# Strategic Resilience*

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Preliminary and incomplete. Do not circulate.

**Abstract**

Countries around the world are reckoning with the second Trump administration's adversarial approach to trade policy. This in mind, we ask how a small country can prepare to face a larger trading partner that uses trade taxes as a means of terms-of-trade manipulation and as a carrot or stick for non-trade concessions. We focus on whether and how the small country should use industrial policy in advance of trade-mediated conflicts. When the two countries' preferences over non-trade concessions are aligned, slightly misaligned, or very misaligned, the small country uses capital subsidies to manipulate its terms of trade intertemporally. When their misalignment is moderately low, it subsidizes capital varieties useful under autarky. When their misalignment is moderately high, it combines both of the above policies with additional subsidies that worsen its own terms of trade when facing terms-of-trade manipulation. In this final case, policies are economically costly but prevent coercion on non-trade concessions; the small country "protects its sovereignty."

*This version: March 2026. Author contacts: becko@princeton.edu and daniel.oconnor@princeton.edu. We are grateful for the suggestions and comments of Felix Tintlenot and Jaume Ventura, as well as seminar participants at UCLA and UC Berkeley. Arthur Adam provided excellent research assistance.

# 1 Motivation

The second Trump administration has abandoned decades of formal agreements and informal norms on the use of United States trade policy. Economically, the U.S. has adopted an "America First" stance that seeks to tilt trade arrangements in its favor. This new stance was typified by the U.S.'s high "Liberation Day" tariffs, which the administration argued—rightly or wrongly—raised substantial revenues at the expense of foreign trading partners. Geopolitically, the U.S. has dramatically expanded its use of *threatened* trade taxes as a coercive tool wielded to extract discrete, non-trade concessions. The U.S. demands—directed toward allies and adversaries alike—have included the transfer of foreign territories (Greenland), the rights to use shared military bases for unilateral operations (Spain), and the acceptance of migrants returned on U.S. military aircraft (Colombia).

In the wake of this upheaval, countries around the world are reevaluating their places in the world trading system and especially their trading relationships with the United States. In a speech at Davos 2026, Canada's prime minister Mark Carney stressed the perils of economic dependence:

> *Stop invoking rules-based international order as though it still functions as advertised. Call it what it is—a system of intensifying great power rivalry, where the most powerful pursue their interests, using economic integration as coercion... You cannot live within the lie of mutual benefit through integration, when integration becomes the source of your subordination.*

Already, various countries have reacted to the new U.S. trade regime by investing in domestic production capacity for goods historically imported from the U.S. and by pursuing third-party trade agreements.

The urgency of building geoeconomic resilience to U.S. coercion has meant that policy-making in this area has outpaced the development of a consensus theoretical paradigm.[1] This paper seeks to narrow the gap between theory and practice by shedding light on three questions: First, what is the nature of the market failure, if any, from the perspective of a country facing economic and geopolitical coercion? Second, if private markets do not respond appropriately, how ought such a country's government intervene? And third, what are the impacts of these interventions on the volume of and gains from trade around the world?

To shed light on these questions, we begin by building a simple neoclassical model of trade and geopolitical coercion. In the model, a small country, Home (e.g., Canada), and a

[1] Below, we discuss several important prior contributions, notably McLaren (1997), Clayton et al. (2024), and Kooi (2025).

large country, Foreign (e.g., U.S.), interact over three periods.[2] At time 0, forward-looking private firms in Home form irreversible capital investments subject to government subsidies. At time ½, Foreign makes a take-it-or-leave-it trade threat that conditions its future trade taxes on a binary, non-trade, "geopolitical" action chosen by Home. Home chooses an action balancing its exogenous geopolitical preferences against the anticipated economic costs of Foreign's trade sanctions. At time 1, the two countries interact economically, with Home producing using its capital stock determined at time 0 and with the countries trading subject to Foreign's trade taxes determined at time ½.

The first part of our analysis characterizes the outcomes of the time-½ geopolitical game *taking as given* Home's capital stock. We show that the nature of Foreign's trade threats can be partitioned into three separate regimes depending on the strength of Home's geopolitical preferences. First, when Home's geopolitical preferences are aligned with Foreign's or weakly misaligned, Foreign can achieve its preferred economic and geopolitical outcomes. Foreign simply offers to put Home in autarky if it takes Foreign's not-preferred action and to optimally manipulate its terms of trade otherwise. When Home's geopolitical preferences are not too misaligned with Foreign's, autarky is a big enough stick that Home takes Foreign's preferred action. Second, when Home's geopolitical preferences are somewhat less aligned, Foreign must "sweeten the deal" in order to incentivize Home to take Foreign's preferred action. Foreign does this by offering an action-conditional "carrot" in the form of trade taxes more liberal than terms-of-trade manipulation. When Home's preferences are not too misaligned, Foreign's opportunity cost of deviating from its economically optimal policy is smaller than its geopolitical gain from successful coercion. Third, when Home's geopolitical preferences are sufficiently misaligned with Foreign's, Foreign's opportunity cost of the carrot required to coerce Home exceeds its own geopolitical preference. Foreign therefore abandons its attempts to coerce Home geopolitically and simply returns to its economically preferred policy of terms-of-trade manipulation.

A particularly important aspect of the first part of our analysis concerns how Home's equilibrium economic and geopolitical welfare changes as it moves between the three regimes. As more misaligned Home geopolitical preferences cause it to transition between regimes 1 and 2, its welfare changes continuously. This reflects the simple observation that, when Home's geopolitical preferences become slightly stronger than its economic preference for terms-of-trade manipulation relative to autarky, Foreign need only liberalize slightly relative to terms-of-trade manipulation in order to keep Home willing to take Foreign's preferred action. The same is not true when further misalignment of Home's geopolitical preferences

[2]Although our baseline analysis focuses on the asymmetric, two-country case to make our analysis tractable and transparent, we will later consider extensions to the general, many-country case.

causes it to transition between regimes 2 and 3. In this instance, Foreign's on-path trade taxes jump from a liberal carrot back to terms-of-trade manipulation—an economic loss for Home—while at the same time Home's equilibrium geopolitical action changes to whatever Home prefers—a geopolitical gain for Home. Critically, we show that the geopolitical gain always strictly exceeds the economic loss. This is because in regime 2, Foreign's trade policy always holds Home indifferent to its outside option, which is to take its preferred geopolitical action but face autarky. Home prefers to move from this utility to one where it takes its preferred geopolitical action and faces terms-of-trade manipulation for the simple reason that gains from trade are positive.

The second part of our analysis builds on this characterization to study Home's optimal ex-ante capital subsidies. Whereas Foreign's trade policy fits into one of three regimes conditional on Home capital, we show that Home's choice of capital is characterized by not three but four distinct cases. The first and fourth apply when geopolitical preferences are sufficiently aligned or misaligned. In this instance, Home's time-0 policy subsidizes investments in whichever capital varieties raise its trade elasticities local to the quantities it trades under Foreign terms-of-trade manipulation. Home does this despite that prices in Foreign—a large economy—are exogenous; this is because, as in McLaren (1997), it is still possible for Home to manipulate its terms of trade intertemporally by shifting its capital stock in ways that change Foreign's trade taxes. The second case applies when geopolitical preferences are misaligned an intermediate but somewhat lower amount. In this instance, Foreign's optimal choice of carrot holds Home's total time-½ and time-1 utility to the level of its outside option, in which Home is in autarky. Home's ex-ante capital subsidies therefore promote whichever varieties of capital have the greatest difference in rental rates under autarky relative to trade "carrots."

The third case is the most novel to our analysis and, we argue, the most relevant to current policy discussions. This case applies when geopolitical preferences are misaligned an intermediate but somewhat higher amount. At this level of misalignment, Home would be coerced by Foreign if it simply implemented its optimal capital subsidies from the first or fourth cases. However, recognizing that its utility is discontinuously higher if it can avoid coercion by moving into regime 3, the planner uses capital subsidies that—in addition to improving its own on-path economic welfare as in cases 1 and 4—increase Foreign's economic opportunity cost of coercing it. This involves not only improving its own outside option, as in case 2, but also increasing Foreign's gains from trade under terms-of-trade manipulation and decreasing them under more generous "carrots." We view this case as particularly relevant to real-world policy discussions because it *provides a rationale for subsidizing investments that prevent Home from being coerced*. In all other cases, Home's capital subsidies raise its

economic welfare under Foreign coercion but have no impact on its equilibrium geopolitical behavior.

Although the results discussed above hold in general neoclassical settings with many goods, it is illustrative to consider their implications in a textbook supply-and-demand setting. Concretely, we consider an example economy in which Home exports one good to Foreign and Foreign exports another good—a quasilinear numeraire—to Home. We suppose that Home's time-0 capital investments manifest as shifts in its supply curve and consider which such shifts Home targets with its subsidies in each of the cases considered above. In cases 1 and 4—i.e., where there is low or high enough misalignment of geopolitical preferences—Home subsidizes only those changes in capital that flatten its supply curve local to the quantities it exports under terms-of-trade manipulation. In case 2—i.e., where misalignment is intermediate but somewhat lower—Home taxes investments that shift down its supply curve, essentially attempting to reduce its producer surplus to lower its gains from trade. In case 3—i.e., where misalignment is intermediate but somewhat higher—Home engages in both of the policies from earlier cases, but in addition seeks to shift down its supply curve local to the quantity it exports under terms-of-trade manipulation and shift up its supply curve local to the quantity it exports under Foreign's most generous trade "carrot." Interestingly, since some of these policies are local while others are non-local, and since some concern shifts while others concern rotations, all of them can be done simultaneously without conflicting.

Our simple supply-and-demand example also illustrates several channels through which Home's optimal resilience-building policies affect trade outcomes. First, by raising Foreign's opportunity cost of economic coercion, these policies widen the range of geopolitical parameters under which Foreign applies terms-of-trade manipulation rather than liberalizing its trade policy as a carrot. This mechanism decreases trade. At the same time, Home's policies to flatten and shift down its supply curve local to the quantities it trades under terms-of-trade manipulation raise trade conditional on terms-of-trade manipulation. This mechanism increases trade. The overall impact of policy on Home's gains from trade is similarly ambiguous, with Home's flattening of its supply curve lowering Foreign's terms-of-trade-manipulating tariffs and hence raising Home's gains from trade, while at the same time Home's overall upward shifting of its supply curve except at the quantities it trades under terms-of-trade manipulation lowers its gains from trade.

This draft is preliminary and incomplete. Future versions will develop analogs of the applied results above in a conventional, Melitz-like trade model rather than an elementary supply-and-demand environment. Future versions will also consider the extension of our results to countries without size asymmetries, many countries, and limited commitment by Foreign at time ½.

**Related literature** First and foremost, our analysis stands on the shoulders of McLaren (1997). McLaren similarly considers an economic environment in which private actors make irreversible investments prior to trade policy decisions. In McLaren (1997), governments subsequently either (a) engage in a trade war or (b) Nash bargain over tariffs (whether (a) or (b) occurs is exogenous), whereas in our case they play a simple game in which trade policies are exchanged for geopolitical actions. Nonetheless, much of the economics remains the same in these two settings: although McLaren does not characterize optimal ex-ante investment policies, our case-1 and case-4 policies would be optimal in his (a), while our case-2 policies would be optimal in his (b). In this sense, our model provides a microfoundation that rationalizes why countries may find themselves in (a) or (b) depending on their geopolitical alignment. However, our more fundamental contribution relative to McLaren is to show that Home's desire to *move between (a) and (b)* itself provides a novel policy rationale. This motive arises because we allow the trade regime to arise endogenously as an optimal policy of Foreign.

We also connect to much more recent work studying resilience-building policies in the geoeconomics literature. While analyses of how economic interdependence leads to geopolitical coercion date back to at least Hirschman (1945) and Baldwin (1985), we relate most directly to Clayton et al. (2024) and Kooi (2025). Like us, both of these papers consider how governments can optimally set policies in anticipation of coercion by a foreign hegemon. However, we differ from these papers in one essential way that leads to qualitatively different results regarding optimal ex-ante policies: we assume that the behaviors the hegemon seeks to influence are discrete rather than continuous. In Clayton et al. (2024), the hegemon can extract continuous monetary payments from foreign firms, while in Kooi (2025), countries Nash bargain over a perfectly divisible outside geopolitical good. These assumptions both imply that the coerced actor is always held exactly to its incentive compatibility constraint, as in our case 2. We instead focus on the complementary case of binary geopolitical decisions, motivated by recent events in which the United States has often demanded discrete concessions (e.g., the sovereignty of Greenland) and abandoned its demands rather than simply scaling them back when rebuffed by foreign governments. Our analysis highlights that this discreteness generates discontinuities in Home's welfare as a function of its capital stock, which results in conceptually distinct policies.

Finally, from a modeling perspective, we build upon Becko (2024) and Becko and O'Connor (2024), who adopt similar economic and geopolitical models but address different questions. Whereas these papers focus on Foreign's optimal trade taxes for coercion at time 1 and its optimal trade and capital policies for building Home dependence at time 0, we focus on the problem of Home at time 0.

# 2 A model of trade and geopolitics

We consider a stylized, two country environment that builds on Becko and O'Connor (2024). Subsequent sections will extend our analysis to the case with more countries, country size asymmetries, and imperfect commitment.

## 2.1 Environment

There are two countries, Home (variables denoted without asterisks) and Foreign (with asterisks). Home and Foreign interact economically and geopolitically over three periods: an economic time 0, an interim geopolitical period (time ½), and an economic time 1.

Economic interactions between Home and Foreign consist of trade in goods $g \in \mathcal{G}$. Foreign is a large economy in the sense that its marginal rates of substitution between these goods are exogenous to its interactions with Home. Home, by contrast, is small, so its marginal rates of substitution depend on trade as well as on time-0 investments into capital varieties $v \in \mathcal{V}$. Capital is formed by private firms but is subject to Home government subsidies.

Geopolitical interactions between Home and Foreign concern Foreign's time-1 trade taxes and a non-market geopolitical action $a \in \mathcal{A}$ that Home chooses but about which both countries have preferences. Foreign conditions its trade taxes on Home's action, a form of economic coercion that can influence Home's geopolitical behavior.

Figure 1 illustrates the timing of these interactions. At time 0, the countries trade and Home firms engage in economic interactions, including trade and (only in Home) capital investment. At time ½, they play a two-stage game of perfect information that jointly determines Foreign's time-1 trade taxes and a geopolitical action taken by Home; Foreign makes a take-it-or-leave-it offer that conditions its time-1 trade taxes on Home's geopolitical behavior and Home chooses that behavior trading off geopolitical and economic preferences. At time 1, they interact again economically, using the capital stocks formed at time 0 and the trade taxes determined at time ½.

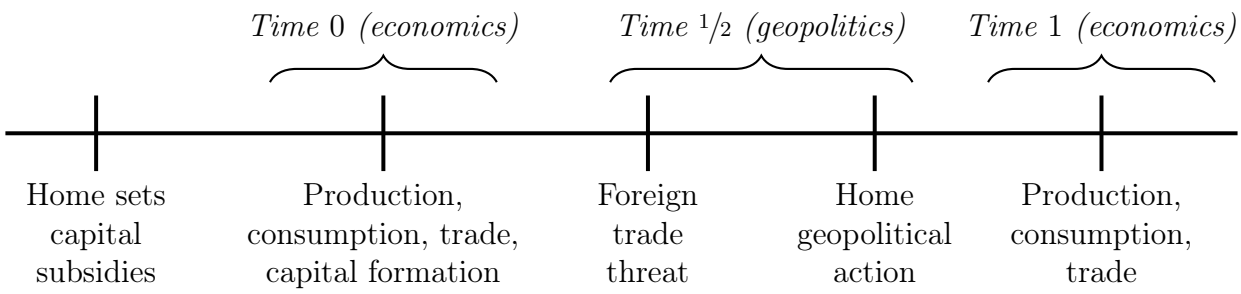



**Figure 1:** *Model timing*

We now describe these interactions in reverse order.

**Time-1 economic interactions** This period determines Home and Foreign time-1 economic welfare given Home capital stock $k = \{k_v\}$ and Foreign trade taxes $\tau_1^* = \{\tau_{1g}^*\}$.[3]

Home contains a representative household and a representative firm who transact at prices $p_1 = \{p_{1g}\}$. The household experiences utility $u_1(c_1)$ from its net consumption $c_1 = \{c_{1g}\}$ and collects domestic profits $\pi_1$. It chooses consumption to solve

$$c_1 \in \arg\max_{\hat{c}_1} \; u_1(\hat{c}_1) \quad \text{s.t.} \quad p_1 \cdot \hat{c}_1 = \pi_1. \tag{1}$$

The firm owns the capital endowment and produces net output $y_1 = \{y_{1g}\}$ subject to a production possibilities frontier $F_1(y_1, k) \leq 0$. It chooses net output to solve

$$y_1 \in \arg\max_{\hat{y}_1} \; p_1 \cdot \hat{y}_1 \quad \text{s.t.} \quad F_1(\hat{y}_1, k) \leq 0, \tag{2}$$

generating profits

$$\pi_1 = p_1 \cdot y_1. \tag{3}$$

Foreign is a large economy whose domestic prices are exogenously given by $\bar{p}_1^* = \{\bar{p}_{1g}^*\}$. Its prices differ from Home's by its trade taxes,[4] so that

$$\bar{p}_1^* = p_1 + \tau_1^*. \tag{4}$$

Markets clear, i.e.,

$$c_1 + c_1^* = y_1 + y_1^*. \tag{5}$$

We assume fundamentals are such that, for any $k$ and $\tau_1^*$, (1)–(5) admit a unique solution. Letting $\tilde{x}(k, \tau_1^*)$ denote the corresponding value of each equilibrium variable $x$, Home and Foreign time-1 economic welfare can be expressed as

$$U_1(k, \tau_1^*) \equiv u_1[\tilde{c}_1(k, \tau_1^*)] \quad \text{and} \quad U_1^*(k, \tau_1^*) \equiv \bar{p}_1^* \cdot [\tilde{c}_1^*(k, \tau_1^*) - \tilde{y}_1^*(k, \tau_1^*)] \,.$$

**Time-½ geopolitical interactions** This period determines Home's geopolitical action and Foreign's trade taxes given Home's capital stock.

[3] We assume the countries arrive to time 1 with no debts; see the discussion of debt in "Time-0 economic interactions."

[4] Note that since Home does not use trade taxes, its domestic prices are also the world prices. Although we do not allow Home to use trade taxes, if we did it would set them to zero. This is because (a) it cannot move Foreign prices and (b) it has a more direct instrument—capital subsidies—for influencing its capital stock.

First, Foreign chooses a trade tax threat, which conditions its time-1 trade policy on Home's geopolitical behavior. Formally, the trade tax threat is a function $\tilde{\tau}_1^*(\cdot)$ from the set of possible Home geopolitical actions $\mathcal{A}$ to the space of Foreign trade tax vectors $[\mathbb{R} \cup \{-\infty, \infty\}]^{\mathcal{G}}$.[5] Second, Home chooses a geopolitical action $a \in \mathcal{A}$. We assume for simplicity that $\mathcal{A} = \{\underline{a}, \bar{a}\}$ is binary. These choices together determine Foreign's realized time-1 trade taxes:

$$\tau_1^* = \tilde{\tau}_1^*(a). \tag{6}$$

Each country chooses its actions in this game to maximize the sum of its anticipated economic utility in time 1 and a geopolitical utility that depends on the action. We denote Home's geopolitical utility by $z(a)$ and Foreign's by $z^*(a)$, and we assume Foreign strictly prefers $\bar{a}$.

We can solve the game by backward induction: Given a Foreign trade threat, Home chooses its action to maximize its total subsequent utility, breaking any indifferences (we assume) in the order of Foreign's preference, i.e., in favor of efficiency. Anticipating this, Foreign chooses its trade threat to maximize its own total subsequent utility, accounting for Home's reaction. Formally, Foreign's threat $\tilde{\tau}_1^*(\cdot)$ and Home's geopolitical action $a$ satisfy

$$\begin{aligned} \tilde{\tau}_1^*(\cdot), a \in \arg\max_{\hat{\tau}_1^*(\cdot), \hat{a}} \; & U_1^*[k, \hat{\tau}_1^*(\hat{a})] + z^*(\hat{a}) \\ \text{s.t.} \quad & \hat{a} \in \arg\max_{\check{a}} \; U_1[k, \hat{\tau}_1^*(\check{a})] + z(\check{a}). \end{aligned} \tag{7}$$

If Foreign is indifferent between any two trade threats that result in different Home utilities, we assume it breaks indifference in favor Home's preference, i.e., it favors efficiency.

We assume fundamentals are such that, for any $k$, (7) has a unique solution up to Lerner symmetry. We resolve the Lerner-associated indeterminacy by assuming Foreign always sets $\tilde{\tau}_1^*(\cdot)$ so that under any geopolitical action $a$, the Lagrange multiplier on Home's time-1 household budget constraint—call it $\tilde{\lambda}_1[k, \tilde{\tau}_1^*(a)]$—is one. All indeterminacies now resolved, we let $\tilde{\tau}_1^*(\cdot; k)$ and $\tilde{a}(k)$ denote Foreign's threat and Home's action given any capital stock $k$.

**Time-0 economic interactions** This period determines Home's capital stock given its capital formation subsidies.

Home's representative household and firm transact at prices $p_0 = \{p_{0g}\}$ and also rationally anticipate time-1 equilibrium prices and profits under the equilibrium capital allocation,

[5] We allow infinite trade taxes to ensure Foreign can implement autarky.

or—in a slight abuse of notation—

$$\tilde{p}_1(k) \equiv \tilde{p}_1[k, \tilde{\tau}_1^*(\tilde{a}(k); k)] \quad \text{and} \quad \tilde{\pi}_1(k) \equiv \tilde{\pi}_1[k, \tilde{\tau}_1^*(\tilde{a}(k); k)]. \tag{8}$$

The household experiences utility $u_0(c_0)$ from its net consumption $c_0 = \{c_{0g}\}$ and collects domestic profits $\pi_0$ as well as government transfers $T_0$. It chooses consumption to solve

$$c_0 \in \arg\max_{\hat{c}_0} \max_{\hat{c}_1} u_0(\hat{c}_0) + u_1(\hat{c}_1) \quad \text{s.t.} \quad p_0 \cdot \hat{c}_0 + p_0 \cdot \hat{c}_0 = \pi_0 + \tilde{\pi}_1(k) + T_0. \tag{9}$$

The firm produces net output $y_0 = \{y_{0g}\}$ and forms time-invariant capital $k = \{k_v\}$ subject to a production possibilities frontier $F_0(y_0, k) \leq 0$ and subsidies $s_0 = \{s_{0v}\}$ to capital formation. It chooses net output and capital to solve

$$y_0, k \in \arg\max_{\hat{y_0}, \hat{k}} \max_{\hat{y}_1} p_0 \cdot \hat{y}_0 + s_0 \cdot \hat{k} + \tilde{p}_1(k) \cdot \hat{y}_1 \quad \text{s.t.} \quad F_0(\hat{y}_0, \hat{k}) \leq 0, \quad F_1(\hat{y}_1, \hat{k}) \leq 0, \tag{10}$$

generating time-0 profits

$$\pi_0 = p_0 \cdot y_0 + s_0 \cdot k. \tag{11}$$

Home's time-0 transfers rebate the costs of its capital subsidies, i.e.,

$$T_0 = -s_0 \cdot k. \tag{12}$$

Analogously to time 1, Foreign is a large economy whose domestic prices are exogenously given by $\bar{p}_0^* = \{\bar{p}_{0g}^*\}$. Its prices differ from Home's by some exogenously given trade taxes $\bar{\tau}_0^* = \{\bar{\tau}_{0g}^*\}$, so that

$$\bar{p}_0^* = p_0 + \bar{\tau}_0^*. \tag{13}$$

Although Foreign's net import demands are perfectly elastic across goods intratemporally, we assume Foreign has no willingness to borrow or save—either due to extreme preferences or financial frictions.[6] In other words, Foreign's time-0 net imports have a total value of zero at world prices (trade is balanced), i.e.,

$$p_0 \cdot (c_0^* - y_0^*) = 0$$

[6]Although we are not interested in financial market imperfects per se, we intentionally impose this assumption so that countries are in financial autarky. This allows us to focus on the role of capital accumulation policies and their impact on trade sanctions rather than on capital controls, which would require taking a stance on the nature of financial sanctions. We view financial sanctions as beyond the scope of this paper.

Markets clear, i.e.,

$$c_0 + c_0^* = y_0 + y_0^*. \tag{14}$$

We assume fundamentals are such that, for any $s_0$, (9)–(14) have a unique solution, and we let $\tilde{x}(s_0)$ denote the corresponding value of each time-0 variable $x$. These variables allow us to define the highest time-0 economic welfare consistent with Home accumulating a capital stock $k$, or

$$U_0(k) \equiv \begin{cases} u_0[\tilde{c}_0(s_0)] & \text{if there exists } s_0 \text{ s.t. } k = \tilde{k}(s_0) \\ -\infty & \text{otherwise} \end{cases}.$$

## 2.2 Home planning problem

This paper's main goal is to characterize Home's optimal capital accumulation subsidies $s_0$.

To formalize this planning problem, recall that for any subsidies $s_0$, $\tilde{k}(s_0)$ is the unique associated Home capital stock while $U_0(s_0)$ is the unique value of Home's time-0 economic welfare. Similarly recall that for any capital $k$, $W(k)$—Home's "welfare given capital"—is the unique value of Home's geopolitical utility plus its time-1 economic utility. Home's planning problem is to choose the capital subsidies that maximize its total welfare, i.e., to solve

$$\max_{s_0} U_0(k) + z[\tilde{a}(k)] + U_1(k) \quad \text{where} \quad k = \tilde{k}(s_0). \tag{15}$$

The rest of the paper studies Home's optimal capital subsidies and how they depend on the conflict between its geopolitical preferences and those of Foreign.

# 3 Capital and coercion

This section characterizes Home welfare given a capital stock, accounting for capital's impact on Foreign's choice of trade threats and Home's resulting geopolitical behavior. Section 4 subsequently builds on this taxonomy to study Home's optimal capital subsidies.

## 3.1 The trade policy welfare frontier

A useful starting point for our analysis is to visualize the frontier of time-1 Home and Foreign economic utilities implementable with some Foreign trade taxes. Figure 2 illustrates this set. Since trade is neoclassical, there is a lowest possible time-1 economic utility Home achieves under any Foreign trade taxes: autarky. We let $\tau_1^{*A}$ be the (for instance, infinite) trade taxes

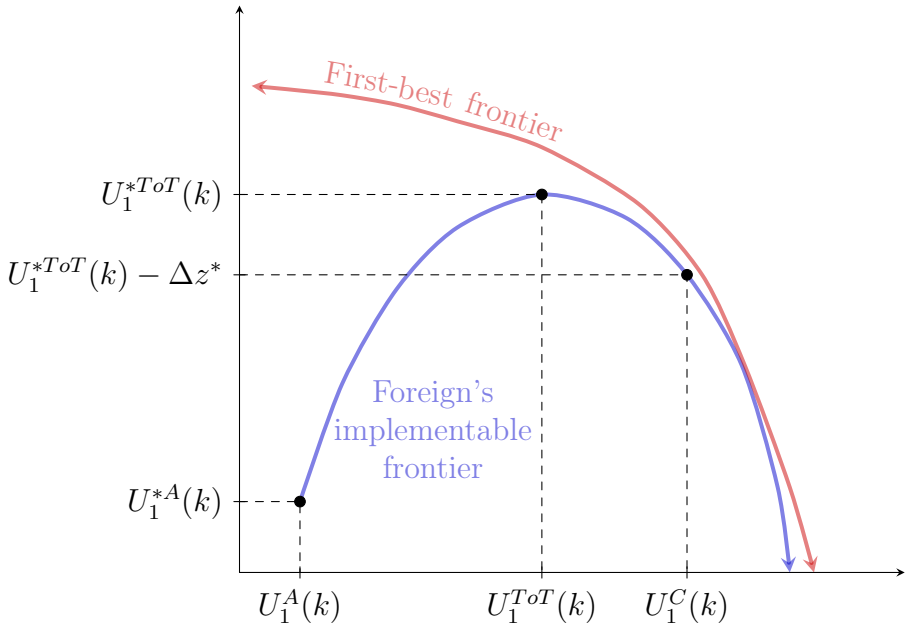



**Figure 2:** *Blue: Frontier of time-1 utilities implementable with some Foreign trade taxes. Red: First-best frontier. Points: Autarky (Foreign's optimal off-path allocation), terms-of-trade optimality (Foreign's optimal on-path allocation if not coercing Home), and Foreign's "best offer" it is willing to make to change Home's geopolitical action.*

that implement autarky and denote utility under autarky by

$$U_1^A(k) \equiv U_1(k, \tau_1^{*A}) \quad \text{and} \quad U_1^{*A}(k) \equiv U_1^*(k, \tau_1^{*A}).$$

Both Home and Foreign time-1 utility rise as Foreign liberalizes from autarky and we move along the blue line that illustrates—for any level of economic utility Foreign wants to deliver to Home—the highest possible utility achievable for Foreign. Eventually, Foreign utility reaches a maximum at the familiar Mill-Bickerdike trade taxes where Foreign optimally manipulates its terms of trade. Letting $\tau_1^{*T}(k)$ be these trade taxes given capital $k$, we denote welfare under optimal terms-of-trade manipulation by

$$U_1^{ToT}(k) \equiv U_1[k, \tau_1^{*ToT}(k)] \quad \text{and} \quad U_1^{*ToT}(k) \equiv U_1^*[k, \tau_1^{*ToT}(k)].$$

As Foreign continues to liberalize, there is a single point—free trade—at which its implementable frontier intersects the first-best frontier (the highest utilities technologically achievable without implementation constraints). Further liberalization, i.e., Foreign trade subsidies, continues to raise Home's time-1 utility at Foreign's expense.

## 3.2 Three regimes of (non-)coercion

We now fix a Home capital stock $k$ and use Figure 2 to divide our analysis into three distinct regimes depending on the strength of Home's geopolitical preferences. Recalling we assume Foreign prefers the action $\bar{a}$, we let $\Delta z^* > 0$ denote Foreign's preference for that action and we let $\Delta z$ (which may be positive or negative) denote Home's preference for the other action, $\underline{a}$. That is,

$$\Delta z \equiv z(\underline{a}) - z(\bar{a}) \quad \text{and} \quad \Delta z^* \equiv z^*(\bar{a}) - z(\underline{a}).$$

First, consider the case where the extent of disagreement about geopolitical actions is weak: Suppose Home prefers the same action as Foreign, $\bar{a}$, or it prefers $\underline{a}$ but its geopolitical preference is weakly smaller than the difference in its time-1 economic welfare between autarky and Foreign's terms-of-trade-optimal trade taxes $\tau_1^{*ToT}(k)$. That is,

$$\Delta z \leq U_1^{ToT}(k) - U_1^A(k).$$

In this instance, Foreign can achieve both its highest possible time-1 economic payoff and its highest possible geopolitical payoff. It simply can threaten to impose autarky in response to $\underline{a}$ and $\tau_1^{*ToT}(k)$ in response to $\bar{a}$. This provides Home a strong enough incentive that it chooses $\bar{a}$, and it comes at no cost to Foreign, since the off-path threat is never realized. In this regime, Home's lifetime welfare is $U_0(k) + z(\bar{a}) + U_1^{ToT}(k)$.

Second, consider the case where Home's geopolitical preferences are moderated misaligned with Foreign's. In this instance, Foreign may find it worthwhile to use not only an off-path "stick" (autarky) but also an on-path "carrot" by offering to lower its time-1 trade taxes in exchange for Home taking its preferred geopolitical action. Foreign is willing to do this so long as the cost—its foregone time-1 economic utility from deviating from $\tau_1^{*ToT}(k)$—is less than the benefit—its geopolitical preference $\Delta z^*$ for Home to take Foreign's preferred action.[7] We define by $U_1^C(k)$ the highest time-1 economic utility Foreign can deliver to Home before the cost exceeds the benefit, i.e.,

$$U_1^C(k) = \max_{\tau_1^*} \; U_1(k, \tau_1^*) \quad \text{s.t.} \quad U_1^{*ToT}(k) - U_1^*(k, \tau_1^*) \leq \Delta z^*,$$

and we let $\tau_1^{*C}(k)$ denote the corresponding trade taxes. We consider the case where Home's preference for $\underline{a}$ is stronger than in the first case, but weak enough that Foreign finds it

[7] Recall we assume that if Foreign's cost and benefit of coercing Home are exactly equal, then it does not do so. As we will later show, this breaks indifference on the side of efficiency.

cost-effective to offer a reduction in its trade taxes to induce Home to play $\bar{a}$. Formally,

$$U_1^{ToT}(k) - U_1^A(k) < \Delta z < U_1^C(k) - U_1^A(k). \tag{16}$$

In this instance, Foreign still threatens autarky for the off-path action $\underline{a}$, but now "sweetens the deal" by lowering its on-path trade taxes just enough to induce Home to take $\bar{a}$. That is, Foreign sets $\tilde{\tau}_1^*(a)$ to ensure Home's time-½ plus time-1 welfare is exactly $z(\underline{a}) + U_1^A(k)$; Home's lifetime welfare is therefore $U_0(k) + z(\underline{a}) + U_1^A(k)$. The first inequality in (16) ensures this is necessary for Foreign to induce Home to play $\bar{a}$, while the second ensures Foreign prefers it to simply playing $\tau_1^{*ToT}(k)$ and receiving its less-preferred geopolitical action.

Third, consider the case where Home's geopolitical preferences are very misaligned with Foreign's. Formally, suppose

$$U_1^C(k) - U_1^A(k) \leq \Delta z.$$

In this instance, Foreign may still be capable of offering large enough trade subsidies to incentivize Home to play $\underline{a}$, but these subsidies would have to be so large that they are not worth it. Foreign prefers to simply maximize its time-1 economic payoff by playing $\tau_1^{*ToT}(k)$ (even unconditionally) and accepting that Home will choose its less-preferred geopolitical action. In this instance, Home's lifetime welfare is $U_0(k) + U_1^{ToT}(k) + z(\bar{a})$.

We collect these observations in the following lemma. Below we let $W[k, z(\cdot)]$ denotes Home's lifetime welfare—i.e., its time-0 economic utility plus its time-½ geopolitical utility plus its time-1 economic utility—as a function of its capital $k$ and geopolitical preferences $z(\cdot)$.

**Lemma 1.** *Preferences fall into one of three regimes:*

*i. Regime 1:* $\Delta z \leq U_1^{ToT}(k) - U_1^A(k)$.

*In this regime,* $a = \bar{a}$, $\tilde{\tau}_1^*(a) = \tau_1^{*ToT}(k)$, *and* $W[k, z(\cdot)] = U_0(k) + U_1^{ToT}(k) + z(\bar{a})$.

*ii. Regime 2:* $U_1^{ToT}(k) - U_1^A(k) < \Delta z < U_1^C(k) - U_1^A(k)$.

*In this regime,* $a = \bar{a}$, $\tilde{\tau}_1^*(\neg a) = \tau_1^{*A}$, *and* $\tilde{\tau}_1^*(a)$ *is set so that* $W[k, z(\cdot)] = U_0(k) + U_1^A(k) + z(\underline{a})$.

*iii. Regime 3:* $U_1^C(k) - U_1^A(k) \leq \Delta z$.

*In this regime,* $a = \underline{a}$, $\tilde{\tau}_1^*(a) = \tau_1^{*ToT}(k)$, *and* $W[k, z(\cdot)] = U_0(k) + U_1^{ToT}(k) + z(\underline{a})$.

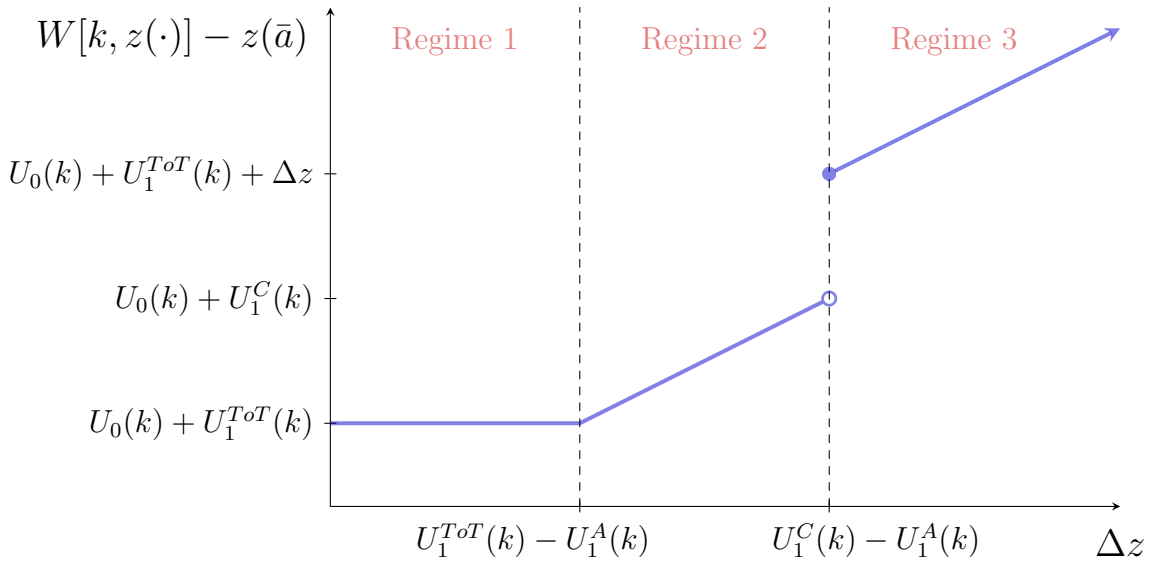



**Figure 3:** *Home lifetime welfare, given capital stock $k$, as a function of Home's geopolitical preference for action $\underline{a}$ relative to $\bar{a}$.*

### 3.3 Three ex-post benefits of ex-ante capital investments

We now build on the equilibrium categorization of Lemma 1 to understand how Home's capital stock shapes its lifetime welfare $W(k)$. We will later use this characterization to inform the design of Home's time-0 capital formation subsidies.

We begin by observing that changes in Home's capital stock can change its welfare given capital either by (a) changing its welfare within one of the three regimes from Lemma 1 or by (b) changing which of the three regimes the equilibrium falls into.

We begin with (a). Although there are three regimes in Lemma 1, note that the first and the third regimes—where Home's geopolitical preferences are either very weak or very strong—deliver the same Home lifetime welfare up to exogenous constants. So the impact of changes in capital are the same in both: a change in $k$ raises Home welfare to the extent it increases Home's time-1 economic utility under Foreign's terms-of-trade-optimal policy, or $U_1^{ToT}(k)$, by more than it lowers Home time-0 economic utility, $U_0(k)$. In the second regime, where Home's geopolitical preferences are of intermediate strength, the impact of a change in capital on Home's time-1 welfare instead depends on capital's usefulness during autarky, $U_1^A(k)$. Intuitively, autarky is Home's outside option at time-½ in regime 2, so the better off is Home under autarky, the more generous of a carrot Foreign must offer to make it willing to choose $\bar{a}$.

We next turn to (b), i.e., the potential impact of Home capital on Home welfare given capital through changes in the (non-)coercion regime. Whether such changes have a welfare

impact, of course, depends on whether Home welfare changes at the borders of the three regimes. Between regimes 1 and 2, there is no such jump: as Home's geopolitical preference $\Delta z$ rises slightly above the cutoff, Foreign offers only a small carrot relative to $\tau_1^{*ToT}(k)$ in order to keep Home's incentives aligned. The story, however, is different between regimes 2 and 3, as illustrated in Figure 3. There, Home's welfare jumps as it suddenly loses Home's more generous trade "carrot"—i.e., $\tau_1^{*C}(k)$, the policy delivering Home utility $U_1^C(k)$—but also switches to its preferred geopolitical action. The geopolitical gain always exceeds the economic loss. To see why, note that, at the border between regimes 2 and 3, Home's geopolitical preference is as strong as its time-1 economic preference for Foreign's carrot relative to its stick of autarky. Its geopolitical preference must, therefore, exceed its time-1 economic preference for Foreign's carrot relative to Foreign's terms-of-trade-optimal policy, $\tau_1^{*ToT}(k)$, since that policy is not autarky and there are always gains from trade. That is,

$$U_1^C(k) - U_1^{ToT}(k) < U_1^C(k) - U_1^A(k) = \Delta z.$$

Changes in Home capital can induce this jump in two different ways. First, they can lower Home's time-1 economic benefit from Foreign's "carrot" policy relative to autarky, for instance by reducing in some manner Home's gains from trade. Second, they can lower Foreign's time-1 economic preference for its terms-of-trade-optimal policy relative to its "carrot" policy, so that Foreign is willing to offer more generous carrots before the economic opportunity cost of doing so exceeds the geopolitical benefit.

We collect these observations in the following lemma. The lemma refers to the "regimes" of Lemma 1.

**Lemma 2.** *Home capital can change Home's equilibrium welfare, $W(k)$, in three ways:*

*i. If parameters are strictly within regimes 1 or 3, then $\partial W[k, z(\cdot)]/\partial k = d[U_0(k) + U_1^{ToT}(k)]/dk$.*

*ii. If parameters are strictly within regime 2, then $\partial W[k, z(\cdot)]/\partial k = d[U_0(k) + U_1^A(k)]/dk$.*

*iii. If parameters are at the boundary between regimes 2 and 3, then $W[k, z(\cdot)]$ decreases discontinuously in the difference $U_1^C(k) - U_1^A(k)$.*

## 3.4 Endogenous equilibrium regimes

Our analysis has so far emphasized capital's impact on Home welfare local to a particular Foreign trade policy regime. Of course, Home's choice of capital also determines which such

regime Home finds itself in. This section considers which trade regime emerges endogenously under Home's optimal capital subsidies.

We begin by defining two relevant capital allocations. First, we let $k^{ToT}$ denote Home's optimal capital allocation conditional on being within regime 1 or regime 3. By Lemma 2, this is given by

$$k^{ToT} = \arg\max_k \; U_0(k) + U_1^{ToT}(k).$$

We similarly let $k^A$ denote Home's optimal capital allocation conditional on being within regime 2. Again by Lemma 2, this is given by

$$k^A = \arg\max_k \; U_0(k) + U_1^A(k).$$

Figure 4 plots in blue solid lines and red dashed lines, respectively, Home's lifetime welfare under $k^{ToT}$ and $k^A$ as a function of the strength of its geopolitical preference, $\Delta z$. Two observations are in order. First, whenever $\Delta z$ is such that regime 1 or 3 occurs under either capital stock, $k^{ToT}$ must deliver higher welfare by its definition; whenever $\Delta z$ is such that regime 2 occurs under either capital stock, $k^A$ must deliver higher welfare. Second, $k^A$ transitions from regime 1 to regime 2 at a weaker level of geopolitical preference $\Delta z$ than $k^{ToT}$. This is because, for arbitrary $k$, the transition occurs when $\Delta z = U_1^{ToT}(k) - U_1^A(k)$, and this quantity is be larger for $k^{ToT}$ than for $k^A$ because $k^{ToT}$ is designed to prioritize welfare under terms-of-trade manipulation while $k^A$ is designed to prioritize welfare under autarky.[8]

It is instructive to further compare welfare under a third level of capital, $k$. We choose $k$ to be some capital stock that performs close to as well as $k^{ToT}$ in regimes 1 and 3, but which transitions from regime 2 to 3 at a significantly lower strength of geopolitical preference.[9] While, by construction, Home prefers $k$ to $k^{ToT}$ and $k^A$ for $\Delta z$ at which $k$ is in regime 3 but $k^{ToT}$ is not, Home always prefers $k^{ToT}$ or $k^A$ at lower levels of disagreement. The reason is that at any $\Delta z$, either $k$ and $k^{ToT}$ are both in regime 1 or either $k$ and $k^A$ are both in regime

[8] Formally, we know from the definitions of $k^{ToT}$ and $k^A$ that

$$U_0(k^A) + U_1^{ToT}(k^A) < U_0(k^{ToT}) + U_1^{ToT}(k^{ToT}) \quad \text{and} \quad U_0(k^A) + U_1^A(k^A) > U_0(k^{ToT}) + U_1^A(k^{ToT}).$$

Subtracting the second inequality from the first implies

$$U_1^{ToT}(k^A) - U_1^A(k^A) < U_0(k^{ToT}) - U_1^A(k^{ToT}).$$

[9] Such $k$ exist in general, because $k^{ToT}$ maximizes $U_0(k) + U_1^{ToT}(k)$, while the boundary between regimes 2 and 3 is given by $\Delta z = U_1^C(k) - U_1^A(k)$. In the generic case that these two functions of $k$ have non-proportional Jacobians, a slight deviation from $k^{ToT}$ can lower the boundary between regimes 2 and 3 to first order while only reducing $U_0(k) + U_1^{ToT}(k)$ to second order.

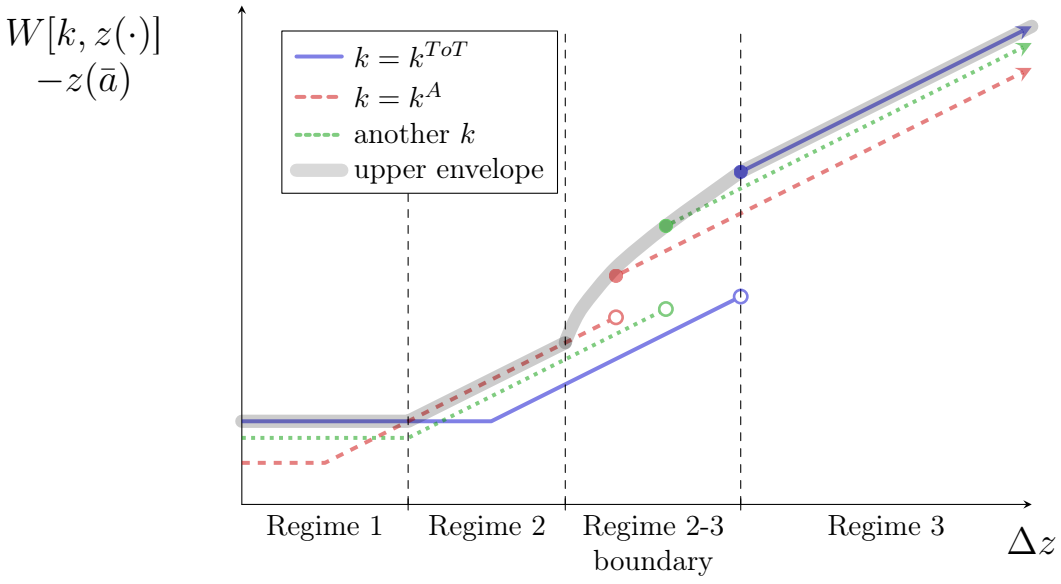



**Figure 4:** *Upper envelope of Home lifetime welfare, taken over all possible capital stocks $k$, as a function of Home's geopolitical preference for action $\underline{a}$ relative to $\bar{a}$.*

2 (recall that $k^{ToT}$ transitions from regime 1 to regime 2 at higher $\Delta z$ than $k^A$ does). In the former case, $k^{ToT}$ delivers higher welfare by construction; in the latter, $k^A$ delivers higher welfare by construction.

Combining these observations allows us to characterize the regions of geopolitical preference at which each trade policy regime emerges *under Home's optimal choice of capital*. First, for low enough $\Delta z$, welfare is higher under $k^{ToT}$ than $k^A$. At such $\Delta z$, Home chooses $k^{ToT}$ and we are in regime 1. For slightly higher $\Delta z$, welfare is higher under $k^A$ than under $k^{ToT}$. At such $\Delta z$, Home chooses $k^A$ and we are in regime 2. As $\Delta z$ increases, we eventually reach a point where some other $k$ jumps to its respective regime 3 and delivers higher welfare than $k^A$. Home then chooses such $k$ and we are endogenously at the boundary between regimes 2 and 3. Eventually, $\Delta z$ is high enough that Foreign will not coerce Home if Home has a capital stock $k^{ToT}$; in this case Home simply chooses $k^{ToT}$ and we are in regime 3.

# 4 Optimal ex-ante industrial policies

We now turn to Home's optimal industrial policies at time 0. Our analysis highlights the distinct ex-ante capital accumulation policies justified by each of the three cases highlighted in the prior section.

Throughout this section, all variables are, unless otherwise specified, assumed to take their values under Home's optimal subsidies.

## 4.1 Home capital policies for dynamic terms-of-trade manipulation

We now begin our analysis of Home's optimal capital subsidies, beginning with case 1 in Lemma 2. This case corresponds to when Home's geopolitical preferences are sufficiently aligned or misaligned with those of Foreign.

In all cases, the Home planner's optimal capital subsidies must balance any marginal time-$\frac{1}{2}$ geopolitical benefits and time-1 economic benefits against marginal time-0 economic costs, consistent with (15). As a first step in our analysis of Home's optimal subsidies, we now characterize these time-0 costs. This part of our analysis will apply to all three cases described by Lemma 2. We subsequently analyze the benefits, which are specific to case 1.

Toward characterizing the marginal time-0 costs of capital subsidies this end, consider an arbitrary variation in subsidies $ds_0$ local to their optimal level. The induced change in Home's time-0 economic utility, measured in dollar terms, is

$$dU_0/\lambda = p_0 \cdot dc_0 = p_0 \cdot dy_0, \tag{17}$$

where $\lambda$ is the Lagrange multiplier on the Home household constraint in (9). The second equality follows from the household budget constraint under financial autarky and the fact that $p_0 = \bar{p}_0^* + \bar{\tau}_0^*$ is exogenously fixed. Next, totally differentiating the time-$t$ production feasibility constraint and using the firm's first-order condition with respect to $y_t$ in (10) implies

$$F_{ty}(y_t, k) \cdot dy_t + F_{tk}(y_t, k) \cdot dk = 0 \quad \Longrightarrow \quad p_t \cdot dy_t = -\mu_t F_{tk}(y_t, k) \cdot dk, \tag{18}$$

where $\mu_t$ is the Lagrange multiplier on firm's the time-$t$ production feasibility constraint in (10). Finally, the firm's first-order condition with respect to $k$ is

$$s_0 = \mu_0 F_{0,k}(y_0, k) + \mu_1 F_{1,k}(y_1, k), \tag{19}$$

for $\mu_1$ is the Lagrange multiplier on firm's the time-1 production feasibility constraint. Note that, by (18), $-\mu_t F_{tk}(y_t, k)$ is the marginal market value of the production made feasible by a marginal change in capital; we henceforth refer to it as the marginal product of capital (MPK) vector and denote it by

$$r_t \equiv -\mu_t F_{tk}(y_t, k). \tag{20}$$

Combining this definition with (17)–(19), we arrive at an expression for marginal change in time-0 economic utility with respect to a change in subsidies, stated in the following lemma.

**Lemma 3.** *The marginal time-0 cost of capital subsidies is given, in dollar units, by*

$$\frac{1}{\lambda}\frac{dU_0(s_0)}{ds_0} = [-s_0 - r_1] \cdot \frac{d\tilde{k}(s_0)}{ds_0}.$$

The lemma communicates the straightforward observation that there are two time-0 economic costs associated with changes in subsidies. First, to the extent there are already subsidies in place, any new changes in Home's capital stock generate misallocation / fiscal externalities. Second, changes in Home's capital stock can reflect substitution between Home consumption at time 0 and time 1. Since the Home household is on its Euler equation, the money-metric utility it gives up at time 0 is, on the margin, equal to the money-metric utility it gains at time 1; the latter is, in turn, equal to the market value of the additional capital in time 1.

Having characterized the time-0 costs of changes in capital subsidies, we now turn to their geopolitical and time-1 benefits. Recall we have already shown in case 1 of Lemma 2 that these benefits satisfy

$$\frac{dW(k)}{dk} = \frac{dU_1^{ToT}(k)}{dk}, \tag{21}$$

so it remains to characterize the right-hand side. To this end, we now consider an arbitrary variation in Home capital $dk$ brought on by a change in time-0 subsidies and consider its time-1 welfare impact under Foreign's terms-of-trade-optimal trade taxes. Importantly, we must account for the fact these trade taxes may be endogenous to Home's capital stock.

The resulting change in Home's time-1 consumption utility, measured in dollar terms, is given by

$$dU_1^{ToT}/\lambda = -dp_1 \cdot c_1 + d\pi_1 \tag{22}$$

by the envelope theorem. The change in time-1 profits is, also by the envelope theorem, given by

$$d\pi_1 = dp_1 \cdot y_1 - \mu_1 F_{1y}(y_1, k) \cdot dk = dp_1 \cdot y_1 + r_1 \cdot dk, \tag{23}$$

where the second equality uses that $\mu_1$ is the same Lagrange multiplier as in the definition of $r_1$ in 20. Finally, since Home prices are exogenous,

$$dp_1 = \frac{d\tau_1^{*ToT}(k)}{dk} \cdot dk. \tag{24}$$

Combining (21)–(24) and letting $m_1 \equiv c_1 - y_1$ denote Home's time-1 net imports, we conclude

that in this case, the impact of a change in capital on welfare given capital satisfies

$$\frac{1}{\lambda}\frac{dW(k)}{dk} = r_1 - m_1 \cdot \frac{d\tau_1^{*ToT}(k)}{dk}.$$

We can now combine the marginal time-0 costs of changes in subsidies with the marginal time-$\frac{1}{2}$ and time-1 benefits. Setting the total first-order impact to zero, we arrive at a first-order necessary condition for optimal capital subsidies:[10]

$$s_0 = -m_1 \cdot \frac{d\tau_1^{*ToT}(k)}{dk} \tag{25}$$

This expression reflects the observation of McLaren (1997) that—even though Foreign is a large economy, implying that Foreign has no market power at time 1—Home still has the ability to manipulate its terms of trade dynamically. This is because world prices are the sum of Foreign's exogenous prices and its *endogenous* trade taxes, which depend on Home's capital stock.

The final step of our analysis is to substitute into 25 using the standard expression for Foreign's terms-of-trade-optimal trade taxes. These trade taxes are given in ad-valorem terms as the solution to[11]

$$\tau_1^{*av} = \Sigma_1[\bar{p}_1^*/(1+\tau_1^{*av}), k], \quad \text{where} \quad \Sigma_{1g}(p_1, k) \equiv \left[\frac{m}{\hat{p}_{1g}(m,k)} \cdot \frac{d\hat{p}_1(m,k)}{dm_g}\right]\Bigg|_{m=\hat{m}_1(p_1,k)}$$

and where $\hat{p}_1(m,k)$ is any function that returns Home prices, up to a constant, as a function of its imports and capital, and where $\hat{m}_1(p_1,k)$ is any function that returns Home net imports as a function of world prices and capital.[12] Totally differentiating implies

$$\frac{d\log(1+\tau_1^{*av})}{dk} = \left[1 + \frac{\partial\log(1+\Sigma_1)}{\partial\log p_1}\right]^{-1}\frac{\partial\log(1+\Sigma_1)}{\partial k}$$

[10] Here, we implicitly assume that the Jacobian $d\tilde{k}(s_0)/ds_0$ is invertible.

[11] See, for example, Dixit and Norman (1980) or Becko (2024). By ad-valorem, we mean that $\tau_{1g}^{*av} = \tau_{1g}^*/p_{1g}$. Note this implies $p_{1g} = \bar{p}_{1g}^*/(1+\tau_{1g}^{*av})$ by 4.

[12] These functions are straightforward to define since Home's economy is efficiency conditional on capital. For $\hat{p}_1(m,k)$, one such function is $\partial V_1(m,k)/\partial m$, where $V_1(m,k)$ is the Meade utility defined by

$$V_1(m,k) \equiv \max_{c,y}\ u_1(c) \quad \text{s.t.} \quad F_1(y,k) \leq 0, \quad c = m + y.$$

For $\hat{m}_1(p,k)$, one such function is the solution to the problem

$$\max_m \max_{c,y}\ u_1(c) \quad \text{s.t.} \quad F_1(y,k) \leq 0, \quad c = m + y, \quad p \cdot m = 0.$$

For a reference, see Becko and O'Connor (2024).

Finally, we use that $p_{1g} = \bar{p}^*_{1g} - \tau^*_{1g} = \bar{p}^*_{1g}/(1+\tau^{*av}_{1g})$—which note implies $d\tau^*_{1g} = p_{1g} d\log(1+\tau^{*av}_g)$—to substitute into (25). We thereby arrive at our first proposition, which characterizes Home's optimal time-0 capital subsidies in regime 1 of Lemma 1.

**Proposition 4.** *Suppose that under Home's optimal time-0 capital subsidies,* $\Delta z < U_1^{ToT}(k) - U_1^A(k)$ *or* $\Delta z > U_1^C(k) - U_1^A(k)$*. Then*

$$s_0 = -M_1 \cdot \left[1 + \frac{\partial \log[1+\Sigma_1(p_1,k)]}{\partial \log p_1}\right]^{-1} \cdot \frac{\partial \log[1+\Sigma_1(p_1,k)]}{\partial k}.$$

*where* $M_{1g} \equiv p_{1g} m_{1g}$ *denotes Home's expenditure on net imports.*

The proposition captures Home's optimal ex-ante behavior when geopolitical preferences are sufficiently aligned or misaligned that Foreign simply uses its terms-of-trade-optimal trade taxes on the equilibrium path. To the extent marginal changes in Home's capital subsidies will not push it into a different geopolitical regime, Home's incentives are simply to change its capital stock in whatever direction moves Foreign's trade taxes the most advantageously. This is simply the direction that most improves Home's terms of trade by lowering Foreign import tariffs and raising its export subsidies; this raises world prices for Home's exports and lowers world prices for Home's imports. Since Foreign's trade taxes are set in line with Home's trade elasticities, Home's optimal capital subsidies attempt to raise these elasticities (i.e., lower $\Sigma_1$). They can do this through capital's effect on Home's terms-of-trade elasticities. These direct effects are then amplified or dampened depending on how Home's terms-of-trade elasticities depend on prices, which move in response to Foreign's updates trade taxes.

It is important to note that Home's optimal policies only attempt to move capital because of the resulting impacts on Home's terms-of-trade elasticities *locally*. This will contrast with Home's optimal subsidies in different geopolitical regimes, which target non-local moments.

**Example.** To explore this result more concretely, we turn to a simple supply-and-demand setting in which, at time 1, Home exports a single good to Foreign and Foreign exports a quasilinear numeraire to Home. We conceive of Home as possessing capital varieties that, if invested into at time 0, can change the shape of its supply curve at time 0. We use this setting to illustrate precisely which changes in its capital stock Home would ideally like to subsidize.

In the case of case 1, Home's goal is to locally raise its own elasticities of demand for net imports. In the simple supply-and-demand setting, this simply means flattening its supply curve local to the quantity it exports when facing terms-of-trade manipulation. Figure 5 illustrates this change. Notably, Home only values changes in its supply curve *local* to the traded quantity and leaves all other investments to the market.

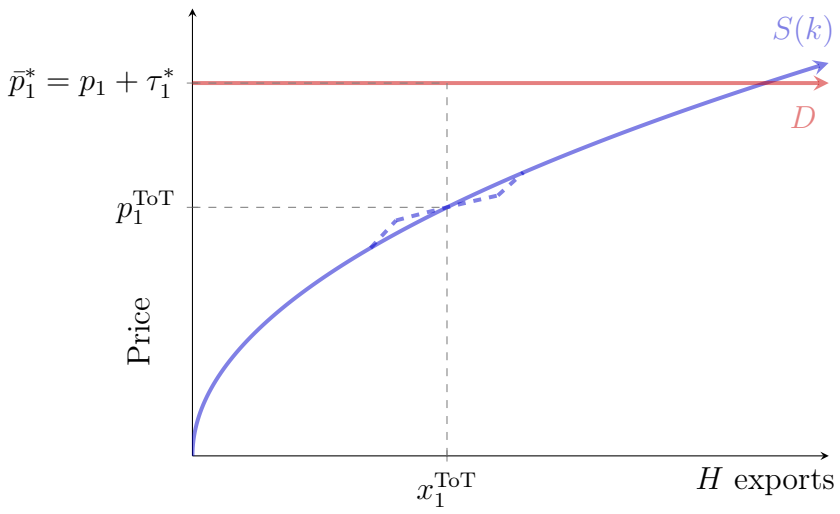



**Figure 5:** *In case 1, Home's optimal capital investments flatten its supply curve local to terms-of-trade manipulation.*

## 4.2 Home capital policies for extracting larger "carrots"

We now turn to Home's optimal capital subsidies in the second case of Lemma 2. This is when Home's geopolitical preferences are such that Foreign will offer a "carrot" by liberalizing its on-path trade taxes in order to coerce Home geopolitical, and when Home is not on the margin of moving into a different regime.

This case is particularly simple to analyze: Lemma 3 has already characterized the impact on Home's time-0economic welfare of marginal changes in capital; these are given by

$$\frac{1}{\lambda}\frac{dU_0(s_0)}{ds_0} = [-s_0 - r_1] \cdot \frac{d\tilde{k}(s_0)}{ds_0}.$$

Moreover, Lemma 2 has established that capital's impact on Home's time-$\frac{1}{2}$ geopolitical and time-1 economic utility is given by $dU_1^A(k)/dk$, where recall $U_1^A(k)$ is Home's time-1 economic utility under autarky given capital $k$. Following the same steps as in Section 4.1 implies that

$$\frac{1}{\lambda}\frac{dU_1^A(k)}{dk} = r_1^A \equiv \tilde{r}_1(k, \tau_1^{*A}),$$

i.e., the dollar value of capital under autarky is given simply by its vector of market interest rates.

Combining these observations, we arrive at a simple expression for Home's optimal time-0 capital subsidies:

**Proposition 5.** *Suppose that under Home's optimal time-*0 *capital subsidies,* $U_1^{ToT}(k) -$

$U_1^A(k) < \Delta z < U_1^C(k) - U_1^A(k)$. *Then*

$$s_0 = r_1^A - r_1.$$

In other words, Home subsidies each capital variety by an amount equal to the difference between its actual time-1 rental rate (i.e., $r_1^C$) and its off-path time-1 rental rate under autarky. This realigns private incentives—which are based on the equilibrium path—with Home's social incentives. Home's social incentives internalize that Foreign's trade "carrot" is tuned exactly so as to keep Home indifferent between (a) the on-path trade taxes under its less preferred geopolitical action and (b) the off-path trade taxes (autarky) and its preferred geopolitical action. Since Home internalizes the impact of Home's capital stock on the size of Foreign's carrot, it seeks to promote investments purely on the basis of what increases welfare under autarky.

Proposition 5 is closely related to Proposition 1 of Kooi (2025), who also argues that a countries optimal ex-ante capital subsidies are proportional to the difference between its actual and off-path interest rates. The only essential difference between these results is the frameworks in which they arise. In Kooi (2025), countries Nash bargain over the division of a geopolitical "prize" and rental rates depend on whether this bargaining succeeds because the outside option is (a) a war that involves exogenous military spending and/or (b) non-cooperative trade policy relative to cooperative trade policy. Here, the rental rates differ because of Foreign's endogenous trade threat. A key difference is that, unlike in Kooi (2025), the difference in rental rates may or may not be relevant for policy, depending on the extent of disagreement in geopolitical preferences.

**Example.** We now return to the simple supply-and-demand setting introduced above. In case 2, Home's goal is to subsidize capital varieties more useful in autarky than under Foreign's carrot. In this context, such a policy simply translates into shifting up the supply curve between these quantities. Such a shift has no market value under autarky, but negative market value (proportional to the integral under the supply shift between these quantities) under Foreign's carrot. Figure 6 illustrates a shift up in Home's supply curve. Notably, in contrast to case 1, the value of such shifts is purely nonlocal: what matters is how much Home can reduce is total producer surplus, which is totally unaffected by a change in its supply curve at any one point.

## 4.3 Home capital policies for avoiding coercion

Finally, we consider the third case of Lemma 2, in which preferences are on the border between regimes 2 and 3. While this may appear to be a knife-edge case, it in fact occurs so long as

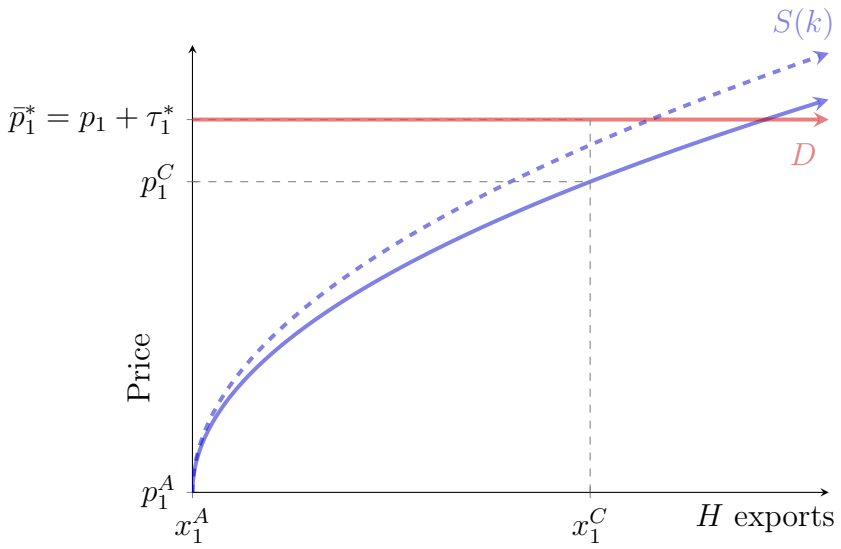



**Figure 6:** *In case 2, Home's optimal capital investments shift up its supply curve between autarky and Foreign's most generous carrot.*

preferences are close enough to the border under Home's laissez-faire capital subsidies, since the jump in Home welfare at this motivates capital distortions that move the equilibrium exactly to this border.

In this case, the problem of the Home planner is to set capital to maximize its welfare under Foreign's terms-of-trade-optimal trade taxes (since we are *just* within regime 3), but subject to an additional constraint: Foreign's preference for its desired geopolitical outcome, $\Delta z^*$, must exceed the economic welfare it gives up by eschewing terms-of-trade manipulation and instead offering Home a generous enough carrot to change its behavior. In other words, the planner's problem is to choose $k$ to solve

$$\begin{aligned} &\max_k \; U_0(k) + U_1^{ToT}(k) \\ &\text{s.t.} \quad U_1^{*ToT}(k) - U_1^{*C}(k) \geq \Delta z^*, \end{aligned} \tag{26}$$

where

$$U_1^{*C}(k) \equiv \max_{\tau_1^*} \; U_1^*(k, \tau_1^*) \quad \text{s.t.} \quad U_1(k, \tau^*) - U_1^A(k) \geq \Delta z.$$

The impact of a change in capital on the objective in (26) is just as in the first case considered in Section 4.1. However, the planner must also account for capital's impact on its constraint, i.e., on Foreign's willingness to prioritize economics (terms-of-trade manipulation) over geopolitical coercion. We consider capital's impact on Foreign's time-1 economic welfare under each of these strategies in turn.

We begin with capital's impact on Foreign's time-1 economic welfare under terms-of-trade manipulation. This is easiest to analyze by recasting the Foreign planner's problem as a primal problem of choosing Home's net imports relative to a terms of trade constraint. To do so, we define Home's "Meade utility" as the highest level of time-1 economic welfare compatible with given vectors of net imports and capital. That is,

$$V_1(m,k) \equiv \max_{c,y} \; u_1(c) \quad \text{s.t.} \quad F_1(y,k) \leq 0, \quad c = y + m.$$

By standard arguments (see Becko (2024) or Becko and O'Connor (2024)), Foreign can, with some trade taxes, implement any vector of Home net imports $m$ compatible with trade balance, which can be expressed in terms of Home's Meade utility as

$$V_{1,m}(m,k) \cdot m = 0.$$

Its terms-of-trade manipulation problem is therefore

$$U_1^{*ToT}(k) = \max_{\hat{m}_1} \; -\bar{p}_1^* \cdot \hat{m}_1 \quad \text{s.t.} \quad V_{1,m}(\hat{m}_1,k) \cdot \hat{m}_1 = 0.$$

The advantage of this formulation is that it makes it straightforward to compute the value to Foreign of a marginal change in Home capital. By the envelope theorem, this is simply

$$\frac{dU_1^{*ToT}(k)}{dk} = \mu^{ToT} m_1^{ToT} \cdot V_{1,mk}(m_1^{ToT},k) = \lambda \mu^{ToT} m_1^{ToT} \cdot \hat{p}_{1,k}(m_1^{ToT},k),$$

where $\mu_1^{*ToT} \geq 0$ is Foreign's Lagrange multiplier on its terms-of-trade constraint under its terms-of-trade-optimal taxes, where $m_1^{ToT}$ is Home's net import vector under them, and where $\hat{p}_1(m_1^{ToT},k)$ is the function defined in Footnote 12. This function provides a price vector consistent with Home's domestic equilibrium conditions at any level of net imports and capital.

Second, we turn to capital's impact on Foreign's time-1 economic welfare under its cheapest successful coercive policy. Foreign's coercive problem admits the same primal representation as its terms-of-trade problem, but with an additional constraint: Foreign must offer a generous enough "carrot" that Home's economic preference for the carrot relative to autarky exceeds its geopolitical preference. That is,

$$U_1^{*C}(k) = \max_{\hat{m}_1} \; -\bar{p}_1^* \cdot \hat{m}_1 \quad \text{s.t.} \quad V_{1,m}(\hat{m}_1,k) \cdot \hat{m}_1 = 0, \quad V_1(\hat{m}_1,k) - V_1(0,k) \geq \Delta z. \tag{27}$$

Applying the envelope theorem to this problem implies

$$\begin{aligned}\frac{dU_1^{*C}(k)}{dk} &= \mu^C m_1^C \cdot V_{1,mk}(m_1^C, k) + \kappa^C \left[V_{1,k}(\hat{m}_1, k) - V_{1,k}(0, k)\right] \\ &= \lambda\mu^C m_1^C \cdot \hat{p}_{1,k}(m_1^C, k) + \lambda\kappa^C(r_1^C - r_1^A),\end{aligned}$$

where $\mu_1^{*C} \geq 0$ and $\kappa_1^{*C} \geq 0$ are the Lagrange multipliers on the constraints in (27), where $m_1^C$ is Home's net import vector at the problem's solution, and where $r_1^C \equiv \tilde{r}_1(k, \tau_1^{*C})$ is Home's interest rate under the most generous carrot Foreign is willing to offer. The final equality uses that

$$\frac{dU_1^C(k)}{dk} = \frac{\partial V_1[\tilde{m}_1(\tau_1^{*C}, k), k]}{dk}$$

since Home's economy is efficient at time 2.

Putting all of these terms together, we arrive at a first-order condition for (26):

$$0 = -s_0 - m_1 \cdot \frac{d\tau_1^{*ToT}(k)}{dk} + \mu^{ToT} m_1^{ToT} \cdot \hat{p}_{1,k}(m_1^{ToT}, k) - \mu^C m_1^C \cdot \hat{p}_{1,k}(m_1^C, k) - \kappa^C(r_1^C - r_1^A).$$

This allows us to arrive at the following result.

**Proposition 6.** *Suppose Home's time-0 capital subsidies, $s_0$, are set optimally, and suppose $\Delta z = U_1^C(k) - U_1^A(k)$. Then for some positive $\kappa^C$, $\mu^{ToT}$, $\mu^C$, we have*

$$s_0 = s_0^1 + \kappa^C s_0^{\bar{2}} + \mu^{ToT} m_1^{ToT} \cdot \hat{p}_{1,k}(m_1^{ToT}, k) - \mu^C m_1^C \cdot \hat{p}_{1,k}(m_1^C, k),$$

where $s_0^1$ denotes the expression for capital subsidies from Proposition 4, and where $s_0^{\bar{2}}$ denotes the expression for capital subsidies from Proposition 5 in the extremal case where Foreign offers the most generous carrot it is willing.[13]

**Example.** We now return to our simple supply-and-demand setting for a final time above. In case 3, Home subsidizes capital for three distinct reasons. Two are to flatten its supply curve at the terms-of-trade manipulation quantity and to shift it up globally; these are the forces already shown in Figures 5 and 6. Figure 7 illustrates Home's third, distinct motive, which is to raise Foreign's economic opportunity cost of coercion by shifting down its supply curve local to the terms-of-trade manipulation quantity and shifting it up local to the "carrots" quantity. Importantly, all three of the motives discussed above can be pursued simultaneously without conflicting, since some concern local changes while other concern global changes, and since some concern rotations while others concern shifts.

[13] In both cases, these expressions must be evaluated at Home's capital stock under the full optimal policy $s_0$ .

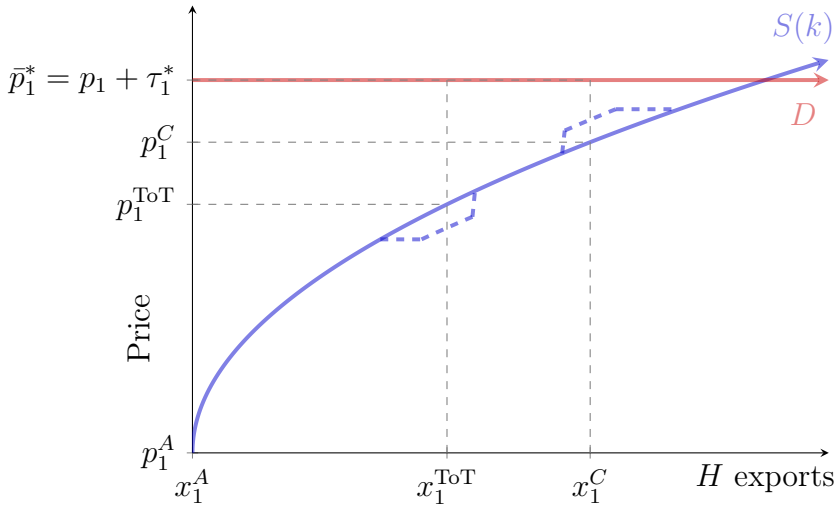



**Figure 7:** *In case 3, Home's optimal capital investments also shift down its supply curve at the terms-of-trade manipulation quantity and shift it up at the quantity trade under Foreign's most generous carrot.*

# 5 Future work

This draft is preliminary and incomplete. Future versions will develop analogs of the applied results above in a conventional, Melitz-like trade model rather than an elementary supply-and-demand environment. Future versions will also consider the extension of our results to countries without size asymmetries, many countries, and limited commitment by Foreign at time ½.

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