A.9 Short-run assumptions

Our short-run payoff assumptions require that hegemonies prefer *rules* to *power* in a static sense, whereas the opposite is true for dominant countries. In the setting above, this is equivalent to assuming that H is a hegemon if it is large enough relative to subordinate F , so that inequality (38) holds. In that case, F anticipates being worse off under power-based bargaining, and would only accept to engage in trade if *rules* assured that there would not be renegotiation in $\tau = 2$.

In contrast, H is dominant if inequality (38) does not hold. In that case, subordinate Foreign would benefit from bilateral power-based negotiations even anticipating that renegotiation in $\tau = 2$ would cut its gain in that stage. Home therefore does not need to provide *rules* to induce participation – and would not do it except if it has long-run,

dynamic considerations, as in our model.

B Proofs

Proof of Lemma 1. In states $\omega \in \{h_i, d_i\}$, upon receiving $\rho = R$, country i can guarantee itself at least $V_i(\omega, R)$, but can also change to P at no cost and thus guarantee itself $V_i(\omega, P)$. Thus for states in which i is the leader, we have that $V_i(\omega, R) \geq V_i(\omega, P)$.

Moreover, in any symmetric Markovian equilibrium, it must be the case that if $\sigma(\omega, R) = P$, then $\sigma(\omega, P) = P$. This can be seen directly from the inequalities below, representing country j 's expected continuation payoffs. That is, if j is the leader at ω and $\sigma(\omega, R) = P$, then

$$u_j(\omega, P) + \delta \sum_{\omega' \in \Omega} q_{\omega, \omega'} V_j(\omega', P) \geq u_j(\omega, R) + \delta \sum_{\omega' \in \Omega} q_{\omega, \omega'} V_j(\omega', R).$$

It follows directly that

$$u_j(\omega, P) + \delta \sum_{\omega' \in \Omega} q_{\omega, \omega'} V_j(\omega', P) > u_j(\omega, R) - c + \delta \sum_{\omega' \in \Omega} q_{\omega, \omega'} V_j(\omega', R).$$

That is, if a country prefers not to choose R when it is costless, then it will also not choose it when it has a cost $c > 0$.

Consider now the states in which country i is subordinate $\omega \in \Omega \setminus \{h_i, d_i\}$. At subordinate states, country i does not choose the regime, but the leader at state ω does. The value functions satisfy:

$$V_i(\omega, \rho) = u_i(\omega, \sigma(\omega, \rho)) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', \sigma(\omega, \rho)).$$

We consider all possible combinations of $\sigma(\omega, R)$ and $\sigma(\omega, P)$, using the result above that $\sigma(\omega, R) = P$ implies $\sigma(\omega, P) = P$.

Case A: $\sigma(\omega, R) = R$ and $\sigma(\omega, P) = R$. Then, for leaders:

$$\begin{aligned} V_i(\omega, R) &= u_i(\omega, R) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', R) \\ V_i(\omega, P) &= u_i(\omega, R) - c + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', R) \end{aligned}$$

so $V_i(\omega, R) - V_i(\omega, P) = c > 0$, for leaders, while $V_i(\omega, R) - V_i(\omega, P) = 0$, for subordinates.

Case B: $\sigma(\omega, R) = R$ and $\sigma(\omega, P) = P$. Then:

$$\begin{aligned} V_i(\omega, R) &= u_i(\omega, R) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', R) \\ V_i(\omega, P) &= u_i(\omega, P) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', P). \end{aligned}$$

Since $u_i(\omega, R) \geq u_i(\omega, P)$ for subordinate states by assumption, and $V_i(\omega', R) \geq V_i(\omega', P)$ for all ω' that are leadership states for i by the result established above, and by induction for all remaining subordinate states, we have $V_i(\omega, R) \geq V_i(\omega, P)$.

Case C: $\sigma(\omega, R) = P$ and $\sigma(\omega, P) = P$. The result is immediate in this case and the inequality holds with equality.

This exhausts all possible cases. Therefore $V_i(\omega, R) \geq V_i(\omega, P)$ for all $\omega \in \Omega$ and all $i \in \{1, \dots, N\}$.

■

Proof of Proposition 1. The first part of the proposition follows from Lemma 1 and the fact that $u_i(h_i, R) > u_i(h_i, P)$, $\forall i$ (by assumption). Together, they imply that

$$u_i(h_i, R) + \delta \sum_{\omega' \in \Omega} q_{h_i, \omega'} V_i(\omega', R) \geq u_i(h_i, P) + \delta \sum_{\omega' \in \Omega} q_{h_i, \omega'} V_i(\omega', P), \quad (39)$$

so country i keeps R when it inherits R in state h_i .

To prove the second part of the result, let us suppose by contradiction that σ^* is a symmetric equilibrium strategy profile with $\sigma(d_i, P) = R$ for some $i \in \{1, 2, \dots, N\}$. Since σ^* is a symmetric equilibrium, it must also be that $\sigma(d_j, P) = R$, $\forall j \in \{1, 2, \dots, N\}$. We will construct a deviation strategy σ' and show that it improves upon the proposed strategy σ^* , implying that σ^* is not an equilibrium, a contradiction.

Let us construct this deviation strategy σ' so that it is identical to σ^* at all histories except (at most) two: (i) at a history h' in which the pair (ω, ρ) is (d_i, P) and (ii) at a history $h'' = (h', (h_i, P))$, which is defined to be a history at state h_i that follows history h' in conjunction with the play of P . At history h' , this deviation strategy specifies the play of P (recall that the candidate equilibrium strategy σ^* specifies the play of R at such history), whereas at history h'' the constructed deviation strategy σ' specifies the play of R (which may or may not coincide with the action specified by σ^* at this history h'').

At h' , the deviation yields $u_i(d_i, P) > u_i(d_i, R) - c$ in the current period. For each possible subsequent state, the deviation either saves c immediately (d_j) or defers it by one period (d_i or h_i), strictly improving payoffs since $-c < \delta(-c)$. Thus σ' dominates

σ^* at h' , contradicting equilibrium. Hence $\sigma(d_i, P) = P$ for all i .

■

Proof of Corollary 2. Given Proposition 1, we know that $\forall i$ it must be the case that $\sigma(h_i, R) = R$ and $\sigma(d_i, P) = P$. Thus, to fully specify only a symmetric Markovian equilibrium remains to specify $\sigma(h_i, P)$ and $\sigma(d_i, R)$. There are four possibilities: (i) $\sigma(h_i, P) = P$ and $\sigma(d_i, R) = P$; (ii) $\sigma(h_i, P) = P$ and $\sigma(d_i, R) = R$; (iii) $\sigma(h_i, P) = R$ and $\sigma(d_i, R) = R$; and (iv) $\sigma(h_i, P) = R$ and $\sigma(d_i, R) = P$. Cases (i) and (ii) are power-based, case (iii) is rules-based, and case (iv) is a cyclic equilibrium. ■

Proof of Proposition 2. We can write the rules-based equilibrium payoff at a dominant state i as:

$$\begin{aligned} V_i(d_i, R) &= u_i(d_i, R) + \delta \sum_{\omega} q_{d_i, \omega} V_i(\omega, R) \\ &\leq u_i(d_i, R) + \frac{\delta}{1 - \delta} \bar{u}, \end{aligned} \quad (40)$$

where $\bar{u}$ is the maximum stage game payoff a country can get in any state under any strategy. Moreover, to have a rules-based equilibrium, it must be the case that

$$\begin{aligned} V_i(d_i, R) &\geq u_i(d_i, P) + \delta \sum_{\omega} q_{d_i, \omega} V_i(\omega, P) \\ &\geq u_i(d_i, P) + \frac{\delta}{1 - \delta} \underline{u}, \end{aligned} \quad (41)$$

where $\underline{u}$ is the minimum stage game payoff in any state and under any strategy. Note that (i) $\bar{u}$ and $\underline{u}$ are not functions of δ and (ii) $\Delta \equiv \frac{\delta}{1 - \delta}(\bar{u} - \underline{u})$ is increasing in δ . Since $u_i(d_i, P) > u_i(d_i, R)$, there exists $\underline{\delta} > 0$ such that

$$u_i(d_i, P) > u_i(d_i, R) + \frac{\delta}{1 - \delta}(\bar{u} - \underline{u}), \quad \forall \delta < \underline{\delta}. \quad (42)$$

Therefore, for such $\delta < \underline{\delta}$, (42) contradicts (40) and (41). ■

Proof of Proposition 3. Part A. Restrict attention to $c < \min_i(u_i(h_i, R) - u_i(h_i, P))$, so that hegemon always prefer rules. In any rules-based equilibrium, the unique candidate strategy profile is σ^R , characterized by (i) maintaining R whenever it inherits R , (ii) rebuilding R from P as the hegemon, and (iii) by the “No Hard Choices” condition, dominant countries maintain P when the status quo is P . Conditions (i) and

(iii) require that the two incentive constraints for each dominant country i are satisfied:

$$v_i^R \geq u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i^c(\omega', P) \quad (1)$$

$$u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i^c(\omega', P) \geq v_i^R - c \quad (2)$$

where $v_i^R \equiv u_i(d_i, R) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i(\omega', R)$ is independent of c , since the cost is never paid on the equilibrium path once the status quo is R .

Since σ^R prescribes rebuilding R the first time i is hegemon under status quo P , and never again on-equilibrium path, the cost c is paid at most once along any equilibrium path. This yields $V_i^c(\omega, P) = V_i^0(\omega, P) - c K_i(\omega)$, where

$$K_i(\omega) \equiv \mathbb{E}_{(\omega, P)}^{\sigma^R} \left[\sum_{t \geq 0} \delta^t \mathbf{1}\{t \text{ is the first period in which } i \text{ is hegemon and } \rho_t = P\} \right] \in (0, 1].$$

The upper bound $K_i(\omega) \leq 1$ since the cost is paid at most once, so the indicator is nonzero for at most one period, and $\delta^t \leq 1$. The strict lower bound $K_i(d_i) > 0$ follows from irreducibility of Q , which guarantees that country i becomes hegemon with positive probability from any state. Defining $v_i^0 \equiv V_i^0(d_i, P)$, constraints (1) and (2) at $c = 0$ collapse to:

$$v_i^R \geq v_i^0 \geq v_i^R,$$

so a rules-based equilibrium at $c = 0$ requires $v_i^0 = v_i^R$ for all i , which fails generically. We consider the two generic cases.

Case 1: $v_i^0 > v_i^R$. Constraint (1) requires $v_i^R \geq v_i^0 - c K_i(d_i)$, i.e., $c \geq (v_i^0 - v_i^R)/K_i(d_i)$. Since $K_i(d_i) \leq 1$, a sufficient condition for violation is:

$$c < v_i^0 - v_i^R \equiv \bar{c}_i > 0.$$

Case 2: $v_i^0 < v_i^R$. Constraint (2) requires:

$$v_i^0 - c K_i(d_i) \geq v_i^R - c \iff c(1 - K_i(d_i)) \geq v_i^R - v_i^0 > 0.$$

Since $K_i(d_i) \in (0, 1]$, if $K_i(d_i) = 1$ this constraint requires $0 \geq v_i^R - v_i^0 > 0$, a contradiction. If $K_i(d_i) < 1$, it requires $c \geq (v_i^R - v_i^0)/(1 - K_i(d_i)) > 0$, which again fails for c sufficiently small. In either case, constraint (2) is violated for all $c < v_i^R - v_i^0 \equiv \underline{c}_i > 0$.

In both cases, setting $\underline{c} = \min_i \underline{c}_i > 0$ ensures that for all $c < \underline{c}$, at least one incentive

constraint is violated for some dominant country i , so no rules-based equilibrium exists.

Part B. A rules-based equilibrium specifies that $\sigma(h_i, P) = R$. Thus, it requires

$$\begin{aligned} u_i(h_i, R) - c + \delta \sum_{\omega' \in \Omega} q_{h_i, \omega'} V_i(\omega', R) &\geq u_i(h_i, P) + \delta \sum_{\omega' \in \Omega} q_{h_i, \omega'} V_i(\omega', P) \\ \Leftrightarrow c &\leq u_i(h_i, R) - u_i(h_i, P) + \delta \sum_{\omega' \in \Omega} q_{h_i, \omega'} \{V_i(\omega', R) - V_i(\omega', P)\}. \end{aligned}$$

We know that $u_i(h_i, R) - u_i(h_i, P) > 0$ and is bounded. Moreover, for any given $\delta < 1$, we have that $\forall \omega', V_i(\omega', R) - V_i(\omega', P) \geq 0$ and is uniformly bounded across all possible equilibria. Thus, there exists $\bar{c}_\delta > u_i(h_i, R) - u_i(h_i, P)$ for which $\forall c > \bar{c}_\delta$, the inequality above is violated. ■

Proof of Proposition 4. For part A, consider a symmetric strategy profile $\sigma(\omega, \rho)$ in which $\sigma(h, \rho) = R$, and $\sigma(d, \rho) = P, \forall \rho$. Such a strategy generates a continuation payoff for each country i and for every state (ω, ρ) , denoted by $\tilde{V}_i(\omega, \rho)$. Before we proceed, note that this strategy σ induces $\tilde{V}_i(h_i, P) = \tilde{V}_i(h_i, R) - c$, $\tilde{V}_i(d_i, P) = \tilde{V}_i(d_i, R)$, $\tilde{V}_i(h_j, P) = \tilde{V}_i(h_j, R)$, $\tilde{V}_i(d_j, P) = \tilde{V}_i(d_j, R), \forall i, j \in \{1, 2, \dots, N\}$, with $i \neq j$. Therefore, succinctly, we have that $\tilde{V}_i(\omega, R) \geq \tilde{V}_i(\omega, P), \forall i \in \{1, 2, \dots, N\}, \forall \omega \in \Omega$. Thus, $\forall c < u_i(h_i, R) - u_i(h_i, P)$ we can write:

$$u_i(h_i, R) + \delta \sum_{\omega'} q_{\omega, \omega'} \tilde{V}_i(\omega', R) - c \geq u_i(h_i, P) + \delta \sum_{\omega'} q_{\omega, \omega'} \tilde{V}_i(\omega', P). \quad (43)$$

In addition, note that

$$\begin{aligned} u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} \tilde{V}_i(\omega', P) &= \\ u_i(d_i, P) + \delta \{q_{d_i, h_i} \tilde{V}_i(h_i, P) + \sum_{\omega' \in \Omega, \omega' \neq h_i} q_{d_i, \omega'} \tilde{V}_i(\omega', R)\} &= \\ u_i(d_i, P) - u_i(d_i, R) + u_i(d_i, R) + \delta \{q_{d_i, h_i} \tilde{V}_i(h_i, R) - q_{d_i, h_i} c + \sum_{\omega' \in \Omega, \omega' \neq h_i} q_{d_i, \omega'} \tilde{V}_i(\omega', R)\} &= \\ u_i(d_i, R) + \delta \sum_{\omega'} q_{d_i, \omega'} \tilde{V}_i(\omega', R) + (u_i(d_i, P) - u_i(d_i, R)) - \delta q_{d_i, h_i} c. \end{aligned}$$

Thus, for

$$\forall c < \frac{u_i(d_i, P) - u_i(d_i, R)}{\delta q_{d_i, h_i}}, \quad (44)$$

we have that:

$$u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} \tilde{V}_i(\omega', P) \geq u_i(d_i, R) + \delta \sum_{\omega'} q_{d_i, \omega'} \tilde{V}_i(\omega', R). \quad (45)$$

Conditions (43) and (45) imply that the proposed strategy profile σ induces a symmetric Markovian equilibrium; indeed, it induces the cyclic equilibrium. Moreover, if we decrease δ , condition (44) becomes easier to satisfy and so do conditions (43) and (45). To show uniqueness, note first that there cannot be a power-based equilibrium since for c sufficiently small ($c < u_i(h_i, R) - u_i(h_i, P), \forall i$), the hegemon will always choose rules. Moreover, it cannot be a rules-based equilibrium (which we proved in Proposition 3). If it is neither a rules-based nor a power-based, then the only possible class of Markovian symmetric pure strategy equilibria is cyclic equilibria (see Corollary 2).

For part B, consider a strategy profile for which $\sigma(\omega, P) = P, \forall \omega \in \Omega$. Then, the induced payoffs are denoted by $\tilde{V}(\omega, \rho)$. This strategy will induce an equilibrium if $\forall i$:

$$u_i(\omega, P) + \delta \sum_{\omega'} q_{\omega, \omega'} \tilde{V}_i(\omega', P) > u_i(\omega, R) - c + \delta \sum_{\omega'} q_{\omega, \omega'} \tilde{V}_i(\omega', R), \quad \forall \omega \in \Omega.$$

This can be simplified to:

$$c > u_i(\omega, R) - u_i(\omega, P) + \delta \sum_{\omega'} q_{\omega, \omega'} (\tilde{V}_i(\omega', R) - \tilde{V}_i(\omega', P)). \quad (46)$$

Moreover, since

$$\tilde{V}_i(\omega', R) - \tilde{V}_i(\omega', P) \leq \frac{\max_{i, \omega, \rho} u_i(\omega, \rho) - \min_{i, \omega, \rho} u_i(\omega, \rho)}{1 - \delta},$$

we have that there exists $\bar{c}$ for which $\forall c > \bar{c}$, condition (46) is satisfied and thus there is a power-based equilibrium. To show uniqueness, note that for sufficiently large c , it cannot be the case that $\sigma(h_i, P) = R$ and, by Corollary 2, we are left with power-based as the only class of possible symmetric pure strategy Markovian equilibria. ■

Proof of Proposition 5. Note first that for any δ and any given equilibrium, there exists Δv such that $V_i(\omega, R) - V_i(\omega, P) \leq \frac{\Delta v}{1 - \delta}, \forall i, \omega$. Moreover, recall that there exists $\underline{u}$ such that $V_i(\omega, P) \geq \frac{\underline{u}}{1 - \delta}, \forall \omega$, and $\bar{u}$ such that $V_i(\omega, R) \leq \frac{\bar{u}}{1 - \delta}, \forall \omega$.²⁸ Then, for

²⁸For example, consider $\Delta v \equiv \max_{\omega, \rho} u(\omega, \rho) - \min_{\omega, \rho} u(\omega, \rho)$, and $\bar{u} \equiv \max_{\omega, \rho} u(\omega, \rho)$.

any equilibrium, we can write country i 's expected continuation payoff at (d_i, P) as:

$$V_i(d_i, P) = \frac{1}{1 - \delta q_{d_i, d_i}} \left\{ u_i(d_i, P) + \delta \sum_{\omega' \neq d_i} q_{d_i, \omega'} V_i(\omega', P) \right\}$$

$$V_i(d_i, P) \geq \frac{1}{1 - \delta q_{d_i, d_i}} \left\{ u_i(d_i, P) + \delta(1 - q_{d_i, d_i}) \frac{\underline{u}}{1 - \delta} \right\}$$

Moreover, the expected continuation payoff at (d_i, R) in any equilibrium in which $\sigma(d_i, R) = R$ can be written as:

$$V_i(d_i, R) = \frac{1}{1 - \delta q_{d_i, d_i}} \left\{ u_i(d_i, R) + \delta \sum_{\omega' \neq d_i} q_{d_i, \omega'} V_i(\omega', R) \right\}$$

$$V_i(d_i, R) \leq \frac{1}{1 - \delta q_{d_i, d_i}} \left\{ u_i(d_i, R) + \delta(1 - q_{d_i, d_i}) \frac{\bar{u}}{1 - \delta} \right\}$$

Together, these two conditions imply that at any equilibrium in which *rules* is played on-equilibrium path, at state (d_i, R) we must have that:

$$u_i(d_i, R) + \delta q_{d_i, d_i} V_i(d_i, R) + \delta \sum_{\omega' \neq d_i} q_{d_i, \omega'} V_i(\omega', R)$$

$$\geq u_i(d_i, P) + \delta q_{d_i, d_i} V_i(d_i, P) + \delta \sum_{\omega' \neq d_i} q_{d_i, \omega'} V_i(\omega', P),$$

$$u_i(d_i, P) - u_i(d_i, R) \leq \delta q_{d_i, d_i} \{V_i(d_i, R) - V_i(d_i, P)\}$$

$$+ \delta \sum_{\omega' \neq d_i} q_{d_i, \omega'} \{V_i(\omega', R) - V_i(\omega', P)\}.$$

which in turn implies that it is necessary that:

$$u_i(d_i, P) - u_i(d_i, R) \leq \delta \frac{q_{d_i, d_i}}{1 - \delta q_{d_i, d_i}} \left\{ u_i(d_i, R) - u_i(d_i, P) + \delta(1 - q_{d_i, d_i}) \frac{\bar{u} - \underline{u}}{1 - \delta} \right\} \quad (47)$$

$$+ \delta(1 - q_{d_i, d_i}) \frac{\Delta v}{1 - \delta}.$$

As $q_{d_i, d_i} \rightarrow 1$, the r.h.s. of (47) converges to $\delta \frac{1}{1 - \delta} \{u_i(d_i, R) - u_i(d_i, P)\} < 0$. Since $u_i(d_i, P) - u_i(d_i, R) > 0$, we have finalized the proof. ■

Proof of Proposition 6. A Rules-based equilibrium exists if and only if three conditions are satisfied:

1. A hegemon country must prefer to create Rules:

$$u_i(h_i, R) - c + \delta \sum_{\omega'} q_{h_i, \omega'} V_i(\omega', R) \geq u_i(h_i, P) + \delta \sum_{\omega'} q_{h_i, \omega'} V_i(\omega', P).$$

2. A dominant country prefers to maintain P when it receives P. (We know from Proposition 1 that this is a necessary condition for rules-based equilibria):

$$u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i(\omega', P) \geq u_i(d_i, R) - c + \delta \sum_{\omega'} q_{d_i, \omega'} V_i(\omega', R).$$

3. A dominant country prefers to maintain R rather than switching to P :

$$u_i(d_i, R) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i(\omega', R) \geq u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i(\omega', P).$$

The three conditions above can be rewritten as:

$$c \leq \Delta u_i(h_i) + \delta \sum_{\omega'} q_{h_i, \omega'} \Delta V_i(\omega') \quad (\text{a})$$

$$c \geq \Delta u_i(d_i) + \delta \sum_{\omega'} q_{d_i, \omega'} \Delta V_i(\omega') \quad (\text{b})$$

$$0 \leq \Delta u_i(d_i) + \delta \sum_{\omega'} q_{d_i, \omega'} \Delta V_i(\omega') \quad (\text{c})$$

In a rules-based equilibrium, a hegemon country creates rules, thus, it must be that: $\Delta V_i(h_i) = c$ and $\Delta V_i(h_j) = 0$, for all $i \neq j$. Therefore, for two countries, we can write, using (HLT):

$$\begin{aligned} \Delta V_i(d_i) &= \Delta u_i(d_i) + \delta \{ \varepsilon \Delta V_i(h_i) + (1 - \varepsilon) \Delta V_i(d_j) \} \\ &= \Delta u_i(d_i) + \delta \{ \varepsilon c + (1 - \varepsilon) \Delta V_i(d_j) \} \end{aligned}$$

Moreover,

$$\begin{aligned} \Delta V_i(d_j) &= \Delta u_i(d_j) + \delta \{ \varepsilon \Delta V_i(h_j) + (1 - \varepsilon) \Delta V_i(d_i) \} \\ &= \Delta u_i(d_j) + \delta \{ (1 - \varepsilon) \Delta V_i(d_i) \} \end{aligned}$$

This defines a linear system of two equations and two unknowns. Solving this system, we have:

$$\Delta V_i(d_i) = \frac{\Delta u_i(d_i) + \delta \varepsilon c + \delta (1 - \varepsilon) \Delta u_i(d_j)}{1 - \delta^2 (1 - \varepsilon)^2} \quad (48)$$

$$\Delta V_i(d_j) = \frac{\Delta u_i(d_j) + \delta (1 - \varepsilon) (\Delta u_i(d_i) + \delta \varepsilon c)}{1 - \delta^2 (1 - \varepsilon)^2} \quad (49)$$

Condition (b) can be rewritten as:

$$\begin{aligned} c &\geq \Delta u_i(d_i) + \delta \{ \varepsilon \Delta V_i(h_i) + (1 - \varepsilon) \Delta V_i(d_j) \} = \Delta u_i(d_i) + \delta \{ \varepsilon c + (1 - \varepsilon) \Delta V_i(d_j) \} \\ &= \Delta u_i(d_i) + \delta \varepsilon c + \delta(1 - \varepsilon) \frac{\Delta u_i(d_j) + \delta(1 - \varepsilon)(\Delta u_i(d_i) + \delta \varepsilon c)}{1 - \delta^2(1 - \varepsilon)^2} =: RHS_1(\delta, \varepsilon) \end{aligned}$$

However, as $\varepsilon \rightarrow 0$:

$$\lim_{\varepsilon \rightarrow 0} RHS_1(\delta, \varepsilon) = \Delta u_i(d_i) + \delta \frac{\Delta u_i(d_j) + \delta \Delta u_i(d_i)}{1 - \delta^2} \quad (50)$$

$$= \frac{\Delta u_i(d_i) + \delta \Delta u_i(d_j)}{1 - \delta^2} \quad (51)$$

Note that, from (EFF), we know that $\Delta u_i(d_i) + \Delta u_i(d_j) > 0$, thus, for δ close enough to 1, we have that $\lim_{\varepsilon \rightarrow 0} RHS_1(\delta, \varepsilon) > 0$.

Condition (a) can be rewritten as:

$$\begin{aligned} c &\leq \Delta u_i(h_i) + \delta \{ q_{h_i, h_i} \Delta V_i(h_i) + (1 - q_{h_i, h_i}) \Delta V_i(d_i) \} \\ &= \Delta u_i(h_i) + \delta \left\{ q_{h_i, h_i} c + (1 - q_{h_i, h_i}) \left[\frac{\Delta u_i(d_i) + \delta \varepsilon c + \delta(1 - \varepsilon) \Delta u_i(d_j)}{1 - \delta^2(1 - \varepsilon)^2} \right] \right\} \Leftrightarrow \\ c \left(1 - \delta q_{h_i, h_i} - \frac{\delta^2 \varepsilon (1 - q_{h_i, h_i})}{1 - \delta^2(1 - \varepsilon)^2} \right) &\leq \Delta u_i(h_i) + \delta (1 - q_{h_i, h_i}) \frac{\Delta u_i(d_i) + \delta(1 - \varepsilon) \Delta u_i(d_j)}{1 - \delta^2(1 - \varepsilon)^2} \Leftrightarrow \\ c &\leq \frac{\Delta u_i(h_i) + \delta (1 - q_{h_i, h_i}) \frac{\Delta u_i(d_i) + \delta(1 - \varepsilon) \Delta u_i(d_j)}{1 - \delta^2(1 - \varepsilon)^2}}{1 - \delta q_{h_i, h_i} - \frac{\delta^2 \varepsilon (1 - q_{h_i, h_i})}{1 - \delta^2(1 - \varepsilon)^2}} =: RHS_2(\delta, \varepsilon) \end{aligned}$$

However, as $\varepsilon \rightarrow 0$:

$$\begin{aligned} \lim_{\varepsilon \rightarrow 0} RHS_2(\delta, \varepsilon) &= \frac{\Delta u_i(h_i) + \delta (1 - q_{h_i, h_i}) \frac{\Delta u_i(d_i) + \delta \Delta u_i(d_j)}{1 - \delta^2}}{1 - \delta q_{h_i, h_i}} \\ &= \frac{\Delta u_i(h_i) - \frac{\Delta u_i(d_i) + \delta \Delta u_i(d_j)}{1 + \delta}}{1 - \delta q_{h_i, h_i}} + \frac{\Delta u_i(d_i) + \delta \Delta u_i(d_j)}{1 - \delta^2} \\ &> \frac{\frac{\Delta u_i(d_i) + \Delta u_i(d_j)}{2} - \frac{\Delta u_i(d_i) + \delta \Delta u_i(d_j)}{1 + \delta}}{1 - \delta q_{h_i, h_i}} + \lim_{\varepsilon \rightarrow 0} RHS_1(\delta, \varepsilon) \\ &= \frac{\Delta u_i(d_i) \left(\frac{\delta - 1}{2(1 + \delta)} \right) + \Delta u_i(d_j) \left(\frac{1 - \delta}{2(1 + \delta)} \right)}{1 - \delta q_{h_i, h_i}} + \lim_{\varepsilon \rightarrow 0} RHS_1(\delta, \varepsilon) \\ &= \frac{(\Delta u_i(d_j) - \Delta u_i(d_i)) (1 - \delta)}{2(1 + \delta) (1 - \delta q_{h_i, h_i})} + \lim_{\varepsilon \rightarrow 0} RHS_1(\delta, \varepsilon) > \lim_{\varepsilon \rightarrow 0} RHS_1(\delta, \varepsilon), \end{aligned}$$

for $\delta \in (0, 1)$, where the first inequality follows from (HBL). Thus there exists ε small

enough such that $RHS_2(\delta, \varepsilon) > RHS_1(\delta, \varepsilon)$. This means that there exists $c > 0$ such that conditions (a) and (b) are satisfied. Finally, condition (c) can be rewritten as:

$$\begin{aligned} 0 &\leq \Delta u_i(d_i) + \delta \{ \varepsilon \Delta V_i(h_i) + (1 - \varepsilon) \Delta V_i(d_j) \} \\ &= \Delta u_i(d_i) + \delta \left\{ \varepsilon c + (1 - \varepsilon) \frac{\Delta u_i(d_j) + \delta(1 - \varepsilon)(\Delta u_i(d_i) + \delta \varepsilon c)}{1 - \delta^2(1 - \varepsilon)^2} \right\} = RHS_3(\delta, \varepsilon) \end{aligned}$$

However, as $\varepsilon \rightarrow 0$:

$$\lim_{\varepsilon \rightarrow 0} RHS_3(\delta, \varepsilon) = \Delta u_i(d_i) + \delta \frac{\Delta u_i(d_j) + \delta \Delta u_i(d_i)}{1 - \delta^2} = \frac{\Delta u_i(d_i) + \delta \Delta u_i(d_j)}{1 - \delta^2}.$$

However, from (EFF), we know that $\Delta u_i(d_i) + \Delta u_i(d_j) > 0$, thus, for δ close enough to 1, we have that $\lim_{\varepsilon \rightarrow 0} RHS_3(\delta, \varepsilon) > 0$. Thus, there exists ε small enough such that condition (c) is satisfied. ■

Proof of Proposition 7. A switch from R to P at any moment in time clearly cannot be part of the efficient solution, since by assumption $\sum_{i \in \mathcal{I}} u_i(\omega, R) > \sum_{i \in \mathcal{I}} u_i(\omega, P)$, $\forall \omega \in \Omega$. Thus, if the cost c of switching from P to R is ever paid, the efficient solution must be such that it will keep R from that moment onward. Therefore, given any pair (δ, c) , the efficient solution either prescribes a once-and-for-all switch from P to R at some period t or it prescribes the permanent play of P . Fix any pair $(\bar{\delta}, \bar{c})$ and consider the case where R is implemented indefinitely. Then, for any (δ, c) with (i) $\delta = \bar{\delta}$ and $c < \bar{c}$, or (ii) $\delta > \bar{\delta}$ and $c = \bar{c}$, the efficient solution will also prescribe R . Consider now the case where P is implemented indefinitely. Then, for any (δ, c) with (i) $\delta = \bar{\delta}$ and $c > \bar{c}$, or (ii) $\delta < \bar{\delta}$ and $c = \bar{c}$, the efficient solution will also prescribe P . To see this, suppose that at (δ, c) efficiency prescribes R at period τ . Then:

$$\sum_{t \geq \tau} \sum_{i \in \mathcal{I}} \delta^{t-1} u_i(\omega_t, R) \pi(\omega_t, t) - c \geq \sum_{t \geq \tau} \sum_{i \in \mathcal{I}} \delta^{t-1} u_i(\omega_t, P) \pi(\omega_t, t),$$

where $\pi(\omega, t)$ denotes the probability of state ω at period t . Equivalently,

$$c \leq \sum_{t \geq \tau} \sum_{i \in \mathcal{I}} \delta^{t-1} \{ u_i(\omega_t, R) - u_i(\omega_t, P) \} \pi(\omega_t, t). \quad (52)$$

The right-hand side of inequality (52) is a discounted sum with positive coefficients, and therefore increasing in δ . Additionally, note that the set of parameters (δ, c) for which the efficient solution prescribes the play of the rules-based regime is non-empty. In particular, it includes all c such that $c < \sum_{j \in \mathcal{I}} \{ u_j(h_i, R) - u_j(h_i, P) \}$, $\forall \delta$. It also includes pairs (δ, c) with high δ . Formally, $\forall c$, there exists δ_c such that $\forall \delta > \delta_c$, the

efficient solution prescribes R . This follows because the aggregate payoff is higher under *rules* than under *power* in every state, so as long as δ is sufficiently high, the difference between the discounted sum of payoffs under *rules* versus *power* will be higher than the cost c . Similarly, for any δ , a sufficiently high cost exists such that the efficient solution prescribes the constant choice of a power-based regime. Suppose not. Then, there exists i for which

$$\frac{\sum_{j \in \mathcal{I}} u_j(h_i, R)}{1 - \delta} - c \geq \sum_{t \geq \tau} \sum_{j \in \mathcal{I}} \delta^{t-1} u_j(\omega_t, P) \geq \frac{\sum_{j \in \mathcal{I}} \underline{u}_j}{1 - \delta},$$

where $\underline{u}_j$ represents each player j 's minimum payoff at any state ω . Analogously, let $\bar{u}_j$ represent each player j 's maximum payoff at any state ω . Then, it must be that

$$c < \frac{\sum_{j \in \mathcal{I}} \bar{u}_j}{1 - \delta} - \frac{\sum_{j \in \mathcal{I}} \underline{u}_j}{1 - \delta}.$$

A sufficiently high c violates this inequality.

Finally, consider two pairs (δ_1, c_1) and (δ_2, c_2) under which the optimal solution specifies P indefinitely. Then, following (52), we can write:

$$c_k \geq \sum_{t \geq \tau} \sum_{i \in \mathcal{I}} \delta_k^{t-1} \{u_i(\omega_t, R) - u_i(\omega_t, P)\} \pi(\omega_t, t), \quad k = 1, 2. \quad (53)$$

Multiplying the first inequality for c_1 by λ and the second inequality for c_2 by $(1 - \lambda)$:

$$\lambda c_1 + (1 - \lambda) c_2 \geq \sum_{t \geq \tau} \sum_{i \in \mathcal{I}} (\lambda \delta_1^{t-1} + (1 - \lambda) \delta_2^{t-1}) \{u_i(\omega_t, R) - u_i(\omega_t, P)\} \pi(\omega_t, t).$$

Using Jensen's inequality, we conclude our proof. ■

Proof of Proposition 8. By Proposition 7, under (EFF), the efficient solution is either always- P or eventually always- R . It therefore suffices to show that, whenever a rules-based equilibrium exists, the social planner strictly prefers to pay c once and maintain R forever over never paying c and remaining at P .

A rules-based equilibrium requires two sets of incentive constraints to hold. First, there must exist a country $i^* \in \mathcal{I}$ and a state $\omega^* \in \{h_{i^*}, d_{i^*}\}$ at which i^* is willing to pay c to create rules when the status quo is P . Since $V_{i^*}(\omega^*, P)$ —the equilibrium continuation value following the choice of P at ω^* —may involve future transitions to R and hence satisfies $V_{i^*}(\omega^*, P) \geq \mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} u_{i^*}(\omega_t, P)$, the creation incentive implies:

$$\mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} u_{i^*}(\omega_t, R) - c \geq \mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} u_{i^*}(\omega_t, P). \quad (54)$$

Second, since the rules-based equilibrium prescribes the permanent maintenance of R on the equilibrium path, every country $j \in \mathcal{I}$ must prefer to maintain rules at every state $\omega \in \Omega$ when the status quo is already R (no cost is incurred upon keeping R). By the same reasoning as above, the maintenance incentive implies: (leaders prefer to keep R and subordinates derive higher utility from this)

$$\mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} u_j(\omega_t, R) \geq \mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} u_j(\omega_t, P), \quad \forall j \in \mathcal{I}, \forall \omega \in \Omega. \quad (55)$$

Summing (54) over i^* and (55) over all $j \neq i^*$, both evaluated at state ω^* (which is admissible since (55) holds for all $\omega \in \Omega$), yields:

$$\mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} \left[\sum_{i \in \mathcal{I}} u_i(\omega_t, R) \right] - c \geq \mathbb{E} \sum_{t=1}^{\infty} \delta^{t-1} \left[\sum_{i \in \mathcal{I}} u_i(\omega_t, P) \right]. \quad (56)$$

Condition (56) is the social planner's condition evaluated at initial state ω^* for preferring to pay c once and maintain R forever over remaining permanently at P . Furthermore, once rules are created, the assumption $\sum_{i \in \mathcal{I}} u_i(\omega, R) > \sum_{i \in \mathcal{I}} u_i(\omega, P)$ for all $\omega \in \Omega$ guarantees that the planner maintains R in every subsequent state, never finding it optimal to revert to P and incur cost c again. The efficient solution is thus the permanent choice of R . ■

Proof of Proposition 9. Suppose, by contradiction, that there is a symmetric Markovian equilibrium with $\sigma(\Phi_{ij}, \rho) = (R, R)$. Then, each country will have an incentive to unilaterally deviate and play P , getting a higher payoff at that period and not altering the status quo for the subsequent period. Moreover, due to symmetry, we cannot have $\sigma(\Phi_{ij}, \rho) = (R, P)$ or $\sigma(\Phi_{ij}, \rho) = (P, R)$, which concludes the proof. ■

Proof of Proposition 10. Suppose that there is an equilibrium in which both the hegemon and dominant countries choose to maintain R . Then, the following inequality must be satisfied:

$$u_i(d_i, R) + \delta \sum_{\omega'} q_{d_i, \omega'} V(\omega', R) \geq u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} V(\omega', P) \quad (57)$$

Moreover, since the equilibrium choices are $\sigma(d_i, R) = R$ and $\sigma(d_i, P) = P$, we must have:

$$V(d_i, \rho) = u_i(d_i, \rho) + \delta \sum_{\omega'} q_{d_i, \omega'} V(\omega', \rho), \quad (58)$$

which can be rewritten as:

$$V(d_i, \rho) = \frac{u_i(d_i, \rho) + \delta(q_{d_i, h_i} V(h_i, \rho) + q_{d_i, \Phi} V(\Phi, \rho))}{1 - \delta q_{d_i, d_i}}.$$

Additionally, since in such an equilibrium hegemon create R , we have that $V(h_i, P) = V(h_i, R) - c$. In the bipolar state Φ , symmetry implies that only (R, R) and (P, P) can arise in a symmetric pure-strategy equilibrium. By Proposition 9, (R, R) is not an equilibrium, hence (P, P) is the unique symmetric equilibrium action profile. Therefore, continuation play in Φ is independent of the inherited regime, implying $V(\Phi, R) = V(\Phi, P)$. Then, we can rewrite the condition above as:

$$V(d_i, R) = \frac{u_i(d_i, R) + \delta(q_{d_i, h_i}(V(h_i, P) + c) + q_{d_i, \Phi} V(\Phi, P))}{1 - \delta q_{d_i, d_i}}. \quad (59)$$

It must also be the case that $V(d_i, R) \geq V(d_i, P)$, since arriving at a state under regime R is always weakly better than arriving at it under regime P (Lemma 1, which also holds here), thus it must be true that

$$\frac{u_i(d_i, R) - u_i(d_i, P) + \delta q_{d_i, h_i} c}{1 - \delta q_{d_i, d_i}} \geq 0.$$

This can hold only if:

$$u_i(d_i, P) - u_i(d_i, R) \leq \delta q_{d_i, h_i} c. \quad (60)$$

Thus, a necessary condition for the existence of a pure strategy symmetric Markovian equilibrium in which hegemon create (and maintain) R and dominants maintain R is that:

$$q_{d_i, h_i} \geq \frac{u_i(d_i, P) - u_i(d_i, R)}{\delta c}.$$

This concludes the proof. ■

Proof of Proposition 11. Suppose that a rules-based equilibrium exists. Then, in the bipolar state it must be the case that

$$V_i(\Phi, R) \geq u_i(\Phi, (P, R)) + \delta \sum_{\omega'} q_{\Phi, \omega'} V_i(\omega', P) \quad (61)$$

Now consider a different world in which the utility of country i in state Φ following the play of (P, R) is $\tilde{u}_i(\Phi, (P, R)) = u_i(\Phi, (P, R)) - \kappa$, for some $\kappa \in (0, u_i(\Phi, (P, R)))$. Then, (61) also holds. That is, condition (61) also holds for smaller values of $u_i(\Phi, (P, R))$. Since

all other restrictions remain unchanged, a rules-based equilibrium also exists under this smaller value of $u_i(\Phi, (P, R))$. Relatedly, we also have that

$$u_i(\Phi, (P, R)) + \delta \sum_{\omega'} q_{\Phi, \omega'} V_i(\omega', P) \geq u_i(\Phi, (P, R)) + \frac{\delta}{1 - \delta} \underline{u}.$$

Additionally, $V_i(\Phi, R) \leq \frac{1}{1 - \delta} \bar{u}$. Thus, a necessary condition for rules-based equilibrium is:

$$u_i(\Phi, (P, R)) \leq \frac{\bar{u} - \delta \underline{u}}{1 - \delta}.$$

Thus, for sufficiently high $u_i(\Phi, (P, R))$, a rules-based equilibrium does not exist. ■

Proof of Proposition 12. Consider first a dominant country i that receives R as the status quo. If $u_i(d_i, R)$ increases, in the short run its incentive to choose P over R decreases, as $[u_i(d_i, P) - u_i(d_i, R)]$ falls. In the long run, in addition to remaining dominant, the country can become hegemonic or subordinate. As hegemonic, its gain with R relative to P increases if $u_i(h_i, R)$ rises. The same is true as subordinate. Therefore, the incentive of a dominant country to keep R rises. The analysis for a hegemonic country both for introducing and for keeping R is analogous. Hence, if the payoff of all countries under R increases, a rules-based equilibrium becomes viable under a larger set of parameters.

It follows that the opposite result obtains if $u_i(., R)$ falls for all countries. ■

Proof of Proposition 13. Under the current structure of payoffs and the initial transition matrix Q , there is a rules-based equilibrium. First keep the same structure of payoffs, thus ignoring (I2). In line with (I1), there is a new transition matrix Q' . Under Q' , there are two possibilities: R is no longer an equilibrium, in which case the proof is complete, or R remains an equilibrium. In the latter case, now incorporating (I2), we know from Proposition 12 that the set of parameters that sustains R as an equilibrium shrinks as the payoff under R decreases for all players. It then suffices to show that, if those payoffs decrease enough, it becomes impossible to sustain R . Consider that, under (I2), $u_i(h_i, R) = u_i(h_i, P) \forall i$; $u_i(h_j, R) = u_i(h_j, P) \forall i, j, i \neq j$; and $u_i(d_j, R) = u_i(d_j, P) \forall i, j, i \neq j$. In this case, dominant countries have a short-run gain from choosing *power* without any long-run cost, since the payoff under *rules* is so low that it provides no gain for hegemons or subordinates. This makes R unsustainable. ■

Before we prove Proposition 14, we will prove the following three lemmas.

Lemma 2 (Irreversibility) *In any pure-strategy symmetric Markovian equilibrium of the $\{P, RL\}$ game, for any state ω : if $\sigma(\omega, RL) = P$ then $\sigma(\omega, P) = P$.*

Proof. Suppose $\sigma(\omega, RL) = P$. Switching from RL to P is costless, so this reveals:

$$u_i(\omega, P) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', P) \geq u_i(\omega, RL) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', RL).$$

The payoff from switching from P to RL costs $c > 0$. Thus,

$$u_i(\omega, RL) - c + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', RL),$$

which is strictly less than the right-hand side above. Therefore, the leader strictly prefers P over switching to RL , so $\sigma(\omega, P) = P$. ■

Lemma 3 *In any symmetric Markovian equilibrium of the $\{P, RL\}$ game:*

- (i) $0 \leq V_i(\omega, RL) - V_i(\omega, P) \leq c$ for all leadership states $\omega \in \{h_i, d_i\}$.
- (ii) $V_i(\omega, RL) \geq V_i(\omega, P)$ for all subordinate states $\omega \in \{h_j, d_j\}$.
- (iii) For any $\gamma > 0$, the inequalities in (i) and (ii) are strict: $V_i(\omega, RL) > V_i(\omega, P)$ for all ω .

Proof. (i) *Lower bound.* Inheriting RL gives the leader every option available under P at weakly lower cost: switching from RL to P is free, while switching from P to RL costs $c > 0$. Hence $V_i(\omega, RL) \geq V_i(\omega, P)$.

(i) From P , the leader can always pay c to switch to RL , so $V_i(\omega, RL) - V_i(\omega, P) \leq c$.

(ii) Since $\lambda \leq \bar{\lambda}$, we have $u_i(\omega, RL) \geq u_i(\omega, P)$ for all subordinate states. Using Lemma 2, we know that if arriving at a subordinate state under RL means a switch to P , then so does arriving at that state under P , so it would be equivalent for the subordinate country, however, it may be the case that $\sigma(\omega, RL) = RL$ while $\sigma(\omega, P) = P$ in which case the subordinate country would prefer a status quo RL . The inequality in (i) for the states in which the country is the leader completes the proof (similar logic as in Lemma 1).

(iii) For any $\gamma > 0$, $u_i(h_i, RL) = u_i(h_i, R) + \gamma > u_i(h_i, P)$. Since $q_{d_i, h_i} > 0$, the hegemon state is reachable from d_i , and since all states communicate, the strict advantage at h_i propagates to all states, yielding strict inequality everywhere. ■

Lemma 4 (Full Appeasement Guarantees Maintenance) *At $\gamma = \bar{\gamma}$ and $\lambda < \bar{\lambda}$, rules-lite is always maintained once established: $\sigma(\omega, RL) = RL$ for all ω .*

Proof. Suppose, by contradiction, that $\sigma(\omega, RL) = P$ for some state ω . Then:

$$u_i(\omega, P) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', P) \geq u_i(\omega, RL) + \delta \sum_{\omega'} q_{\omega, \omega'} V_i(\omega', RL).$$

Rearranging:

$$u_i(\omega, P) - u_i(\omega, RL) \geq \delta \sum_{\omega'} q_{\omega, \omega'} [V_i(\omega', RL) - V_i(\omega', P)] \geq 0.$$

where the last inequality is Lemma 3(i)–(ii). Hence it must be $u_i(\omega, P) \geq u_i(\omega, RL)$.

At $\omega = h_i$: $u_i(h_i, RL) = u_i(h_i, R) + \bar{\gamma} > u_i(h_i, P)$. Contradiction.

At $\omega = d_i$: $u_i(d_i, RL) = u_i(d_i, R) + \bar{\gamma} = u_i(d_i, P)$, so the static terms tie. The inequality then requires $\delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', RL) - V_i(\omega', P)] \leq 0$. But by Lemma 3(iii), since $\bar{\gamma} > 0$, $V_i(\omega', RL) > V_i(\omega', P)$ strictly for all reachable ω' , and $q_{d_i, h_i} > 0$ ensures the hegemon state is reachable. So the sum is strictly positive. Contradiction. ■

Proof of Proposition 14. We derive the incentive constraint separately for the dominant and hegemon states.

Dominant state. Country i at state d_i keeps RL rather than switching to P if and only if:

$$u_i(d_i, RL) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i(\omega', RL) \geq u_i(d_i, P) + \delta \sum_{\omega'} q_{d_i, \omega'} V_i(\omega', P). \quad (62)$$

Substituting $u_i(d_i, RL) = u_i(d_i, R) + \gamma$ and rearranging:

$$\delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', RL) - V_i(\omega', P)] \geq u_i(d_i, P) - u_i(d_i, R) - \gamma = \bar{\gamma} - \gamma.$$

By Lemma 3(iii), $\delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', RL) - V_i(\omega', P)] > 0$ for any $\gamma > 0$. Then

$$\gamma \geq \bar{\gamma} - \delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', RL) - V_i(\omega', P)].$$

Note that, for any given regime RL and associated γ , because the stage-game payoff difference is at most γ in every state and the discount factor is δ , the geometric sum is bounded by $\frac{\gamma}{1-\delta}$. That is, since $u_i(\omega, RL) \leq u_i(\omega, R) + \gamma$, $\forall \omega$, we can write:

$$\sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', RL) - V_i(\omega', P)] \leq \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', R) + \frac{\gamma}{1-\delta} - V_i(\omega', P)].$$

Therefore, we have that

$$\begin{aligned} \gamma &\geq \bar{\gamma} - \delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', RL) - V_i(\omega', P)] \\ &\geq \bar{\gamma} - \delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', R) - V_i(\omega', P)] - \frac{\delta \gamma}{1-\delta}. \end{aligned}$$

Thus,

$$\gamma \geq (1 - \delta)\bar{\gamma} - (1 - \delta)\delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', R) - V_i(\omega', P)].$$

Since the right-hand side of the condition above does not depend on γ , we can define $\gamma^*(d_i) \equiv (1 - \delta)\bar{\gamma} - (1 - \delta)\delta \sum_{\omega'} q_{d_i, \omega'} [V_i(\omega', R) - V_i(\omega', P)]$. That $\gamma^*(d_i) < \bar{\gamma}$ follows from Lemma 4, which establishes that the incentive constraint is strictly satisfied at $\gamma = \bar{\gamma}$. Any $\gamma > \gamma^*(d_i)$ is sufficient for this incentive constraint to be satisfied.

Hegemon state. Country i at state h_i keeps RL rather than switching to P if and only if:

$$u_i(h_i, RL) + \delta \sum_{\omega'} q_{h_i, \omega'} V_i(\omega', RL) \geq u_i(h_i, P) + \delta \sum_{\omega'} q_{h_i, \omega'} V_i(\omega', P).$$

Since $u_i(h_i, RL) = u_i(h_i, R) + \gamma > u_i(h_i, P)$ for any $\gamma > 0$, and $V_i(\omega', RL) \geq V_i(\omega', P)$ by Lemma 3(i)–(ii), both the static and dynamic terms favor RL . The constraint is satisfied for any $\gamma > 0$. Set $\gamma^*(h_i) = 0$.

Thus, set $\gamma^* = \gamma^*(d_i) < \bar{\gamma}$. For all $\gamma \geq \gamma^*$, both the dominant and hegemon incentive constraints are satisfied, so all leaders maintain RL upon inheriting it. By symmetry, this holds for all countries i . ■