# The Great Game: A Model of Geoeconomic Competition

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**Abstract**

We build a model of two hegemons that have valuable trading relationships with each other and at the same time compete in exerting geoeconomic power over countries in the rest of the world. When the hegemons trade with each other, their optimal policy is shaped both by classic economic considerations - the profitability of that specific trade - and by geoeconomic competition - how the trade affects the power of each hegemon vis-a-vis the rest of the world. We show that containment, a policy mix in which a hegemon limits sales of its inputs to the rival hegemon and uses its power to demand that the rest of the world scales down purchases from the rival, arises when the two hegemons offer relatively substitutable exports, are less interdependent with each other, and have more direct geopolitical rivalry. Countries in the rest of the world benefit, all else equal, from hegemons containing each other since they partially squander their power with offsetting demands. However, containment policy can also worsen the efficiency of global production, leaving the rest of the world worse off.

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JEL Codes: F10, F30, F40, F50, N40, P45.

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# 1 Introduction

The global economy is characterized by two large hegemonic countries, the US and China, that have valuable economic relationships with each other but also compete in exerting power over the rest of the world. This form of interdependent geoeconomic competition employs many of the traditional policy instruments – such as tariffs, industrial policy, and export controls – as well as economic threats, but has different underlying motivations for the use of these instruments than those in classic economic analysis. We provide a model to analyze optimal policy between two competing hegemons that attempt to accommodate or contain each other, and characterize the welfare implications for the hegemons as well as the rest of the world.

We show that when the two hegemons trade with each other, optimal policy is shaped both by economic motives – the profitability of that particular trade – and geoeconomic ones – how that trade affects the power of each hegemon vis-a-vis the rest of the world. For example, the US faces two separate motives when it considers selling advanced semiconductors to Chinese industries. First, selling the semiconductors to China directly generates profits for the US semiconductor industry and might also help that industry to scale up and become more productive. Second, the semiconductors acquired from the US are used by Chinese firms to produce other products, such as artificial intelligence, that are then sold worldwide in competition with US AI firms. Since countries like the US and China exert their geoeconomic power by threatening countries in the rest of the world with the withdrawal of access to their respective technologies, this competition has two components. First, even in the absence of geoeconomic threats, the downstream industries of each hegemon compete for economic profits worldwide. Second, from the perspective of a country in the rest of the world being threatened by a hegemon with a cutoff, the rival hegemon is the outside option. For example, a country might not fear losing access to US technology if Chinese technology were a viable substitute.

We show that hegemons choose to either accommodate or contain each other depending on the relative substitutability and profitability of the exports that they can offer to the rest of the world. A policy of containment, in which the US, for example, imposes export controls on semiconductor sales to China and uses some of its power to induce countries in the rest of the world to scale down purchases of Chinese downstream technology, is more likely to occur when the two hegemons' downstream technologies are closer substitutes and when China is not a profitable customer for the US upstream industry. The substitutability matters because it induces a motive for each hegemon to make the rival technology less attractive to decrease the targeted country's outside option. The interdependence upstream matters because a policy of containment hurts the country imposing it more, the more profitable the

rival hegemon was as a customer.

Our model features two hegemonic countries populated by a downstream and upstream sector as in Figure 1. The upstream sector sells inputs to the downstream sectors of both hegemonic countries. The downstream sector of each hegemon sells its output to the rest of the world. We assume that the downstream sector of each hegemon has an external economy of scale so that it becomes more productive the more it produces. The rest of the world consists of a continuum of homogeneous countries that produce using the inputs of both hegemons.

Each country has a representative consumer and a representative government that maximizes its country's welfare. The policy game takes place over two stages, the Beginning and the Middle, while all production and consumption take place at the End. In the Middle, the two hegemons exert their power over the rest of the world. They do so, following the framework of Clayton et al. (2026a,c), by threatening the other countries with loss of access to the inputs (the downstream sector output) that they control. They demand that countries in the rest of the world take a set of costly actions if they want to avoid being cut off from the inputs. These costly actions take two forms: wedges and transfers. Wedges are demands that the targeted country change its sourcing choices of inputs between the two rival hegemons. Technically, they are wedges in the target country's first order conditions in production, the revenue of which is remitted lump-sum to the targeted country's consumer. These wedges help us capture a mix of taxes/subsidies or quantity restrictions that are common in practice, such as US demands that other countries do not use Chinese telecommunication equipment. Transfers are paid by the targeted government to the hegemon and can represent either direct monetary transfers, in-kind transfers, or political concessions.

Countries that are being targeted in the Middle stage decide whether to accept or reject each hegemon's contract (the set of threats and demands). We employ a Nash-in-Nash bargaining approach, whereby each government accepts or rejects the contract of each hegemon taking as given that it accepts the rival hegemon's contract and the terms of that contract. Geoeconomic competition arises in this context because in each relationship the outside option for the targeted country is the relationship with the rival hegemon. The Nash-in-Nash structure allows for substantial tractability of the problem, but does not allow for the terms of a hegemon's contract to be set directly to influence the rival hegemon's contract terms. Instead, we capture the economics of influencing the terms of the rival hegemon's contract with the Beginning policy stage.

In the Beginning, both hegemons set in a Nash game an export wedge on sales of their upstream industry to the rival hegemon. In doing so, they take into account the equilibrium effect in the Middle and End periods not only on prices, industries' productivity and

profits, but also on geoeconomic power and the terms of the contract offered by the rival hegemon. Importantly, the export wedges set in the Beginning are not revenue neutral and each hegemon can use them to extract rents from the rival.

The two hegemons are interdependent and have a potentially profitable economic relationship with each other because they each produce in the downstream sector using inputs from both the domestic and the rival hegemon's upstream sectors. This economic relationship gives rise to a standard terms-of-trade motive: each hegemon uses an export wedge to exploit the finite elasticity of the rival hegemon's demand for its upstream inputs. This is a classic motive for trade policy and the foundation for optimal tariffs or export taxes to maximize profits by increasing the relative price of exports compared to imports.

In a hegemonic setup, however, the terms of trade manipulation is not the only force. The hegemon also pays attention to how the export wedge affects the inside and outside options of the countries in its economic network (i.e., the hegemon's power). If the two hegemons' downstream sectors are relatively substitutable as inputs in the production function of RoW countries, then each hegemon aims to contain its rival. The hegemon uses export wedges to make the downstream industry of its rival less attractive to the targeted countries, thus aiming to worsen their outside option. While this imposes direct losses on the profits of the hegemon's upstream industry that can no longer do as much (profitable) business with the rival hegemon, it raises overall welfare (profits plus transfers) for the hegemon by increasing its power over the targeted countries by more than the profits lost in its economic relationship with the rival hegemon.

For sufficiently high substitutability, the hegemons switch to containment toward each other. For example, the extent to which Chinese and US technology have become in recent years closer substitutes contributes to the rise of symmetric containment policies. The US restricts advanced chips exports to China, and China restricts exports of processed rare earths and magnets to the US. In both cases, the aim is to impact the rival's downstream technology. More generally, this captures an increase in hegemonic competition whenever an upcoming rival starts to approach the technological sophistication of the incumbent hegemon, thus being able to serve as a viable outside option for the rest of the world.

In setting their export wedges towards each other, the two rival hegemons are taking into consideration three effects: the classic terms-of-trade motive, the viability of the rival as a passive outside option, and the influence on the rival's geoeconomic policies. Geoeconomic competition is this latter effect. For example, to build its own power, the US attempts to induce China to do two things: (i) For China to scale down its containment policy towards the US, and (ii) For China to scale down its attempts to resist US containment policy. In practice, US policy aims to induce changes in Chinese policies that lower Chinese demands

that the rest of the world use more of Chinese goods and less of US goods. The presence of stronger external economies of scale amplifies these policy decisions because they offer greater leverage in manipulating the relative productivity of the rival hegemon.

For most of the paper, the objective function of each hegemonic government is to maximize its representative consumer's welfare. However, we also allow for the possibility that each hegemonic government also dislikes its rival having power. This helps us capture geopolitical rivalry between the two hegemons, albeit in reduced form. Heightened rivalry induces the hegemon to pursue policies of containment even when they decrease its own consumer's welfare. This helps us capture mercantilist policies that seek to shift the power balance but are overall zero- or even negative-sum.

We characterize how the welfare of the RoW countries is affected by geoeconomic competition. The presence of a rival hegemon can help the RoW countries by providing them with a better outside option, especially when the rival hegemons are using their power to contain each other. Each hegemon is using some of its power to contain the rival hegemon, but since their demands pull in opposite directions, from the perspective of the RoW country they partly offset each other. Similarly, each hegemon might use its policies to make its industries attractive to the RoW country in an attempt to build up its own power. Yet, since each hegemon is doing this, each hegemon is also providing the RoW country with an attractive outside option vis-a-vis the rival hegemon, and hence improving the bargaining position of the RoW country.

These forces capture historical episodes such as nonaligned countries during the Cold War benefiting from competition between the US and the USSR. For example, Nasser's Egypt benefited by bargaining simultaneously with each Cold War hegemon that demanded Egypt mostly form an economic and military relationship with them and not their rival. In present times, these forces are again at play in many developing countries that are rich in mineral resources. For example, the US and China are competing to secure a supply of minerals from countries in the African Copper Belt. These countries, for example Zambia, are potentially benefiting from being able to extract better terms and infrastructure financing from China and the US who are putting forward competing offers.

In our model, however, the partial equilibrium effects above can be swamped by general equilibrium considerations. As the two hegemons try to contain each other, they are affecting the world production frontier. For example, each hegemon restricting the rival's access to its upstream goods lowers the efficiency of the world production frontier. To the extent that the rest of the world countries suffer from this unwinding of the gains of globalization for production, their welfare is lower. Intuitively, while all else equal these countries benefit from the hegemons' offsetting demands, these demands are also associated with the hegemons

destroying some of the world production efficiency as they compete with each other. The US and China denying each other access to critical inputs can leave the rest of the world worse off. Returning to the example of countries in the African Copper Belt, their welfare would suffer if US-China competition were to impair the global production function sufficiently to reduce overall demand for the minerals.

In order to characterize each hegemon's sphere of influence, we generalize the model to allow for heterogeneity in the rest of the world countries. Some countries for geographical or cultural reasons have a more valuable economic relationship with one of the two hegemons. We show that power is amplified in equilibrium with the endogenous emergence of a dominant hegemon. Suppose that one of the two hegemons was ex-ante more likely to be powerful. For a given exogenous difference, that hegemon uses its extra power to build more power. Each country that agrees to shift its economic relationship toward that hegemon in turn provides that hegemon with more power over other countries, thus amplifying its sphere of influence. The dominant hegemon exploits this power externality in its favor, while its rival on the margin finds accommodation more profitable. This allows us to capture the notion, all else equal, that geoeconomic power tends to be concentrated endogenously in a few dominant countries.

**Related Literature.** There is a deep literature in political science and in history on great power competition, including in economic statecraft. Among many contributions, there are notable ones by Hirschman (1945), Baldwin (1985), Kindleberger (1973), Krasner (1976), Keohane and Nye (1977), Gilpin (1981), Kennedy (1987), Ikenberry (2001), Mearsheimer (2003), Blackwill and Harris (2016), Walt (2018), and Farrell and Newman (2019). Waltz (1979) emphasizes how economic interdependence interacts with anarchic and hierarchical international orders.

This paper is related to an emerging literature in economics studying how multiple hegemons compete in the economic and geopolitical sphere. Broner, Martin, Meyer and Trebesch (2024) consider a model of spheres of influence in which two hegemons use trade relationships to align a continuum of countries with their preferred geopolitical actions. Meyer and Wesseler (2025) build a model of carrots and sticks being used by multiple hegemons and confront it with data from the Cold War. Becko et al. (2025) consider multiple hegemons using tariffs as a way to induce geopolitical alignment. Madsen and Prat (2026) build a formal contracting model with multiple principals and a single agent and apply it to geoeconomic competition. We build on our work in Clayton et al. (2026a,c). The appendix of Clayton et al. (2026a) introduces a model with multiple hegemons but only considers cases of full separability or perfect overlap between the two hegemons.

More generally there is a fast growing literature on geoeconomics including work by Kleinman et al. (2024), Thoenig (2023), Antràs and Miquel (2023), Fernández-Villaverde et al. (2024), Becko and O'Connor (2024), Liu and Yang (2024), Kooi (2024), Mattoo et al. (2024), Alekseev and Lin (2024), Pflueger and Yared (2024), Egorov et al. (2025), Fernández-Villaverde et al. (2025), Mayer et al. (2025), and Fernández-Villaverde et al. (2026).[1] We also relate to the literature on how interdependence and war are related (Fearon (1995); Powell (2006); Martin et al. (2008, 2012)).

The Nash-in-Nash protocol that we use is related to the theory of Horn and Wolinsky (1988), and has been used to study trade agreements by Bagwell et al. (2020, 2021). The linear-quadratic modeling in trade settings was prominently used by Melitz and Ottaviano (2008) and Mayer et al. (2014), and by Bagwell and Staiger (2005) and Amador and Bagwell (2013) to study optimal tariffs. The vertical structure that we study is related to the literature in industrial organization on vertical integration and foreclosures (Hart and Tirole (1990); Rey and Tirole (2007)). Many of the policy tools that we study also relate to their classic analysis in the macroeconomics and trade literature that analyzed industrial, trade, and capital control policies: Ottonello, Perez and Witheridge (2023), Bartelme et al. (2019), Eaton and Engers (1992), Bagwell and Staiger (1999), Bagwell and Staiger (2001), Bagwell and Staiger (2004), Grossman and Helpman (1995), Ossa (2014), Farhi and Werning (2016), Costinot et al. (2014), Costinot and Werning (2019), Sturm (2022), Elliott and Jackson (2025).

# 2 Model Setup

The global economy has two hegemonic countries, which are large and indexed by $h \in \mathcal{H} = \{US, CH\}$. We assume that the two hegemons are symmetric.[2] There is also a unit continuum of small open economies that are going to be the targets of hegemonic coercion, which we denote $n$. We refer to these small open economies as Rest of World (RoW) countries. Figure 1 provides a visualization of the global economy in this model.

Hegemon $h$ has an upstream sector $e_h$ with an endowment $\overline{e} > 0$ of that sector's good, and a downstream sector $d_h$ that produces its own differentiated good. We denote the prices of these sectors' output $p_{e_h}$ and $p_h$, respectively. Each RoW country $n$ has a final good producing sector that produces a numeraire final good, denoted $f$. The numeraire final good is identical across countries. Each sector consists of a unit continuum of identical firms, and hence we refer to a representative firm. Each country has a representative consumer

[1] See Mohr and Trebesch (2024) and Clayton et al. (2025b) for overviews of the literature.

[2] We study asymmetric hegemons in Section 5.

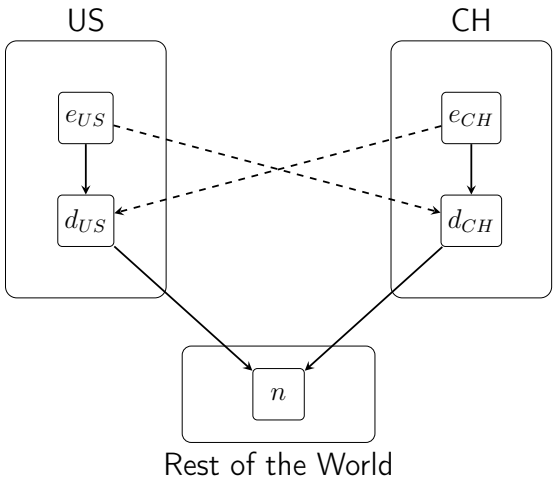



Figure 1: This figure displays the global economic structure of the model.

and a government.

**Rest of World Country $n$.** Country $n$'s final goods producing sector produces the numeraire final good out of the downstream goods $d_h$ of each of the two hegemons. To enable derivation of closed-form solutions, we assume production functions that give rise to simple linear-quadratic profit functions (Melitz and Ottaviano (2008)). In particular, its output is $f_n(x) = A_n \sum_{h\in\mathcal{H}} x_h$, where $x = \{x_h\}_{h\in\mathcal{H}}$ is the vector of usage $x_h$, which is the use of sector $d_h$'s good by sector $n$. In order to produce, the final goods producer needs to also utilize the numeraire final good in the amount $x_{nf} = \sum_{h\in\mathcal{H}}[\zeta_n x_h + \frac{1}{2}\kappa_n x_h^2] + K_n \prod_{h\in\mathcal{H}} x_h$. The term $\zeta_n$ captures the efficiency of using downstream goods in production, for example capturing transport costs. The final term on the right hand side captures nonseparability: the hegemons' downstream goods are separable if $K_n = 0$, substitutes if $K_n > 0$, and complements if $K_n < 0$. Throughout the paper, we assume goods are weak substitutes, $K_n \geq 0$. The profits of a firm in sector $n$ are[3]

$$\Pi_n = \sum_{h\in\mathcal{H}} \left[(A_n - \zeta_n - p_h)x_h - \frac{1}{2}\kappa_n x_h^2\right] - K_n \prod_{h\in\mathcal{H}} x_h. \tag{1}$$

Country $n$'s representative consumer owns the final goods producers in her country and consumes the numeraire consumption good only. The consumer's budget constraint is $C_{nf} \leq \Pi_n$, and her utility for simplicity is $U_n(C_{nf}) = C_{nf}$.

[3]We assume that $\kappa_n > K_n$ so that each firm's optimization problem is convex.

**Hegemon $h$.** The downstream sector $d_h$ uses the upstream goods, $e_h$ and $e_{-h}$, of both hegemons in its production process. Throughout the paper, we use the notation $-h$ to refer generically to the rival hegemon. Parallel to the production structure in the RoW countries, output is given by $f_d(l_h, i_h) = A_d(l_h + i_h)$, where $l_h$ is the use of the domestic upstream good $e_h$ and $i_h$ is the use of the imported upstream good $e_{-h}$. In order to produce, the downstream firm needs to utilize the numeraire final good in the amount $x_{hf} = \zeta^{own} l_h + \zeta^{rival} i_h + \frac{1}{2}\kappa_d(l_h^2 + i_h^2) + K_d l_h i_h - \xi y_h^* y_h$. Each downstream firm's production process features an external economy of scale at the sectoral level: the unit cost of production is declining in aggregate sectoral production $y_h^*$. The parameter $\xi \geq 0$ captures the strength of the economy of scale, with a value of zero corresponding to no economies of scale. We assume $K_d \geq 0$ so that upstream goods are substitutes in downstream production. We simplify the exposition by setting $A_d = 1$, so that $l_h$ and $i_h$ are interpreted as output produced by $d_h$ using $e_h$ and $e_{-h}$, respectively. Since each individual firm is a price taker in the continuum of firms in its sector, the profit function of a firm in sector $d_h$ is[4]

$$\begin{aligned}\Pi_{d_h}(l_h, i_h) = (p_h + \xi y_h^* - \zeta^{own} - p_{d_h e_h}) l_h \\ + (p_h + \xi y_h^* - \zeta^{rival} - p_{d_h e_{-h}}) i_h - \frac{1}{2}\kappa_d(l_h^2 + i_h^2) - K_d l_h i_h,\end{aligned} \tag{2}$$

where $p_{d_h e_k}$ denotes the price that firms in sector $d_h$ pay for good $e_k$. We define "interdependence" $\zeta = \zeta^{own} - \zeta^{rival}$, which measures the attractiveness of foreign sourcing relative to domestic sourcing: higher $\zeta$ represents greater interdependence. We assume $\zeta \leq 0$, so that importing is weakly more costly.

Hegemon $h$'s representative consumer owns the domestic upstream good endowment and the domestic downstream sector, with profits $\Pi_{d_h}$. The consumer has linear preferences, $U_h(C_{he_h}, C_{hf}) = \tilde{p}_e C_{he_h} + C_{hf}$ over its own upstream good and the numeraire final good. Therefore, the parameter $\tilde{p}_e$ pins down the domestic opportunity cost of utilizing the upstream good $e_h$ in downstream production rather than consumption, that is $p_{e_h} = \tilde{p}_e$.[5] The consumer's budget constraint is $p_{e_h} C_{he_h} + C_{hf} \leq p_{e_h}\overline{e} + \Pi_{d_h}$. The government of $h$'s objective function loads both on its representative consumer's utility and (potentially) on a vector of aggregate quantities $z$: $U_h(C_{he_h}, C_{hf}) + v_h(z)$. The utility term $v_h(z)$ allows us to capture direct geopolitical objectives like the desire to shrink an opposing hegemon's sector, or caring directly about the power of the rival hegemons. We set $v_h(z) = 0$ for most of the paper, and activate this force in Section 4.1.

Profit maximization by the hegemon's downstream sector combined with the equilibrium

[4] We assume that $\kappa_d > K_d$ so that each firm's optimization problem is convex.

[5] We assume that the endowment $\overline{e}$ is sufficiently large that the consumer is marginal at a positive level of consumption.

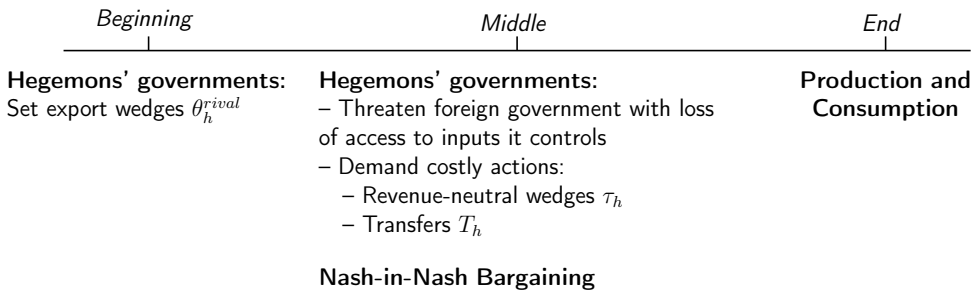



Figure 2: Model Timeline

relationship $y_h^* = y_h$ gives rise to a sectoral supply curve[6]

$$p_h = \tilde{p} - \sigma y_h^* + \frac{1}{2}\sum_{k \in \mathcal{H}} [p_{d_h e_k} - \tilde{p}_e] \tag{3}$$

where $\tilde{p} = \frac{1}{2}(\zeta^{own} + \zeta^{rival}) + \tilde{p}_e$ measures the baseline cost of production. $\sigma = \xi - \frac{\kappa_d + K_d}{2}$ is the magnitude of the equilibrium response of the price to increases in output, and is increasing in the external economy of scale $\xi$ and decreasing in the production curvature $\kappa_d + K_d$. We assume that $\sigma > 0$, so that the external economy of scale dominates and the price decreases in sectoral output. We define $\pi_n = A_n - \zeta_n - \tilde{p}$, which captures the unit profits of country $n$ from utilization of good $h$ when downstream producer $d_h$'s good price is equal to the opportunity cost of upstream inputs and the price impact of output is zero.

**Market Clearing.** The market clearing conditions for the upstream and downstream goods of the hegemons are $l_h + i_{-h} + C_{he_h} = \overline{e}$, and $x_h = y_h$ for each $h \in \mathcal{H}$. Market clearing for the numeraire final good follows from Walras' law.

## 2.1 Geoeconomic Policy Game

The geoeconomic policy game unfolds with a timing structure summarized in Figure 2. In the End, production and consumption occur as in the previous subsection. In the Middle, each hegemon $h$ offers a contract to the government of each country $n$ in a Nash-in-Nash game, and countries choose which contract(s) to accept. In the Beginning, each hegemon $h$ can set bilateral wedges in a Nash game on sales of their upstream and downstream goods, and on imports of the rival's upstream good.

[6] See the proof of Proposition 1 for the full derivation.

### 2.1.1 Hegemonic Contracting in the Middle

In the Middle, each hegemon $h$ offers a contract to the government of each country $n$. We focus on contracts of $h$ that are symmetric across RoW countries. Following Clayton et al. (2026a), hegemon $h$'s contract offered to the government of country $n$ specifies demands for two types of costly actions: (i) a required transfer $T_h$ from country $n$'s government to country $h$'s government; (ii) changes in downstream good purchases from each hegemon by country $n$. We represent (ii) as revenue-neutral wedges $\tau_h = \{\tau_h^{own}, \tau_h^{rival}\}$ on the purchases of downstream goods, with equilibrium revenues $r_h = \tau_h^{own} x_h^* + \tau_h^{rival} x_{-h}^*$ remitted lump sum to countries $n$ that accept hegemon $h$'s contract.[7] The transfers capture revenue extraction by the hegemon and in practice might be monetary, in kind, or a political concession.[8] The revenue neutral wedges aim to influence the sourcing decisions of the targeted countries and can include (dis)incentives to purchase inputs from one hegemon or the other.[9] For example, the U.S. might ask a country to increase the purchases of its own goods and decrease the purchases from China. To enforce its demands, hegemon $h$ threatens to stop exports of sector $d_h$ to country $n$ in the event that $n$ rejects $h$'s contract.[10]

We assume that the two hegemons offer contracts in a Nash-in-Nash game in the Middle period. That is, hegemon $h$ offers its contracts taking as given both the terms of hegemon $-h$'s offered contracts and that each country $n$ will accept hegemon $-h$'s offer. The Nash-in-Nash contracting structure (à la Horn and Wolinsky (1988)) is a common simplifying bargaining protocol also used in international economics by Bagwell, Staiger and Yurukoglu (2020, 2021) to study tariff negotiations. It allows each hegemon to internalize the effect of its offer on the equilibrium, but not on the offer of the rival hegemon. This simplifies the analysis by smoothing out the best response of $h$, which otherwise might involve offers that induced the target to reject $-h$'s contract. However, it does not allow country $n$ to reject both contracts.[11] This set-up does not allow for the possibility that one hegemon offers a contract with terms that are contingent on the targeted government accepting/rejecting the rival hegemon's contract, or with specific terms that are contingent on the terms offered by

[7] The subscript identifies the hegemon imposing the wedge. The superscripts *own* and *rival* identify purchases of that hegemon's downstream good and the rival hegemon's downstream good.

[8] In principle we also allow the transfers to be negative, i.e. a payment to RoW countries.

[9] The revenue-neutral wedges can capture Pigouvian taxes and quantity restrictions (e.g., Clayton and Schaab (2022)) and are common in the macroprudential policy literature (Farhi and Werning (2016)). Such instruments capture many government policies such as industrial policy and trade policy. Given the rebates, the wedges most closely resemble quantity restrictions.

[10] Because the target of threats (a government of a small open economy) is infinitesimal in global markets, exclusion of that country from purchasing hegemon $h$'s inputs does not change the equilibrium. Hegemon $h$ is willing to punish the individual infinitesimal government because it loses no value by doing so.

[11] This means that country $n$ can in principle be worse off than under autarky.

the rival hegemon. On the other hand, we employ the timing structure to instead allow each hegemon in the Beginning period to set policies that, while invariant to whether targeted countries accept or reject contracts in the Middle period, take into account the effects on the terms of the contract offered by the rival hegemon in the Middle period. This set-up balances analytical tractability with capturing the strategic interactions between the hegemons that are important for the economics of the model.

**Participation Constraints of Country $n$.** Country $n$ receives contracts that are offered by both hegemons. Given the Nash-in-Nash structure, $n$ separately decides whether or not to accept the offer of each hegemon $h$, taking as given that it accepts the offer from hegemon $-h$. This results in two participation constraints, one for each hegemon.

If $n$ accepts both offers, it achieves value $V_n(\tau) - \sum_{h\in\mathcal{H}} T_h$, where

$$V_n(\tau) = \max_x \ \Pi_n(x) - \sum_{h\in\mathcal{H}} (\tau_h^{own} + \tau_{-h}^{rival}) x_h + \sum_{h\in\mathcal{H}} r_h, \tag{4}$$

where $\tau = \{\tau_h\}_{h\in\mathcal{H}}$ is the vector of both hegemons' wedges. If instead country $n$ rejects $h$'s contract (while accepting $-h$'s contract), then it achieves value $V_n^o(\tau_{-h}) - T_{-h}$, where

$$V_n^o(\tau_{-h}) = \max_{x_{-h}^o} \ \Pi_n((0, x_{-h}^o)) - \tau_{-h}^{own} x_{-h}^o + r_{-h}. \tag{5}$$

We use the superscript $o$ to denote outside option values when country $n$ has rejected the contract offered by hegemon $h$. For example, $x_{-h}^o$ denotes the usage by country $n$ of the downstream good of hegemon $-h$ when $n$ has rejected hegemon $h$'s contract; hence we write the vector of inputs as $(0, x_{-h}^o)$ because $n$ has been cut off by hegemon $h$.

The participation constraint of country $n$ in its contracting relationship with hegemon $h$ is given by $V_n(\tau) - \sum_{h\in\mathcal{H}} T_h \geq V_n^o(\tau_{-h}) - T_{-h}$, which simplifies to

$$V_n(\tau) - T_h \geq V_n^o(\tau_{-h}). \tag{6}$$

The participation constraint with hegemon $-h$ follows the same symmetric derivation.

*Hegemon $h$'s Maximization Problem in the Middle.* Hegemon $h$ takes as given the contracts offered by hegemon $-h$ and that they are accepted, and chooses its contracts to maximize its final payoff, $U_h(C_{he_h}, C_{hf}) + v_h(z) + T_h$, subject to the participation constraint (equation 6) and to the determination of the equilibrium in the End.[12]

[12]So that the hegemon's contracting problem is convex, we assume that $\kappa_n - \sigma - \xi > 0$ and that $(\kappa_n - \xi - \sigma)(\kappa_n - \sigma)^2 - K_n^2 \kappa_n > 0$. We assume the model parameters are such that the stability condition $(\kappa_n - \sigma)(\kappa_n - \sigma - \xi) > K_n \kappa_n$ holds. Since each hegemon takes the rival hegemon's revenue

### 2.1.2 Hegemon $h$'s Problem in the Beginning

In the Beginning, hegemon $h$ can impose on its own firms: (i) a bilateral wedge $\theta_h^{rival}$ on sales of its upstream good to the rival hegemon's downstream sector; (ii) a bilateral wedge $\theta_{hd}^n$ on sales of its downstream good to country $n$; (iii) a bilateral wedge $\tau_{hd}^{rival}$ on $d_h$'s purchases of the rival's upstream good.[13] The wedge revenues are remitted lump sum to hegemon $h$'s representative consumer. Given the production functions, at the firm level there is full passthrough of the wedges into the export prices. Therefore, the aim of these wedges from the perspective of the hegemon is both to raise revenue from the rival hegemon and to affect the production of the downstream sector of the rival hegemon that faces higher input costs as a consequence. The hegemon chooses its wedges to maximize its final payoff, internalizing the effect of its wedges on the contracting problem in the Middle.[14]

## 2.2 Equilibrium Characterization

We construct an equilibrium in which at each point in time, each agent's optimization problem yields an interior solution, taking as given the interior optimization solutions of other agents.[15] All other allocations are determined given these wedges.

**Proposition 1** *In equilibrium, an optimal set of wedges of hegemon $h$ in the Beginning and Middle is given by*

$$\tau_h^{own} = -\beta_\pi \pi_n - \beta_\zeta \zeta; \qquad \tau_h^{rival} = \gamma_\pi \pi_n - \gamma_\zeta \zeta; \tag{7}$$

$$\theta_h^{rival} = \eta_\pi \pi_n + \eta_\zeta \zeta, \tag{8}$$

*and $\theta_{hd}^n = \tau_{hd}^{rival} = 0$, where the scalar loadings are defined in the proof.*

The simple linear quadratic structure of the global economy allows for a concise characterization of the equilibrium in terms of key optimal-policy wedges. The rest of the paper derives theoretical results about these optimal policies and the resulting allocations and focuses on explaining the underlying economic mechanisms.

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remissions as given in the best response problem, an off-equilibrium deviation by one hegemon to offering an alternative contract can generate nonzero net revenues for the rival hegemon. We assume that such revenues are remitted lump sum to that hegemon's representative consumer.

[13] It is without loss of generality to abstract from bilateral wedges on sales of $e_h$ to $d_h$.

[14] In the proof of Proposition 1, we provide parameter restrictions such that the hegemon's optimization problem is convex and the stability condition holds.

[15] In practice, this means that we restrict to parameters such that the allocations at the inside and outside options are positive, $l_h, i_h, x_h, x_{-h}^o > 0$ for $h \in \mathcal{H}$. In particular, we focus on parametrization such that the interior equilibrium constructed by Proposition 1 exists over a positive range $0 \leq K_n \leq k$ for $k > 0$.

# 3 Power: Containment or Accommodation

We show how the two hegemons optimally use the combination of Beginning and Middle wedges to trade off economic rents earned from sales to their competitor against competition in the geoeconomic sphere. Power competition gives rise to two possible policy regimes: a regime of containment, in which each hegemon uses its policy instruments to build its own power by lowering its rival's attractiveness; and a regime of accommodation, in which the hegemons focus on earning economic rents and promote each other's attractiveness to the rest of the world.

**Power.** We define the power of hegemon $h$ over country $n$ to be the maximum slack in the participation constraint of that country vis-a-vis that hegemon, taking as given all other aggregate quantities and prices, as well as the rival hegemon's policies,[16]

$$\text{Power}_h = V_n(0, \tau_{-h}) - V_n^o(\tau_{-h}) = \frac{1}{2\kappa_n} \frac{\Big(\kappa_n(A_n - \zeta_n - p_{nh}) - K_n(A_n - \zeta_n - p_{n,-h})\Big)^2}{\kappa_n^2 - K_n^2}, \quad (9)$$

where $p_{nh} = p_h + \tau_{-h}^{rival}$ and $p_{n,-h} = p_{-h} + \tau_{-h}^{own}$ are the prices faced for the two downstream goods by the producers in the RoW country, accounting for the rival hegemon's wedges. This is Micro-Power, as introduced by Clayton et al. (2026a), and captures the maximal private value of costly actions that the hegemon $h$ can demand of country $n$ before its contract is rejected. In making this assessment, country $n$ takes as given all equilibrium aggregates, including its outside option with the rival hegemon. In political science and in international relations, this resonates with the notion of relational power: "A has power over B to the extent that he can get B to do something that B would not otherwise do" (Dahl (1957)).

Power grows disproportionately in the gap between the value for the producers in country $n$ of using hegemon $h$'s downstream good $d_h$ compared to the value of using the rival hegemon's downstream good $d_{-h}$. Those values are captured by the terms $A_n - \zeta_n - p_{nh}$ and $A_n - \zeta_n - p_{n,-h}$, which are the unit profitabilities of using each type of input. Power decreases the more the two inputs are substitutes, that is an increase in $K_n$. Considering a symmetric configuration with $p_{nh} = p_{n,-h}$, then power comparative statics in $K_n$ are driven by the ratio $\frac{(\kappa_n - K_n)^2}{\kappa_n^2 - K_n^2} = \frac{\kappa_n - K_n}{\kappa_n + K_n}$, which decreases in $K_n$ and converges to zero power when the two inputs are perfect substitutes (the limit of $K_n \uparrow \kappa_n$). This nonlinearity of power, as in Clayton et al. (2026c), plays an important role in geoeconomic competition because a rival hegemon might be a small source of economic rents (i.e. not a profitable direct customer),

[16] The proof of Proposition 1 derives equation 9.

but still undermine much of the geoeconomic power in its role as the targets' outside option.

Having characterized power, we now characterize optimal policy of the hegemon.

**Optimal Policy in the Middle.** The optimal wedge that hegemon $h$ demands on country $n$'s purchases of the rival hegemon's downstream good $d_{-h}$ is given by[17]

$$\tau_h^{rival} = \underbrace{-\frac{1}{2}\theta_h^{rival}}_{\text{Economic Profits}} + \underbrace{\sigma(x^o_{-h} - x_{-h})}_{\text{Building Power}}. \tag{10}$$

This traces hegemon $h$'s best response, taking as given not only the wedges set in the Beginning, but also the wedges demanded by the rival hegemon in the Middle. The first term, $-\frac{1}{2}\theta_h^{rival}$, takes into account that if hegemon $h$ subsidizes purchases of the rival hegemon's downstream good in the Middle, that indirectly boosts the demand for $h$'s upstream good. If in the Beginning hegemon $h$ had imposed an export markup, $\theta_h^{rival} > 0$, on sales of its upstream good to the rival hegemon's downstream sector, then the extra demand for its upstream good generates economic profits for $h$'s upstream sector. This force helps us to capture a traditional rationale for boosting the demand for other countries' goods insofar as those sectors are dependent on upstream goods that the hegemon's economy supplies.

The crucial force in our model is captured by the second term, $x^o_{-h} - x_{-h}$, that traces how the hegemon manipulates the inside and outside options of the RoW countries in order to build power. The term $x_{-h}$ is country $n$'s use of hegemon $-h$'s downstream good at the inside option, while the term $x^o_{-h}$ is country $n$'s use of that same good at the outside option in which it has rejected hegemon $h$'s contract and been cut off from purchasing good $d_h$. Therefore, $x^o_{-h} - x_{-h}$ is the gap in use of good $d_{-h}$ by country $n$ at the outside versus inside options in its contracting relationship with hegemon $h$.

Hegemon $h$, in offering its contract to each RoW country, takes into account the effect of the demanded costly actions on the power it has on all other countries. Following Clayton et al. (2026a), the hegemon is building Macro-Power by manipulating the equilibrium in its favor. Under the hegemon's optimal contract, a marginal increase in its demand that the RoW country use less of the rival hegemon's inputs changes power over all other RoW countries by

$$-\frac{\partial[V_n(\tau) - V_n^o(\tau_{-h})]}{\partial p_{-h}}\frac{\partial p_{-h}}{\partial x_{-h}} = -(x^o_{-h} - x_{-h})\frac{dp_{-h}}{dx_{-h}} = (x^o_{-h} - x_{-h})\sigma. \tag{11}$$

This highlights the nonlinear nature of power. As hegemon $h$ demands that each RoW country shrinks its usage of the rival hegemon's inputs, not only does it build power over

[17] For the derivation of this optimal policy see the proof of Proposition 1.

the RoW countries because their outside options worsen faster than their inside option, but it increases the marginal value of further shrinking the usage of the rival hegemon's inputs.

Each RoW country accepts the hegemon's demands taking as given the values of all aggregates and prices (Micro-Power), but as all RoW countries lower their usage of the rival hegemon's downstream sector, that sector becomes less productive (aggregate economies of scale kick in reverse). A less productive rival hegemon lowers the outside option of all RoW countries. This aggregate effect, operating through equilibrium prices and externalities (note $\frac{\partial p_{-h}}{\partial x_{-h}} = -\sigma$) is the origin of the hegemon's Macro Power. Our geoeconomic framework features a Power Externality since countries accept the hegemons' contracts without internalizing that the actions they acquiesce to affect how much power the hegemons have over other countries.[18] In political science and international relations, it resonates with notions of structural power in which a hegemon shifts an entire equilibrium environment in its favor (Strange (1988)).

Equation 11 characterizes the building power motives in the optimal wedge described by equation 10.[19] The last term in equation 10 traces the effect that changes in the equilibrium have on hegemon $h$'s power over RoW countries. If equilibrium price amplification is shut down ($\sigma = 0$), then the optimal wedge reduces to $\tau_h^{rival} = -\frac{1}{2}\theta_h^{rival}$. In this special case, the hegemon purely aims to extract mark-ups from the rival hegemon while not distorting the production of RoW countries.[20]

**Optimal Policy in the Beginning.** We next build intuition on the incentives of each hegemon in setting the export wedge in the Beginning on sales to its rival, focusing in particular on how anticipation of geoeconomic competition between the two hegemons affects

[18] The power externality is related to public versus private offers by a principal facing multiple agents with externalities (Segal (1999)).

[19] In the proof of Proposition 1, we show that the optimal wedge on country $n$'s purchases of the hegemon's own good is $\tau_h^{own} = -\xi y_h$, which is a standard policy motive to subsidize a sector with an external economy of scale.

[20] The broader economic insights of the paper, however, do not strictly require the presence of external economies of scale ($\xi > 0$). Many of the effects would arise in a configuration of the model with no external economies of scale, and in which equilibrium amplification happens via prices and market clearing. In our setup, this corresponds to cases in which $\sigma < 0$.

the desired export wedge. The optimal ex-ante wedge of hegemon $h$ can be decomposed as[21]

$$\theta_h^{rival} = \overbrace{\frac{1}{\epsilon_{-h}}}^{\text{Terms of Trade}} + \underbrace{\frac{1}{-\frac{\partial i_{-h}}{\partial \theta_h^{rival}}} \left( \overbrace{\frac{\partial p_{-h}}{\partial \theta_h^{rival}}(x^o_{-h} - x_{-h})}^{\text{Direct}} + \overbrace{\frac{\partial \tau_{-h}^{own}}{\partial \theta_h^{rival}}(x^o_{-h} - x_{-h}) + \frac{\partial \tau_{-h}^{rival}}{\partial \theta_h^{rival}}(0 - x_h)}^{\text{Geoeconomic Competition}} \right)}_{\text{Building Power}}. \tag{12}$$

The first term on the right hand side is the direct effect of the export wedge and the incentives mirror those of equation 10 for the wedges in the Middle. An increase in hegemon $h$'s export wedge impacts the profits it extracts from the downstream sector of the rival hegemon in two ways: positively on the infra-marginal units $i_{-h}$ and negatively on the marginal unit ($\frac{\partial i_{-h}}{\partial \theta_h^{rival}}$). This gives rise to the standard terms of trade term of the optimal tax formula, set to the inverse semi-elasticity of foreign import demand, $\epsilon_{-h} = -\frac{1}{i_{-h}} \frac{\partial i_{-h}}{\partial \theta_h^{rival}}$. The terms of trade manipulation via an export tax is reminiscent, via Lerner (1936) symmetry, of the motive for an optimal tariff, a tax on imports (Johnson (1953)).[22] In both cases the aim of the optimal tax is to increase the relative price of exports compared to imports.

The term labeled "Building Power" is the motive arising from offensive geoeconomic policy, to build power over RoW countries. The term labeled "Direct" parallels the power building motive in the Middle, while making use of a different policy instrument: a higher export wedge in the Beginning directly raises the price of the rival's good, and all else equal builds power when $h$ is containing its rival ($x^o_{-h} - x_{-h} > 0$). This term would be present irrespective of whether the country $-h$ is a competing hegemon or a passive outside option. Indeed, Clayton et al. (2026c,a) characterize this term to show how optimal trade policy changes beyond the classic terms-of-trade manipulation result in the presence of geoeconomic considerations.

The term labeled "Geoeconomic Competition" captures forces specifically arising from geoeconomic competition. Hegemon $h$ takes into account that a higher export wedge in the Beginning will impact the wedges set by the rival hegemon in the Middle, which affects the hegemon's ability to build power. Hegemon $h$ aims to always reduce the rival hegemon's containment policy (the last term in equation 12), and how much the rival fights the containment policy of hegemon $h$ (the second to last term). Both power building motives are scaled by the inverse demand response of $d_{-h}$, $\frac{\partial i_{-h}}{\partial \theta_h^{rival}} = -\frac{1}{2} \frac{1}{\kappa_d - K_d}$. When the rival's downstream sector is able to divert expenditures due to high substitutability ($K_d \uparrow \kappa_d$), the building power motive is more muted.

[21] See the proof of Proposition 1.

[22] See Ossa and Redding (2026) for a modern review.

**Containment and Accommodation Policy.** We define containment policy to be attempts by hegemon $h$ to build power by making the rival hegemon less attractive. Formally, these are captured by the term $(x^o_{-h} - x_{-h})$ and we define shorthand notation for total containment marginal incentives $t_h \equiv x^o_{-h} - x_{-h}$. Rearranging equation 10, we have

$$t_h = \frac{1}{\sigma}\left(\tau_h^{rival} + \frac{1}{2}\theta_h^{rival}\right). \tag{13}$$

Total containment measures how much hegemon $h$ depresses use of the rival hegemon's downstream good by country $n$, relative to the outside option. It optimally does so in two ways: in the Beginning by imposing an export mark-up to the rival hegemon's downstream sector $\theta_h^{rival} > 0$, and in the Middle by using its power over RoW countries to demand that they shrink their usage of the rival hegemon's input. A positive value of $t_h$ means that hegemon $h$ has depressed use of the rival's good relative to the outside option, and we refer to this as *containment*. A negative value of $t_h$ means that hegemon $h$ has promoted use of the rival's good relative to the outside option, and we refer to this as *accommodation*. For the rest of the paper we characterize the equilibrium values of the containment policy $t_h$.[23]

# 4 World Configurations and RoW Welfare

In this section we focus on how key forces (parameters) affect the equilibrium containment policy and the welfare of the rest of the world. We focus on four forces: (i) the substitutability between hegemons $K_n$; (ii) the interdependence between the hegemons $\zeta$; (iii) the strength of the economies of scale $\xi$; (iv) the strength of direct geopolitical rivalry. For each force we provide both a graphical illustration and a proposition characterizing the generic effects.

**The Role of Substitutability.** We start by exploring the role of substitutability of the two hegemons' downstream goods in production in the RoW countries. The parameter $K_n$ in the RoW final good producer's profit function (equation 1) controls how substitutable the inputs provided by the two hegemons are and, therefore, influences how good of an outside option each hegemon is for its rival from the perspective of RoW countries. The following proposition characterizes how substitutability affects total containment, all else held fixed.[24]

[23] The signs of the two subwedges $\tau_h^{rival}$ and $\theta_h^{rival}$ are not necessarily the same as $t_h$ since as we discussed they target related but distinct policy motives. For example, even in containment $\tau_h^{rival}$ might overall be negative due to the economic profit force as in equation 10.

[24] As discussed in the proofs, for both Proposition 2 and 4 some of the described regions can be empty.

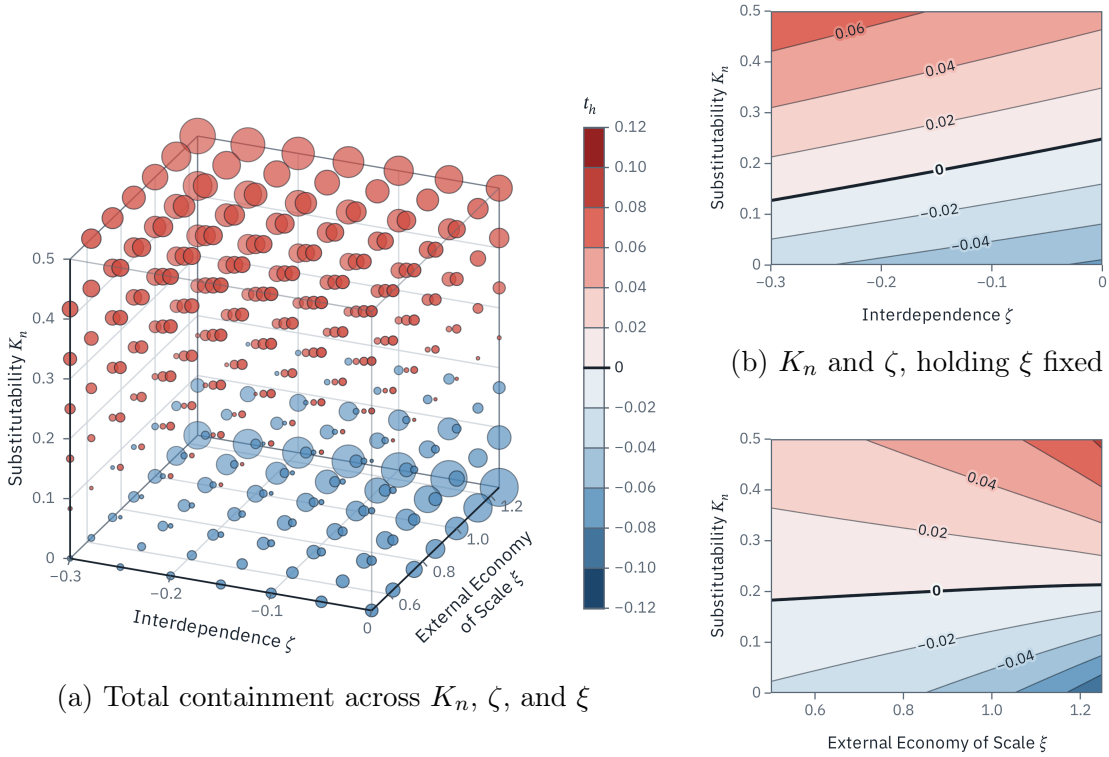
**Proposition 2** *There is a threshold* $\overline{K}_n \geq 0$ *such that the hegemons accommodate each other* ($t_h < 0$) *if* $K_n < \overline{K}_n$ *and contain each other* ($t_h > 0$) *if* $K_n > \overline{K}_n$.

Proposition 2 shows that at low levels of $K_n$ the two hegemons accommodate each other by setting $t_h < 0$. Figure 3 illustrates these properties graphically. The 3D plot in the left panel has substitutability on the vertical axis and indeed shows that, holding constant other parameters, the hegemons switch to containment at sufficiently high $K_n$. The two contour plots on the right hand side further illustrate the point while keeping constant one of the other two parameters. To build intuition, consider the case of $K_n = 0$, so that the two hegemons' inputs enter separably in the production of RoW countries. In this case, geoeconomic competition forces are muted because, holding the effective price of one hegemon's good fixed, the contribution of the rival hegemon's good cancels between the inside and outside option values in the definition of power (equation 9). Each hegemon focuses on extracting export rents. They do so by accommodating each other: boosting the demand for the rival hegemon's good by the RoW countries ($\tau_h^{rival} < 0$) while extracting a markup by charging the rival an export wedge ($\theta_h^{rival} > 0$).[25]

As $K_n$ increases the two hegemons start to face more competition from each other in terms of being better outside options vis-a-vis one another. When the two hegemons' goods are sufficiently substitutable with each other, this latter force dominates and the hegemons optimally switch to containing each other. The contour plots in Panels (b) and (c) of Figure 3 illustrate the corresponding threshold values of $K_n$ as those that are associated with $t_h = 0$ (the black solid line). Containment is implemented in two different ways. First, it pushes the hegemon to set export wedges that are higher than those that would have simply maximized the direct rents extracted from the rival hegemon's downstream sector. Higher export wedges are driven by the desire to shrink the rival hegemon's downstream sector, thus making it less productive and therefore less attractive as an outside option for the RoW countries. As an example, this captures US export controls on advanced chips that are far stricter than those that would have simply maximized the US chip-makers' monopoly rents and are instead aiming to shrink China's AI industry and lower its productivity so that China cannot offer the rest of the world high quality AI models as an alternative to US ones. Second, containment, for sufficiently high $K_n$, also takes the form of hegemon $h$ using its power over the RoW countries to demand that they use less of the rival hegemon's goods. The hegemon here aims to further lower the productivity of the rival hegemon by shrinking the demand for its products. As an example, this captures US demands that countries in

[25]Indeed, Proposition 1 shows that at $K_n = 0$ accommodation takes the form of a subsidy on purchases of the rival hegemon's good in the Middle in order to maximize rent extraction via a positive export wedge set in the Beginning.

Figure 3: Total Containment: Substitutability, Interdependence, and External Economies of Scale




(a) Total containment across $K_n$, $\zeta$, and $\xi$

(b) $K_n$ and $\zeta$, holding $\xi$ fixed

(c) $K_n$ and $\xi$, holding $\zeta$ fixed

*Notes:* This figure plots total containment $t_h$ in the symmetric equilibrium as the substitutability of the hegemons' goods $K_n$, interdependence $\zeta$, and the external economy of scale $\xi$ vary. Positive values (red) are containment and negative values (blue) are accommodation. In panel (a), each circle is one combination of the three parameters: its size is the magnitude of $t_h$ and its color is the sign. Panels (b) and (c) plot contours of $t_h$ on two slices of panel (a), holding $\xi$ and $\zeta$ fixed respectively. The thick line is $t_h = 0$, where the hegemons switch between accommodation and containment. The color scale in panel (a) applies to the contours in panels (b) and (c).

its sphere of influence rely less on Chinese AI models and more on US models.

**The Role of Interdependence.** The trade-off between economic profits from trade and power building is at the core of each hegemon's decision to contain or accommodate its rival. The next proposition shows how greater interdependence alters the hegemon's containment policy.[26]

**Proposition 3** *Total containment is decreasing in interdependence, that is* $\frac{dt_h}{d\zeta} < 0$.

[26]Formally, an all-else-equal increase in interdependence $\zeta$ comes from a perturbation $d\zeta^{own} = -d\zeta^{rival} > 0$, so that cost $\tilde{p}$ does not change.

Intuitively, greater interdependence makes foreign sourcing more attractive relative to domestic sourcing. All else equal, as the rival hegemon's downstream sector relies more on imported upstream goods, the economic profits that hegemon $h$ can earn from exports of its upstream good rise. This leads hegemon $h$ to shift toward accommodation of its rival. Figure 3 illustrates this property in Panels (a) and (b). As interdependence increases, the hegemons move more toward accommodation (larger blue dots in Panel (a)).

As interdependence rises for both hegemons, as in this symmetric model, both reduce containment of each other. The basic intuition is that each hegemon is becoming a bigger customer for the other, and a big customer is all else equal not worth containing as much because containment would cause too large a loss of economic profit. An example is US chip makers' arguments that export controls should be lowered because the Chinese market is a very profitable market segment for these US companies.

**The Role of External Economies of Scale.** We turn next to the role of economies of scale $\xi$. As the proposition below makes formal, the economies of scale amplify the underlying decision to contain or accommodate in the first place.

**Proposition 4** *There exist thresholds $K_\ell, K_u$ such that: If $K_n < K_\ell$, then $t_h < 0$ and $\frac{dt_h}{d\xi} < 0$; If $K_n > K_u$, then $t_h > 0$ and $\frac{dt_h}{d\xi} > 0$.*

The external economies of scale's amplification of the decision to contain or accommodate is illustrated in Figure 3 Panel (c), in which higher values of $\xi$ increase the magnitude of $t_h$ at high and low values of $K_n$. The intuition is that higher economies of scale amplify the strategic motives of each hegemon to build more power, that is both hegemons focus more on Macro Power. Endogenous amplification of power is an important force in at least two respects. First, as we study in Section 5, it will play a role in determining the endogenous emergence of hegemons and spheres of influence. Second, the world economy has become structurally more dependent on sectors with large production externalities, not just in terms of economies of scale, but also in terms of strategic complementarities and network effects. Examples include payment systems, information services, digitally delivered platforms, as well as scale in physical infrastructure for both AI and transport. These externalities amplify the strategic incentives of the hegemons, who push harder on the policy levers in an attempt to shift the world equilibrium in their favor.

## 4.1 The Role of Geopolitical Rivalry

In this subsection we explore the role of direct geopolitical rivalry between the two hegemons. We do so by studying objective functions of the hegemons' governments that directly put

negative weight on the Micro-Power of the rival hegemon. We do so by making use of the separable component $v_h(z)$ of the hegemon's objective function that we introduced in Section 2 but have so far set to zero. Formally, we specify $v_h(z) = -\rho\sqrt{\text{Power}_{-h}}$, with $\rho \geq 0$ and where $\text{Power}_{-h}$ is the rival hegemon's Micro-Power as in equation 9. Therefore, each hegemon's government now maximizes an objective function that has both the domestic consumer welfare and the geopolitical rivalry,

$$U_h(C_{he_h}, C_{hf}) + v_h(z) = \tilde{p}_e C_{he_h} + C_{hf} - \rho\sqrt{\text{Power}_{-h}}.$$

While the term $v_h(z)$ is reduced-form and ad-hoc, it helps us to capture a direct element of geopolitical rivalry. For example, Mattoo, Ruta and Staiger (2024) extend the classic work of Bagwell and Staiger (1999) on trade negotiation by allowing for a disutility term on the rival hegemon's welfare. Having the hegemons place direct dis-utility on the Micro-Power of their rival emphasizes the ability of the rival to demand costly actions, including transfers or geopolitical concessions, or to counteract $h$'s own demands for costly actions. While the specification of $v_h$ is ad-hoc, it keeps the focus of our model on power and how hegemons optimally wield it. The Proposition below shows that an increase in the geopolitical rivalry, a rise in $\rho$, leads hegemons to increase their total containment.[27]

**Proposition 5** *Total containment is increasing in the geopolitical rivalry, that is* $\frac{dt_h}{d\rho} > 0$.

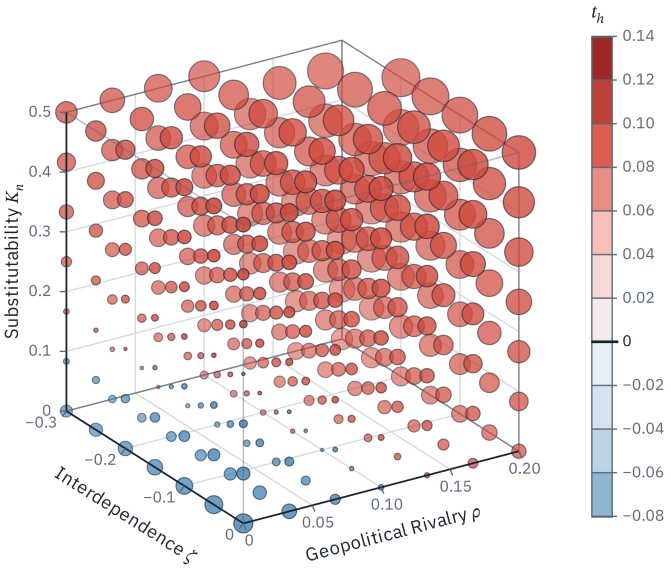
Figure 4 is analogous to Figure 3, but now plots the equilibrium containment policy as a function of geopolitical rivalry $\rho$ rather than the external economies of scale $\xi$. The effect of rivalry on containment is visible on all three panels, as bigger and deeper red dots or areas correspond to more containment at a higher level of rivalry. Intuitively, rivalry pushes the hegemons to pursue containment even when it is bad for their representative consumer (and the domestic firms it owns), as long as it directly shrinks the power of the rival hegemon. This term embeds in our model some aspects of the mercantilist zero-sum (or even negative-sum) logic that often surfaces in international relations.

**Three World Configurations: USSR-US Cold War, US-China 1990s, US-China 2026.** We find it useful to use the model to make sense, at least at a broad level, of major economic configurations of the world economy since the last world war. This helps us illustrate the model, and offers a lens to view the economic history and its relevance to today. Figure 5 is analogous to Figure 4 but focuses on three specific examples.

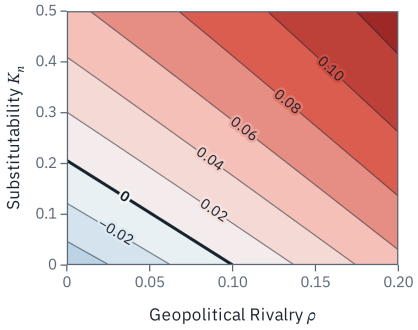
Consider first the era of the Cold War between the US and the USSR. We think of those two hegemons as having: (i) high rivalry (high $\rho$), (ii) low interdependence (low $\zeta$), and (iii)

[27] Appendix B.1 re-derives the optimal wedges and presents proofs for results of this subsection.

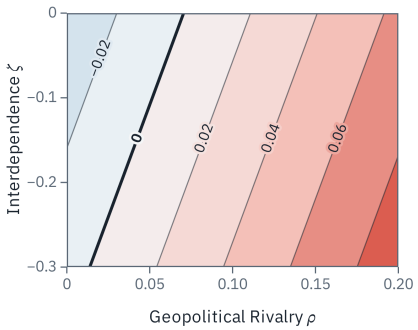
Figure 4: Total Containment and Geopolitical Rivalry




(a) Total containment across $K_n$, $\zeta$, and $\rho$




(b) $K_n$ and $\rho$, holding $\zeta$ fixed




(c) $\zeta$ and $\rho$, holding $K_n$ fixed

*Notes:* This figure plots total containment $t_h$ in the symmetric equilibrium as the substitutability of the hegemons' goods $K_n$, interdependence $\zeta$, and geopolitical rivalry $\rho$ vary. The model without geopolitical rivalry is the case $\rho = 0$. Positive values (red) are containment and negative values (blue) are accommodation. In panel (a), each circle is one combination of the three parameters: its size is the magnitude of $t_h$ and its color is the sign. Panels (b) and (c) plot contours of $t_h$ on two slices of panel (a), holding $\zeta$ and $K_n$ fixed respectively. The thick line is $t_h = 0$, where the hegemons switch between accommodation and containment. The color scale in panel (a) applies to the contours in panels (b) and (c).

a relatively low level of substitutability (relatively low $K_n$). Indeed, over this period the US and USSR had little trade between each other, and neither relied heavily on inputs sold by the rival. The two countries were essentially not economically interdependent (Mastanduno (1992)).[28] The military and power rivalry arose from both a deep philosophical difference on the setup of their societies, communism versus capitalism, as well as security concerns in this new nuclear era (Thompson et al. (2022)). It is less clear whether the two hegemons were substitutable in production, with probably more substitutability in heavy military industries than in consumer goods. Figure 5 shows that this configuration leads to a heightened policy

[28] See also Gopinath et al. (2025).

of containment between the hegemons. The policy is driven by the very high level of rivalry, which is not mitigated by a loss of a potentially economically profitable relationship between the two hegemons. The low level of substitutability does not accentuate the incentives to contain, which come predominantly from the rivalry itself.

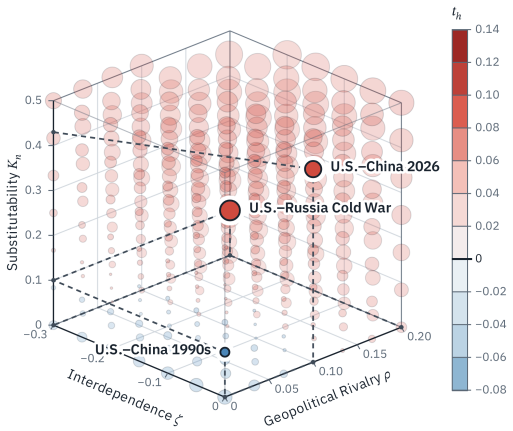
Consider second the relationship between the US and China, as two potential hegemons, in the 1990s. China at the time was a developing nation, still recovering from the Cultural Revolution, and opening up to world markets. The low level of development in China, and the availability of cheap labor, meant that it offered a potentially profitable opportunity for trade with the US. China would import relatively advanced goods and export basic manufacturing, as in a Ricardian trade view (Schott (2008)). The US and China also appeared to be on a relatively friendly trajectory with respect to geopolitics (Fan et al. (2026)). Indeed, many economists thought that accommodation might lead to more ideological alignment (149 U.S. Economists (2000)). We think of this configuration as having: (i) low rivalry (low $\rho$), (ii) high interdependence (high $\zeta$), and (iii) a relatively low level of substitutability (relatively low $K_n$). Figure 5 shows that this configuration leads to a policy of accommodation. The hegemons focus on boosting each other up economically to maximize the rents that they can extract given the high level of interdependence. The fact that the two hegemons are not good outside options for each other means that geoeconomic competition motives are muted. Similarly, the low geopolitical rivalry leaves the two hegemons free to engage in positive sum policies as long as each benefits.

Consider last the relationship between the US and China today, in 2026. The major changes since the 1990s are that the geopolitical rivalry appears to be intensifying, $\rho$ is now higher, and that China with its higher level of production sophistication is now a closer substitute, higher $K_n$, for the US than it was in the 1990s (Fan et al. (2026); de Soyres et al. (2025)). On the other hand, economic interdependence is still high even if it has likely changed nature, resembling more a world of specialization. Figure 5 shows that this configuration leads to a policy of medium containment. Both the increase in rivalry and the increase in substitutability push toward containment, one for direct power reasons and the other because of geoeconomic competition. However, these effects are counteracted by the two hegemons having an interdependent economic relationship.

We do not want to push these big picture illustrations too far, given the simplicity of the model and the obvious need to refrain from taking such calibrations too literally. Yet, these illustrations offer a theory-based way to think about major historical configurations of the world order. For example, they caution against using the Cold War as a guiding historical example for the present situation. A more apt historical analogy would be the Great Power competition between England, France, Germany, and Russia in the period from the 1870s

to the First World War. These powers were interdependent during a wave of globalization of world goods and financial markets that most closely resembles the world after the Cold War. They also had a varying degree of geopolitical rivalry and, being all developed nations to some degree, a relatively close substitutability.

Figure 5: Three World Configurations




*Notes:* This figure places three configurations of the world in the space of Figure 4: substitutability of the hegemons' goods $K_n$, interdependence $\zeta$, and geopolitical rivalry $\rho$. The U.S.–Russia Cold War combines low interdependence, high rivalry, and low substitutability. U.S.–China relations in the 1990s combine high interdependence, no rivalry, and low substitutability. U.S.–China relations in 2026 combine high interdependence, moderate rivalry, and high substitutability. The dashed lines trace each configuration's position on the three axes. The size of each marker is the magnitude of total containment $t_h$ at that configuration and its color is the sign, red for containment and blue for accommodation. The faded circles reproduce panel (a) of Figure 4.

## 4.2 Welfare of Rest of the World Countries

We next turn to how competition between the hegemons affects the welfare of RoW countries. We focus on how escalations in geopolitical rivalry (a rise in $\rho$) affect welfare.

Using the participation constraint with respect to hegemon $h$, the welfare of RoW country $n$ is given by its outside option in its contracting relationship with hegemon $h$, that is $\mathcal{W}_n = V_n^o(\tau_{-h}) - T_{-h}$.[29] Importantly, this outside option depends on the contract being offered by hegemon $-h$, including the transfer extracted. Using the participation constraint of RoW country $n$ in its contracting relationship with hegemon $-h$ to substitute out

[29]The contract between a hegemon and a RoW country shares features of a two part tariff (Oi (1971)), since it has both a price component (the wedges) and a lump sum transfer. The hegemon, however, here uses the two parts not only to extract surplus from each country, but to manipulate the gap between the inside and outside option of all other countries. The ex-ante wedges between the hegemons do not share this feature since there are no lump-sum transfers between hegemons.

$-T_{-h} = V_n^o(\tau_h) - V_n(\tau)$, we write the RoW country's welfare as the sum of its two outside options (one with each hegemon) net of its inside option, $\mathcal{W}_n = \sum_{h \in \mathcal{H}} V_n^o(\tau_{-h}) - V_n(\tau)$. Intuitively, the welfare of country $n$ increases with the value of its outside options, and the inside option is subtracted to account for transfers that each hegemon extracts.[30] The following proposition characterizes how changes in the rivalry $\rho$ affect welfare.

**Proposition 6** *RoW country welfare is strictly concave in $\rho$, that is $\frac{d^2\mathcal{W}_n}{d\rho^2} < 0$. If the two hegemons are accommodating each other, that is $t_h < 0$, then welfare is strictly increasing in $\rho$, that is $\frac{d\mathcal{W}_n}{d\rho} > 0$.*

RoW welfare is concave in rivalry, as illustrated in Figure 6. Panel (a) shows the concave shape of $\mathcal{W}_n$ in $\rho$, holding fixed the values of substitutability and interdependence, so that welfare is at first increasing in the rivalry before eventually declining when the rivalry gets too strong. The black dot marks the rivalry level that maximizes RoW welfare, which we denote $\rho^*$. The gray surface in Panel (a) plots the set of $\rho^*$ for different values of substitutability and interdependence. The second part of Proposition 6 highlights that the threshold $\rho^*$ always lies in the containment regime: if the two hegemons are accommodating each other, then an increase in rivalry necessarily increases RoW welfare.

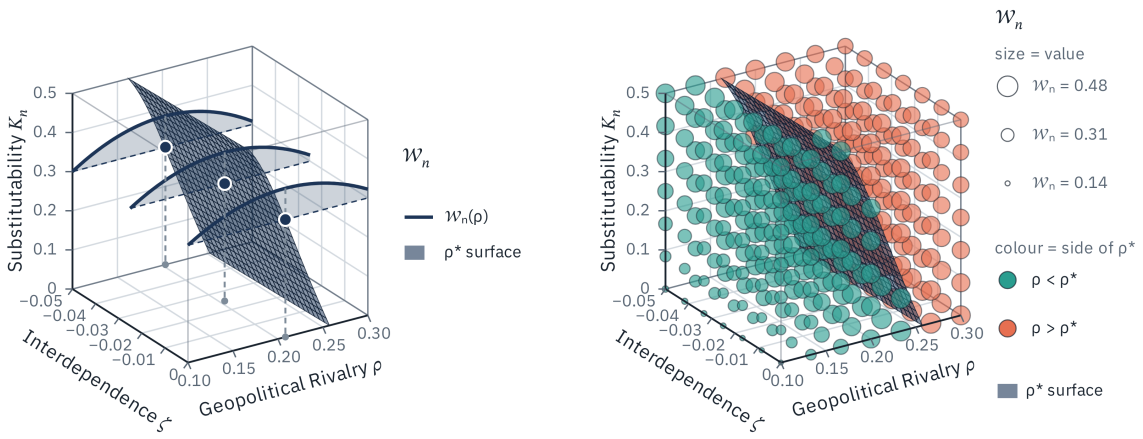
Intuitively, concavity arises from two competing effects on RoW welfare. On the positive side, as the rivalry escalates, each hegemon both promotes its own good and contains its rival's good. These opposing demands partially offset each other, and each hegemon depletes some of its own power in trying to contain its rival, leaving RoW countries with relatively higher outside options. This captures the notion that hegemons waste some of their power in demanding opposing actions to the benefit of RoW countries' bargaining positions. Recent examples include the US and China competing over mineral resources in Africa, with each hegemon demanding that the minerals be sold preferentially to itself and not the rival (e.g. the Lobito Corridor US-driven project to secure minerals from Africa's Copper Belt, and the competing TAZARA railway project from China with similar aims). Historically, this also captures the benefits to Nasser's Egypt of offsetting demands and competition between the US and the USSR during the Cold War.

However, the same containment policies of each hegemon from the escalating rivalry (Proposition 5) also induce a loss in efficiency of the hegemons as each rival tries to shrink the other. The loss in efficiency manifests in a higher effective price of the goods that the

[30] Note that in principle RoW welfare in this model can be negative. It is a consequence of the Nash-in-Nash bargaining protocol in which the country does not consider deviating to accepting none of the two contracts offered by the hegemons. We took a simple but extreme case in which the two hegemons have all the bargaining power, since they make take-it-or-leave-it offers. Appendix B.3.2 relaxes this assumption.

hegemon sells: $\frac{d[p_h+\tau_h^{own}]}{d\rho} > 0$. The higher prices lower the welfare of the RoW countries by increasing the cost of production. Once the rivalry $\rho$ is sufficiently large, the loss of economic efficiency dominates, and RoW countries are made worse off by further escalations.

Figure 6: Rest of World Welfare and Geopolitical Rivalry




(a) Welfare curves and the $\rho^*$ surface

(b) Where more rivalry raises welfare

*Notes:* This figure plots the welfare of RoW countries $\mathcal{W}_n$ as the substitutability of the hegemons' goods $K_n$, interdependence $\zeta$, and geopolitical rivalry $\rho$ vary. In panel (a), each curve plots $\mathcal{W}_n$ against $\rho$ at one level of interdependence, holding $K_n$ fixed. Each curve is drawn above the dashed line at its own values of $K_n$ and $\zeta$, in rescaled units. Welfare is hump-shaped in rivalry, and the dot marks the welfare-maximizing level of rivalry $\rho^*$. The surface plots $\rho^*$ across all values of $K_n$ and $\zeta$. In panel (b), each circle is one combination of the three parameters, and its size increases with $\mathcal{W}_n$. Green circles lie on the side of the $\rho^*$ surface with $\rho < \rho^*$, where an increase in rivalry raises RoW welfare. Orange circles lie on the side with $\rho > \rho^*$, where an increase in rivalry lowers RoW welfare.

Intuitively, as the two hegemons' rivalry becomes very high, the hegemons turn to mercantilist policies that destroy the total size of the pie (the world economy's production frontier), as long as they perceive these policies to damage the power of their competitor more than what they lose. The RoW countries suffer in this scenario because their welfare loads on the state of the global economy.[31]

Figure 6 Panel (b) illustrates the hump-shaped welfare relationship across the 3D plot. To the left of the $\rho^*$ surface, at low rivalry, welfare increases as $\rho$ rises. In these configurations

[31] In this subsection we focused on a supply-side notion of production efficiency so that the inefficiency manifests as higher prices. The model could be extended to have a Keynesian demand-side inefficiency. For example, the countries in the rest of the world might have industries the output of which is demand-determined by exporting. If containment policy of the hegemon generates a fall in world demand, then the rest of the world would suffer from lower exports and output. This could capture, for example, the case of countries that are commodity exporters and exposed to world demand cycles.

of the model, the green dots, the rivalry is sufficiently low that a little more rivalry is actually positive for the RoW welfare. To the right of the $\rho^*$ surface, the orange dots are configurations of the model parameters in which any further increase in rivalry decreases the RoW welfare. The shape of these two regions shows that higher substitutability and/or lower interdependence reduce the level of rivalry that can be introduced before the RoW welfare starts to decrease.

# 5 Heterogeneous Hegemons, Power Amplification, and Sphere of Influence

The core model presented thus far featured a homogeneous mass of RoW countries, but in practice some countries are more likely because of geographic or cultural reasons, for example, to be closely tied to one of the two hegemons. In this section we introduce heterogeneity in RoW countries to study how a hegemon's "sphere of influence," the set of countries over which a hegemon has more power than its rival, arises endogenously. In doing so, we also characterize how the power externality amplifies potentially small differences in the primitive ability of two candidate hegemons to become dominant in equilibrium. If one hegemon has a given power differential with its potential rival, it will exploit it to build more power in equilibrium. As each country enters the sphere of influence of that hegemon, it is used to build yet more power over other countries. The model, therefore, provides a core mechanism for the endogenous emergence of hegemons with a larger sphere of influence than the primitive characteristics would imply in the absence of power amplification.

Formally, let $m \in [0,1]$ index the RoW countries. RoW countries potentially differ in their technology parameter $A_m$ and in their costs $\zeta_{mh}$ of importing from each hegemon. For example, some countries may be more closely tied economically to one hegemon for geographic or cultural reasons (e.g., lower broadly-defined trade costs). To enable a tractable aggregation, we assume that the parameters $\kappa_m = \kappa_n$ and $K_m = K_n$ are homogeneous across all $m$. We use the $n$ notation for shared parameters to maintain a parallel notation to the baseline model. The production function of RoW countries is analogous to that in the baseline model, so that the profits of a firm in the country $m$ are

$$\Pi_m = \sum_{h \in \mathcal{H}} \left[ (A_m - \zeta_{mh} - p_h) x_{mh} - \frac{1}{2} \kappa_n x_{mh}^2 \right] - K_n \prod_{h \in \mathcal{H}} x_{mh}, \tag{14}$$

where $x_{mh}$ denotes the usage by a country $m$ firm of hegemon $h$'s downstream good. Parallel to the baseline model, we define $\pi_{mh} = A_m - \zeta_{mh} - \tilde{p}_h$ to be the natural profitability of

$m$ for using good $h$, where $\tilde{p}_h = \frac{1}{2}\sum_{k\in\mathcal{H}} \tilde{p}_{e_k} + \frac{1}{2}(\zeta_h^{own} + \zeta_h^{rival})$ captures the primitive cost of production of hegemon $h$'s downstream sector when there is no impact of output on the sectoral price.[32] Variation across RoW countries in $\pi_{mh}$ is the source of heterogeneity we focus on below since it helps us capture the value of an a-priori relationship between country $m$ and each of the two hegemons, with a higher $\pi_{mh}$ providing for a more profitable relationship.

We delegate to Online Appendix B.2 the derivation of the equilibrium and optimal policies in this heterogeneous set-up, and we focus here on the core results and intuition. The model is extremely tractable and features an aggregation to an as-if representative country whose natural profitabilities are equal to those of the average country in the heterogeneous population, $\overline{\pi}_h = \int_{m=0}^{1} \pi_{mh} dm$.

If the average profitabilities are symmetric, that is $\overline{\pi}_h = \overline{\pi}_{-h}$, and hegemons' cost parameters $\tilde{p}_{e_h}, \zeta_h^{own}, \zeta_h^{rival}$ are symmetric, then the equilibrium wedges are the same as in the case in which the two hegemons were facing homogeneous RoW countries in the previous sections. If the average profitabilities differ across the two hegemons, the aggregation still allows us to characterize the model as if there were a representative homogeneous RoW country with different profitabilities with the two hegemons. In either case, hegemon $h$'s optimal demanded wedges $\tau_{hm}^{own}, \tau_{hm}^{rival}$ are constant across RoW countries. However, the equilibrium purchases $x_{mh}$ vary across countries $m$ according to their natural profitabilities.

Compared to the symmetric case, asymmetries induce the more dominant hegemon (with higher average profitability $\overline{\pi}_h$) to shift towards containment while the less dominant hegemon shifts towards accommodation. This is a manifestation of the nonlinearity of power discussed in Section 3: the more dominant hegemon has a stronger incentive to contain its rival to further build its power, while the less dominant one has lower prospects for competing over power and so shifts towards focusing on economic rents.

**Spheres of Influence and Endogenous Emergence of a Dominant Hegemon.** We define each hegemon's sphere of influence as the set of countries that hegemon $h$ has more power over than its rival. In this heterogeneous set-up, hegemon $h$'s Micro Power (the analogous concept for the homogeneous case is equation 9) over country $m$ is given by:

$$\sqrt{\text{Power}_{h,m}} = \sqrt{\text{Power}_h} + \frac{1}{\sqrt{2\kappa_n(\kappa_n^2 - K_n^2)}}\left(\kappa_n(\pi_{mh} - \overline{\pi}_h) - K_n(\pi_{m,-h} - \overline{\pi}_{-h})\right) \quad (15)$$

[32] We assume that $0 < \pi_l < \pi_{mh} < \pi_u < \infty$ so that natural profitability is bounded (away from 0).

where $\text{Power}_h$ is $h$'s power over the representative average RoW country. Intuitively, (square root) power over country $m$ starts from (square root) power over the average country, and then adjusts based on whether country $m$ is relatively more economically tied to $h$ or $-h$ than the average country. Hegemon $h$ has more power over countries that have more profitable economic relations with it ($\uparrow \pi_{mh}$) and, when $K_n > 0$ and downstream goods are substitutes, have a worse outside option due to lower profitability from using the rival's downstream good ($\downarrow \pi_{m,-h}$).

Equation 15 highlights that hegemon $h$'s sphere of influence is determined by the prevailing equilibrium, since power over the average country is determined not only by primitive differences in the natural profitabilities of the two hegemons but also by the endogenous equilibrium prices and policies that result from geoeconomic competition. In Figure 7, we illustrate how the sphere of influence of each hegemon depends on endogenous amplification. Panel (a) shows the spheres of influence (i.e., the countries over which each hegemon has relatively more power) for the two hegemons when hegemon $US$ has a natural profitability advantage over hegemon $CH$ (i.e., $\overline{\pi}_{US} > \overline{\pi}_{CH}$). The blue and red shaded regions are the respective spheres of US and CH, while the solid black line is the boundary of countries over which the two hegemons have equal power. A specific country $m$ is characterized by a location $(\pi_{m,US}, \pi_{m,CH})$. The natural pole of the US hegemon is on the top left: those countries that have relatively high $\pi_{m,US}$ and low $\pi_{m,CH}$. China is the symmetric pole in the bottom right.[33] Panel (a) shows that even when external economies of scale are small, the average profitability advantage of US expands its sphere into some countries that are more economically tied to CH than US (i.e., those below the 45-degree line).

Consider a country with characteristics $\pi_{mh} = \overline{\pi}_h - \varepsilon_h$ and $\pi_{m,-h} = \overline{\pi}_{-h}$, where $\varepsilon_h$ is set such that $\text{Power}_{h,m} = \text{Power}_{-h,m}$. The shifter $\varepsilon_h$ captures how far hegemon $h$'s sphere expands into countries whose natural profitability with $h$ is below average. In a model parametrization with symmetric hegemons, we would have $\varepsilon_h = 0$ (i.e., the black line in Panel (a) would be the 45-degree line). Starting from the case of symmetric hegemons, we show that a small increase in the natural profitability of the average country with hegemon $h$ expands $h$'s sphere of influence by

$$\frac{d\varepsilon_h}{d\overline{\pi}_h} = 1 + \omega_h.$$

The expansion starts from the direct effect 1 of the higher natural profitability (i.e., countries

[33] Note that the graph is not centered at zero, and the choice of a circle is purely illustrative. One could for example map the regions into a globe, by using latitude and longitude to measure distance between countries, or map using a gravity equation a more multidimensional object into the notion of baseline profitability.

on average have higher natural profitability with $h$), and adds in terms $\omega_h > 0$ that result from equilibrium amplification. In particular, $\omega_h$ can be decomposed as

$$\omega_h = \sigma \frac{d[y_h - y_{-h}]}{d\overline{\pi}_h} + \sigma \frac{\kappa_n}{\kappa_n + K_n} \frac{d[t_h - t_{-h}]}{d\overline{\pi}_h} + \frac{K_n}{\kappa_n + K_n} \frac{d[\tau_{-h}^{own} + \frac{1}{2}\theta_h^{rival} - (\tau_h^{own} + \frac{1}{2}\theta_{-h}^{rival})]}{d\overline{\pi}_h}.$$

Equilibrium amplification $\omega_h$ is comprised of three (weakly) positive effects that each contribute to $\omega_h > 0$.[34] The first term captures increases in attractiveness of the hegemon's own good coming through the effect on prices. As natural profitability rises, demand for $h$'s downstream good rises, pushing down its cost through the external economy of scale and in turn increasing $h$'s power relative to $-h$. This effect would be there even if the hegemons did not employ any strategic geoeconomic policy. The second and third terms capture amplification from the policy responses of each hegemon. The second term captures changes in the containment policies. As the natural profitability of $h$ rises, hegemon $h$ shifts towards containment whereas its rival shifts towards accommodation. This makes $h$'s good even more attractive relative to its rival's, and amplifies the expansion of $h$'s sphere of influence. The final term captures the net increase in attractiveness of each hegemon's own good (their own subsidy net of the export wedge of their rival). The increase in natural profitability also leads $-h$'s good to be promoted less ($\tau_{-h}^{own} + \frac{1}{2}\theta_h^{rival}$ rises) while $h$'s good is promoted more, further reinforcing the equilibrium amplification.

Intuitively, the exogenous increase in hegemon $h$'s attractiveness to RoW countries increases its Micro Power all else equal. Hegemon $h$ makes use of this extra power to build even more power. It does so by inducing countries to shift their economic activities toward itself and away from the rival hegemon. Each country agrees to do so, based on its private cost of shifting production, but without internalizing the extra economic dependency on hegemon $h$ that this induces. Indeed, hegemon $h$ exploits the power externality to shift the overall equilibrium in its favor. The rival hegemon, given its relatively lower exogenous profitability, finds it optimal to accommodate some of these changes because (compared to before the shift) it would be too expensive to use its own reduced power to contain the rival hegemon's strategy. The power amplification therefore shifts the sphere of influence further in favor of the more attractive hegemon than would have occurred in the absence of amplification.

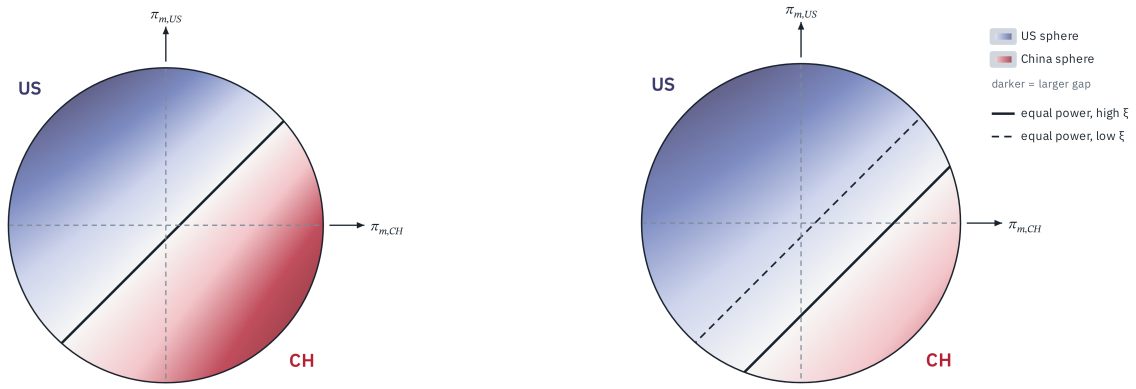
Figure 7 Panel (b) shows that the expansion of hegemon US's sphere of influence is amplified as the external economy of scale increases: the equal power boundary shifts down and to the right at higher $\xi$.[35] The intuition is that a higher external economy of scale

[34] Appendix B.2 shows each of these effects is weakly positive.

[35] Appendix B.2 shows that this is a generic property: starting from the case of symmetric hegemons, the same marginal increase in US natural profitability induces a larger increase in US's sphere

provides a better opportunity for the dominant hegemon to build Macro power and shift the balance of power in its favor. More generally, the endogenous amplification of small differences in the ex-ante attractiveness of potential hegemons provides a foundation for the endogenous emergence of dominant hegemons out of a set of potential rivals.

Figure 7: Spheres of Influence and External Economies of Scale




(a) Low $\xi$ (b) High $\xi$

*Notes:* This figure plots the spheres of influence of the two hegemons across RoW countries that differ in their profitability from using each hegemon's good: $\pi_{m,US}$ for the US good on the vertical axis and $\pi_{m,CH}$ for the Chinese good on the horizontal axis. Each disc is centered on the average country, and the US has a small advantage in average profitability. Countries in blue are in the US sphere of influence, meaning the US has more power over them than China does, and countries in red are in China's sphere. Darker shading indicates a larger gap in power. The solid line marks the countries over which the two hegemons have equal power. Panel (a) has a low external economy of scale $\xi$ and panel (b) a high one. The dashed line in panel (b) reproduces the equal-power line of panel (a).

Our multiple hegemon framework is tractable and could be extended in many directions. Appendix B.3 discusses some very interesting possibilities: (i) allowing for hegemons to invest in R&D to develop a different production function; (ii) having the rest of the world engage in economic security policy and form alliances; (iii) bargaining and coercion between the hegemons; and, (iv) repeated games and the impact of geoeconomic competition on future economic rents and current commitments.

# 6 Conclusion

In this paper we introduce a model of geoeconomic competition in which two hegemons both have a profitable trading relationship with each other and compete with each other

of influence when the external economy of scale is larger. Formally, $\omega_h$ is increasing in $\xi$.

in exerting power over the rest of the world. Hegemons trade off the economic rents they can earn from selling upstream goods to their rival, against the fact that more efficient production enables their rival to better compete in geoeconomic power over countries in the rest of the world. We show that the model gives rise to regimes of containment, in which a hegemon tries to weaken its rival through a combination of export wedges and demands that countries in the rest of the world buy less of the rival's goods, or accommodation, in which a hegemon promotes its rival and focuses on economic profits. A hegemon is more likely to contain its rival when the goods they use to form economic threats against the rest of the world are more substitutable in the rest of world countries' production; when the two hegemons are less interdependent with each other; and when the geopolitical rivalry between hegemons is higher. We characterize how geoeconomic rivalry affects the welfare of the rest of the world: at low levels of rivalry the rest of the world benefits due to its better bargaining position, but as rivalry increases further the rest of the world starts to suffer from the loss of economic efficiency in the world economy induced by the stronger attempt of each hegemon to contain the rival. We relate the model to both the current U.S.-China rivalry and to previous episodes of great power competition.

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# Appendix

## A.1 Proofs

### A.1.1 Proof of Proposition 1

Before deriving the optimal contract and export wedges, we start by deriving the price and demand schedules in hegemon $h$'s downstream sector $d_h$, which are central to that analysis. The downstream firm chooses $l_h$ and $i_h$, taking aggregate output $y_h^*$ as given. Accounting for the wedge $\theta_{hd}^n$ on downstream sales, its first-order conditions are

$$\kappa_d l_h + K_d i_h = p_h - \theta_{hd}^n + \xi y_h^* - \zeta^{own} - p_{d_h e_h},$$
$$\kappa_d i_h + K_d l_h = p_h - \theta_{hd}^n + \xi y_h^* - \zeta^{rival} - p_{d_h e_{-h}}.$$

The prices paid for the domestic and imported upstream goods are $p_{d_h e_h} = \tilde{p}_e$ and $p_{d_h e_{-h}} = \tilde{p}_e + \tau_{hd}^{rival} + \theta_{-h}^{rival}$. Summing the first-order conditions and using $l_h + i_h = y_h = y_h^*$ gives

$$p_h = \tilde{p} - \sigma y_h + \theta_{hd}^n + \frac{1}{2}\tau_{hd}^{rival} + \frac{1}{2}\theta_{-h}^{rival}, \tag{A.1}$$

where we defined $\tilde{p} = \frac{1}{2}(\zeta^{own} + \zeta^{rival}) + \tilde{p}_e$ and $\sigma = \xi - \frac{\kappa_d + K_d}{2}$. Defining $\zeta = \zeta^{own} - \zeta^{rival}$, subtracting the first-order condition for $l_h$ from that for $i_h$ and rearranging gives

$$i_h = \frac{1}{2}y_h + \frac{\zeta - \tau_{hd}^{rival} - \theta_{-h}^{rival}}{2(\kappa_d - K_d)}. \tag{A.2}$$

#### A.1.1.1 Derivation of Contracting Wedges in the Middle

The welfare of hegemon $h$ is $\mathcal{W}_h = \tilde{p}_e \bar{e} + \theta_h^{rival} i_{-h} + \Pi_{d_h} + T_h + \tau_{hd}^{rival} i_h + \theta_{hd}^n y_h$, which includes all tax rebates (the last two terms). If the participation constraint of the RoW country did not bind, hegemon $h$ could increase its transfer and be strictly better off, so that $T_h = V_n - V_n^o$. Following Clayton et al. (2026a,c), we employ the primal approach of representing hegemon $h$'s optimization problem in terms of allocations, and then back out the implementing wedges $\tau_h$. In particular, the FOCs of RoW country $n$,

$$\kappa_n x_h + K_n x_{-h} = A_n - \zeta_n - p_h - \tau_h^{own} - \tau_{-h}^{rival}, \tag{A.3}$$

for a given allocation determine the implementing wedges. Expressing the participation constraint via the primal approach and using that hegemon $h$'s wedges are revenue-neutral, we have

$$\begin{aligned} T_h = &\sum_{k \in \mathcal{H}} \left[ (A_n - \zeta_n - p_k)x_k - \frac{1}{2}\kappa_n x_k^2 \right] - \tau_{-h}^{rival} x_h - \tau_{-h}^{own} x_{-h} - K_n \prod_{k \in \mathcal{H}} x_k \\ &- \max_{x_{-h}^o} \left\{ (A_n - \zeta_n - p_{-h} - \tau_{-h}^{own}) x_{-h}^o - \frac{1}{2}\kappa_n (x_{-h}^o)^2 \right\} \end{aligned} \tag{A.4}$$

Therefore employing the primal approach and market clearing $x_h = y_h$, we write

$$\max_x \mathcal{W}_h = \tilde{p}_e \bar{e} + \theta_h^{rival} i_{-h} + \tau_{hd}^{rival} i_h + \theta_{hd}^n y_h + \Pi_{d_h} + T_h$$

internalizing the determinations of $p_h$ (equation A.1), $i_h$ (equation A.2), $T_h$ (equation A.4), $l_h = x_h - i_h$, and $y_h = x_h$, and where

$$\Pi_{d_h} = \max_{l_h, i_h} \Big\{ (p_h - \theta^n_{hd} + \xi y^*_h - \zeta^{own} - \tilde{p}_e) l_h + (p_h - \theta^n_{hd} + \xi y^*_h - \zeta^{rival} - \tilde{p}_e) i_h \\ - \frac{1}{2}\kappa_d (l_h^2 + i_h^2) - (\tau^{rival}_{hd} + \theta^{rival}_{-h}) i_h - K_d l_h i_h \Big\}$$

We can now take the first order conditions.

**FOC in $x_h$.** The FOC in $x_h$, by Envelope Theorem, is

$$0 = \tau^{rival}_{hd} \frac{\partial i_h}{\partial x_h} + \theta^n_{hd} + \frac{\partial [p_h + \xi y^*_h]}{\partial x_h} x_h + A_n - \zeta_n - p_h - \tau^{rival}_{-h} - \kappa_n x_h - K_n x_{-h} - \frac{\partial p_h}{\partial x_h} x_h$$

Using the country $n$ FOC $\tau^{own}_h = A_n - \zeta_n - p_h - \tau^{rival}_{-h} - \kappa_n x_h - K_n x_{-h}$, we have

$$\hat{\tau}^{own}_h = -\xi x_h \tag{A.5}$$

where we define $\hat{\tau}^{own}_h = \tau^{own}_h + \frac{1}{2}\tau^{rival}_{hd} + \theta^n_{hd}$.

**FOC in $x_{-h}$.** The FOC in $x_{-h}$ is

$$0 = \theta^{rival}_h \frac{\partial i_{-h}}{\partial x_{-h}} + \tau^{rival}_h - \frac{\partial p_{-h}}{\partial x_{-h}} (x_{-h} - x^o_{-h})$$

Using $\frac{\partial i_{-h}}{\partial x_{-h}} = \frac{1}{2}$ and $\frac{\partial p_{-h}}{\partial x_{-h}} = -\sigma$,

$$\tau^{rival}_h = -\frac{1}{2}\theta^{rival}_h + \sigma(x^o_{-h} - x_{-h}) \tag{A.6}$$

**Solving.** We have a system of five equations for each hegemon: the hegemon's optimality conditions (A.5 and A.6), the country $n$ FOC (A.3), the price (A.1), and use at the outside option, $x^o_{-h} = \frac{A_n - \zeta_n - p_{-h} - \tau^{own}_{-h}}{\kappa_n}$. To solve, we substitute out for $x^o_{-h}$, $\tau^{rival}_h$, $p_h$, $x_h = -\frac{1}{\xi}\hat{\tau}^{own}_h$, and $y_h = x_h$, obtaining

$$\hat{\tau}^{own}_h = -\frac{\xi}{\kappa_n - \sigma - \xi}\pi_n - \frac{\xi\sigma}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\frac{1}{2}\theta^{rival}_{-h} - \frac{K_n \kappa_n}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\hat{\tau}^{own}_{-h},$$

where we defined $\pi_n = A_n - \zeta_n - \tilde{p}$. Substituting in the counterpart equation for $\hat{\tau}^{own}_{-h}$,

$$\hat{\tau}^{own}_h = -\beta^M_\pi \pi_n - \beta^M_\theta \sigma \left[ \frac{1}{2}\theta^{rival}_{-h} - K_n \frac{\kappa_n}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)} \frac{1}{2}\theta^{rival}_h \right]$$

where we defined $\beta_\pi^M = \frac{\xi(\kappa_n-\sigma)}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n}$ and $\beta_\theta^M = \frac{\xi(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2}$.

Finally, using the FOC for $\tau_h^{rival}$ and substituting out for $x_{-h}^o$ and $x_{-h}$, we have

$$\tau_h^{rival} = -\frac{\sigma+\kappa_n}{\kappa_n}\frac{1}{2}\theta_h^{rival} + \frac{\sigma}{\kappa_n}\pi_n + \frac{\sigma(\kappa_n-\sigma-\xi)}{\kappa_n\xi}\hat{\tau}_{-h}^{own} \tag{A.7}$$

**Derivation of Equation 9.** Take hegemon $h$. Defining $\hat{\pi}_h = A_n - \zeta_n - p_{nh}$, where $p_{nh} = p_h + \tau_{-h}^{rival}$ and $p_{n,-h} = p_{-h} + \tau_{-h}^{own}$, then $\text{Power}_h = V_n(0,\tau_{-h}) - V_n^o(\tau_{-h})$,

$$V_n(0,\tau_{-h}) = \max_{x_h,x_{-h}}\left\{\hat{\pi}_h x_h + \hat{\pi}_{-h}x_{-h} - \frac{\kappa_n}{2}(x_h^2+x_{-h}^2) - K_n x_h x_{-h}\right\} + r_{-h},$$

$$V_n^o(\tau_{-h}) = \max_{x_{-h}^o}\left\{\hat{\pi}_{-h}x_{-h}^o - \frac{\kappa_n}{2}(x_{-h}^o)^2\right\} + r_{-h}.$$

At the outside option, the first-order condition yields $x_{-h}^o = \frac{\hat{\pi}_{-h}}{\kappa_n}$ and $V_n^o(\tau_{-h}) = \frac{\hat{\pi}_{-h}^2}{2\kappa_n} + r_{-h}$. At the inside option, the first-order conditions of country $n$ yield $x_h = \frac{\kappa_n\hat{\pi}_h - K_n\hat{\pi}_{-h}}{\kappa_n^2-K_n^2}$ and

$$V_n(0,\tau_{-h}) = \frac{\kappa_n\hat{\pi}_h^2 - 2K_n\hat{\pi}_h(A_n-\zeta_n-p_{n,-h})}{2(\kappa_n^2-K_n^2)} + \frac{\kappa_n(A_n-\zeta_n-p_{n,-h})^2}{2(\kappa_n^2-K_n^2)} + r_{-h}.$$

Subtracting the outside-option, we have $\text{Power}_h = \frac{(\kappa_n\hat{\pi}_h - K_n\hat{\pi}_{-h})^2}{2\kappa_n(\kappa_n^2-K_n^2)}$, which is equation 9.

### A.1.1.2 Derivation of Ex-Ante Wedges

Recalling the ex-post maximization problem, we now maximize $\mathcal{W}_h$ over the ex-ante wedges $(\tau_{hd}^{rival}, \theta_{hd}^n, \theta_h^{rival})$. Analysis simplifies substantially due to Envelope Theorem applied over the ex-post primal optimization, that is we are now solving

$$\max_{\tau_{hd}^{rival},\theta_{hd}^n,\theta_h^{rival}}\{\max_x \mathcal{W}_h\}.$$

Importantly, $\tau_{-h}$ is a function of $\theta_h^{rival}$ but is constant in $\tau_{hd}^{rival}, \theta_{hd}^n$. The FOC in $\tau_{hd}^{rival}$ is

$$0 = i_h + \tau_{hd}^{rival}\frac{\partial i_h}{\partial \tau_{hd}^{rival}} - i_h.$$

Therefore, we have $\tau_{hd}^{rival} = 0$. Next, the FOC in $\theta_{hd}^n$ is

$$0 = y_h - y_h + \frac{\partial p_h}{\partial \theta_{hd}^n}y_h - \frac{\partial p_h}{\partial \theta_{hd}^n}x_h.$$

The right hand side is equal to zero given market clearing, and so we normalize $\theta^n_{hd} = 0$. Together, these imply that $\tau^{own}_h = \hat{\tau}^{own}_h$.

Finally, the key FOC in $\theta^{rival}_h$, by Envelope Theorem, is

$$0 = i_{-h} + \theta^{rival}_h \frac{\partial i_{-h}}{\partial \theta^{rival}_h} + (x^o_{-h} - x_{-h})\left(\frac{\partial p_{-h}}{\partial \theta^{rival}_h} + \frac{\partial \tau^{own}_{-h}}{\partial \theta^{rival}_h}\right) - x_h \frac{\partial \tau^{rival}_{-h}}{\partial \theta^{rival}_h}$$

Substituting $\frac{\partial i_{-h}}{\partial \theta^{rival}_h} = -\frac{1}{2}\frac{1}{\kappa_d - K_d}$, $\frac{\partial p_{-h}}{\partial \theta^{rival}_h} = \frac{1}{2}$, and $i_{-h} = \frac{1}{2}x_{-h} + \frac{1}{2}\frac{1}{\kappa_d - K_d}\zeta - \frac{1}{2}\frac{1}{\kappa_d - K_d}\theta^{rival}_h$,

$$\frac{1}{\kappa_d - K_d}\theta^{rival}_h = \frac{1}{2}x_{-h} + \frac{1}{2}\frac{1}{\kappa_d - K_d}\zeta + (x^o_{-h} - x_{-h})\left(\frac{1}{2} + \frac{\partial \tau^{own}_{-h}}{\partial \theta^{rival}_h}\right) - x_h \frac{\partial \tau^{rival}_{-h}}{\partial \theta^{rival}_h}$$

Using the derived wedges in the Middle, we have $\frac{\partial \tau^{own}_{-h}}{\partial \theta^{rival}_h} = -\frac{1}{2}\beta^M_\theta \sigma$ and $\frac{\partial \tau^{rival}_{-h}}{\partial \theta^{rival}_h} = \frac{\sigma(\kappa_n - \sigma - \xi)}{\xi \kappa_n}\frac{\partial \tau^{own}_h}{\partial \theta^{rival}_h} = \frac{1}{2}\frac{K_n \sigma}{\xi(\kappa_n - \sigma)}\beta^M_\theta \sigma$, so

$$\frac{1}{\kappa_d - K_d}\theta^{rival}_h = \frac{1}{2}x_{-h} + \frac{1}{2}\frac{1}{\kappa_d - K_d}\zeta + (x^o_{-h} - x_{-h})\frac{1}{2}\left(1 - \beta^M_\theta \sigma\right) - x_h \frac{1}{2}\frac{K_n \sigma}{\xi(\kappa_n - \sigma)}\beta^M_\theta \sigma$$

Using $x^o_{-h} - x_{-h} = \frac{1}{\sigma}(\tau^{rival}_h + \frac{1}{2}\theta^{rival}_h) = -\frac{1}{2}\frac{1}{\kappa_n}\theta^{rival}_h + \frac{1}{\kappa_n}\pi_n + \frac{\kappa_n - \sigma - \xi}{\xi \kappa_n}\tau^{own}_{-h}$ and $x_h = -\frac{1}{\xi}\tau^{own}_h$,

$$\begin{aligned}\frac{2}{\kappa_d - K_d}\theta^{rival}_h + \frac{1}{2}\frac{1 - \beta^M_\theta \sigma}{\kappa_n}\theta^{rival}_h =& -\frac{1}{\xi}\tau^{own}_{-h} + \frac{1}{\kappa_d - K_d}\zeta + \frac{1}{\kappa_n}\pi_n(1 - \beta^M_\theta \sigma) \\ &+ \frac{\kappa_n - \sigma - \xi}{\xi \kappa_n}\tau^{own}_{-h}(1 - \beta^M_\theta \sigma) + \frac{1}{\xi}\tau^{own}_h \frac{K_n \sigma}{\xi(\kappa_n - \sigma)}\beta^M_\theta \sigma\end{aligned} \tag{A.8}$$

*Convexity and Stability.* We first derive conditions for convexity and stability, then solve for the equilibrium. Substituting in for $\tau^{own}_h, \tau^{own}_{-h}$,

$$\begin{aligned}\theta^{rival}_h =& \frac{1}{\psi}\left[\frac{(\sigma + \xi) + (\kappa_n - \sigma - \xi)\beta^M_\theta \sigma}{\xi \kappa_n}\beta^M_\pi - \frac{1}{\xi}\frac{K_n \sigma}{\xi(\kappa_n - \sigma)}\beta^M_\theta \sigma \beta^M_\pi + \frac{1}{\kappa_n}\left(1 - \beta^M_\theta \sigma\right)\right]\pi_n \\ &+ \frac{1}{\psi}\frac{1}{\kappa_d - K_d}\zeta - \phi \theta^{rival}_{-h}\end{aligned}$$

where $\psi = \frac{2}{\kappa_d - K_d} + \frac{1}{2}\frac{1 - \beta^M_\theta \sigma}{\kappa_n} - \frac{\beta^M_\theta}{\kappa_n \xi}\left[\sigma + \xi + (\kappa_n - \sigma - \xi)\beta^M_\theta \sigma + \frac{K_n^2 \kappa_n^2 \sigma^2}{\xi(\kappa_n - \sigma)^2(\kappa_n - \sigma - \xi)}\beta^M_\theta\right]\frac{1}{2}\sigma$ and $\phi = \frac{1}{\psi}\frac{K_n \beta^M_\theta (\sigma + \xi)}{\xi^2(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\left(\xi + (\kappa_n - \sigma - \xi)\beta^M_\theta \sigma\right)\frac{1}{2}\sigma$. From here, we obtain the condition for concavity $\psi > 0$ and stability $|\phi| < 1$.

*Equilibrium Optimal Export Wedge.* Returning to equation A.8 and using symmetry, we

have $\tau_h^{own} = \tau_{-h}^{own} = -\beta_\pi^M[\pi_n + \frac{1}{2}\frac{\sigma}{\kappa_n - \sigma}\theta_h^{rival}]$ and therefore

$$\theta_h^{rival} = \frac{1}{\varphi}\left[\frac{(\kappa_n - \sigma) + K_n\left(1 - \frac{\sigma+\xi}{\xi}\beta_\theta^M\sigma\right)}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi) + K_n\kappa_n}\pi_n + \frac{1}{\kappa_d - K_d}\zeta\right]$$

where $\varphi = \psi(1+\phi) > 0$. We therefore define $\theta_h^{rival} = \eta_\pi\pi_n + \eta_\zeta\zeta$ for $\eta_\pi = \frac{1}{\varphi}\frac{(\kappa_n-\sigma)+K_n(1-\frac{\sigma+\xi}{\xi}\beta_\theta^M\sigma)}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n}$ and $\eta_\zeta = \frac{1}{\varphi}\frac{1}{\kappa_d - K_d} > 0$.

*Deriving Equilibrium $\tau_h^{own}$.* Substituting in for $\tau_h^{own}$, $\varphi$ and $\beta_\pi^M$, we obtain

$$\tau_h^{own} = -\xi\frac{\left(4(\kappa_n - \sigma) + (\kappa_d - K_d)(1 - \beta_\theta^M\sigma)\right)\pi_n + \sigma\zeta}{2(\kappa_d - K_d)\varphi\left[(\kappa_n - \sigma)(\kappa_n - \sigma - \xi) + K_n\kappa_n\right]}.$$

We therefore define $\tau_h^{own} = -\beta_\pi\pi_n - \beta_\zeta\zeta$ for $\beta_\pi = \xi\frac{4(\kappa_n-\sigma)+(\kappa_d-K_d)(1-\beta_\theta^M\sigma)}{2(\kappa_d-K_d)\varphi[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n]} > 0$ and $\beta_\zeta = \xi\frac{\sigma}{2(\kappa_d-K_d)\varphi[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n]} > 0$. Note that $\beta_\pi > 0$ is required for the allocation to be interior since $x_h = -\frac{1}{\xi}\tau_h^{own}$ and since $\pi_n \geq 0$ and $\zeta \leq 0$.

*Deriving Equilibrium $x_h$.* We have $x_h = -\frac{1}{\xi}\tau_h^{own} = \frac{(4(\kappa_n-\sigma)+(\kappa_d-K_d)(1-\beta_\theta^M\sigma))\pi_n+\sigma\zeta}{2(\kappa_d-K_d)\varphi[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n]}$.

*Deriving Equilibrium $\tau_h^{rival}$.* Using equation A.7 for $\tau_h^{rival}$ and the solutions for $\theta_h^{rival}, \tau_{-h}^{own}$, we write $\tau_h^{rival} = \gamma_\pi\pi_n - \gamma_\zeta\zeta$ for $\gamma_\pi = \frac{\sigma}{\kappa_n} - \frac{\sigma+\kappa_n}{\kappa_n}\frac{1}{2}\eta_\pi - \frac{\sigma(\kappa_n-\sigma-\xi)}{\kappa_n\xi}\beta_\pi$ and $\gamma_\zeta = \frac{\sigma+\kappa_n}{\kappa_n}\frac{1}{2}\eta_\zeta + \frac{\sigma(\kappa_n-\sigma-\xi)}{\kappa_n\xi}\beta_\zeta$.

### A.1.2 Proof of Proposition 2

Starting from the country $n$ FOC (equation A.3) and substituting in $p_h$,

$$(\kappa_n + K_n - \sigma)x_h = \pi_n - \tau_h^{own} - \frac{1}{2}\theta_{-h}^{rival} - \tau_{-h}^{rival}$$

Using the hegemon's optimum, $t_h = \frac{1}{\sigma}(\tau_h^{rival} + \frac{1}{2}\theta_h^{rival})$ and $\tau_h^{own} = -\xi x_h$, we have $t_h = \frac{1}{\sigma}\pi_n - \frac{1}{\sigma}(\kappa_n - \sigma - \xi + K_n)x_h$. Substituting in optimal $x_h$ derived in Proposition 1, we have

$$t_h = \frac{\left(4K_n - (\kappa_d - K_d) + (\kappa_d - K_d)\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n - \sigma)}\right)\pi_n - \left(\kappa_n - \sigma - \xi + K_n\right)\zeta}{2(\kappa_d - K_d)\varphi\left((\kappa_n - \sigma)(\kappa_n - \sigma - \xi) + K_n\kappa_n\right)}. \tag{A.9}$$

To show that $t_h$ has a single crossing property, observe that its denominator is strictly positive. We show single crossing by showing that the numerator $\mathcal{N}_h(K_n) = \Big(4K_n - (\kappa_d -$

$K_d)+(\kappa_d-K_d)\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\Big)\pi_n-\Big(\kappa_n-\sigma-\xi+K_n\Big)\zeta$, is increasing in $K_n$ and satisfies $\mathcal{N}_h(0)<0$.

To show that the numerator is increasing in $K_n$, we have

$$\frac{d\mathcal{N}_h(K_n)}{dK_n}=\left(4+(\kappa_d-K_d)\frac{\sigma^2}{\xi(\kappa_n-\sigma)}\frac{d[K_n\beta_\theta^M]}{dK_n}\right)\pi_n-\zeta>(\kappa_d-K_d)\frac{\sigma^2}{\xi(\kappa_n-\sigma)}\frac{d[K_n\beta_\theta^M]}{dK_n}\pi_n$$

which follows from $\zeta\leq 0$ and $\pi_n>0$. To show that $\frac{\partial[K_n\beta_\theta^M]}{\partial K_n}\geq 0$, we have

$$\frac{\partial[K_n\beta_\theta^M]}{\partial K_n}=\xi(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)\frac{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2+K_n^2\kappa_n^2}{\left((\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2\right)^2}>0$$

Therefore, $\mathcal{N}_h$ is increasing in $K_n$. We conclude by showing that $\mathcal{N}_h(0)<0$. We have $\mathcal{N}_h(0)=-(\kappa_d-K_d)\pi_n-\Big(\kappa_n-\sigma-\xi\Big)\zeta$ so we need to show that $(\kappa_d-K_d)\pi_n+\Big(\kappa_n-\sigma-\xi\Big)\zeta>0$. To show this, we show that $i_{-h}>0$ at $K_n=0$ implies precisely this condition. Using $i_h(0)=\frac{1}{2}x_h(0)+\frac{1}{2}\frac{1}{\kappa_d-K_d}\zeta-\frac{1}{2}\frac{1}{\kappa_d-K_d}\theta_{-h}^{rival}(0)$ and Proposition 1, we have

$$\begin{aligned}i_h(0)=&\frac{1}{2}\frac{\Big(4(\kappa_n-\sigma)+(\kappa_d-K_d)(1-\beta_\theta^M\sigma)\Big)\pi_n+\sigma\zeta}{2(\kappa_d-K_d)\varphi(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}+\frac{1}{2}\frac{1}{\kappa_d-K_d}\zeta\\&-\frac{1}{2}\frac{1}{\kappa_d-K_d}\frac{1}{\varphi}\left[\frac{1}{(\kappa_n-\sigma-\xi)}\pi_n+\frac{1}{\kappa_d-K_d}\zeta\right]\end{aligned}$$

Using at $K_n=0$ that $\varphi=\psi=\frac{2}{\kappa_d-K_d}+\frac{1}{2}\frac{1-\beta_\theta^M\sigma}{\kappa_n-\sigma}-\frac{1}{2}\sigma\frac{1}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}$ and $\beta_\theta^M=\frac{\xi}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}$,

$$i_{-h}=\frac{1}{4}\frac{1}{\psi}\left\{\frac{2}{\kappa_d-K_d}+\frac{1-\beta_\theta^M\sigma}{\kappa_n-\sigma}\right\}\left(\frac{1}{(\kappa_n-\sigma-\xi)}\pi_n+\frac{1}{\kappa_d-K_d}\zeta\right)$$

Finally, since $\psi>0$ we have

$$\begin{aligned}0<&\frac{2}{\kappa_d-K_d}+\frac{1}{2}\frac{1-\beta_\theta^M\sigma}{\kappa_n-\sigma}-\frac{1}{2}\sigma\frac{1}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}\\=&\frac{\kappa_n-\sigma+\xi}{\xi}\left(\frac{1}{\kappa_d-K_d}+\frac{1}{2}\frac{1-\beta_\theta^M\sigma}{\kappa_n-\sigma}\right)-\frac{\kappa_n-\sigma-\xi}{\xi}\frac{1}{\kappa_d-K_d}-\frac{1}{2}\frac{1}{\xi}\\<&\frac{\kappa_n-\sigma+\xi}{\xi}\left(\frac{1}{\kappa_d-K_d}+\frac{1}{2}\frac{1-\beta_\theta^M\sigma}{\kappa_n-\sigma}\right)\end{aligned}$$

Therefore, interiority $i_{-h}>0$ requires that $\frac{1}{(\kappa_n-\sigma-\xi)}\pi_n+\frac{1}{\kappa_d-K_d}\zeta>0$. Hence $\mathcal{N}_h(0)<0$ and $t_h<0$ when $K_n=0$. Therefore, $t_h$ also has single crossing in $K_n$ (note that the region of containment may be empty). This concludes the proof.

### A.1.3 Proof of Proposition 3

Using the proof of Proposition 2, we have $\frac{dt_h}{d\zeta} = -\frac{\kappa_n-\sigma-\xi+K_n}{2(\kappa_d-K_d)\varphi\left((\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n\right)} < 0.$

### A.1.4 Proof of Proposition 4

Starting from $t_h$ (equation A.9), we rearrange $\varphi$ to write

$$\varphi = \frac{2}{\kappa_d - K_d} + \frac{1}{2}\frac{(\kappa_n - \sigma - \xi + K_n)(1-\beta_\theta^M\sigma) - \sigma + \frac{\sigma^2 K_n}{\xi(\kappa_n-\sigma)}\beta_\theta^M\sigma}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+(K_n\kappa_n)}$$

We then write the denominator of $t_h$ as

$$\mathcal{D} = \left[4K_n-(\kappa_d-K_d)+(\kappa_d-K_d)\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]\sigma+(\kappa_n-\sigma-\xi+K_n)\left[4(\kappa_n-\sigma)+(\kappa_d-K_d)(1-\beta_\theta^M\sigma)\right].$$

Recall from the proof of Proposition 2 the notation $t_h = \frac{\mathcal{N}}{\mathcal{D}}$ for $\mathcal{N} \equiv \mathcal{N}_h(K_n) = \Big(4K_n - (\kappa_d - K_d) + (\kappa_d - K_d)\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\Big)\pi_n - \Big(\kappa_n - \sigma - \xi + K_n\Big)\zeta$. To ease exposition, write

$$\Omega = 4K_n - (\kappa_d - K_d) + (\kappa_d - K_d)\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}$$

$$\Lambda = 4(\kappa_n - \sigma) + (\kappa_d - K_d)(1-\beta_\theta^M\sigma)$$

so that $\mathcal{D} = \Omega\sigma + (\kappa_n - \sigma - \xi + K_n)\Lambda$ and $\mathcal{N} = \Omega\pi_n - \Big(\kappa_n - \sigma - \xi + K_n\Big)\zeta$. Differentiating, $\mathcal{D}^2\frac{dt_h}{d\xi} = \frac{d\mathcal{N}}{d\xi}\mathcal{D} - \frac{d\mathcal{D}}{d\xi}\mathcal{N}$. Since $\frac{d\mathcal{N}}{d\xi} = \frac{d\Omega}{d\xi}\pi_n + 2\zeta$ and $\frac{d\mathcal{D}}{d\xi} = \Omega + \frac{d\Omega}{d\xi}\sigma - 2\Lambda + (\kappa_n - \sigma - \xi + K_n)\frac{d\Lambda}{d\xi}$,

$$\begin{aligned}\mathcal{D}^2\frac{dt_h}{d\xi} =& \left(\frac{d\Omega}{d\xi}\pi_n + 2\zeta\right)\Big(\Omega\sigma + (\kappa_n - \sigma - \xi + K_n)\Lambda\Big) \\ &- \left(\Omega + \frac{d\Omega}{d\xi}\sigma - 2\Lambda + (\kappa_n - \sigma - \xi + K_n)\frac{d\Lambda}{d\xi}\right)\Big(\Omega\pi_n - \Big(\kappa_n - \sigma - \xi + K_n\Big)\zeta\Big)\end{aligned}$$

Using $\frac{d\Lambda}{d\xi} = -4 - (\kappa_d - K_d)\frac{d[\beta_\theta^M\sigma]}{d\xi}$ and $\frac{d\Omega}{d\xi} = (\kappa_d - K_d)\frac{d}{d\xi}\left[\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]$, simplifying yields

$$\mathcal{D}^2\frac{dt_h}{d\xi} = -\left[\Omega + (\kappa_n - \sigma - \xi + K_n)\frac{d\Lambda}{d\xi}\right]\mathcal{N} + \left[2\Omega + \frac{d\Omega}{d\xi}(\kappa_n - \sigma - \xi + K_n)\right]x_h\mathcal{D}$$

which uses $x_h = \frac{\Lambda\pi_n + \sigma\zeta}{\Omega\sigma + (\kappa_n - \sigma - \xi + K_n)\Lambda}$ (Proposition 1). The proof strategy is as follows:

1. In Step 1, we show that $\Omega + (\kappa_n - \sigma - \xi + K_n)\frac{d\Lambda}{d\xi} < 0$, so that the first term is negative

when $\mathcal{N} < 0$ and positive when $\mathcal{N} > 0$. Combined with Proposition 2, this means that the first term is negative for $K_n < \overline{K}_n$ and positive for $K_n > \overline{K}_n$.

2. In Step 2, we show that $2\Omega + \frac{d\Omega}{d\xi}(\kappa_n - \sigma - \xi + K_n)$ is negative at $K_n = 0$, increasing in $K_n$, and crosses above zero.

*Step 1.* To verify that $B_{\mathcal{N}} \equiv -\left[\Omega + (\kappa_n - \sigma - \xi + K_n)\frac{d\Lambda}{d\xi}\right] > 0$, substituting in we have

$$\begin{aligned}
B_{\mathcal{N}} =& 4(\kappa_n - \sigma - \xi) + (\kappa_d - K_d)\left[1 + (\kappa_n - \sigma - \xi + K_n)\frac{d[\beta_\theta^M \sigma]}{d\xi} - \frac{K_n \beta_\theta^M \sigma^2}{\xi(\kappa_n - \sigma)}\right] \\
>& (\kappa_d - K_d)\beta_\theta^M \sigma\left[(\kappa_n - \sigma - \xi + K_n)\frac{1}{\beta_\theta^M \sigma}\frac{d[\beta_\theta^M \sigma]}{d\xi} - \frac{K_n \sigma}{\xi(\kappa_n - \sigma)}\right]
\end{aligned}$$

We have

$$\begin{aligned}
\frac{1}{\beta_\theta^M \sigma}\frac{d[\beta_\theta^M \sigma]}{d\xi} =& \frac{1}{\frac{\xi(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)\sigma}{(\kappa_n - \sigma)^2(\kappa_n - \sigma - \xi)^2 - (K_n \kappa_n)^2}}\frac{d}{d\xi}\left[\frac{\xi(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)\sigma}{(\kappa_n - \sigma)^2(\kappa_n - \sigma - \xi)^2 - (K_n \kappa_n)^2}\right] \\
=& \frac{\xi + \sigma}{\xi\sigma} - \frac{(\kappa_n - \sigma)^2(\kappa_n - \sigma - \xi)^2 + (K_n \kappa_n)^2}{(\kappa_n - \sigma)^2(\kappa_n - \sigma - \xi)^2 - (K_n \kappa_n)^2}\frac{\frac{d[(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)]}{d\xi}}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)} \\
>& \frac{1}{\xi} + \frac{1}{\sigma}
\end{aligned}$$

which follows from $\frac{d[(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)]}{d\xi} < 0$. Therefore since $\kappa_n - 2\sigma = \kappa_n - \sigma - \xi + \frac{\kappa_d + K_d}{2} > 0$,

$$B_{\mathcal{N}} > (\kappa_d - K_d)\beta_\theta^M \sigma\left[(\kappa_n - \sigma - \xi)\left(\frac{1}{\xi} + \frac{1}{\sigma}\right) + K_n\left(\frac{1}{\xi} + \frac{1}{\sigma} - \frac{\sigma}{\xi(\kappa_n - \sigma)}\right)\right] > 0$$

concluding Step 1.

*Step 2.* We next show that $B_2 = 2\Omega + \frac{d\Omega}{d\xi}(\kappa_n - \sigma - \xi + K_n)$ is increasing in $K_n$, negative at $K_n = 0$, and eventually turns positive. We have

$$B_2 = 2\left(4K_n - (\kappa_d - K_d) + (\kappa_d - K_d)\frac{K_n \beta_\theta^M \sigma^2}{\xi(\kappa_n - \sigma)}\right) + (\kappa_d - K_d)\frac{d}{d\xi}\left[\frac{K_n \beta_\theta^M \sigma^2}{\xi(\kappa_n - \sigma)}\right](\kappa_n - \sigma - \xi + K_n)$$

First, we have $B_2|_{K_n = 0} = -2(\kappa_d - K_d) < 0$. Next, we have

$$\begin{aligned}
\frac{dB_2}{dK_n} =& 2\left(4 + (\kappa_d - K_d)\frac{d}{dK_n}\left[\frac{K_n \beta_\theta^M \sigma^2}{\xi(\kappa_n - \sigma)}\right]\right) + (\kappa_d - K_d)\frac{d}{d\xi}\left[\frac{K_n \beta_\theta^M \sigma^2}{\xi(\kappa_n - \sigma)}\right] \\
&+ (\kappa_d - K_d)\frac{d^2}{d\xi dK_n}\left[\frac{K_n \beta_\theta^M \sigma^2}{\xi(\kappa_n - \sigma)}\right](\kappa_n - \sigma - \xi + K_n)
\end{aligned}$$

We therefore look to show that $\frac{d}{dK_n}\left[\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]\geq 0$, $\frac{d}{d\xi}\left[\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]\geq 0$, and $\frac{d^2}{d\xi dK_n}\left[\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]\geq 0$, which together imply that $\frac{dB_2}{dK_n}>0$. First, we have

$$\begin{aligned}
\frac{d}{d\xi}\left[\frac{\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right] =& \frac{\frac{d}{d\xi}\left[(\kappa_n-\sigma-\xi)\sigma^2\right]-\frac{(\kappa_n-\sigma-\xi)\sigma^2\frac{d}{d\xi}\left[(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2\right]}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2}}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2} \\
=& \frac{(\kappa_n-\sigma-\xi)\sigma^2\left\{\frac{2}{\sigma}+\frac{2(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)\left((\kappa_n-\sigma-\xi)+2(\kappa_n-\sigma)\right)}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2}-\frac{2}{\kappa_n-\sigma-\xi}\right\}}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2} \\
\geq& \frac{(\kappa_n-\sigma-\xi)\sigma^2}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2}\left\{\frac{2}{\sigma}+\frac{2(\kappa_n-\sigma-\xi)+2(\kappa_n-\sigma)}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}\right\} \\
>& 0
\end{aligned}$$

Next, since $\frac{d\beta_\theta^M}{dK_n}\geq 0$ we have $\frac{d}{dK_n}\left[\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]=\frac{\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}+\frac{K_n\sigma^2}{\xi(\kappa_n-\sigma)}\frac{d\beta_\theta^M}{dK_n}>0$. Finally, we have

$$\begin{aligned}
\frac{d^2}{dK_nd\xi}\left[\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right] &= \frac{d}{d\xi}\left[\frac{\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]+K_n\frac{d^2}{dK_nd\xi}\left[\frac{\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right] \\
&> K_n\frac{d}{dK_n}\left[\frac{d}{d\xi}\left[\frac{\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]\right]\geq 0
\end{aligned}$$

which follows since $\frac{d}{dK_n}\left[\frac{1}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2-(K_n\kappa_n)^2}\right]\geq 0$ and since we showed above that $\frac{d}{d\xi}\left[\frac{\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right]>0$. Therefore, we have $\frac{dB_2}{dK_n}>0$.

Finally, we have $B_2\geq 2\Big(4K_n-(\kappa_d-K_d)\Big)$, so $B_2>0$ for $K_n\geq\frac{\kappa_d-K_d}{4}$.

*Summarizing the argument.* We have shown that $\mathcal{D}^2\frac{dt_h}{d\xi}=B_{\mathcal{N}}\mathcal{N}+B_2x_h\mathcal{D}$ where $B_{\mathcal{N}}>0$, $B_2|_{K_n=0}<0$, $B_2|_{K_n=\frac{\kappa_d-K_d}{4}}>0$, $\frac{dB_2}{dK_n}>0$, and $x_h,\mathcal{D}>0$. From Proposition 2, there is a threshold $\overline{K}_n$ such that $t_h,\mathcal{N}<0 \iff K_n<\overline{K}_n$. Accordingly, there is a threshold $K_\ell\leq\overline{K}_n$ and a threshold $K_u\geq\overline{K}_n$ (the regions might be empty) such that $t_h,\frac{dt_h}{d\xi}<0$ for $K_n<K_\ell$ and $t_h,\frac{dt_h}{d\xi}>0$ for $K_n>K_u$. This concludes the proof.

Online Appendix for
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# B.1 Geopolitical Rivalry

## B.1.1 Proof of Proposition 5

Using equation 9, for interior allocations

$$v_h(z) = -\rho\sqrt{\text{Power}_{-h}} = -\hat{\rho}\left[\kappa_n(A_n - \zeta_n - p_{-h} - \tau_h^{rival}) - K_n(A_n - \zeta_n - p_h - \tau_h^{own})\right]$$

where $\hat{\rho} = \frac{1}{\sqrt{2\kappa_n(\kappa_n^2 - K_n^2)}}\rho$. Using $n$'s FOC, $\kappa_n x_h + K_n x_{-h} = A_n - \zeta_n - p_h - \tau_h^{own} - \tau_{-h}^{rival}$, we have $v_h(z) = -\hat{\rho}\left[(\kappa_n^2 - K_n^2)x_{-h} + \kappa_n\tau_{-h}^{own} - K_n\tau_{-h}^{rival}\right]$. Following the proof of Proposition 1, we write $h$'s optimization problem in the Middle as

$$\begin{aligned}\max_x \mathcal{W}_h = \tilde{p}_e\bar{e} + \theta_h^{rival} i_{-h} + \tau_{hd}^{rival} i_h + \theta_{hd}^n y_h + \Pi_{d_h} - \hat{\rho}\left[(\kappa_n^2 - K_n^2)x_{-h} + \kappa_n\tau_{-h}^{own} - K_n\tau_{-h}^{rival}\right] \\ + \sum_{k\in\mathcal{H}}\left[(A_n - \zeta_n - p_k)x_k - \frac{1}{2}\kappa_n x_k^2\right] - \tau_{-h}^{rival}x_h - \tau_{-h}^{own}x_{-h} - K_n\prod_{k\in\mathcal{H}}x_k \\ - \max_{x_{-h}^o}\left\{(A_n - \zeta_n - p_{-h} - \tau_{-h}^{own})x_{-h}^o - \frac{1}{2}\kappa_n(x_{-h}^o)^2\right\}\end{aligned}$$

internalizing the same relationships for $p_h, i_h, l_h, x_h, \Pi_{d_h}$ as from that proof. The first order condition in $x_h$ is the same as before, $\hat{\tau}_h^{own} = -\xi x_h$. The first order condition in $x_{-h}$ is also the same up to the additional derivative in $v_h(z)$, $\tau_h^{rival} = -\frac{1}{2}\theta_h^{rival} + \sigma(x_{-h}^o - x_{-h}) + \hat{\rho}(\kappa_n^2 - K_n^2)$. Applying the same steps to substitute out for $x_{-h}^o$, $\tau_h^{rival}$, and $x_h = -\frac{1}{\xi}\hat{\tau}_h^{own}$,

$$\hat{\tau}_h^{own} = -\frac{\xi}{\kappa_n - \sigma - \xi}\pi_n - \frac{\sigma\xi\frac{1}{2}\left[\theta_{-h}^{rival} - 2\frac{\kappa_n}{\sigma}\hat{\rho}(\kappa_n^2 - K_n^2)\right]}{(\kappa_n - \sigma - \xi)(\kappa_n - \sigma)} - \frac{K_n\kappa_n}{(\kappa_n - \sigma - \xi)(\kappa_n - \sigma)}\hat{\tau}_{-h}^{own}.$$

And finally, substituting in the counterpart equation for $\hat{\tau}_{-h}^{own}$ and substituting out for $\hat{\rho}$,

$$\hat{\tau}_h^{own} = -\beta_\pi^M\pi_n - \beta_\theta^M\sigma\left[\frac{1}{2}\theta_{-h}^{rival} - \frac{K_n\kappa_n}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\frac{1}{2}\theta_h^{rival}\right] + \frac{\beta_\pi^M\sqrt{\frac{1}{2}\kappa_n(\kappa_n^2 - K_n^2)}}{\kappa_n - \sigma}\rho$$

The wedge on the rival's good is

$$\tau_h^{rival} = -\frac{\kappa_n + \sigma}{\kappa_n}\frac{1}{2}\theta_h^{rival} + \frac{\sigma}{\kappa_n}\pi_n + \frac{\sigma(\kappa_n - \sigma - \xi)}{\kappa_n \xi}\hat{\tau}_{-h}^{own} + \left(\frac{\kappa_n^2 - K_n^2}{2\kappa_n}\right)^{1/2}\rho$$

**Optimal Beginning Export Wedge.** As in the proof of Proposition 1, we are solving $\max_{\tau_{hd}^{rival}, \theta_{hd}^n, \theta_h^{rival}}\{\max_x \mathcal{W}_h\}$. Importantly, the rivalry term $v_h(z) = -\hat{\rho}[(\kappa_n^2 - K_n^2)x_{-h} + \kappa_n \tau_{-h}^{own} - K_n \tau_{-h}^{rival}]$ does not directly depend on the wedges $\tau_{hd}^{rival}, \theta_{hd}^n$ (i.e., the rival's wedges depend on $\hat{\tau}_h^{own}$). Applying Envelope Theorem, the first order condition in $\tau_{hd}^{rival}$ is $0 = i_h + \tau_{hd}^{rival}\frac{\partial i_h}{\partial \tau_{hd}^{rival}} - i_h$ as before, so that $\tau_{hd}^{rival} = 0$. Similarly, the FOC in $\theta_{hd}^n$ is $0 = y_h - y_h + \frac{\partial p_h}{\partial \theta_{hd}^n}(y_h - x_h)$, which holds identically. We normalize $\theta_{hd}^n = 0$ as before, implying that $\tau_h^{own} = \hat{\tau}_h^{own}$ as before. Following the proof of Proposition 1, the FOC in $\theta_h^{rival}$ is

$$0 = i_{-h} + \theta_h^{rival}\frac{\partial i_{-h}}{\partial \theta_h^{rival}} + (x_{-h}^o - x_{-h})\left(\frac{\partial p_{-h}}{\partial \theta_h^{rival}} + \frac{\partial \tau_{-h}^{own}}{\partial \theta_h^{rival}}\right) - x_h\frac{\partial \tau_{-h}^{rival}}{\partial \theta_h^{rival}} - \hat{\rho}\left[\kappa_n\frac{\partial \tau_{-h}^{own}}{\partial \theta_h^{rival}} - K_n\frac{\partial \tau_{-h}^{rival}}{\partial \theta_h^{rival}}\right]$$

Following the same substitutions as in the proof of Proposition 1 and using $\frac{\partial \tau_{-h}^{own}}{\partial \theta_h^{rival}} = -\frac{1}{2}\beta_\theta^M \sigma$ and $\frac{\partial \tau_{-h}^{rival}}{\partial \theta_h^{rival}} = \frac{1}{2}\frac{K_n \sigma}{\xi(\kappa_n - \sigma)}\beta_\theta^M \sigma$,[1] we obtain the counterpart of equation A.8,

$$\begin{aligned}\frac{2}{\kappa_d - K_d}\theta_h^{rival} + \frac{1}{2}\frac{1 - \beta_\theta^M \sigma}{\kappa_n}\theta_h^{rival} = &-\frac{1}{\xi}\tau_{-h}^{own} + \frac{1 - \beta_\theta^M \sigma}{\kappa_n}\pi_n + \frac{(1 - \beta_\theta^M \sigma)(\kappa_n - \sigma - \xi)}{\xi \kappa_n}\tau_{-h}^{own} \\ &+ \frac{\zeta}{\kappa_d - K_d} + \frac{\tau_h^{own} K_n \sigma \beta_\theta^M \sigma}{\xi^2(\kappa_n - \sigma)} + \hat{\rho}\left[\kappa_n + \frac{K_n^2 \sigma}{\xi(\kappa_n - \sigma)}\right]\beta_\theta^M \sigma\end{aligned}$$

The convexity and stability conditions are the same as before, given the rivalry term $\rho$ appears only in the constant term. We therefore move directly to solving the symmetric case. Employing symmetry, $\tau_h^{own} = \tilde{\tau}_h^{own} + \frac{\beta_\pi^M \sqrt{\frac{1}{2}\kappa_n(\kappa_n^2 - K_n^2)}}{\kappa_n - \sigma}\rho$, where $\tilde{\tau}_h^{own} = -\beta_\pi^M[\pi_n + \frac{1}{2}\frac{\sigma}{\kappa_n - \sigma}\theta_h^{rival}]$ is the form from the baseline model. Substituting in,

$$\begin{aligned}\frac{2}{\kappa_d - K_d}\theta_h^{rival} + \frac{1}{2}\frac{1 - \beta_\theta^M \sigma}{\kappa_n}\theta_h^{rival} = &\left[-\frac{1}{\xi} + \frac{\kappa_n - \sigma - \xi}{\xi \kappa_n}(1 - \beta_\theta^M \sigma) + \frac{1}{\xi}\frac{K_n \sigma}{\xi(\kappa_n - \sigma)}\beta_\theta^M \sigma\right]\tilde{\tau}_h^{own} \\ &+ \frac{1}{\kappa_n}\pi_n(1 - \beta_\theta^M \sigma) + \frac{1}{\kappa_d - K_d}\left(\zeta + (\kappa_d - K_d)\beta_\rho^B \rho\right)\end{aligned}$$

[1] Note that $\sigma(x_{-h}^o - x_{-h}) = \tau_h^{rival} + \frac{1}{2}\theta_h^{rival} - \hat{\rho}(\kappa_n^2 - K_n^2) = -\frac{\sigma}{\kappa_n}\frac{1}{2}\theta_h^{rival} + \frac{\sigma}{\kappa_n}\pi_n + \frac{\sigma(\kappa_n - \sigma - \xi)}{\kappa_n \xi}\hat{\tau}_{-h}^{own}$.

where $\beta_\rho^B = \frac{-(\sigma+\xi)+\frac{\kappa_n K_n\sigma-(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)\xi}{\xi(\kappa_n-\sigma)}\beta_\theta^M\sigma}{\kappa_n\xi}\frac{\beta_\pi^M\sqrt{\frac{1}{2}\kappa_n(\kappa_n^2-K_n^2)}}{\kappa_n-\sigma}+\frac{\left[\kappa_n+\frac{K_n^2\sigma}{\xi(\kappa_n-\sigma)}\right]\beta_\theta^M\sigma}{\sqrt{2\kappa_n(\kappa_n^2-K_n^2)}}$. Note that this is identical to the baseline model with $\zeta$ replaced by $\zeta+(\kappa_d-K_d)\beta_\rho^B\rho$, and so we obtain

$$\theta_h^{rival}=\frac{1}{\varphi}\left[\frac{(\kappa_n-\sigma)+K_n\left(1-\frac{\sigma+\xi}{\xi}\beta_\theta^M\sigma\right)}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n}\pi_n+\frac{1}{\kappa_d-K_d}\zeta+\beta_\rho^B\rho\right].$$

*Derivation of $x_h$.* Substituting $\theta_h^{rival}$ into $\tau_h^{own}$ and using $x_h=-\frac{1}{\xi}\tau_h^{own}$,

$$\begin{aligned}x_h=&\frac{\left(4(\kappa_n-\sigma)+(\kappa_d-K_d)(1-\beta_\theta^M\sigma)\right)\pi_n+\sigma\zeta}{2(\kappa_d-K_d)\varphi\left[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n\right]}\\&+\frac{\sqrt{\frac{1}{2}\kappa_n(\kappa_n^2-K_n^2)}\left(-4-\frac{(\kappa_d-K_d)}{\kappa_n}+\frac{\sigma(\kappa_d-K_d)\left[\kappa_n+\frac{K_n^2\sigma}{\xi(\kappa_n-\sigma)}+\frac{\kappa_n^2-K_n^2}{\sigma}\right]\beta_\theta^M\sigma}{\kappa_n(\kappa_n^2-K_n^2)}\right)\rho}{2(\kappa_d-K_d)\varphi\left[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n\right]}\end{aligned}$$

*Derivation of $t_h$.* Starting from the country $n$ FOC at symmetric allocations $(\kappa_n-\sigma-\xi+K_n)x_h=\pi_n-\frac{1}{2}\theta_{-h}^{rival}-\tau_{-h}^{rival}$ and substituting in $\tau_h^{rival}+\frac{1}{2}\theta_h^{rival}=\sigma t_h+\hat{\rho}(\kappa_n^2-K_n^2)$, we have $t_h=\frac{1}{\sigma}\pi_n-\frac{1}{\sigma}(\kappa_n-\sigma-\xi+K_n)x_h-\frac{1}{\sigma}\sqrt{\frac{\kappa_n^2-K_n^2}{2\kappa_n}}\rho$. Substituting in for $x_h$, we obtain

$$t_h=\frac{\left(4K_n-(\kappa_d-K_d)+(\kappa_d-K_d)\frac{K_n\beta_\theta^M\sigma^2}{\xi(\kappa_n-\sigma)}\right)\pi_n-\left(\kappa_n-\sigma-\xi+K_n\right)\zeta+\frac{\sqrt{\frac{1}{2}\kappa_n(\kappa_n^2-K_n^2)}}{\kappa_n}\Gamma\rho}{2(\kappa_d-K_d)\varphi\left((\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n\right)}$$

where $\Gamma=4(\kappa_n-\sigma-\xi)+(\kappa_d-K_d)(1-\Theta)$ and $\Theta=\left((\kappa_n-\sigma-\xi+K_n)\kappa_n+\left(\kappa_n^2+(\kappa_n-\sigma-\xi)K_n\right)\frac{K_n\sigma}{\xi(\kappa_n-\sigma)}\right)\frac{\beta_\theta^M\sigma}{\kappa_n^2-K_n^2}$. To show $\frac{dt_h}{d\rho}>0$, we need to show that $\Gamma>0$. The proof is divided into two cases.

*Case 1:* $\Theta<1+\frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}$ In this case, we have

$$(\kappa_d-K_d)(\Theta-1)<(\kappa_d-K_d)\frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}=4\frac{\kappa_d-K_d}{\kappa_d+K_d}(\kappa_n-\sigma-\xi)\leq 4(\kappa_n-\sigma-\xi)$$

and therefore $\Gamma>0$.

*Case 2:* $\Theta\geq 1+\frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}$ To show that $\Gamma>0$, we aim to show that $\frac{\Theta-1}{\kappa_n-\sigma-\xi}<\frac{4}{\kappa_d-K_d}$. Since $\psi>0$, then $\Psi<\frac{4}{\kappa_d-K_d}$ for $\Psi=\left[\sigma+2\xi+\left[(\kappa_n-\sigma-\xi)+\frac{K_n^2\kappa_n^2\sigma}{\xi(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)}\right]\beta_\theta^M\sigma\right]\frac{\beta_\theta^M\sigma}{\kappa_n\xi}-\frac{1}{\kappa_n}$. We aim to show that $\frac{\Theta-1}{\kappa_n-\sigma-\xi}<\Psi$, from which the proof follows. Defining $B=\frac{\Theta}{\beta_\theta^M\sigma}$

(we show below that $B > 0$), since $\Theta \geq 1 + \frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}$, then $\beta_\theta^M \sigma \geq \frac{1+\frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}}{B}$. Therefore,

$$\begin{aligned}
&\Psi - \frac{\Theta - 1}{\kappa_n - \sigma - \xi} \\
&= \left[\sigma + 2\xi + \left[(\kappa_n - \sigma - \xi) + \frac{K_n^2\kappa_n^2\sigma}{\xi(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)}\right]\beta_\theta^M\sigma\right]\frac{\beta_\theta^M\sigma}{\kappa_n\xi} \\
&\qquad + \frac{\sigma+\xi}{\kappa_n(\kappa_n-\sigma-\xi)} - \frac{B\beta_\theta^M\sigma}{\kappa_n-\sigma-\xi} \\
&> \left\{\frac{1}{\kappa_n\xi}\left[(\kappa_n - \sigma - \xi) + \frac{K_n^2\kappa_n^2\sigma}{\xi(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)}\right]\right. \\
&\qquad \left.\left(1 + \frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}\right) + \frac{\sigma+2\xi}{\kappa_n\xi}B - \frac{B^2}{\kappa_n-\sigma-\xi}\right\}\frac{1}{B}\beta_\theta^M\sigma \\
&> \left\{\frac{1}{\xi}\left(1 + \frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}\right) + \frac{2}{\kappa_n-\sigma-\xi}B - \frac{\kappa_n}{\kappa_n-\sigma-\xi}\frac{B^2}{\kappa_n-\sigma-\xi}\right\}\frac{\kappa_n-\sigma-\xi}{\kappa_n}\frac{1}{B}\beta_\theta^M\sigma \\
&= \left\{\frac{\kappa_n}{\xi}\left(1 + \frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}\right) + 2\mathcal{B} - \mathcal{B}^2\right\}\frac{\kappa_n-\sigma-\xi}{\kappa_n^2}\frac{1}{B}\beta_\theta^M\sigma.
\end{aligned}$$

where we have defined $\mathcal{B} = B\frac{\kappa_n}{\kappa_n-\sigma-\xi}$. Therefore we need to show that $g(\mathcal{B}) > 0$ for $g(\mathcal{B}) = \frac{\kappa_n}{\xi}\left(1 + \frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}\right) + 2\mathcal{B} - \mathcal{B}^2$. Note that we have

$$B - \frac{\kappa_n-\sigma-\xi}{\kappa_n} = \frac{K_n\kappa_n^2 + \kappa_n^2\frac{K_n\kappa_n\sigma}{\xi(\kappa_n-\sigma)} + (\kappa_n-\sigma-\xi)\frac{K_n^2\kappa_n\sigma}{\xi(\kappa_n-\sigma)} + (\kappa_n-\sigma-\xi)K_n^2}{\kappa_n(\kappa_n^2-K_n^2)} \geq 0$$

and therefore $\mathcal{B} \geq 1$. Therefore, $g'(\mathcal{B}) = 2(1-\mathcal{B}) \leq 0$ within the relevant range of parameters. The positive root of $g(\mathcal{B})$ is given by $\mathcal{B}^+ = 1 + \sqrt{1 + \frac{\kappa_n}{\xi}\left(1 + \frac{2(\kappa_n-\sigma-\xi)}{\xi-\sigma}\right)}$ (the lower root is negative), so we need to show that $\mathcal{B} < \mathcal{B}^+$. Since $\kappa_n K_n \leq (\kappa_n-\sigma-\xi)(\kappa_n-\sigma)$,

$$\begin{aligned}
\mathcal{B} - 1 =& \frac{(\kappa_n-\sigma-\xi+K_n)\kappa_n + \left(\kappa_n^2 + (\kappa_n-\sigma-\xi)K_n\right)\frac{K_n\sigma}{\xi(\kappa_n-\sigma)}}{\kappa_n^2-K_n^2}\frac{\kappa_n}{\kappa_n-\sigma-\xi} - 1 \\
\leq& \frac{\frac{(\kappa_n-\sigma-\xi)^2(\kappa_n-\sigma)^2}{\kappa_n^4} + \frac{\frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n}}{\kappa_n-\sigma-\xi} + \left(\frac{\kappa_n}{\kappa_n-\sigma-\xi} + \frac{\frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n}}{\kappa_n}\right)\frac{\frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n}\sigma}{\xi(\kappa_n-\sigma)}}{\left(1 - \frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n^2}\right)\left(1 + \frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n^2}\right)} \\
=& \frac{\left(\frac{\kappa_n-\sigma}{\kappa_n} + \frac{\sigma}{\xi}\right)\left(1 + \frac{(\kappa_n-\sigma-\xi)^2(\kappa_n-\sigma)}{\kappa_n^3}\right)}{\left(1 - \frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n^2}\right)\left(1 + \frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n^2}\right)} \leq \frac{\frac{\kappa_n-\sigma}{\kappa_n} + \frac{\sigma}{\xi}}{1 - \frac{(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n^2}} < \frac{\kappa_n\left(1 + \frac{1}{2}\frac{\sigma}{\xi}\right)}{\sigma+\xi}
\end{aligned}$$

where the last inequality follows since $(\kappa_n-\sigma)(\sigma+\xi)-\kappa_n\sigma = \xi(\kappa_n-\sigma-\xi)+(\xi-\sigma)(\sigma+\xi) > 0$. Therefore, $\mathcal{B} < 1+\frac{\kappa_n}{\sigma+\xi}\left(1+\frac{1}{2}\frac{\sigma}{\xi}\right)$. It suffices to show $1+\frac{\kappa_n}{\sigma+\xi}\left(1+\frac{1}{2}\frac{\sigma}{\xi}\right) \leq \mathcal{B}^+$, that is,

$$\Delta\mathcal{B} \equiv 1+\left(1+\hat{\sigma}+\hat{\kappa}_n\right)\left[1+\frac{2\hat{\kappa}_n}{1-\hat{\sigma}}-\left(1+\hat{\sigma}+\hat{\kappa}_n\right)\left(\frac{1+\frac{1}{2}\hat{\sigma}}{\hat{\sigma}+1}\right)^2\right] > 0$$

where $\hat{\sigma} = \frac{\sigma}{\xi} < 1$ and $\hat{\kappa}_n = \frac{\kappa_n-\sigma-\xi}{\xi} > 0$. First, $\Delta\mathcal{B}|_{\hat{\kappa}_n=0} = 1-\frac{1}{4}\hat{\sigma}^2 > 0$. Since $0 \leq \hat{\sigma} < 1$,

$$\frac{\partial\Delta\mathcal{B}}{\partial\hat{\kappa}_n} = 1+\frac{2\hat{\kappa}_n}{1-\hat{\sigma}}+\left(1+\hat{\sigma}+\hat{\kappa}_n\right)\left[\frac{2}{1-\hat{\sigma}}-2\left(\frac{1+\frac{1}{2}\hat{\sigma}}{\hat{\sigma}+1}\right)^2\right] > \left(1+\hat{\sigma}+\hat{\kappa}_n\right)\left[2-2\right] = 0$$

Therefore, $\Delta\mathcal{B} > \Delta\mathcal{B}|_{\hat{\kappa}_n=0} > 0$. Therefore, $\mathcal{B} < \mathcal{B}^+$. Therefore, $\frac{\Theta-1}{\kappa_n-\sigma-\xi} < \Psi < \frac{4}{\kappa_d-K_d}$, and therefore $\Gamma > 0$, concluding the proof of Case 2.

Putting together Cases 1 and 2, we have $\frac{dt_h}{d\rho} > 0$, concluding the proof.

### B.1.2 Proof of Proposition 6

Using symmetry, RoW country's welfare is $\mathcal{W}_n = 2V_n^o(\tau_{-h}) - V_n(\tau)$. By Envelope Theorem, $\frac{dV_n^o(\tau_{-h})}{d\rho} = -\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho}x_{-h}^o + \frac{dr_{-h}}{d\rho}$ and $\frac{dV_n(\tau)}{d\rho} = -2\frac{d[p_{-h}+\tau_{-h}^{own}+\tau_h^{rival}]}{d\rho}x_{-h} + 2\frac{dr_{-h}}{d\rho}$, so that

$$\frac{d\mathcal{W}_n}{d\rho} = -2\left(\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho}(x_{-h}^o - x_{-h}) + \frac{d\tau_h^{rival}}{d\rho}(0-x_{-h})\right).$$

*Proof of strict concavity.* Differentiating again, we have

$$\frac{d^2\mathcal{W}_n}{d\rho^2} = -2\left(\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho}\frac{d[x_{-h}^o - x_{-h}]}{d\rho} - \frac{d\tau_h^{rival}}{d\rho}\frac{dx_{-h}}{d\rho}\right)$$

Using the country $n$ FOC and symmetry, $\frac{d\tau_h^{rival}}{d\rho} = -\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho} - (\kappa_n+K_n)\frac{dx_{-h}}{d\rho}$. Using the outside option, $\frac{dx_{-h}^o}{d\rho} = -\frac{1}{\kappa_n}\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho}$, we have $\frac{d\tau_h^{rival}}{d\rho} = \frac{dx_{-h}^o}{d\rho}\kappa_n - (\kappa_n+K_n)\frac{dx_{-h}}{d\rho}$ and

$$\frac{d^2\mathcal{W}_n}{d\rho^2} = -2\left(-\kappa_n\left(\frac{dx_{-h}^o}{d\rho}+\frac{dx_{-h}}{d\rho}\right)\frac{dt_h}{d\rho} + K_n\left(\frac{dx_{-h}}{d\rho}\right)^2\right)$$

Proposition 5 proved that $\frac{dt_h}{d\rho} > 0$, so it remains to prove that $\frac{dx_{-h}^o}{d\rho}+\frac{dx_{-h}}{d\rho} < 0$. First,

$$\frac{dx_h}{d\rho} = -\frac{1}{\kappa_n-\sigma-\xi+K_n}\sqrt{\frac{\kappa_n^2-K_n^2}{2\kappa_n}} - \frac{\sigma}{\kappa_n-\sigma-\xi+K_n}\frac{dt_h}{d\rho} < 0$$

so it remains to show that $\frac{dx_{-h}^o}{d\rho} < 0$, which also establishes that $\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho} > 0$. Since $\frac{dx_{-h}^o}{d\rho} = \frac{dt_h}{d\rho}+\frac{dx_{-h}}{d\rho}$, $\frac{dt_h}{d\rho} = \frac{\sqrt{\frac{1}{2}\kappa_n(\kappa_n^2-K_n^2)}}{\kappa_n}\frac{4(\kappa_n-\sigma-\xi)+(\kappa_d-K_d)(1-\Theta)}{2(\kappa_d-K_d)\varphi\left[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n\right]}$,

$\frac{dx_h}{d\rho} = \frac{\sqrt{\frac{1}{2}\kappa_n(\kappa_n^2-K_n^2)}\left(-4-\frac{(\kappa_d-K_d)}{\kappa_n}+(\kappa_d-K_d)\frac{\sigma}{\kappa_n(\kappa_n^2-K_n^2)}\left[\kappa_n+\frac{K_n^2\sigma}{\xi(\kappa_n-\sigma)}+\frac{\kappa_n^2-K_n^2}{\sigma}\right]\beta_\theta^M\sigma\right)}{2(\kappa_d-K_d)\varphi\left[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n\right]}$, and $\Theta = \left((\kappa_n-\sigma-\xi+K_n)\kappa_n+\left(\kappa_n^2+(\kappa_n-\sigma-\xi)K_n\right)\frac{K_n\sigma}{\xi(\kappa_n-\sigma)}\right)\frac{\beta_\theta^M\sigma}{\kappa_n^2-K_n^2}$, we have

$$\begin{aligned}\Upsilon^{-1}\frac{dx^o_{-h}}{d\rho} =& -4\frac{\sigma+\xi}{\kappa_n}-(\kappa_d-K_d)\frac{1}{\kappa_n}\frac{\beta_\theta^M\sigma}{\kappa_n^2-K_n^2}\Bigg[(\kappa_n-\sigma-\xi+K_n)\kappa_n \\ &+\left(\kappa_n^2+(\kappa_n-\sigma-\xi)K_n\right)\frac{K_n\sigma}{\xi(\kappa_n-\sigma)}-\sigma\left(\kappa_n+\frac{K_n^2\sigma}{\xi(\kappa_n-\sigma)}+\frac{\kappa_n^2-K_n^2}{\sigma}\right)\Bigg]\end{aligned}$$

where $\Upsilon = \frac{\sqrt{\frac{1}{2}\kappa_n(\kappa_n^2-K_n^2)}}{2(\kappa_d-K_d)\varphi\left[(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)+K_n\kappa_n\right]}$. Defining $\mathcal{J} = (\kappa_n-\sigma-\xi+K_n)\kappa_n+\left(\kappa_n^2+(\kappa_n-\sigma-\xi)K_n\right)\frac{K_n\sigma}{\xi(\kappa_n-\sigma)}-\sigma\left(\kappa_n+\frac{K_n^2\sigma}{\xi(\kappa_n-\sigma)}+\frac{\kappa_n^2-K_n^2}{\sigma}\right)$, we have

$$\kappa_n\mathcal{J}+(\kappa_n^2-K_n^2)(2\sigma+\xi) = \frac{K_n}{\xi(\kappa_n-\sigma)}\left(\kappa_n\xi+(\kappa_n-\xi)\sigma\right)\left(\kappa_n^2+(\kappa_n-2\sigma-\xi)K_n\right)\geq 0$$

where the final inequality comes trivially if $\kappa_n-2\sigma-\xi>0$, and comes otherwise since

$$\kappa_n^2+(\kappa_n-2\sigma-\xi)K_n \geq \kappa_n^2+\frac{(\kappa_n-2\sigma-\xi)(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n} > \kappa_n^2-\frac{\sigma\kappa_n^2}{\kappa_n} = \kappa_n(\kappa_n-\sigma)>0$$

Therefore, $\mathcal{J}\geq -\frac{(\kappa_n^2-K_n^2)(2\sigma+\xi)}{\kappa_n}$, and therefore

$$\Upsilon^{-1}\frac{dx^o_{-h}}{d\rho} \leq -\frac{1}{\kappa_n}\left(4(\sigma+\xi)-\frac{1}{\kappa_n}(\kappa_d-K_d)(2\sigma+\xi)\beta_\theta^M\sigma\right)$$

Next, using $0<\psi<\frac{2}{\kappa_d-K_d}+\frac{1}{2}\frac{1-\beta_\theta^M\sigma}{\kappa_n}-\frac{\beta_\theta^M\sigma}{2\kappa_n\xi}(\sigma+\xi)$, we obtain

$$\beta_\theta^M\sigma < \frac{\xi}{2\xi+\sigma}\frac{4\kappa_n+\kappa_d-K_d}{\kappa_d-K_d} < \frac{\xi}{2\xi+\sigma}\frac{6\kappa_n}{\kappa_d-K_d}$$

where the last line uses $\kappa_d-K_d\leq 2(\xi-\sigma)<2\kappa_n$. Therefore,

$$\Upsilon^{-1}\frac{dx^o_{-h}}{d\rho} \leq -\frac{1}{\kappa_n}\left(4(\sigma+\xi)-\frac{6(2\sigma+\xi)\xi}{2\xi+\sigma}\right) = -\frac{1}{\kappa_n}\left(\frac{4\sigma^2+2\xi^2}{2\xi+\sigma}\right)<0$$

and therefore $\frac{dx^o_{-h}}{d\rho}<0$. This concludes the proof of strict concavity.

*Proof that welfare increases under accommodation.* Suppose that $t_h<0$, that is $x^o_{-h}<$

$x_{-h}$. Using $\frac{d\tau_h^{rival}}{d\rho} = -\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho} - (\kappa_n + K_n)\frac{dx_{-h}}{d\rho}$ and $\frac{dx_{-h}^o}{d\rho} = -\frac{1}{\kappa_n}\frac{d[p_{-h}+\tau_{-h}^{own}]}{d\rho}$,

$$\frac{d\mathcal{W}_n}{d\rho} = 2\left(\kappa_n \frac{dx_{-h}^o}{d\rho} x_{-h}^o - (\kappa_n + K_n)\frac{dx_{-h}}{d\rho} x_{-h}\right)$$

Since $x_{-h}^o < x_{-h}$, since from Proposition 5 $0 < \frac{dt_h}{d\rho}$ and so $\frac{dx_{-h}}{d\rho} < \frac{dx_{-h}^o}{d\rho}$, and since as shown above $-\frac{dx_{-h}^o}{d\rho} > 0$, then $-\frac{dx_{-h}^o}{d\rho} x_{-h}^o < -\frac{dx_{-h}}{d\rho} x_{-h}$. Therefore,

$$\frac{d\mathcal{W}_n}{d\rho} > 2\frac{dx_{-h}}{d\rho} x_{-h}\left(\kappa_n - (\kappa_n + K_n)\right) = -2K_n \frac{dx_{-h}}{d\rho} x_{-h} \geq 0$$

where the final inequality follows since from above $\frac{dx_{-h}}{d\rho} < 0$. This concludes the proof.

## B.2 Heterogeneous Hegemons

In this appendix, we formally characterize the equilibrium with heterogeneous hegemons (Section 5).

**Construction of the Equilibrium.** As in the main text, we construct an equilibrium in which at each point in time, each agent's optimization problem yields an interior solution, taking as given the interior optimization solutions of other agents. To streamline the derivations, we omit the bilateral wedges $\theta_{hd}^m$ and $\tau_{hd}^{rival}$, which as in the baseline model would be set equal to zero. We define $\zeta_h = \zeta_h^{own} + \tilde{p}_{e_h} - (\zeta_h^{rival} + \tilde{p}_{e_{-h}})$ to be the interdependence of hegemon $h$.[2]

**Proposition 7** *In equilibrium, an optimal set of wedges of hegemon $h$ in the Beginning and Middle is given by*

$$\tau_{hm}^{own} = \tau_h^{own} = \beta_\pi^{own}\overline{\pi}_h + \beta_\pi^{rival}\overline{\pi}_{-h} + \beta_\zeta^{own}\zeta_h + \beta_\zeta^{rival}\zeta_{-h} \tag{B.1}$$

$$\tau_{hm}^{rival} = \tau_h^{rival} = \gamma_\pi^{own}\overline{\pi}_h + \gamma_\pi^{rival}\overline{\pi}_{-h} + \gamma_\zeta^{own}\zeta_h + \gamma_\zeta^{rival}\zeta_{-h} \tag{B.2}$$

$$\theta_h^{rival} = -\eta_\pi^{own}\overline{\pi}_h + \eta_\pi^{rival}\overline{\pi}_{-h} - \eta_\zeta^{own}\zeta_h + \eta_\zeta^{rival}\zeta_{-h} \tag{B.3}$$

*where the scalar loadings are defined in the proof.*

**Total Containment.** The next proposition shows the comparative statics of total containment in the average country's characteristics.

**Proposition 8** *Let $K_n > 0$. Hegemon $h$'s total containment $t_h$ is increasing in $\overline{\pi}_h$ and decreasing in $\overline{\pi}_{-h}$.*

[2] In the baseline model, symmetry $\tilde{p}_{e_h} = \tilde{p}_e$ meant that the difference in upstream goods prices dropped out of $\zeta$.

**Spheres of Influence.** In our setup, the presence of externalities means that small differences in fundamentals can amplify to large differences in the power of the two hegemons. To make this point precise, we analyze how a hegemon's sphere of influence is amplified by changes in fundamentals. As described in the main text, we consider the "boundary" country, which we denote $m_0$, over which the hegemons have the same power. Formally, we define country $m_0$ to have profitability $\pi_{m_0 h} = \overline{\pi}_h - \varepsilon_h$ from using $h$'s good and profitability $\pi_{m_0,-h} = \overline{\pi}_{-h}$ from using $-h$'s good, where $\varepsilon_h$ is such that the two hegemons' Micro-Powers are equated given the equilibrium of Proposition 7,[3]

$$\text{Power}_{h,m_0} = \text{Power}_{-h,m_0}. \tag{B.4}$$

The proof of Proposition 9 shows that this threshold is proportional to the gap in (square root) power of the two hegemons over the representative country,

$$\varepsilon_h = \frac{\sqrt{2\kappa_n(\kappa_n^2 - K_n^2)}}{\kappa_n + K_n}\left(\sqrt{\text{Power}_h} - \sqrt{\text{Power}_{-h}}\right).$$

At a symmetric parametrization, $\varepsilon_h = 0$ since the two hegemons have equal power over the representative country. To illustrate how power is amplified, starting from a symmetric parametrization, consider the effect of a small natural profitability advantage of hegemon $h$. This could arise, for example, if hegemon $h$ is more technologically advanced or faces lower transport costs. The proof of Proposition 9 shows that

$$\frac{d\varepsilon_h}{d\overline{\pi}_h} = 1 + \omega_h, \tag{B.5}$$

where $\omega_h$ captures the equilibrium power amplification. Intuitively when $\omega_h$ is larger, small asymmetries generate large power imbalances, pushing more countries towards the sphere of influence of the hegemon with the advantage. We now show formally that $\frac{d\omega_h}{d\xi} > 0$.

**Proposition 9** *Equilibrium power amplification is increasing in the size of the external economy of scale, that is* $\frac{d\omega_h}{d\xi} > 0$.

#### B.2.0.1 Proof of Proposition 7

The derivations of the price and demand schedules of $d_h$ follow the same structure and yield

$$p_h = \tilde{p}_h - \sigma y_h + \frac{1}{2}\theta_{-h}^{rival} \tag{B.6}$$

$$i_h = \frac{1}{2}y_h + \frac{1}{2}\frac{1}{\kappa_d - K_d}\left(\zeta_h - \theta_{-h}^{rival}\right) \tag{B.7}$$

where the baseline price is now $\tilde{p}_h = \frac{1}{2}\sum_{k\in\mathcal{H}}\tilde{p}_{e_k} + \frac{1}{2}(\zeta_h^{own} + \zeta_h^{rival})$ and hegemon $h$'s interdependence parameter is now $\zeta_h = \zeta_h^{own} + \tilde{p}_{e_h} - (\zeta_h^{rival} + \tilde{p}_{e_{-h}})$. Higher $\zeta_h$ makes foreign sourcing more attractive relative to domestic sourcing, taking upstream prices into account.

[3]Because equal level shifts $\pi_{m_0 k} \to \pi_{m_0 k} + \epsilon$ leave $\varepsilon_h$ unchanged, it is without loss of generality to define the baseline from $\overline{\pi}_h$ and to only shift the profitability of $h$.

**Optimal Policy in the Middle.** Following the proof of Proposition 1, we write $h$'s objective in the Middle as

$$\begin{aligned}\max_{\{x_m\}} \mathcal{W}_h = \tilde{p}_{e_h}\overline{e}_h + \theta_h^{rival} i_{-h} + \Pi_{d_h} \\ + \int_{m=0}^{1} \Bigg[ \sum_{k\in\mathcal{H}} \left[ (A_m - \zeta_{mk} - p_k)x_{mk} - \frac{1}{2}\kappa_n x_{mk}^2 \right] \\ - \tau_{-hm}^{rival} x_{mh} - \tau_{-hm}^{own} x_{m,-h} - K_n \prod_{k\in\mathcal{H}} x_{mk} \Bigg] dm \\ - \int_{m=0}^{1} \max_{x^o_{m,-h}} \left\{ (A_m - \zeta_{m,-h} - p_{-h} - \tau_{-hm}^{own}) x^o_{m,-h} - \frac{1}{2}\kappa_n (x^o_{m,-h})^2 \right\} dm\end{aligned}$$

internalizing the determination of $p_h$ (equation B.6), $i_h$ (equation B.7), $l_h = y_h - i_h$, and $y_h = \int_{m=0}^{1} x_{mh} dm \equiv x_h$, and where

$$\begin{aligned}\Pi_{d_h} = \max_{l_h, i_h} \Big\{ (p_h + \xi y_h^* - \zeta_h^{own} - \tilde{p}_{e_h}) l_h + (p_h + \xi y_h^* - \zeta_h^{rival} - \tilde{p}_{e_{-h}}) i_h \\ - \frac{1}{2}\kappa_d (l_h^2 + i_h^2) - \theta_{-h}^{rival} i_h - K_d l_h i_h \Big\}\end{aligned}$$

*FOC in $x_{mh}$.* The first order condition in $x_{mh}$ is

$$0 = \frac{\partial [p_h + \xi y_h^*]}{\partial y_h} y_h + \tau_{hm}^{own} - \int_{j=0}^{1} \frac{\partial p_h}{\partial y_h} x_{jh} dj$$

Using $\int_{j=0}^{1} x_{jh} dj = y_h$, we have

$$\tau_{hm}^{own} = -\xi y_h$$

which is therefore the same for all $m$. We denote $\tau_h^{own} \equiv -\xi y_h$ this common value.

*FOC in $x_{m,-h}$.* The first order condition in $x_{m,-h}$ is

$$0 = \theta_h^{rival} \frac{\partial i_{-h}}{\partial y_{-h}} + \tau_{hm}^{rival} - \frac{\partial p_{-h}}{\partial y_{-h}} \int_{j=0}^{1} (x_{j,-h} - x^o_{j,-h}) dj$$

Using $\frac{\partial i_{-h}}{\partial x_{-h}} = \frac{1}{2}$ and $\frac{\partial p_{-h}}{\partial x_{-h}} = -\sigma$,

$$\tau_{hm}^{rival} = -\frac{1}{2}\theta_h^{rival} + \sigma \int_{j=0}^{1} (x^o_{j,-h} - x_{j,-h}) dj$$

The RHS does not depend on $m$, so $\tau_{hm}^{rival}$ is the same for all $m$. We denote $\tau_h^{rival} = -\frac{1}{2}\theta_h^{rival} + \sigma \int_{j=0}^{1} (x^o_{j,-h} - x_{j,-h}) dj$ this common value.

**Solving.** Define average outside option demand to be $x^o_{-h} = \int_{m=0}^1 x^o_{m,-h} dm = \frac{A_n - \zeta_{n,-h} - p_{-h} - \tau^{own}_{-h}}{\kappa_n}$. Using the first order condition of $m$,

$$\kappa_n x_{mh} + K_n x_{m,-h} = A_m - \zeta_{mh} - p_h - \tau^{rival}_{-h,m} - \tau^{own}_{hm}$$

integrating over $m$ we have by market clearing and defining $A_n = \int_{m=0}^1 A_m dm$ and $\zeta_{nh}$ analogously,

$$\kappa_n x_h + K_n x_{-h} = A_n - \zeta_{nh} - p_h - \tau^{rival}_{-h} - \tau^{own}_h.$$

Then using market clearing $x_h = y_h$, we can solve as-if there were a representative country. Defining $\overline{\pi}_h$ and substituting out for $p_h, x^o_h, \tau^{rival}_h$, and $x_h = -\frac{1}{\xi}\tau^{own}_h$, we obtain

$$\tau^{own}_h = -\frac{\xi}{\kappa_n - \sigma - \xi}\overline{\pi}_h - \frac{\xi\sigma}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\frac{1}{2}\theta^{rival}_{-h} - \frac{K_n\kappa_n}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\tau^{own}_{-h}$$

Substituting in the counterpart equation for $\tau^{own}_{-h}$ and simplifying, we obtain

$$\tau^{own}_h = -\beta^M_\theta\left[(\kappa_n - \sigma)\overline{\pi}_h + \sigma\frac{1}{2}\theta^{rival}_{-h}\right] + K_n\widetilde{\beta}^M_\theta\left[(\kappa_n - \sigma)\overline{\pi}_{-h} + \sigma\frac{1}{2}\theta^{rival}_h\right]$$

where $\beta^M_\theta = \frac{\xi(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}{(\kappa_n - \sigma)^2(\kappa_n - \sigma - \xi)^2 - (K_n\kappa_n)^2}$ and $\widetilde{\beta}^M_\theta = \frac{\kappa_n\xi}{(\kappa_n - \sigma)^2(\kappa_n - \sigma - \xi)^2 - (K_n\kappa_n)^2}$.

**Export Wedge in the Beginning.** The FOC in $\theta^{rival}_h$, by Envelope Theorem, is

$$0 = i_{-h} + \theta^{rival}_h\frac{\partial i_{-h}}{\partial\theta^{rival}_h} - \frac{\partial[p_{-h} + \tau^{own}_{-h}]}{\partial\theta^{rival}_h}(x_{-h} - x^o_{-h}) - \frac{\partial\tau^{rival}_{-h}}{\partial\theta^{rival}_h}x_h$$

which uses symmetry of the Middle wedges across countries and the definitions of the representative-country variables. Using $\frac{\partial i_{-h}}{\partial\theta^{rival}_h} = -\frac{1}{2}\frac{1}{\kappa_d - K_d}$, $\frac{\partial p_{-h}}{\partial\theta^{rival}_h} = \frac{1}{2}$, and substituting in for $i_{-h}$, we obtain

$$\frac{1}{\kappa_d - K_d}\theta^{rival}_h = \frac{1}{2}x_{-h} + \frac{1}{2}\frac{1}{\kappa_d - K_d}\zeta_{-h} + (x^o_{-h} - x_{-h})\left(\frac{1}{2} + \frac{\partial\tau^{own}_{-h}}{\partial\theta^{rival}_h}\right) - x_h\frac{\partial\tau^{rival}_{-h}}{\partial\theta^{rival}_h}$$

The derivations of the Middle wedges above yield $\frac{\partial\tau^{own}_{-h}}{\partial\theta^{rival}_h} = -\beta^M_\theta\frac{1}{2}\sigma$ and $\frac{\partial\tau^{rival}_{-h}}{\partial\theta^{rival}_h} = \frac{\sigma(\kappa_n - \sigma - \xi)}{\xi\kappa_n}\frac{\partial\tau^{own}_h}{\partial\theta^{rival}_h} = \frac{\sigma(\kappa_n - \sigma - \xi)}{\xi\kappa_n}K_n\widetilde{\beta}^M_\theta\frac{1}{2}\sigma$, so we have

$$\frac{1}{\kappa_d - K_d}\theta^{rival}_h = \frac{1}{2}x_{-h} + \frac{1}{2}\frac{1}{\kappa_d - K_d}\zeta_{-h} + (x^o_{-h} - x_{-h})\frac{1}{2}\left(1 - \beta^M_\theta\sigma\right) - x_h\frac{\sigma(\kappa_n - \sigma - \xi)}{\xi\kappa_n}K_n\widetilde{\beta}^M_\theta\frac{1}{2}\sigma$$

Substituting in $x^o_{-h} - x_{-h} = \frac{1}{\sigma}(\tau^{rival}_h + \frac{1}{2}\theta^{rival}_h) = -\frac{1}{2}\frac{1}{\kappa_n}\theta^{rival}_h + \frac{1}{\kappa_n}\overline{\pi}_{-h} + \frac{\kappa_n-\sigma-\xi}{\xi\kappa_n}\tau^{own}_{-h}$ and $x_h = -\frac{1}{\xi}\tau^{own}_h$,

$$\begin{aligned}\frac{2}{\kappa_d - K_d}\theta^{rival}_h + \frac{1}{2}\frac{1-\beta^M_\theta\sigma}{\kappa_n}\theta^{rival}_h =& -\frac{\tau^{own}_{-h}}{\xi} + \frac{\zeta_{-h}}{\kappa_d - K_d} + \frac{(1-\beta^M_\theta\sigma)(\kappa_n-\sigma-\xi)\tau^{own}_{-h}}{\xi\kappa_n} \\ &+ \frac{1}{\xi}\tau^{own}_h\frac{\sigma(\kappa_n-\sigma-\xi)}{\xi\kappa_n}K_n\widetilde{\beta}^M_\theta\sigma + \frac{(1-\beta^M_\theta\sigma)\overline{\pi}_{-h}}{\kappa_n}\end{aligned}$$

Substituting in for $\tau^{own}_h$ from above and using $\beta^M_\theta = \frac{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}{\kappa_n}\widetilde{\beta}^M_\theta$, we have

$$\begin{aligned}\theta^{rival}_h =& \frac{\frac{\widetilde{\beta}^M_\theta(\kappa_n-\sigma-\xi)}{\xi}\frac{(\kappa_n-\sigma)\left(\sigma+\xi+(\kappa_n-\sigma-\xi)\beta^M_\theta\sigma\right)\xi+K_n^2\widetilde{\beta}^M_\theta\sigma^2\kappa_n}{\kappa_n\xi}(\kappa_n-\sigma) + 1 - \beta^M_\theta\sigma}{\psi\kappa_n}\overline{\pi}_{-h} \\ &- \frac{1}{\psi}\frac{K_n\widetilde{\beta}^M_\theta(\sigma+\xi)}{\kappa_n\xi}\frac{\xi+(\kappa_n-\sigma-\xi)\beta^M_\theta\sigma}{\xi}(\kappa_n-\sigma)\overline{\pi}_h + \frac{1}{\psi}\frac{1}{\kappa_d-K_d}\zeta_{-h} - \phi\theta^{rival}_{-h}\end{aligned}$$

where $\psi, \phi$ are given as in the baseline model. Substituting in the counterpart equation for $\theta^{rival}_{-h}$ and simplifying, we have

$$\theta^{rival}_h = -\eta^{own}_\pi\overline{\pi}_h + \eta^{rival}_\pi\overline{\pi}_{-h} - \eta^{own}_\zeta\zeta_h + \eta^{rival}_\zeta\zeta_{-h}$$

where the coefficients are given by

$$\begin{aligned}\eta^{rival}_\pi =& \frac{1}{\psi(1-\phi^2)}\left\{\frac{1-\beta^M_\theta\sigma}{\kappa_n} + \phi\frac{K_n\widetilde{\beta}^M_\theta(\sigma+\xi)}{\kappa_n\xi}\frac{\xi+(\kappa_n-\sigma-\xi)\beta^M_\theta\sigma}{\xi}(\kappa_n-\sigma)\right. \\ &\left. + \frac{\widetilde{\beta}^M_\theta(\kappa_n-\sigma-\xi)(\kappa_n-\sigma)}{\kappa_n\xi}\frac{(\kappa_n-\sigma)\left(\sigma+\xi+(\kappa_n-\sigma-\xi)\beta^M_\theta\sigma\right)\xi+K_n^2\widetilde{\beta}^M_\theta\sigma^2\kappa_n}{\kappa_n\xi}\right\}\end{aligned}$$

$$\eta^{own}_\pi = \frac{\phi}{(1-\phi^2)\sigma\psi}\left(\frac{4}{\kappa_d-K_d}(\kappa_n-\sigma) + (1-\beta^M_\theta\sigma)\right)$$

$$\eta^{rival}_\zeta = \frac{1}{1-\phi^2}\frac{1}{\psi}\frac{1}{\kappa_d-K_d}$$

$$\eta^{own}_\zeta = \frac{\phi}{1-\phi^2}\frac{1}{\psi}\frac{1}{\kappa_d-K_d}$$

Since $K_n \geq 0$, we have $\eta_\zeta^{own}, \eta_\zeta^{rival} \geq 0$. To show that $\eta_\pi^{own} \geq 0$, from concavity we have

$$\begin{aligned}
0 < \psi = & \frac{2}{\kappa_d - K_d} + \frac{1}{2}\frac{1-\beta_\theta^M \sigma}{\kappa_n} \\
& - \frac{\widetilde{\beta}_\theta^M(\kappa_n - \sigma - \xi)}{\kappa_n \xi}\frac{(\kappa_n - \sigma)\Big(\sigma + \xi + (\kappa_n - \sigma - \xi)\beta_\theta^M \sigma\Big)\xi + K_n^2 \widetilde{\beta}_\theta^M \sigma^2 \kappa_n}{\kappa_n \xi}\frac{1}{2}\sigma \\
\leq & \frac{2}{\kappa_d - K_d} + \frac{1}{2}\frac{1-\beta_\theta^M \sigma}{\kappa_n} - \frac{\widetilde{\beta}_\theta^M(\kappa_n - \sigma - \xi)}{\kappa_n \xi}\frac{(\kappa_n - \sigma)\Big(\sigma + \xi\Big)}{\kappa_n}\frac{1}{2}\sigma \\
= & \frac{2}{\kappa_d - K_d} + \frac{1}{2}\frac{1-\beta_\theta^M \sigma}{\kappa_n - \sigma} - \frac{1}{2}\frac{\sigma + \frac{(\kappa_n - \sigma)\xi + (\kappa_n - \sigma - \xi)\sigma}{\xi}\beta_\theta^M \sigma}{(\kappa_n - \sigma)\kappa_n} \\
\leq & \frac{2}{\kappa_d - K_d} + \frac{1}{2}\frac{1-\beta_\theta^M \sigma}{\kappa_n - \sigma}
\end{aligned}$$

and therefore $\eta_\pi^{own} \geq 0$.

To show that $\eta_\pi^{rival} > 0$, we have

$$\begin{aligned}
\eta_\pi^{rival} \geq & \frac{1}{1-\phi^2}\frac{1}{\psi}\frac{1}{\kappa_n}\Bigg[1 - \beta_\theta^M \sigma \\
& + \frac{\widetilde{\beta}_\theta^M(\kappa_n - \sigma - \xi)}{\xi}\frac{(\kappa_n - \sigma)\Big(\sigma + \xi + (\kappa_n - \sigma - \xi)\beta_\theta^M \sigma\Big)\xi + K_n^2 \widetilde{\beta}_\theta^M \sigma^2 \kappa_n}{\kappa_n \xi}(\kappa_n - \sigma)\Bigg] \\
\geq & \frac{1}{1-\phi^2}\frac{1}{\psi}\frac{1}{\kappa_n}\left[\frac{\widetilde{\beta}_\theta^M(\kappa_n - \sigma - \xi)(\kappa_n - \sigma)^2\Big(\sigma + \xi\Big)}{\xi \kappa_n} - \beta_\theta^M \sigma\right] \\
= & \frac{1}{1-\phi^2}\frac{1}{\psi}\frac{1}{\kappa_n}\beta_\theta^M \frac{(\kappa_n - \sigma - \xi)\sigma + (\kappa_n - \sigma)\xi}{\xi} \\
> & 0
\end{aligned}$$

**Equilibrium Middle Wedges.** We substitute in the solution for $\theta_h^{rival}$ into $\tau_h^{own}$ to obtain

$$\tau_h^{own} = \beta_\pi^{own}\overline{\pi}_h + \beta_\pi^{rival}\overline{\pi}_{-h} + \beta_\zeta^{own}\zeta_h + \beta_\zeta^{rival}\zeta_{-h}$$

where $\beta_\pi^{own} = -\beta_\theta^M\left[(\kappa_n - \sigma) + \sigma\frac{1}{2}\eta_\pi^{rival}\right] - K_n\widetilde{\beta}_\theta^M\sigma\frac{1}{2}\eta_\pi^{own}$, $\beta_\pi^{rival} = \beta_\theta^M\sigma\frac{1}{2}\eta_\pi^{own} + K_n\widetilde{\beta}_\theta^M\Big[(\kappa_n - \sigma) + \sigma\frac{1}{2}\eta_\pi^{rival}\Big]$, $\beta_\zeta^{own} = -\beta_\theta^M\sigma\frac{1}{2}\eta_\zeta^{rival} - K_n\widetilde{\beta}_\theta^M\sigma\frac{1}{2}\eta_\zeta^{own}$, and $\beta_\zeta^{rival} = \beta_\theta^M\sigma\frac{1}{2}\eta_\zeta^{own} + K_n\widetilde{\beta}_\theta^M\sigma\frac{1}{2}\eta_\zeta^{rival}$.

We use $\tau_{hm}^{rival} = -\frac{1}{2}\theta_h^{rival} + \sigma(x_{-h}^o - x_{-h})$ and $x_{-h}^o = \frac{A_n - \zeta_{n,-h} - p_{-h} - \tau_{-h}^{own}}{\kappa_n}$ to write

$$\tau_h^{rival} = -\frac{1}{2}\frac{\kappa_n + \sigma}{\kappa_n}\theta_h^{rival} + \frac{\sigma}{\kappa_n}\overline{\pi}_{-h} + \sigma\frac{\kappa_n - (\sigma + \xi)}{\kappa_n \xi}\tau_{-h}^{own}$$

from which substituting in we obtain

$$\tau_h^{rival} = \gamma_\pi^{own}\overline{\pi}_h + \gamma_\pi^{rival}\overline{\pi}_{-h} + \gamma_\zeta^{own}\zeta_h + \gamma_\zeta^{rival}\zeta_{-h}$$

where $\gamma_\pi^{own} = \frac{1}{2}\frac{\kappa_n+\sigma}{\kappa_n}\eta_\pi^{own} + \frac{\sigma(\kappa_n-\sigma-\xi)}{\kappa_n\xi}\beta_\pi^{rival}$, $\gamma_\pi^{rival} = -\frac{1}{2}\frac{\kappa_n+\sigma}{\kappa_n}\eta_\pi^{rival} + \frac{\sigma}{\kappa_n} + \frac{\sigma(\kappa_n-\sigma-\xi)}{\kappa_n\xi}\beta_\pi^{own}$, $\gamma_\zeta^{own} = \frac{1}{2}\frac{\kappa_n+\sigma}{\kappa_n}\eta_\zeta^{own} + \frac{\sigma(\kappa_n-\sigma-\xi)}{\kappa_n\xi}\beta_\zeta^{rival}$, and $\gamma_\zeta^{rival} = -\frac{1}{2}\frac{\kappa_n+\sigma}{\kappa_n}\eta_\zeta^{rival} + \frac{\sigma(\kappa_n-\sigma-\xi)}{\kappa_n\xi}\beta_\zeta^{own}$.

#### B.2.0.2 Proof of Proposition 8

Using $t_h = -\frac{1}{2}\frac{1}{\kappa_n}\theta_h^{rival} + \frac{1}{\kappa_n}\overline{\pi}_{-h} + \frac{\kappa_n-\sigma-\xi}{\xi\kappa_n}\tau_{-h}^{own}$ and $\tau_{-h}^{own} = -\beta_\theta^M\left[(\kappa_n-\sigma)\overline{\pi}_{-h} + \frac{1}{2}\sigma\theta_h^{rival}\right] + K_n\widetilde{\beta}_\theta^M\left[(\kappa_n-\sigma)\overline{\pi}_h + \frac{1}{2}\sigma\theta_{-h}^{rival}\right]$, we write

$$\begin{aligned} t_h = &-\frac{1}{2}\frac{1}{\kappa_n}\theta_h^{rival} + \frac{1}{\kappa_n}\overline{\pi}_{-h} \\ &+ \frac{\kappa_n-\sigma-\xi}{\xi\kappa_n}\left(-\beta_\theta^M\left[(\kappa_n-\sigma)\overline{\pi}_{-h} + \frac{1}{2}\sigma\theta_h^{rival}\right] + K_n\widetilde{\beta}_\theta^M\left[(\kappa_n-\sigma)\overline{\pi}_h + \frac{1}{2}\sigma\theta_{-h}^{rival}\right]\right) \end{aligned}$$

**Comparative Static in $\overline{\pi}_{-h}$.** We have

$$\begin{aligned} \frac{\partial t_h}{\partial\overline{\pi}_{-h}} = &-\frac{1}{2}\frac{1}{\kappa_n}\left(1 + \frac{\kappa_n-\sigma-\xi}{\xi}\beta_\theta^M\sigma\right)\frac{\partial\theta_h^{rival}}{\partial\overline{\pi}_{-h}} - \frac{K_n^2\kappa_n}{(\kappa_n-\sigma)^2(\kappa_n-\sigma-\xi)^2 - (K_n\kappa_n)^2} \\ &+ \frac{\kappa_n-\sigma-\xi}{\xi\kappa_n}K_n\widetilde{\beta}_\theta^M\frac{1}{2}\sigma\frac{\partial\theta_{-h}^{rival}}{\partial\overline{\pi}_{-h}} \end{aligned}$$

Using Proposition 7, for $K_n > 0$ we have $\frac{\partial\theta_h^{rival}}{\partial\overline{\pi}_{-h}} = \eta_\pi^{rival} > 0$ and $\frac{\partial\theta_{-h}^{rival}}{\partial\overline{\pi}_{-h}} = -\eta_\pi^{own} < 0$, so that $\frac{\partial t_h}{\partial\overline{\pi}_{-h}} < 0$, completing the proof.

**Comparative Static in $\overline{\pi}_h$.** We have

$$\frac{\partial t_h}{\partial\overline{\pi}_h} = -\frac{1}{2}\frac{1}{\kappa_n}\left(1 + \frac{\kappa_n-\sigma-\xi}{\xi}\beta_\theta^M\sigma\right)\frac{\partial\theta_h^{rival}}{\partial\overline{\pi}_h} + \frac{\kappa_n-\sigma-\xi}{\xi\kappa_n}K_n\widetilde{\beta}_\theta^M\left[(\kappa_n-\sigma) + \frac{1}{2}\sigma\frac{\partial\theta_{-h}^{rival}}{\partial\overline{\pi}_h}\right]$$

Using Proposition 7, for $K_n > 0$ we have $\frac{\partial\theta_h^{rival}}{\partial\overline{\pi}_h} = -\eta_\pi^{own} < 0$ and $\frac{\partial\theta_{-h}^{rival}}{\partial\overline{\pi}_h} = \eta_\pi^{rival} > 0$, so that $\frac{\partial t_h}{\partial\overline{\pi}_h} > 0$, completing the proof.

#### B.2.0.3 Threshold Country

**Deriving Power.** Power is given as in equation 9 by

$$\text{Power}_{h,m} = \frac{1}{2\kappa_n}\frac{\left(\kappa_n(A_m - \zeta_{mh} - p_h - \tau_{-h}^{rival}) - K_n(A_m - \zeta_{m,-h} - p_{-h} - \tau_{-h}^{own})\right)^2}{\kappa_n^2 - K_n^2}$$

We can therefore write

$$\sqrt{\text{Power}_{h,m}} = \frac{1}{\sqrt{2\kappa_n(\kappa_n^2 - K_n^2)}}\Big(\kappa_n(\pi_{mh} - \overline{\pi}_h) - K_n(\pi_{m,-h} - \overline{\pi}_{-h})\Big) + \sqrt{\text{Power}_h}$$

where $\text{Power}_h$ denotes power over the average country.

**Threshold Country.** Defining the threshold country $m_0$ by $\sqrt{\text{Power}_{h,m_0}} = \sqrt{\text{Power}_{-h,m_0}}$, we substitute to obtain

$$\varepsilon_h = \frac{\sqrt{2\kappa_n(\kappa_n^2 - K_n^2)}}{\kappa_n + K_n}\Big(\sqrt{\text{Power}_h} - \sqrt{\text{Power}_{-h}}\Big)$$

At a symmetric allocation, $\varepsilon_h = 0$. Using $p_h = \tilde{p}_h - \sigma y_h + \frac{1}{2}\theta_{-h}^{rival}$ and $t_{-h} = \frac{1}{\sigma}(\frac{1}{2}\theta_{-h}^{rival} + \tau_{-h}^{rival})$,

$$\sqrt{2\kappa_n(\kappa_n^2 - K_n^2)}\sqrt{\text{Power}_h} = \kappa_n(\overline{\pi}_h + \sigma y_h - \sigma t_{-h}) - K_n(\overline{\pi}_{-h} + \sigma y_{-h} - \frac{1}{2}\theta_h^{rival} - \tau_{-h}^{own}).$$

Therefore considering the effect of a small increase in $\overline{\pi}_h$ local to a symmetric equilibrium,

$$\frac{d\varepsilon_h}{d\overline{\pi}_h} = 1 + \omega_h$$

where we have $\omega_h = \sigma\Big(\frac{dy_h}{d\overline{\pi}_h} - \frac{dy_{-h}}{d\overline{\pi}_h}\Big) + \frac{\kappa_n\sigma}{\kappa_n + K_n}\Big(\frac{dt_h}{d\overline{\pi}_h} - \frac{dt_{-h}}{d\overline{\pi}_h}\Big) + \frac{K_n}{\kappa_n + K_n}\Big(\frac{d[\tau_{-h}^{own} + \frac{1}{2}\theta_h^{rival}]}{d\overline{\pi}_h} - \frac{d[\tau_h^{own} + \frac{1}{2}\theta_{-h}^{rival}]}{d\overline{\pi}_h}\Big)$. Using $\tau_{-h}^{rival} = -\frac{\sigma + \kappa_n}{\kappa_n}\frac{1}{2}\theta_{-h}^{rival} + \frac{\sigma}{\kappa_n}\overline{\pi}_h + \frac{\sigma(\kappa_n - \sigma - \xi)}{\kappa_n \xi}\tau_h^{own}$,

$$\frac{\kappa_n}{\kappa_n + K_n}\tau_{-h}^{rival} + \frac{K_n}{\kappa_n + K_n}\tau_h^{own} - \sigma y_h + \frac{1}{2}\theta_{-h}^{rival} = \frac{\sigma}{\kappa_n + K_n}\overline{\pi}_h + \frac{K_n - \sigma}{\kappa_n + K_n}\frac{1}{2}\theta_{-h}^{rival} + \frac{\sigma(\kappa_n - \sigma - \xi) + K_n\xi + \sigma(\kappa_n + K_n)}{\xi(\kappa_n + K_n)}\tau_h^{own}$$

and so we get $\omega_h = -\Big[\frac{\sigma}{\kappa_n + K_n} + \frac{K_n - \sigma}{\kappa_n + K_n}\frac{1}{2}(\eta_\pi^{rival} + \eta_\pi^{own}) + \frac{\sigma(\kappa_n - \sigma - \xi) + K_n\xi + \sigma(\kappa_n + K_n)}{\xi(\kappa_n + K_n)}\frac{d}{d\overline{\pi}_h}(\tau_h^{own} - \tau_{-h}^{own})\Big]$. We have

$$\tau_h^{own} - \tau_{-h}^{own} = (\beta_\theta^M + K_n\frac{\kappa_n}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\beta_\theta^M)\Big[(\kappa_n - \sigma)(\overline{\pi}_{-h} - \overline{\pi}_h) + \frac{1}{2}\sigma(\theta_h^{rival} - \theta_{-h}^{rival})\Big]$$

Substituting in for $\beta_\theta^M$, we have

$$\frac{d[\tau_h^{own} - \tau_{-h}^{own}]}{d\overline{\pi}_h} = -\frac{\xi}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi) - (K_n\kappa_n)}\Big[(\kappa_n - \sigma) + \frac{1}{2}\sigma(\eta_\pi^{own} + \eta_\pi^{rival})\Big]$$

which substituting in and simplifying yields

$$\omega_h = \frac{1}{\kappa_n + K_n}\Bigg[\frac{\Big(K_n\xi + \sigma(\kappa_n + K_n)\Big)(\kappa_n - \sigma) + \sigma(K_n\kappa_n)}{D} + \left(\frac{\sigma(\kappa_n - \sigma - \xi) + K_n\xi + \sigma(\kappa_n + K_n)}{D}\sigma + (\sigma - K_n)\right)\frac{1}{2}(\eta_\pi^{rival} + \eta_\pi^{own})\Bigg],$$

where we have defined $D = (\kappa_n - \sigma)(\kappa_n - \sigma - \xi) - \kappa_n K_n > 0$.

#### B.2.0.4 Proof of Proposition 9

We start by simplifying $\omega_h$. Define $G \equiv \frac{4(\kappa_n - \sigma)}{\kappa_d - K_d} + 1 - \beta_\theta^M \sigma > 0$ (where the inequality follows from $\psi > 0$). Simplifying the coefficient $\eta_\pi^{rival}$ using $\widetilde{\beta}_\theta^M = \kappa_n \beta_\theta^M / [(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)]$ and substituting in for $\psi$ and $\phi$ gives

$$\begin{aligned}(1 - \phi^2)\psi\eta_\pi^{rival} &= \frac{1 - \beta_\theta^M\sigma}{\kappa_n} + \frac{\kappa_n - \sigma}{\sigma}\left(\frac{4}{\kappa_d - K_d} + \frac{1 - \beta_\theta^M\sigma}{\kappa_n} - 2\psi\right) + \frac{2(\kappa_n - \sigma)\psi\phi^2}{\sigma} \\ &= \frac{G - 2(\kappa_n - \sigma)\psi(1 - \phi^2)}{\sigma}.\end{aligned}$$

Since $\eta_\pi^{own} = \phi G / [(1 - \phi^2)\sigma\psi]$, summing and simplifying yields

$$(\kappa_n - \sigma) + \frac{\sigma}{2}(\eta_\pi^{rival} + \eta_\pi^{own}) = \frac{G}{2\psi(1 - \phi)}.$$

Define

$$\widehat{R} = \frac{2(\kappa_n - \sigma)\psi(1 - \phi)}{G} > 0, \qquad Y = 1 + \frac{(\kappa_n - \sigma)\sigma + K_n(\kappa_n - K_n)}{D} > 1,$$

and let $\widehat{Y} = Y - \frac{K_n}{\sigma}(1 - \widehat{R})$. Collecting terms in $\omega_h$ and substituting in for $\eta_\pi^{rival} + \eta_\pi^{own}$, we have

$$\begin{aligned}1 + \omega_h &= \frac{\kappa_n}{(\kappa_n + K_n)\sigma}\left[K_n + \frac{\sigma Y - K_n}{\kappa_n - \sigma}\left((\kappa_n - \sigma) + \frac{\sigma}{2}(\eta_\pi^{rival} + \eta_\pi^{own})\right)\right] \\ &= \frac{\kappa_n}{(\kappa_n + K_n)\sigma}\left[K_n + \frac{\sigma Y - K_n}{\widehat{R}}\right] = \frac{\kappa_n}{\kappa_n + K_n}\frac{\widehat{Y}}{\widehat{R}}.\end{aligned} \tag{B.8}$$

Substituting in for $\beta_\theta^M$, $\psi$, and $\phi$ gives

$$1 - \widehat{R} = \frac{\sigma}{DG}\left[\kappa_n - \sigma - K_n + K_n\left(1 + \frac{\sigma}{\xi}\right)\beta_\theta^M\sigma\right] > 0. \tag{B.9}$$

Thus $0 < \widehat{R} < 1$. We first show that $\widehat{R}$ is strictly decreasing and $Y$ is strictly increasing. By the proof of Proposition 4, $\frac{d(\beta_\theta^M \sigma)}{d\xi} > 0$. Hence

$$\frac{dG}{d\xi} = -\frac{4}{\kappa_d - K_d} - \frac{d(\beta_\theta^M \sigma)}{d\xi} < 0, \qquad \frac{dD}{d\xi} = -(\kappa_n - \sigma - \xi) - 2(\kappa_n - \sigma) < 0.$$

The numerator on the right-hand side of (B.9) is positive and strictly increasing in $\xi$ since $K_n < \kappa_n - \sigma - \xi$ and $\xi > \sigma$ imply

$$\frac{d[\sigma(\kappa_n - \sigma - K_n)]}{d\xi} = \kappa_n - 2\sigma - K_n > \xi - \sigma > 0,$$

and since $K_n\sigma(1+\sigma/\xi)\beta_\theta^M\sigma$ is nondecreasing, since $\sigma$, $\sigma/\xi$, and $\beta_\theta^M\sigma$ are positive and strictly increasing. Since $D$ and $G$ are positive and strictly decreasing, it follows that $\frac{d\widehat{R}}{d\xi} < 0$.

In the definition of $Y$, the term with numerator $(\kappa_n - \sigma)\sigma$ is strictly increasing: its numerator has derivative $\kappa_n - 2\sigma > 0$, while $D$ is strictly decreasing. Differentiating the remaining term therefore gives

$$\frac{dY}{d\xi} > \frac{K_n(\kappa_n - K_n)(3\kappa_n - 3\sigma - \xi)}{D^2} \geq 0. \tag{B.10}$$

Suppose first that $\sigma Y \geq K_n$. Substituting in for $\widehat{Y}$, we can write

$$\frac{\widehat{Y}}{\widehat{R}} = Y + \left(Y - \frac{K_n}{\sigma}\right)\left(\frac{1}{\widehat{R}} - 1\right).$$

Both factors in the product are nonnegative and have positive derivatives, since $\frac{dY}{d\xi} > 0$, $\frac{d\sigma}{d\xi} = 1$, and $\frac{d\widehat{R}}{d\xi} < 0$. The right-hand side therefore has a positive derivative, so (B.8) implies $\frac{d\omega_h}{d\xi} > 0$. This case includes $K_n = 0$ and $\sigma Y = K_n$.

Suppose instead that $\sigma Y < K_n$. Since $\widehat{R}$ is positive and strictly decreasing, it is enough to show that $\widehat{Y}$ is positive and strictly increasing. Since $\sigma, Y > 0$, then in this case we must have $K_n > 0$. Using the definition of $Y$,

$$K_n > \sigma Y > \frac{\sigma K_n(\kappa_n - K_n)}{D}.$$

Dividing by $K_n$ and using $K_n < \kappa_n - \sigma - \xi$, we obtain

$$D > \sigma(\kappa_n - K_n) > \sigma(\xi + \sigma).$$

To complete the bounding arguments, define

$$\ell = \left(1 + \frac{\sigma}{\xi}\right)\beta_\theta^M\sigma = \frac{\sigma(\xi + \sigma)}{D\left(1 + \dfrac{\kappa_n K_n}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\right)}.$$

Since $D > \sigma(\xi + \sigma)$, then $0 < \beta_\theta^M\sigma < \ell < 1$.

*Verifying that* $\widehat{Y} > 0$. To bound $\widehat{Y}$, write

$$R = \frac{1-\widehat{R}}{\sigma} = \frac{\kappa_n - \sigma - K_n + K_n\ell}{DG}, \qquad \widehat{Y} = Y - K_n R.$$

First, to show that $\widehat{Y} > 1$, since $\ell < 1$ we have

$$\widehat{Y} > Y - K_n \frac{\kappa_n - \sigma}{DG}$$

Next since $1 - \beta_\theta^M \sigma > 0$ in this case, then $G > \frac{4(\kappa_n - \sigma)}{\kappa_d - K_d}$ and so

$$\widehat{Y} > Y - K_n \frac{\kappa_n - \sigma}{D\frac{4(\kappa_n-\sigma)}{\kappa_d - K_d}} = 1 + \frac{(\kappa_n - \sigma)\sigma + K_n(\kappa_n - K_n - \frac{\kappa_d - K_d}{4})}{D} > 1$$

where the last inequality follows since $\kappa_n - K_n > \sigma + \xi > \xi - \sigma = \frac{\kappa_d + K_d}{2}$.

*Verifying that* $\frac{d\widehat{Y}}{d\xi} > 0$. Recall that we have

$$\frac{d\widehat{Y}}{d\xi} = \frac{dY}{d\xi} - K_n \frac{dR}{d\xi}.$$

Since we have already shown that $\frac{dY}{d\xi} > 0$, we aim to appropriately bound $\frac{dR}{d\xi}$. We have

$$\begin{aligned}\frac{dR}{d\xi} &= \frac{-1 + K_n \frac{d\ell}{d\xi}}{DG} - \frac{d[DG]}{d\xi}\frac{R}{DG} \\ &= \frac{1}{G}\left(\frac{4}{\kappa_d - K_d}R - \frac{1}{D}\right) + \frac{K_n}{DG}\frac{d\ell}{d\xi} + \Big((\kappa_n - \sigma - \xi) + 2(\kappa_n - \sigma)\Big)\frac{R}{D} + \frac{d(\beta_\theta^M \sigma)}{d\xi}\frac{R}{G}\end{aligned}$$

Following the bounding argument from the prior step, we have

$$0 < R < \frac{\kappa_d - K_d}{4D}, \tag{B.11}$$

and therefore

$$\frac{dR}{d\xi} < \frac{K_n}{DG}\frac{d\ell}{d\xi} + \Big((\kappa_n - \sigma - \xi) + 2(\kappa_n - \sigma)\Big)\frac{R}{D} + \frac{d(\beta_\theta^M \sigma)}{d\xi}\frac{R}{G}$$

Next, for $\ell = \frac{\sigma(\xi+\sigma)}{D\left(1+\frac{\kappa_n K_n}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}\right)}$, we have

$$0 < \frac{d\ell}{d\xi} = \frac{\xi+3\sigma}{D\left(1+\frac{\kappa_n K_n}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}\right)} - \frac{dD}{d\xi}\frac{\ell}{D} - \frac{\ell \cdot \frac{d\left[\frac{\kappa_n K_n}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}\right]}{d\xi}}{1+\frac{\kappa_n K_n}{(\kappa_n-\sigma)(\kappa_n-\sigma-\xi)}}$$
$$\leq \frac{\xi+3\sigma}{D} - \frac{dD}{d\xi}\frac{\ell}{D} < \frac{3\kappa_n}{D}$$

Next bounding the derivative in $\beta_\theta^M \sigma = \frac{\xi}{\xi+\sigma}\ell$, using parallel arguments we have

$$0 < \frac{d[\beta_\theta^M \sigma]}{d\xi} \leq \frac{\sigma+\xi}{D} - \frac{1}{D}\frac{dD}{d\xi}\beta_\theta^M \sigma < \frac{3\kappa_n - 2\sigma}{D}.$$

Using the bounds on the derivatives and the bounds on $G$ and $R$, we obtain

$$\frac{dR}{d\xi} < \frac{\kappa_d - K_d}{4(\kappa_n-\sigma)D^2}\left[3K_n\kappa_n + (\kappa_n-\sigma)(3\kappa_n-3\sigma-\xi) + (3\kappa_n-2\sigma)\frac{\kappa_d-K_d}{4}\right].$$

Using $\kappa_d - K_d \leq 2(\xi-\sigma) < 2\xi$ and $3\kappa_n - 2\sigma = 3(\kappa_n-\sigma)+\sigma < 4(\kappa_n-\sigma)$, we have $\frac{\kappa_d-K_d}{4}(3\kappa_n-2\sigma) < 2\xi(\kappa_n-\sigma)$. Using this and $D>0$, we have

$$\frac{dR}{d\xi} < \frac{\kappa_d-K_d}{2D^2}(3\kappa_n-3\sigma-\xi)$$

Having bounded $\frac{dR}{d\xi}$, we conclude by showing that $\frac{d\widehat{Y}}{d\xi} > 0$. Following the bound here and in equation B.10, we have

$$\frac{d\widehat{Y}}{d\xi} = \frac{dY}{d\xi} - K_n\frac{dR}{d\xi} > \frac{K_n(3\kappa_n-3\sigma-\xi)}{D^2}\left(\kappa_n - K_n - \frac{\kappa_d-K_d}{2}\right) > 0$$

where the final step follows since $\kappa_n - K_n - \frac{\kappa_d-K_d}{2} > 0$.

In sum, we have shown in this case that $\frac{d\omega_h}{d\xi} = \frac{\kappa_n}{\kappa_n+K_n}\left(\frac{1}{\widehat{R}}\frac{d\widehat{Y}}{d\xi} - \frac{\widehat{Y}}{\widehat{R}^2}\frac{d\widehat{R}}{d\xi}\right)$, with $\widehat{Y}, \widehat{R} > 0$, $\frac{d\widehat{Y}}{d\xi} > 0$, and $\frac{d\widehat{R}}{d\xi} < 0$. Therefore, $\frac{d\omega_h}{d\xi} > 0$ in this case.

This concludes the proof.

**Showing $\omega_h > 0$.** We conclude by showing that $\omega_h > 0$, and indeed that each component of the decomposition is weakly positive. Using the decomposition derived above under "Threshold Country," we have $\omega_h = \sigma\left(\frac{dy_h}{d\overline{\pi}_h} - \frac{dy_{-h}}{d\overline{\pi}_h}\right) + \sigma\frac{\kappa_n}{\kappa_n+K_n}\left(\frac{dt_h}{d\overline{\pi}_h} - \frac{dt_{-h}}{d\overline{\pi}_h}\right) + \frac{K_n}{\kappa_n+K_n}\left(\frac{d[\tau_{-h}^{own}+\frac{1}{2}\theta_h^{rival}]}{d\overline{\pi}_h} - \frac{d[\tau_h^{own}+\frac{1}{2}\theta_{-h}^{rival}]}{d\overline{\pi}_h}\right)$. We therefore aim to show that each of the three terms in $\omega_h$ is non-negative, and one is strictly positive.

*The term* $\sigma\left(\frac{dy_h}{d\overline{\pi}_h} - \frac{dy_{-h}}{d\overline{\pi}_h}\right)$. We show that $\frac{dy_h}{d\overline{\pi}_h} > 0$ and $\frac{dy_{-h}}{d\overline{\pi}_h} \leq 0$. Recall that $y_h = -\frac{1}{\xi}\tau_h^{own}$. Then, using Proposition 7, we have

$$\frac{dy_h}{d\overline{\pi}_h} = -\frac{1}{\xi}\beta_\pi^{own} = \frac{1}{\xi}\left[\beta_\theta^M\left[(\kappa_n - \sigma) + \sigma\frac{1}{2}\eta_\pi^{rival}\right] + K_n\widetilde{\beta}_\theta^M\sigma\frac{1}{2}\eta_\pi^{own}\right] > 0$$

$$\frac{dy_{-h}}{d\overline{\pi}_h} = -\frac{1}{\xi}\left[\beta_\theta^M\sigma\frac{1}{2}\eta_\pi^{own} + K_n\widetilde{\beta}_\theta^M\left[(\kappa_n - \sigma) + \sigma\frac{1}{2}\eta_\pi^{rival}\right]\right] \leq 0$$

where the inequalities follow from $\eta_\pi^{rival} > 0$ and $\eta_\pi^{own} \geq 0$.

*The term* $\sigma\frac{\kappa_n}{\kappa_n + K_n}\left(\frac{dt_h}{d\overline{\pi}_h} - \frac{dt_{-h}}{d\overline{\pi}_h}\right)$. This term is weakly positive from Proposition 8.

*The term* $\frac{K_n}{\kappa_n + K_n}\left(\frac{d[\tau_{-h}^{own} + \frac{1}{2}\theta_h^{rival}]}{d\overline{\pi}_h} - \frac{d[\tau_h^{own} + \frac{1}{2}\theta_{-h}^{rival}]}{d\overline{\pi}_h}\right)$. We show that $V \equiv \frac{d[\tau_{-h}^{own} + \frac{1}{2}\theta_h^{rival}]}{d\overline{\pi}_h} \geq 0$ and $U \equiv \frac{d[\tau_h^{own} + \frac{1}{2}\theta_{-h}^{rival}]}{d\overline{\pi}_h} < 0$. Using Proposition 7, we have

$$U = \beta_\pi^{own} + \frac{1}{2}\eta_\pi^{rival} = -\beta_\theta^M(\kappa_n - \sigma) + \frac{1 - \beta_\theta^M\sigma}{2}\eta_\pi^{rival} - K_n\widetilde{\beta}_\theta^M\sigma\frac{1}{2}\eta_\pi^{own}$$

$$V = \beta_\pi^{rival} - \frac{1}{2}\eta_\pi^{own} = -\frac{1 - \beta_\theta^M\sigma}{2}\eta_\pi^{own} + K_n\widetilde{\beta}_\theta^M(\kappa_n - \sigma) + K_n\widetilde{\beta}_\theta^M\sigma\frac{1}{2}\eta_\pi^{rival}$$

Substituting in for $\eta_\pi^{rival} = \frac{G - 2(\kappa_n - \sigma)\psi(1-\phi^2)}{\sigma(1-\phi^2)\psi}$ and $\eta_\pi^{own} = \frac{\phi}{(1-\phi^2)\sigma\psi}G$, we have

$$V = \frac{G}{2(1-\phi^2)\sigma\psi}\left(K_n\widetilde{\beta}_\theta^M\sigma - (1 - \beta_\theta^M\sigma)\phi\right)$$

$$U = -\frac{\kappa_n - \sigma}{\sigma} + \left((1 - \beta_\theta^M\sigma) - K_n\widetilde{\beta}_\theta^M\sigma\phi\right)\frac{G}{2(1-\phi^2)\sigma\psi} = \frac{(1 - \beta_\theta^M\sigma)G - 2\psi(\kappa_n - \sigma)}{2\sigma\psi} - \phi V$$

Therefore, it suffices to show that $V \geq 0$ and $(1 - \beta_\theta^M\sigma)G < 2\psi(\kappa_n - \sigma)$.

If $\beta_\theta^M\sigma \geq 1$, then $V \geq 0$ and $U < 0$ follow immediately, so consider instead the case in which $\beta_\theta^M\sigma < 1$. Following the proof of Proposition 9, define

$$\ell = \left(1 + \frac{\sigma}{\xi}\right)\beta_\theta^M\sigma.$$

Since $\beta_\theta^M\sigma < 1$ and $\sigma < \xi$, then $\ell < 2$.

We first show that $G(1 - \beta_\theta^M\sigma) < 2(\kappa_n - \sigma)\psi$. Since $(\kappa_n - \sigma)(\kappa_n - \sigma - \xi) - (K_n\kappa_n) > 0$,

$$0 \leq K_n\widetilde{\beta}_\theta^M = \frac{\kappa_n K_n}{(\kappa_n - \sigma)(\kappa_n - \sigma - \xi)}\beta_\theta^M < \beta_\theta^M.$$

Substituting in for $\psi$, and using this bound together with $\ell < 2$ and $K_n < \kappa_n - \sigma$, gives

$$G - 2(\kappa_n - \sigma)\psi = \frac{(\kappa_n - \sigma)\beta_\theta^M\sigma + K_n^2\widetilde{\beta}_\theta^M\sigma(\ell - 1)}{\xi} \leq \frac{(\kappa_n - \sigma + K_n)\beta_\theta^M\sigma}{\xi} < \frac{2(\kappa_n - \sigma)\beta_\theta^M\sigma}{\xi}.$$

In this case, $\beta_\theta^M \sigma < 1$ and $\kappa_d - K_d < 2\xi$ imply

$$G > \frac{4(\kappa_n - \sigma)}{\kappa_d - K_d} > \frac{2(\kappa_n - \sigma)}{\xi}.$$

Putting these bounds together, we have

$$G - 2(\kappa_n - \sigma)\psi < \frac{2(\kappa_n - \sigma)}{\xi}\beta_\theta^M \sigma < G\beta_\theta^M \sigma,$$

which proves that $G(1 - \beta_\theta^M \sigma) < 2(\kappa_n - \sigma)\psi$. Combined with the lower bound on $G$, it also implies that

$$\psi > \frac{G(1 - \beta_\theta^M \sigma)}{2(\kappa_n - \sigma)} > \frac{1 - \beta_\theta^M \sigma}{\xi}.$$

We use this bound to show that $V \geq 0$. Substituting in for $\psi\phi$ and using $\beta_\theta^M \sigma < 1$ and $\sigma < \xi$,

$$\psi\phi = \frac{K_n \widetilde{\beta}_\theta^M \sigma(\sigma + \xi)}{2\xi\kappa_n}\left(1 + \frac{\kappa_n - \sigma - \xi}{\xi}\beta_\theta^M \sigma\right) \leq \frac{K_n \widetilde{\beta}_\theta^M \sigma(\sigma + \xi)(\kappa_n - \sigma)}{2\xi^2 \kappa_n} \leq \frac{K_n \widetilde{\beta}_\theta^M \sigma}{\xi}$$

Since $\phi \geq 0$, then combining the bounds on $\psi$ and $\phi\psi$ gives

$$\phi(1 - \beta_\theta^M \sigma) \leq \phi\psi\xi \leq K_n \widetilde{\beta}_\theta^M \sigma$$

and therefore we have $V \geq 0$. Therefore since $G(1 - \beta_\theta^M \sigma) < 2(\kappa_n - \sigma)\psi$, since $\phi \geq 0$, and since $V \geq 0$, we have $U < 0$, concluding the proof.

# B.3 Possible Extensions

## B.3.1 Extension: Technology

We extend the model to allow a hegemon to innovate its technology prior to the rivalry. To do so, we incorporate a "Before" period, occurring prior to the Beginning, in which each hegemon is able to invest in technological development. We build on the heterogeneous hegemons extension of Section 5, focusing on the representative (asymmetric) country.

Formally, hegemon $h$'s downstream technology is defined by a state $L_h \in \{\underline{L}, \overline{L}\}$, which governs the cost parameters $\zeta_h^{own}(L_h)$ and $\zeta_h^{rival}(L_h)$ of its production process, the cost parameters $\zeta_{nh}(L_h)$ of the representative RoW country, and the substitutability $K_n(L)$ of the hegemons' downstream goods, where $L = (L_h, L_{-h})$. In the Before period, each hegemon invests in technology development. In particular, hegemon $h$ can choose the probability $z_h \in [0, 1]$ of developing technology $\overline{L}$, with quadratic utility cost $\frac{1}{2}\gamma_h z_h^2$ for $\gamma_h > 0$. To simplify the exposition, we focus on one hegemon, $h$, that is best responding to a hegemon $-h$ that has chosen to innovate the $\overline{L}$ technology for sure, $z_{-h} = 1$.

Denote $\mathcal{W}_h(L_h, \overline{L})$ to be the welfare of hegemon $h$ when it realizes state $L_h$ and its rival

realizes state $\overline{L}$. Then, the maximization problem of hegemon $h$ in the Before period is

$$\max_{z_h \in [0,1]} z_h \mathcal{W}_h(\overline{L}, \overline{L}) + (1 - z_h)\mathcal{W}_h(\underline{L}, \overline{L}) - \frac{1}{2}\gamma_h z_h^2.$$

The optimal investment of hegemon $h$ at interior solutions is

$$z_h^* = \frac{1}{\gamma_h}\Big(\mathcal{W}_h(\overline{L}, \overline{L}) - \mathcal{W}_h(\underline{L}, \overline{L})\Big). \tag{B.12}$$

The following result characterizes how innovation changes in response to exogenous parameter perturbations.[4]

**Proposition 10** *Consider a perturbation to an exogenous parameter $b$ in the state $(\overline{L}, \overline{L})$. The impact on $h$'s optimal innovation is*

$$\gamma_h \frac{dz_h^*}{db} = \overbrace{\frac{\partial \mathcal{W}_h(\overline{L}, \overline{L})}{\partial b}}^{\textit{Direct Effects}} + \overbrace{\frac{\partial i_{-h}}{\partial b}\theta_h^{rival} - \frac{d\theta_{-h}^{rival}}{db} i_h}^{\text{Economic Profits}} \underbrace{- \left(\frac{\partial \tau_{-h}^{rival}}{\partial b} + \frac{\partial \tau_{-h}^{rival}}{\partial \theta_{-h}^{rival}} \frac{d\theta_{-h}^{rival}}{db}\right) x_h + \left(\frac{\partial [p_{-h} + \tau_{-h}^{own}]}{\partial b} + \frac{\partial \tau_{-h}^{own}}{\partial \theta_{-h}^{rival}} \frac{d\theta_{-h}^{rival}}{db}\right) t_h}_{\textit{Building Power}} \tag{B.13}$$

Equation B.13 highlights the impact on innovation incentives coming through the economic profits and power building motives. We focus in particular on the effects of export controls on innovation.

**Effects of Export Controls on Innovation.** We focus on how the prospect of export controls by the rival would affect hegemon $h$'s incentives to innovate. As a thought experiment, suppose that, starting from its optimal export control from the perspective of the Beginning, US could credibly commit to impose a larger export control on CH in the event that CH innovated the $\overline{L}$ technology. The effect of this larger export control is

$$\gamma_{CH} \frac{dz_{CH}^*}{d\theta_{US}^{rival}} = \underbrace{\overbrace{-i_{CH}}^{\text{Economic Profits}}}_{<0} + \underbrace{\overbrace{-\frac{\partial \tau_{US}^{rival}}{\partial \theta_{US}^{rival}} x_{CH} + \frac{\partial \tau_{US}^{own}}{\partial \theta_{US}^{rival}} t_{CH}}^{\text{Building Power}}}_{\geq 0 \qquad\qquad \geq 0}. \tag{B.14}$$

Equation B.14 reveals competing effects on $h$'s innovation from changes in the rival's export wedge. On the one hand, when the $\overline{L}$-technology makes CH's downstream sector very import dependent, a higher Beginning export wedge by US discourages innovation. On the other hand, the higher export wedge also increases the economic profits that US earns from sales of its upstream good to CH, shifting US towards accommodation. The US shift towards

[4] Perturbations in the low state are analogous, and perturbations affecting both states result in linear combinations of these effects.

accommodation increases CH's power, and motivates CH to increase its innovation rate (the second term in equation B.14). This building power motive is further amplified when CH will also be pursuing containment when technology $\overline{L}$ is developed, for example if technology $\overline{L}$ makes US and CH's goods closer substitutes. In these cases, although the direct effect of increasing costs of exports pushes down the innovation rate, the building power effect pushes CH to innovate more and may undermine the efficacy of the export control.

This extension also brings up interesting issues on limited commitment and time inconsistency in policy. A benefit of committing to lower export controls is that it discourages technological innovation in the rival. However, the time inconsistency problem arises because once the rival has not innovated, the ex-post incentives are to increase the export controls.

#### B.3.1.1 Proof of Proposition 10

In the Before period, applying Envelope Theorem we have

$$\begin{aligned}\frac{d\mathcal{W}_h(\overline{L},\overline{L})}{db} =& \frac{\partial \mathcal{W}_h(\overline{L},\overline{L})}{\partial b} + \theta_h^{rival}\frac{\partial i_{-h}}{\partial b} + \left(\frac{\partial p_h}{\partial b} + \frac{1}{2}\frac{d\theta_{-h}^{rival}}{db}\right) y_h - \frac{d\theta_{-h}^{rival}}{db} i_h \\ &+ \int_{m=0}^{1}\Bigg[ -\left(\frac{\partial p_h}{\partial b} + \frac{1}{2}\frac{d\theta_{-h}^{rival}}{db} + \frac{\partial \tau_{-h}^{rival}}{\partial b} + \frac{\partial \tau_{-h}^{rival}}{\partial \theta_{-h}^{rival}}\frac{d\theta_{-h}^{rival}}{db}\right) x_{mh} \\ &- \left(\frac{\partial p_{-h}}{\partial b} + \frac{\partial \tau_{-h}^{own}}{\partial b} + \frac{\partial \tau_{-h}^{own}}{\partial \theta_{-h}^{rival}}\frac{d\theta_{-h}^{rival}}{db}\right)(x_{m,-h} - x_{m,-h}^o)\Bigg] dm\end{aligned}$$

Applying the definitions $x_h = \int_{m=0}^{1} x_{mh} dm$ and $x_{-h}^o = \int_{m=0}^{1} x_{m,-h}^o dm$, we have

$$\begin{aligned}\frac{d\mathcal{W}_h(\overline{L},\overline{L})}{db} =& \frac{\partial \mathcal{W}_h(\overline{L},\overline{L})}{\partial b} + \theta_h^{rival}\frac{\partial i_{-h}}{\partial b} - \frac{d\theta_{-h}^{rival}}{db} i_h - \left(\frac{\partial \tau_{-h}^{rival}}{\partial b} + \frac{\partial \tau_{-h}^{rival}}{\partial \theta_{-h}^{rival}}\frac{d\theta_{-h}^{rival}}{db}\right) x_h \\ &- \left(\frac{\partial p_{-h}}{\partial b} + \frac{\partial \tau_{-h}^{own}}{\partial b} + \frac{\partial \tau_{-h}^{own}}{\partial \theta_{-h}^{rival}}\frac{d\theta_{-h}^{rival}}{db}\right)(x_{-h} - x_{-h}^o)\end{aligned}$$

from which the result follows using $t_h = x_{-h}^o - x_{-h}$.

### B.3.2 Bargaining Weights and Weights on Transfers

The Nash-in-Nash structure means that country $n$ cannot choose to reject both contracts, that is, country $n$ only chooses whether to accept both contracts or reject one of them. In our setup, rejecting both would yield country $n$'s autarky payoff of zero, so that country $n$ would be better off accepting both compared to rejecting both if $\mathcal{W}_n = \sum_h V_n^o(\tau_{-h}) - V_n(\tau) \geq 0$.[5] In this appendix, we relax the take-it-or-leave-it structure of the offers by allowing for reduced-form bargaining weights, which will help to increase the surplus to country $n$ and

[5] Because goods are substitutes, this tends to hold for fixed hegemon wedges, but can fail in part because of the wedges.

make the joint deviation less attractive. We also allow the hegemons to put welfare weights on transfers that are not equal to one.[6]

Formally, we assume that the hegemon places a welfare weight $\lambda > 0$ on transfers, so that the hegemon's welfare is $U_h(C_{he_h}, C_{hf}) + v_h(z) + \lambda T_h$. We also introduce a reduced-form bargaining weight $\mu \in [0, 1)$, so that country $n$ retains a fraction $\mu$ of the gap between its inside and outside options. Therefore, country $n$'s participation constraint in its relationship with hegemon $h$ is now

$$V_n(\tau) - T_h \geq V_n^o(\tau_{-h}) + \mu(V_n(\tau) - V_n^o(\tau_{-h})).$$

The case of $\mu = 0$ is the baseline model, while as $\mu$ rises the hegemon's ability to extract transfers becomes more limited. For this extension we assume transfers are restricted to be nonnegative, that is $T_h \geq 0$, to ensure that all else equal higher $\mu$ directly tightens the participation constraint.

For illustration, consider the case of the baseline model in which $v_h(z) = 0$. In this case, using the binding participation constraint to write transfers as $T_h = (1-\mu)(V_n(\tau) - V_n^o(\tau_{-h}))$, we can write the hegemon's utility as

$$U_h(C_{he_h}, C_{hf}) + \lambda(1 - \mu)(V_n(\tau) - V_n^o(\tau_{-h})).$$

When $\lambda(1 - \mu) = 1$, this objective function collapses to that of the baseline model (with the added restriction of transfer nonnegativity), since the higher value of transfers exactly offsets the reduction in the hegemon's bargaining weight. In this case the strategic incentives of the hegemons are exactly the same even when country $n$ has more bargaining power, so the interior equilibrium of Proposition 1 is the same but the RoW countries achieve higher welfare compared to the case of $\mu = 0$. When $\lambda(1-\mu) > 1$, the value of transfers is relatively high, and the hegemons would have more incentive to extract transfers relative to collecting economic rents.

### B.3.3 Discussion of Further Extensions

**Bargaining and Threats Between Hegemons.** We extend the baseline model to allow for bargaining and threats between the two hegemons. At the start of the Beginning, before export wedges are implemented, the two hegemons can bargain over three terms: (i) the export wedges $\{\theta_h^{rival}\}_{h \in \mathcal{H}}$ set in the Beginning; (ii) the contracts $\{\tau_h, T_h\}_{h \in \mathcal{H}}$ offered in the Middle; and (iii) a side payment $T_{US,CH}$ from CH to US, with $T_{US,CH} < 0$ capturing a side payment from US to CH. We assume that the hegemons can commit to the terms of the bargain.

Let $\theta_h^{rival,o}$ denote the export wedge that hegemon $h$ will implement if bargaining breaks down, and write $\theta^o = \{\theta_h^{rival,o}\}_{h \in \mathcal{H}}$. This wedge might be set with or without commitment, and we sketch the incentives in its determination below. If bargaining breaks down, these

[6] An alternative would be to introduce a participation constraint that checks for the deviation to autarky, essentially imposing that the gains from trade have to be positive for each RoW country. This is similar to a common agency setup in which rejecting both offers (nonparticipation) was an option (Bernheim and Whinston (1986)).

wedges are implemented and the hegemons offer contracts in the Middle as in the baseline model, resulting in hegemon welfare $\mathcal{W}_h^o(\theta^o)$.

We assume equal bargaining power, so that, fixing $\theta^o$, the Nash bargaining solution solves

$$\max_{\{\theta_h^{rival},\tau_h,T_h\}_{h\in\mathcal{H}},T_{US,CH}} \left[\mathcal{W}_{US}+T_{US,CH}-\mathcal{W}_{US}^o(\theta^o)\right]\cdot\left[\mathcal{W}_{CH}-T_{US,CH}-\mathcal{W}_{CH}^o(\theta^o)\right]$$

subject to the determination of equilibrium in the End, the bilateral participation constraints of RoW countries, $V_n(\tau)-T_h\geq V_n^o(\tau_{-h})$ for $h\in\mathcal{H}$.[7]

Because of the presence of the side payment, bargaining results in a "grand coalition" in which the hegemons jointly choose policies to maximize their combined welfare:

$$\max_{\{\theta_h^{rival},\tau_h,T_h\}_{h\in\mathcal{H}}}\sum_{h\in\mathcal{H}}\mathcal{W}_h,$$

subject to equilibrium in the End and the RoW countries' participation constraints.

There are a few interesting consequences of this grand coalition structure. First, cooperation eliminates the incentive to manipulate terms of trade solely to redistribute economic rents between the hegemons, since those transfers are zero sum. Second, the hegemons jointly choose policies to build power in their relationships with RoW countries. They retain incentives to increase the gaps between the inside and outside options of the targets so that they can extract transfers. As a consequence, the hegemons still balance the desire to make each good more attractive to increase power in one relationship against the fact that the same good serves as the outside option in the other relationship.[8] The grand bargain makes each hegemon internalize the effects of its containment policies on the rival hegemon's welfare.

Finally, we sketch the hegemons' incentives when choosing the threatened wedge $\theta_h^{rival,o}$. The allocation that maximizes combined welfare is not affected by $\theta^o$, but the side payment is given by

$$T_{US,CH}=\frac{\mathcal{W}_{CH}-\mathcal{W}_{CH}^o(\theta^o)}{2}-\frac{\mathcal{W}_{US}-\mathcal{W}_{US}^o(\theta^o)}{2}.$$

Consequently, the US benefits from threats that increase its disagreement payoff relative to China's. In particular, a threat that lowers China's disagreement payoff more than the US's improves the US bargaining position.

We assumed that the disagreement wedges affect only disagreement payoffs, leaving the feasible policies and welfare under agreement unchanged. Threats can therefore change the division of surplus but leave the realized equilibrium unchanged. These types of asymmetric threats are consistent with the observed use of semiconductor export threats by the U.S. and rare-earth export threats by China in bargaining (Clayton et al. (2025a)).

[7] There are also participation constraints of the hegemons, $\mathcal{W}_{US}+T_{US,CH}\geq\mathcal{W}_{US}^o(\theta^o)$ and $\mathcal{W}_{CH}-T_{US,CH}\geq\mathcal{W}_{CH}^o(\theta^o)$, which we assume are slack given the threats $\theta^o$.

[8] A distinct extension would allow the two hegemons to consolidate their exclusion threats, offering each RoW country the choice to accept both contracts or lose access to both hegemons' goods. The target's outside option would then be autarky, normalized to zero in the baseline model, so extraction would depend on the gap between the target's inside option and autarky.

**Anticoercion and Economic Security.** Another important extension is to allow for countries to pursue economic security policies. We sketch how to extend the model first to incorporate economic security by the targets of coercion. We then sketch an extension in which the hegemons pursue economic security vis-a-vis each other.

To capture economic security policies by the RoW countries, we could extend the setup by assuming that each of these countries can in the Beginning choose investment between hegemon-reliant technologies or home alternatives as in Clayton et al. (2026c). We could assume that there is a fixed factor that can be allocated between a nontradeable production sector and the country's tradeable sector, with a greater factor allocation increasing the productivity of that sector. The RoW country would be motivated to allocate its factor in ways that reduce each hegemon's power over it.

To capture economic security policies between the two hegemons, we could extend the model by assuming that each hegemon can allocate a local factor between producing its own upstream good and producing an alternative to the upstream good of its rival. Assuming each hegemon is relatively less efficient at producing the alternative, each hegemon has an incentive to rely on purchases of its rival's good for economic reasons, but would also have an incentive to invest in its home alternative to circumvent its rival's export wedge or to influence its rival's offered contracts in the Middle. Even if the two hegemons are bargaining as sketched above, each hegemon might have an incentive to invest in its home alternative in order to increase its bargaining power vis-a-vis its rival by blunting its rival's economic threat. For example, this might capture Chinese incentives to develop its own advanced semiconductor industry if the U.S. imposes a high export wedge to China in that industry for geoeconomic competition reasons.

Finally, one could consider RoW countries forging coalitions in their bargaining against the hegemons. The incentives for coalition building are both to secure better outside options and to reach an economic size in which the coalition internalizes the impact of the hegemons' contracts on the equilibrium. A coalition makes it potentially harder for the hegemons to build Macro Power as studied in Clayton et al. (2026b).

**Commitment.** In models with a single hegemon, the hegemon can benefit from commitments to limit its own behavior in order to deter economic security policies by its targets (Clayton et al. (2026c)). It would be interesting to extend our setup to allow for economic security policies and commitments by the hegemons over their coercion. We conjecture that the prospect of a rising competitor might mute the incentives of an incumbent hegemon to commit itself to more limited coercion. Intuitively, if a rising competitor will erode the rents that the incumbent can earn from its geoeconomic power, the incumbent's motivation to preserve these rents by adhering to rules will be lowered, and the incumbent might start turning more extractive even towards its aligned countries. It is also interesting to consider the relative incentives of the two hegemons to structure rules, as well as when rules are adopted globally (e.g., commitment to limit coercion of all countries) versus within a more contained area (e.g., commitment only over aligned countries, over whom the rival hegemon cannot easily compete).