ECONOMETRICA

JOURNAL OF THE ECONOMETRIC SOCIETY

An International Society for the Advancement of Economic Theory in its Relation to Statistics and Mathematics

https://www.econometricsociety.org/

Econometrica, Vol. 94, No. 1 (January, 2026), 105–136

A FRAMEWORK FOR GEOECONOMICS

CHRISTOPHER CLAYTON
School of Management, Yale University

MATTEO MAGGIORI
Graduate School of Business, Stanford University

JESSE SCHREGER
Economics Division, Columbia Business School

Econometrica, Vol. 94, No. 1 (January, 2026), 105–136

A FRAMEWORK FOR GEOECONOMICS

CHRISTOPHER CLAYTON
School of Management, Yale University

MATTEO MAGGIORI
Graduate School of Business, Stanford University

JESSE SCHREGER
Economics Division, Columbia Business School

Governments use their countries' economic strength from financial and trade relationships to achieve geopolitical and economic goals. We provide a model of the sources of geoeconomic power and how it is wielded. The source of this power is the ability of a hegemonic country to coordinate threats across disparate economic relationships as a means of enforcement on foreign entities. The hegemon wields this power to demand costly actions out of the targeted entities, including mark-ups, import restrictions, tariffs, and political concessions. The hegemon uses its power to change targeted entities' activities to manipulate the global equilibrium in its favor and increase its power. A sector is strategic either in helping the hegemon form threats or in manipulating the world equilibrium via input-output amplification. The hegemon acts a global enforcer, thus adding value to the world economy, but destroys value by distorting the equilibrium in its favor.

KEYWORDS: Geopolitics, economic coercion, economic statecraft.

1. INTRODUCTION

HEGEMONIC COUNTRIES use their financial and economic strength to extract economic and political surplus from other countries around the world. This practice, referred to as geoeconomics, is not as blunt as the direct threat to go to war, as it operates through commercial channels like the threat to interrupt the supply or purchase of goods, the sharing of technology, or financial relationships and services. Despite its importance and practical relevance, the deeper foundations of geoeconomic power have remained elusive.

We provide a formal model of the sources of geoeconomic power and how it is wielded. We identify the source of the power to be the ability of countries like the United States (or China), which we refer to as hegemons, to coordinate threats across disparate economic relationships as a means of enforcement for their demands on foreign entities over which they have no direct legal control. Such coordinated "joint threats"—for example, suspending access to the dollar-based financial system and blocking technological inputs such as semiconductors—are particularly effective because they threaten punishment across many relationships for deviations on any one of them. Indeed, geoeconomic power operates in areas in which complete contracts are not feasible either because of

Christopher Clayton: christopher.clayton@yale.edu
Matteo Maggiori: maggiori@stanford.edu
Jesse Schreger: jesse.schreger@columbia.edu

We thank David Baqaee, Luigi Bocola, Saki Bigio, Fernando Broner (discussant), Laura Doval, James Fearon, Ana Fostel (discussant), Jeff Frieden (discussant), Xavier Gabaix, Ben Golub, Bengt Holmstrom, Alberto Martin, Eric Maskin, Zhengyang Jiang, Reka Juhasz, Ernest Liu, Pablo Ottonello, Diego Perez, Mathias Thoenig, Stephen Redding, Joe Stiglitz, Jean Tirole, Christoph Trebesch, and Luigi Zingales for helpful comments.

 https://doi.org/10.3982/ECTA23206

limited enforceability or because, for political and legal reasons, formal contracts are unpalatable (e.g., government to government relationships). The hegemon's ability to act as a global enforcer using joint threats can add value by reducing commitment issues and expanding the set of feasible economic activity.

The hegemon wields its power to demand costly actions from the targeted entities. This notion of power is broader than market power and also includes the ability to demand changes in economic activities and political concessions. We show how the hegemon uses its demands not only to extract direct monetary benefits but also to shape the global equilibrium in its favor by asking targeted entities to alter their activities vis à vis other entities. For example, the hegemon may demand that foreign banks stop lending to a geopolitical rival, such as when the U.S. demanded that European commercial banks stop financing trade between Iran and third-party countries. A hegemon may also ask a foreign firm to stop using sensitive technology sourced from a rival, such as when the U.S. pressured European firms to stop purchasing telecommunication technology and infrastructure supplied by Huawei.

Formally, we model a collection of countries and productive sectors with an input-output network structure. Sectors are collections of firms operating in a specific country and industry (e.g., Russian oil extraction and American oil extraction are two distinct sectors). The model features limited enforceability of contracts, as well as externalities both in production functions and in the objective functions of country-level representative consumers. Production externalities, whereby an individual sector's productivity can depend on what other sectors are producing both within and across countries, can capture external economies of scale and strategic complementarities. The externalities entering directly in the representative consumer's objective help us capture political affinity between countries' governments as well as externalities that are traditionally outside of the domain of economics, such as national security. We model threats as trigger strategies that firms and governments employ to punish other entities for deviating from contracts through exclusion from an economic relationship in the future. Joint threats are trigger strategies in which the punishment of exclusion from multiple economic relationships is triggered by an entity's deviation on any one of them. In our model, a hegemon is a country that is able to coordinate many such threats both via its national entities and via their economic network abroad.

We allow targeted entities to be firms or governments. In practice, both are relevant: hegemons pressure foreign governments to obtain political concessions or pressure foreign firms for specific actions often against the wishes of those firms' governments. A key feature of our model is that the targeted foreign entities voluntarily comply with the hegemon's demands. They do so if the value of commitment derived from the hegemon's joint threats outweighs the costs of acceding to the hegemon's demands. In practice, these threats are crucial in the conduct of secondary sanctions to induce foreign entities to stop activities that are legal in their own jurisdictions. For example, foreign banks comply with U.S. secondary sanctions given the value generated by their business with the U.S. Formally, voluntary compliance is described by the participation constraint of the targeted entity that tracks the limits to the hegemon's power, that is, the maximal private cost to the entity of the actions the hegemon can demand. We refer to this as the hegemon's Micro-Power.

We show that the hegemon always maximizes global enforcement by coordinating punishment along as many relationships as feasible. In doing so, the hegemon maximizes its Micro-Power. From a micro perspective, a sector is strategic to the extent that the hegemon can use it to build its Micro-Power by forming threats on other entities. In this sense, strategic sectors are those that supply inputs that are widely used, with high value added for targets, and with poor available substitutes. Some goods may have these properties due to physical constraints: rare earths, oil, and gas. Others have them in equilibrium due to increasing returns to scale and natural monopolies. For example, the dollar-based financial infrastructure of payment and clearing systems (like SWIFT) is a strategic asset that the U.S. often uses in geoeconomic threats.

We allow for a rich set of costly actions that the hegemon can demand. Formally, they include both monetary transfers and a complete set of revenue-neutral taxes (wedges) on targeted entities' input purchases. These instruments can be specialized to take the form of mark-ups, bilateral import-export quantity restrictions, tariffs, and political concessions. Many of these instruments are used in practice in economic coercion and sanctions policy. Given its limited power, the hegemon optimally trades off the use of each of the instruments to maximize its country's welfare. All else equal, it favors monetary extraction from sectors that have little influence on the global equilibrium. It favors wedges to alter a target's economic activities whenever those activities impact other sectors that the hegemon cares about. We show that this input-output propagation of the production externalities is summarized by a generalized Leontief inverse matrix and that the hegemon manipulates the transmission in its favor. We define Macro-Power to be the social value to the hegemon of the costly actions it demands of the targeted entities. From a macro perspective, a sector is strategic if demanding costly actions from it is particularly effective at shaping the world equilibrium in the hegemon's favor. In this sense, strategic sectors tend to be those that have a high influence on world output due to endogenous amplification (in the generalized Leontief inverse). Sectors like finance, research and development, and information technology are good candidates for being strategic in this sense.

Crucially, Micro- and Macro-Power interact since the hegemon can use demands on one part of the network to shape the equilibrium in ways that increase its power over other parts. The hegemon values having Micro-Power over sectors that generate its Macro-Power because it can exploit the difference between the private costs to targeted entities and the social benefit to itself. In accepting the hegemon's demands, the targeted entities consider only their private costs, but the hegemon enjoys the social benefits of the outcomes of these actions. As a result, we show that allocations with a hegemon are constrained inefficient from a global perspective. The hegemon acts as a global enforcer, echoing the public good provision highlighted in "hegemonic stability theory" in political science, and some of its policies correct negative externalities. The global planner also provides the same enforcement (maximal joint threats) and, in some dimensions, corrects externalities similarly to the hegemon. However, the hegemon destroys value at the global level compared to the global planner by demanding transfers and manipulating the equilibrium in its favor.

Finally, we specialize the model to two simple applications that illustrate recent examples of geoeconomics in practice. In the first example, we focus on the U.S. demand to European governments and firms that they stop using information technology (IT) infrastructure produced by China's Huawei. Since this technology has strategic complementarities in its adoption, the example illustrates the Macro-Power notion of a strategic sector. Indeed, we show that the pressure that the U.S. applied to European sectors that it could influence was higher because, by causing these sectors not to adopt the technology, the U.S. can also induce lower adoption by sectors and countries that it could not directly pressure.

Our second example focuses on the Chinese Belt and Road Initiative (BRI), an official lending program that aims to join borrowing and trade decisions. The example illustrates the value of joint threats in an economic relationship, government to government lending, in which enforcement is typically limited. In this example, profitable trade relationships act as an endogenous cost of default. Our model explains how China's BRI can enhance borrowing capacity in developing countries while allowing China to demand political concessions from these governments in return.

Literature Review. In two landmark contributions, Hirschman (1945, 1958) relates the structure of international trade to international power dynamics and sets up forward and backward linkages in input-output structures as a foundation for structural economic development. Much of our model is inspired by this work and aims to provide a formal framework for the power structures. We connect to three broad strands of literature.

First, the paper connects to the literature in political science on economic statecraft. The notion of economic statecraft is explored in depth by Baldwin (1985) and Blackwill and Harris (2016). Our modeling of power and the distinction between Micro- and Macro-Power are related to the levels or faces of power as in Bachrach and Baratz (1962), Cohen (1977), and Strange (1988). The literature on hegemonic stability theory debated whether hegemons, by providing public goods globally, can generate better world outcomes than multipolar configurations (Kindleberger (1973), Krasner (1976), Gilpin (1981), Keohane (1984)). Keohane and Nye (1977) analyze the relationship between power and economic interdependence. Waltz (1979) analyzes how economic interdependence relates to anarchic and hierarchical power systems of the international order. Farrell and Newman (2019) and Drezner, Farrell, and Newman (2021) investigate how interdependence can be "weaponized." We relate to the rationalist approach of Fearon (1995) in focusing on hegemonic power in a rational expectations full information model in which the targets voluntarily engage with an hegemon.

Second, the paper relates to the literature on networks, industrial policy, and trade. The literature on networks includes Gabaix (2011), Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi (2012), Blanchard, Bown, and Johnson (2016), Bigio and La'O (2020), Baqaee and Farhi (2019, 2022), Liu (2019), Elliott, Golub, and Leduc (2022), BBBK+ (2022), and Hausmann, Schetter, and Yildirim (2024). In trade, we relate to the study of global value chains (Grossman, Helpman, and Redding (2021), Antràs and Chor (2022)), optimal tariffs and trade agreements (Bagwell and Staiger (1999), Grossman and Helpman (1994)), issue linkage (Limão (2005), Maggi (2016)), and sanctions (Eaton and Engers (1992)). Antràs and Miquel (2023) explore how foreign influence affects tariff and capital taxation policy, and Kleinman, Liu, and Redding (2020) explore whether countries become more politically aligned as they trade more with each other. We also relate to the literature on whether closer trade relationships promote peace (Martin, Mayer, and Thoenig (2008, 2012), Thoenig (2023)).

Third, the paper uses tools developed in economic theory and macroeconomics. We employ grim trigger strategies to build a subgame perfect equilibrium building on Abreu, Pearce, and Stacchetti (1986, 1990). Our notion of joint triggers relates to the literature on multi-market contact (Bernhei and Whinston (1990)) and multitasking (Holmstrom and Milgrom (1991)) in which the presence of multiple activities or tasks can help to provide higher powered incentives. We introduce externalities à la Greenwald and Stiglitz (1986), and our study of the hegemon's optimal usage of wedges and transfers is related to the analysis of inefficiency in the presence of externalities (Geanakoplos and Polemarchakis (1985)) and the macro-prudential tools that can be used to improve welfare (Farhi and Werning (2016)).

2. MODEL SETUP

Time is discrete and infinite, $t = 0, 1, \ldots$ Each period is a stage game, described below. All agents have subjective discount factor β.

2.1. *Stage Game*

There are N countries in the world. Each country n is populated by a representative consumer and a set of productive sectors $\mathcal{I}_n$, and is endowed with a set of local factors $\mathcal{F}_n$. We define $\mathcal{I}$ to be the union of all productive sectors across all countries, $\mathcal{I} = \bigcup_{n=1}^{N} \mathcal{I}_n$, and define $\mathcal{F}$ analogously. Each sector, populated by a continuum of identical firms, produces a differentiated good indexed by $i \in \mathcal{I}$ out of local factors and intermediate inputs. The good produced by sector i is sold on world markets at price p_i, with good 1 as the numeraire. Factor f has price p_f^ℓ. Factors are internationally immobile. Denote the vector of intermediate goods prices (excluding the numeraire) as p, the vector of factor prices as p^ℓ, and the vector of all prices (excluding the numeraire) as $P = (p, p^\ell)$. Supplemental Appendix (Clayton, Maggiori, and Schreger (2026)) Table B.1 references the paper's frequently used notation.

Representative Consumer. The representative consumer in country n has preferences $U_n(C_n) + u_n(z)$, where $C_n = \{C_{ni}\}_{i\in\mathcal{I}}$ and where z is a vector of aggregate variables used to capture externalities à la Greenwald and Stiglitz (1986). Consumers take z as given. We assume U_n is increasing, concave, and continuously differentiable. The term $u_n(z)$ can capture non-economic objectives, such as national security or diplomatic concessions, or direct utility weight on activities in foreign countries. Representative consumer n owns domestic firms and the endowments of local factors, yielding a budget constraint

$$\sum_{i\in\mathcal{I}} p_i C_{ni} \leq \sum_{i\in\mathcal{I}_n} \Pi_i + \sum_{f\in\mathcal{F}_n} p_f^\ell \bar{\ell}_f,$$

where Π_i are the profits of sector i and $p_f^\ell \bar{\ell}_f$ is factor income. We define the consumer's Marshallian demand function as $C_n(p, w_n)$, where $w_n = \sum_{i\in\mathcal{I}_n} \Pi_i + \sum_{f\in\mathcal{F}_n} p_f^\ell \bar{\ell}_f$, indirect utility function from consumption in the stage game as $W_n(p, w_n) = U_n(C_n(p, w_n))$, and total indirect utility in the stage game as $W_n(p, w_n) + u_n(z)$.

Firms. A firm in sector i located in country n produces output y_i using a subset $\mathcal{J}_i \subset \mathcal{I}$ of intermediate inputs and the country n local factors. Firm i's production is $y_i = f_i(x_i, \ell_i, z)$, where $x_i = \{x_{ij}\}_{j\in\mathcal{J}_i}$ is the vector of intermediate inputs used, x_{ij} is use of intermediate input j, $\ell_i = \{\ell_{if}\}_{f\in\mathcal{F}_n}$ is the vector of factors used, and ℓ_{if} is use of local factor f. Firms take the aggregate vector z as given. For simplicity, we assume that for production functions that can use both factors and intermediate inputs, we have $f_i(0, \ell_i, z) = 0$, so that a firm that has no ability to source intermediate inputs cannot produce.[1] We assume that f_i is increasing, strictly concave, and satisfies the Inada conditions in (x_i, ℓ_i), and is continuously differentiable in all its arguments. We use the language of firms and sectors, but this is not meant to restrict the focus to private actors exclusively. Many of these entities might be part of, owned, or operated by the government (e.g., a state-owned enterprise).

The stage game has three subperiods: Beginning, Middle, and End. Since each sector has a continuum of identical firms and we restrict to symmetric equilibria, we consider a

[1]We allow for the presence of sectors that simply repackage the factors and use no intermediate inputs. As we describe below, since factors cannot be stolen, these sectors are treated separately from the main analysis and only used in some examples to sharpen the characterization.

representative firm per sector. We refer to firm i when clarity necessitates distinguishing an individual firm from the rest of the firms in the same sector, and sector i when describing representative firm outcomes (see Supplemental Appendix B.1). The game described below unfolds between an individual firm in sector i and the continuum of firms (suppliers) in sector j.

In the Beginning, firm i places an order x_{ij} to suppliers in sector $j \in \mathcal{J}_i$ and an order ℓ_i for local factors. The order x_{ij} is placed in equal proportion to each firm in sector j. Factor orders are always accepted and factors cannot be stolen.

In the Middle, each firm in sector j decides to Accept, $a_{ij} = 1$, or Reject, $a_{ij} = 0$, the order of firm i. We assume all firms within a given sector j play the same pure strategy. If the order x_{ij} is Rejected by suppliers in sector j, firm i receives none of that input and owes no payment to suppliers in sector j. If the order is Accepted by suppliers in sector j, the suppliers immediately deliver the entire order x_{ij} to firm i.

In the End, if the order was Accepted, firm i owes the payment $p_j x_{ij}$ to suppliers in sector j. Firm i can choose to Pay suppliers, or Steal from them. If firm i chooses to Steal, suppliers in sector j are only able to recover an exogenous fraction $1 - \theta_{ij} \in [0, 1]$ of the sale order value $p_j x_{ij}$. We denote $S_i \subset \mathcal{J}_i$ the subset of sectors from which firm i steals. For example, $S_i = \{1, 2\}$ denotes the action of stealing inputs provided by suppliers in sectors 1 and 2 and not any others, and $S_i = \emptyset$ denotes no stealing.

For an order (x_i, ℓ_i) in the Beginning, a vector $a_i \in \{0, 1\}^{J_i}$ of acceptance choices in the Middle ($J_i = |\mathcal{J}_i|$), and a stealing action $S_i \subset \mathcal{J}_i$ in the End, firm i's stage game payoff is

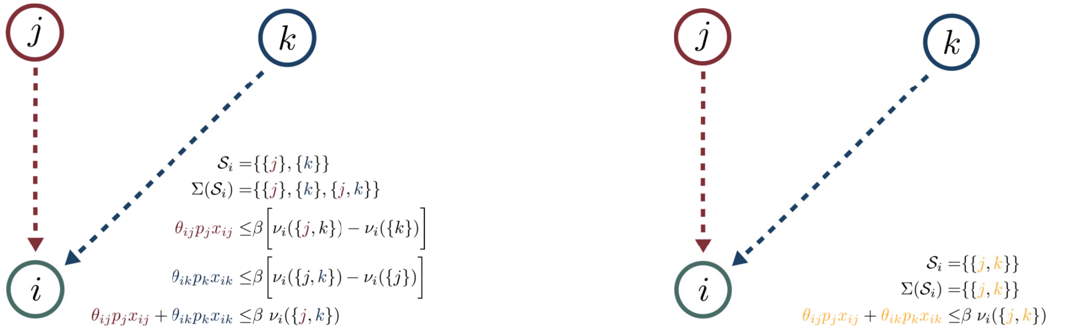
$$p_i f_i(x_i \cdot a_i, \ell_i, z) - \sum_{j \in \mathcal{J}_i} p_j a_{ij} x_{ij} - \sum_{f \in \mathcal{F}_n} p_f^\ell \ell_{if} + \sum_{j \in S} \theta_{ij} p_j a_{ij} x_{ij}.$$

Correspondingly, suppliers in sector j lose $\theta_{ij} p_j a_{ij} x_{ij}$ if firm i steals from them. The stage game captures many economic relationships that are based on repeated transactions and limited enforceability: a lender-borrower relationship in finance or a supplier-customer relationship in goods or services. The enforceability parameters θ_{ij} are flexible, and for example might be lower for international than domestic relationships.

2.2. *Repeated Game*

We assume suppliers play trigger strategies that involve switching to Rejecting any future order by an individual firm following some Stealing actions by that firm. We track permanent exclusion by $B_{ij} \in \{0, 1\}$. If $B_{ij} = 0$, then suppliers in sector j will Reject any order placed by firm i. If $B_{ij} = 1$, then suppliers in sector j will Accept an incentive compatible order (defined below) and Reject an order that is not incentive compatible. For expositional convenience, we say that suppliers in j "Trust" firm i if $B_{ij} = 1$ and "Distrust" firm i if $B_{ij} = 0$. We define $\mathcal{B}_i = \{j | B_{ij} = 1\}$ to be the set of supplying sectors that Trust firm i. Exclusion off-path is tracked at the level of the specific firm within a sector that deviates, taking as given that on path the other firms in the same sector did not deviate and thus retained access. This means that equilibrium prices and quantities do not change based on the deviation of an individual atomistic firm.

The proof of Lemma 1 and Supplemental Appendix B.1 formally characterize trigger strategies and we focus here on an intuitive presentation. We study subgame perfect equilibria that are Markov in $\mathcal{B}_i$, and restrict attention to pure strategies that are symmetric within a sector. In principle, one could allow for non-stationary (front-loaded) punishments in an attempt to worsen the off-path equilibrium and sustain a better equilibrium than Markov and potentially implement the Ramsey plan (Ray (2002), Acemoglu,



(a) Individual Triggers (b) Joint Triggers

FIGURE 1.—*Triggers, action sets, and incentive compatibility constraints. Notes*: Panels focus on a firm in sector i with suppliers in sectors j and k. Action sets and related incentive constraints are from the perspective of firm i under different configurations. Panel (a) illustrates the case in which suppliers in sectors j and k have individual triggers only. Panel (b) illustrates the case in which suppliers in sectors j and k have a joint trigger.

Golosov, and Tsyvinski (2008)). Our purpose is not to explore the best sustainable equilibrium, but to focus on a simple Markov one that provides much economics while minimizing the theoretical complexity.

A strategy of firm i in the Beginning is $\sigma_i^-(\mathcal{B}_i)$, mapping $\mathcal{B}_i$ into an order (x_i, ℓ_i). A strategy of suppliers in sector j in the Middle with regard to firm i is $\sigma_{ij}(x_i, \ell_i, \mathcal{B}_i)$, mapping an order size and $\mathcal{B}_i$ into an acceptance decision a_{ij}. A strategy of firm i in the End is $\sigma_i^+(a_i, x_i, \ell_i, \mathcal{B}_i)$, mapping acceptance decisions, order size, and $\mathcal{B}_i$ into stealing action S_i. We build a value function starting from an exogenous continuation value $\nu_i(\mathcal{B}_i)$ assumed to be non-decreasing and with $\nu_i(\emptyset) = 0$. We focus the exposition on the on-path strategies and values, $\mathcal{B}_i = \mathcal{J}_i$, with Supplemental Appendix B.1 detailing the rest of the off-path strategies and equilibrium value function following the iterative process of Abreu, Pearce, and Stacchetti (1990).

Trigger Strategies and Incentive Compatibility. We study triggers that take two forms: individual and joint. In the case of an individual trigger, if firm i Steals from suppliers in sector j, then suppliers in sector j Distrust individual firm i in all future periods. In the case of a joint trigger between suppliers in sectors j and k with respect to firm i, if firm i Steals from suppliers in either sector j or k, then suppliers in both sectors j and k Distrust individual firm i in all future periods. We assume that joint triggers are symmetric and note that they can be chained. For example, firm i stealing from suppliers h triggers suppliers j if h has a joint trigger with k and k has a joint trigger with j.

Figure 1 illustrates a simple case of two sectors j and k supplying to firm i. In building the incentive compatibility constraint for firm i, we know by backward induction that suppliers never Accept an order that will be stolen since their payoff is strictly negative from doing so. Hence, we focus on a constraint for orders that are Accepted and not stolen. In Panel (a), the suppliers in sector j only have individual triggers, resulting in an IC constraint $\theta_{ij} p_j x_{ij} \leq \beta[\nu_i(\{j, k\}) - \nu_i(\{k\})]$. Firm i compares the one-off Stealing gain $\theta_{ij} p_j x_{ij}$ with the continuation value loss of not being able to use input j again. Suppliers in sector k have an identical setup and constraint. Finally, the firm could Steal from both suppliers, generating the constraint $\theta_{ij} p_j x_{ij} + \theta_{ik} p_k x_{ik} \leq \beta\nu_i(\{j, k\})$. Panel (b) illustrates joint triggers between sectors j and k. Intuitively, firm i would never Steal from only one of sectors j or k, since both would retaliate anyway. $\mathcal{S}_i$ is the set of the smallest undominated stealing actions. In Panel (a), this included stealing from j and k separately, but in Panel (b), only stealing from both at the same time is undominated. The set $\Sigma(\mathcal{S}_i)$ then considers all possible combinations of these undominated actions. In Panel (a), this includes Stealing from j and k separately and Stealing from both at the same time. In Panel (b), this only includes Stealing from both. Therefore, under joint triggers in Panel (b), there is only one IC left, the joint stealing constraint: $\theta_{ij} p_j x_{ij} + \theta_{ik} p_k x_{ik} \leq \beta \nu_i(\{j, k\})$.

Lemma 1 provides a full characterization of the logic above in the general case. Let $P(\mathcal{J}_i)$ denote the power set of $\mathcal{J}_i$, that is, all subsets of $\mathcal{J}_i$, and let $\Sigma(\mathcal{S}) = \{\bigcup_{X \in \mathcal{X}} X | \emptyset \neq \mathcal{X} \subset \mathcal{S}\}$ be all possible unions of elements of $\mathcal{S}$. Given the firm's incentive problems, suppliers' strategy in the Middle is to Accept an order if and only if equation (1) is satisfied for all $S \in \Sigma(\mathcal{S}_i)$.

LEMMA 1: *There is a partition $\mathcal{S}_i$ of $\mathcal{J}_i$ such that the order (x_i, ℓ_i) is incentive compatible with respect to all stealing actions, $P(\mathcal{J}_i)$, if and only if it is incentive compatible with respect to $\Sigma(\mathcal{S}_i)$. The incentive compatibility constraint for $S_i \in \Sigma(\mathcal{S}_i)$ is*

$$\sum_{j \in S_i} \theta_{ij} p_j x_{ij} \leq \beta \big[\nu_i(\mathcal{J}_i) - \nu_i(\mathcal{J}_i \backslash S_i)\big]. \tag{1}$$

Since conditional on the IC holding the continuation value does not depend on order size, firm i's strategy in the Beginning is an order size (x_i, ℓ_i) to maximize its stage game payoff $\Pi_i(x_i, \ell_i, \mathcal{J}_i) = p_i f_i(x_i, \ell_i, z) - \sum_{j \in \mathcal{J}_i} p_j x_{ij} - \sum_{f \in \mathcal{F}_n} p_f^{\ell} \ell_{if}$, subject to incentive compatibility (equation (1)). Since Π_i is a concave function and equation (1) describes a convex set, this optimization problem is convex, the solution of which is the optimal order size.

2.3. *Market Clearing, Externalities, and Equilibrium*

Denote $D_j = \{i \in \mathcal{I} | j \in \mathcal{J}_i\}$ the set of sectors that source from sector j. Market clearing for good j is $\sum_{n=1}^{N} C_{nj} + \sum_{i \in D_j} x_{ij} = y_j$ and for local factor f is $\sum_{i \in \mathcal{I}_n} \ell_{if} = \overline{\ell}_f$. We assume that the vector of aggregates is $z = \{z_{ij}\}$ where $z_{ij}^* = x_{ij}^*$, where the $*$ notation denotes an equilibrium value. That is, z-externalities are based on the quantities of inputs in bilateral sectors i and j relationships. This general formulation can be specialized to cover strategic complementarities, either at the sector level (e.g., external economies of scale) or across sectors (e.g., thick market externalities).

An equilibrium of the model is prices for goods and factors P and allocations $\{x_i, C_n, y_i, \ell_i, z_{ij}\}$ such that: (i) firms maximize profits, given prices; (ii) households maximize utility, given prices; (iii) markets clear.

3. HEGEMONIC POWER

Our main analysis focuses on when and how a hegemon can build power and wield it to demand costly actions. We consider a single country that is a hegemon and Supplemental Appendix B.2 provides an extension to competition between multiple hegemons. We define the hegemon to be country m and for it to be uniquely able to: (i) coordinate firms in its network to create joint threats; (ii) propose take-it-or-leave-it offers to its own firms and *all* downstream sectors of its firms, where contract terms specify joint threats, transfers, and restrictions on inputs purchased. Unlike individual firms and consumers, the hegemon internalizes how the terms of its contract affect the aggregates z and prices P. Since we focus on Markov equilibria, the hegemon offers a contract only for the current stage game and takes the future decisions of itself and of firms as given (i.e., the hegemon cannot commit to future contracts).

A joint threat is a coordination of trigger strategies among multiple supplying sectors of the same firm. Formally, a *joint threat* $\mathcal{S}_i'$ is a partition of $\mathcal{J}_i$ such that $\mathcal{S}_i'$ is coarser than $\mathcal{S}_i$. As an example, returning to Figure 1, a joint threat on a firm in sector i is the suppliers in j and k adopting a joint trigger (essentially moving from the configuration in Panel (a) to that in Panel (b)). Joint threats generically generate value for the firm being threatened because they relax incentive constraints. They embed in our model the view of the hegemon as a global enforcer or policeman of economic activity (Waltz (1979), Gilpin (1981)).

We assume that hegemon m can propose a take-it-or-leave-it contract to each of its domestic sectors and their foreign downstream sectors. Formally, this set is $\mathcal{C}_m = \mathcal{I}_m \cup \mathcal{D}_m$, where $\mathcal{D}_m = \bigcup_{i \in \mathcal{I}_m} D_i \backslash \mathcal{I}_m$ is the set of foreign downstream sectors.[2] The hegemon's contract to firm $i \in \mathcal{C}_m$ specifies: (i) a feasible joint threat $\mathcal{S}_i'$; (ii) non-negative transfers $\mathcal{T}_i = \{T_{ij}\}_{j \in \mathcal{J}_{im}}$ from firm i to the hegemon's representative consumer, where $\mathcal{J}_{im} = \mathcal{I}_m \cap \mathcal{J}_i$ is the set of inputs that sector i sources from the hegemon; (iii) revenue-neutral taxes $\tau_i = \{\{\tau_{ij}\}_{j \in \mathcal{J}_i}, \{\tau_{if}^{\ell}\}_{f \in \mathcal{F}_n}\}$ on purchases of inputs and factors, with equilibrium revenues $\tau_{ij} x_{ij}^*$ and $\tau_{if}^{\ell} \ell_{if}^*$ raised from sector i rebated lump sum to firms in sector i that accept the contract. We denote $\Gamma_i = \{\mathcal{S}_i', \mathcal{T}_i, \tau_i\}$ the contract offered to firm i and $\Gamma = \{\Gamma_i\}_{i \in \mathcal{C}_m}$ the set of all contracts.

We restrict the joint threats that the hegemon can make to involve sectors that are at most one step removed from the hegemon. Formally, we assume it is feasible for the hegemon to use $S \in \mathcal{S}_i$ in forming a joint threat $\mathcal{S}_i'$ if $\exists j \in S$ with $j \in \mathcal{C}_m$. We impose this restriction to prevent unrealistic situations in which the hegemon threatens a firm that it has no (immediate) relationship with.[3]

Taxes adjust the effective price firm i faces to $p_j + \tau_{ij}$ for inputs and $p_f^{\ell} + \tau_{if}^{\ell}$ for factors. Because taxes are revenue-neutral, without loss of generality we assume that tax payments and rebates do not enter the Pay/Steal decision. Instead, we assume that transfer T_{ij} is not paid if j is Stolen.[4] Transfers T_{ij} can cover different interpretations: direct monetary payments, a firm-specific mark-up charged by the hegemon on sales of its goods, or the extraction of value in some other action the firm takes on behalf of the hegemon (e.g., lobbying for political concessions). The revenue-neutral taxes τ_{ij} are typical in the macro-prudential literature that focuses on pecuniary and demand externalities (Farhi and Werning (2016)). Given our rebate rule, they are best thought of as quantity restrictions (see, e.g., Clayton and Schaab (2022)). Importantly, these instruments target relationships between two sectors, covering, for example, restrictions on energy imports from Russia but not from other countries; or restrictions on imports of Chinese goods.[5]

---

[2]Supplemental Appendix B.3.5 extends the analysis to allow the hegemon to directly control domestic firms.

[3]Supplemental Appendix Figure B.2 provides an illustration along the line of Figure 1 of which threats by the hegemon are feasible. Supplemental Appendix B.3.6 illustrates how to incorporate farther indirect trade into our setup.

[4]Under the contract, if firm i Pays suppliers in sector j, then it pays $p_j x_{ij}$ to suppliers in sector j and pays $\tau_{ij}(x_{ij} - x_{ij}^*) + T_{ij}$ to the hegemon's consumer. If firm i Steals from suppliers in sector j, its only payment is $\tau_{ij}(x_{ij} - x_{ij}^*)$ to the hegemon's consumer (which is zero in equilibrium). In this case, suppliers in sector j only recover an amount $(1 - \theta_{ij}) p_j x_{ij}$, while hegemon m's representative consumer recovers none of the transfer.

[5]We focus on restrictions (costly actions) imposed on firms on buying inputs from other suppliers. In principle, we could also allow for bilateral taxes on sales by firm i. In equilibrium, any sales taxes would be fully passed through to the buyer and, in this sense, would be captured by the input taxes that we already consider. However, a difference is that the input taxes on firm i that arise from sales taxes on firm j would not in prin-

Firm Participation Constraint. In deciding whether or not to accept the hegemon's contract, firm i, being small, does not internalize the effect of its decision on the prevailing aggregate vector z and prices. If firm i accepts the contract, it chooses allocations to maximize profits given the contract terms, achieving value

$$V_i(\Gamma_i) = \max_{x_i, \ell_i} \Pi_i(x_i, \ell_i, \mathcal{J}_i) - \sum_{j \in \mathcal{J}_i} \big[\tau_{ij}\big(x_{ij} - x^*_{ij}\big) + T_{ij}\big] - \sum_{f \in \mathcal{F}_m} \tau^{\ell}_{ij}\big(\ell_{if} - \ell^*_{if}\big) + \beta \nu_i(\mathcal{J}_i)$$

$$\text{s.t.} \sum_{j \in S} \big[\theta_{ij} p_j x_{ij} + T_{ij}\big] \leq \beta\big[\nu_i(\mathcal{J}_i) - \nu_i(\mathcal{J}_i \backslash S)\big] \quad \forall S \in \Sigma\big(\mathcal{S}'_i\big). \tag{2}$$

Because transfers are associated with the firm decision to Pay, they tighten the incentive constraints, all else equal. At the level of the individual firm, taxes have two effects: (i) they affect the firm's optimal allocation because they alter the perceived price of the input good; (ii) they affect firm profits directly. In equilibrium, this latter effect washes out since taxes are rebated lump sum (i.e., $x_{ij} = x^*_{ij}$). The optimal allocation x^*_{ij}, and hence remitted revenues, are defined implicitly as a function of contract terms, prices, and z-externalities by the above optimization problem.

If firm i rejects the hegemon's contract, it retains its original action set and achieves the value $V_i(\mathcal{S}_i)$.[6] For firm i to accept the contract, it must be better off under the contract than by rejecting it. This gives rise to the *participation constraint* of firm i,

$$V_i(\Gamma_i) \geq V_i(\mathcal{S}_i), \tag{3}$$

where recall that $\Gamma_i = \{\mathcal{S}'_i, \mathcal{T}_i, \tau_i\}$ so that the participation constraint is comparing the hegemon's contract with joint threats, transfers, and wedges to the outside option.

The hegemon creates slack in the participation constraint by proposing a joint threat, and then can use that slack to demand costly actions. We define a *pressure point* on firm i as a joint threat $\mathcal{S}'_i$ that strictly increases firm i's profits, that is, $V_i(\mathcal{S}'_i) > V_i(\mathcal{S}_i)$. This is the source of the hegemon's power over firm i. Supplemental Appendix B.3.1 shows how to extend the model to allow the hegemon to also generate slack by making the outside option worse by threatening to cut off firms that reject the contract from its inputs. Our focus on voluntary participation in an environment with rational expectations and full information relates to the rationalist school in international relations (Fearon (1995)), although our framework can accommodate biases in the governments' objective functions (e.g., via $u_n(z)$).

Hegemon Maximization Problem. The hegemon's objective function is the utility of its representative consumer, to whom all domestic firm profits and all transfers accrue:

$$\mathcal{U}_m = W_m(p, w_m) + u_m(z), \quad w_m = \sum_{i \in \mathcal{I}_m} \Pi_i(\Gamma_i) + \sum_{f \in \mathcal{F}_m} p^{\ell}_f \overline{\ell}_f + \sum_{i \in \mathcal{D}_m} \sum_{j \in \mathcal{J}_{im}} T_{ij}. \tag{4}$$

Since transfers from domestic sectors to the hegemon's consumer net out from the consumer's wealth, we need only keep track of operating profits $\Pi_i(\Gamma_i) = V_i(\Gamma_i) + \sum_{j \in \mathcal{J}_{im}} T_{ij}$ of the hegemon's domestic sectors. Similarly, taxes on all sectors are revenue-neutral for the hegemon, and therefore net out. However, transfers from foreign sectors do not net out, precisely because the hegemon's consumer has no claim to foreign sectors' profits.

ciple require firm i to agree to the contract. Similarly, we could also allow bilateral taxes on sales by firm i to consumers.

[6]We abuse notation and write $V_i(\mathcal{S}_i)$ as short hand for $V_i(\Gamma_i)$ when $\Gamma_i = \{\mathcal{S}_i, 0, 0\}$.

The hegemon's maximization problem is choosing a contract Γ to maximize its consumer utility (equation (4)), subject to the participation constraints of firms (equation (3)), the feasibility of joint threats, the determination of aggregates $z^*_{ij} = x^*_{ij}$, and determination of prices via market clearing.

3.1. *Optimality of Maximal Joint Threats*

We solve the hegemon's problem in two steps. First, we prove that the hegemon offers a "maximal" joint threat that joins together all feasible threats. Second, we characterize transfers and wedges under the optimal contract.

Starting from the existing set $\mathcal{S}_i$, we show that the hegemon optimally consolidates all feasible threats at its disposal, $\mathcal{S}_i^D = \{S \in \mathcal{S}_i | \exists j \in S s.t. j \in \mathcal{C}_m\}$, into a single stealing action $S_i^D = \bigcup_{S \in \mathcal{S}_i^D} S$. The maximal joint threat is then the single action S_i^D and the remaining threats that the hegemon could not feasibly consolidate: $\overline{\mathcal{S}}_i' = \{S_i^D\} \cup (\mathcal{S}_i \backslash \mathcal{S}_i^D)$.

PROPOSITION 1: *It is weakly optimal for the hegemon to offer a contract with maximal joint threats to every firm it contracts with, that is, $\mathcal{S}_i' = \overline{\mathcal{S}}_i'$ for all $i \in \mathcal{C}_m$.*

Intuitively, Proposition 1 follows from the observation that joint threats expand the set of feasible allocations, and so weakly increase targeted entities' profits. A hegemon that chose a contract that did not involve maximal joint threats could always implement the same transfers and allocations while offering a contract with maximal joint threats. The hegemon, therefore, wants to maximize its global enforcer capabilities.

Since the hegemon's contract involves all of its domestic sectors that supply to sector i entering a single joint threat, transfers can be tracked in total at the sector level, that is, $\overline{T}_i = \sum_{j \in \mathcal{J}_{im}} T_{ij}$. We therefore abuse notation and track only $\overline{T}_i$ in the contract.

3.2. *Leontief Inverse and Network Propagation With Externalities*

In demanding costly actions and transfers out of targeted entities, the hegemon takes into consideration their impact on aggregate prices P and quantity-based externalities z. Therefore, to analyze the hegemon optimal contract, we need to first characterize how changes in firms' allocations x_{ij} propagate through the global network. The proposition below shows that the entire propagation can be characterized in terms of a generalized Leontief inverse.[7]

PROPOSITION 2: *The aggregate response of z^* and P to a perturbation in an exogenous variable e is*

$$\frac{dz^*}{de} = \Psi^z \left(\frac{\partial x^*}{\partial e} + \frac{\partial x^*}{\partial P} \frac{dP}{de} \right),$$

$$\frac{dP}{de} = -\left(\frac{\partial ED}{\partial P} + \frac{\partial ED}{\partial z^*} \Psi^z \frac{\partial x^*}{\partial P} \right)^{-1} \left(\frac{\partial ED}{\partial e} + \frac{\partial ED}{\partial z^*} \Psi^z \frac{\partial x^*}{\partial e} \right),$$

where $\Psi^z = (\mathbb{I} - \frac{\partial x^*}{\partial z^*})^{-1}$ and ED is the vector of excess demand in every good (excluding the numeraire) and factor.

[7]We assume that excess demand ED and firm demand x are continuously differentiable in the relevant range of allocations.

The matrix Ψ^z keeps track of all the successive amplification via the z-externalities of the original perturbation. The term $\frac{dP}{de}$ keeps track of the input-output amplification occurring via changes in equilibrium prices. Network amplification is a standard tool of macroeconomic theory that we embed in our framework since it is crucial to geoeconomics. Most of the existing literature focuses on input-output amplification via equilibrium prices (e.g., Baqaee and Farhi (2019, 2022)), while we additionally stress the importance of production externalities. To provide intuition here and in the rest of the paper, it is useful to consider special cases which we define formally below. First, consider an environment in which all prices are constant in equilibrium as defined below:

DEFINITION 1: The *constant prices* environment assumes that consumers have identical linear preferences over goods, $U_n = \sum_{i\in\mathcal{I}} \tilde{p}_i C_{ni}$, and that each country has a local-factor-only firm with linear production $f_i(\ell_i) = \sum_{f\in\mathcal{F}_n} \frac{1}{\tilde{p}_i} \tilde{p}_f^\ell \ell_{if}$. It assumes that consumers are marginal in every good and factor-only firms are marginal in every local factor so that $p_i = \tilde{p}_i$ and $p_f^\ell = \tilde{p}_f^\ell$.

In this simplified environment, the term $\frac{\partial x^*}{\partial P}\frac{dP}{de}$ would be zero and amplification would only occur via the z-externalities: $\frac{dz^*}{de} = \Psi^z \frac{\partial x^*}{\partial e}$. Here the matrix Ψ^z captures all endogenous amplification since prices are constant, and is akin to a Leontief inverse. Intuitively, the perturbation to e changes production in a sector, leading to reoptimization in other sectors given the production externalities, which in turn filters to other sectors, and so on.

Second, consider switching off the z-externalities as defined below:

DEFINITION 2: The *no z-externalities* environment assumes that $u_n(z)$ and $f_i(x_i, \ell_i, z)$ are constant in z.

In this simplified environment, the term $\frac{\partial x^*}{\partial z^*}$ would be zero and the matrix Ψ^z would reduce to the identity matrix. Amplification would only occur via prices: $\frac{dz^*}{de} = \frac{\partial x^*}{\partial e} + \frac{\partial x^*}{\partial P}\frac{dP}{de}$, where $\frac{dP}{de} = -(\frac{\partial ED}{\partial P})^{-1}\frac{\partial ED}{\partial e}$. Intuitively, the perturbation to e changes excess demand in each market as a result of reoptimization by firms and consumers. These changes in excess demand must then be counteracted through price changes to equilibrate markets, with $\frac{\partial ED}{\partial P}$ giving the response of excess demand to prices. This is the standard input-output amplification mechanism via prices.

3.3. *Hegemon's Optimal Contract and Efficiency*

In characterizing the hegemon's optimal contract, we set up the following notation (see the proof of Proposition 3 for details). We denote $\eta_i \geq 0$ the hegemon's Lagrange multiplier on the participation constraint of firm i and $\Lambda_{iS} \geq 0$ the hegemon's multiplier on the incentive constraint of firm i for stealing action S. We also define $\overline{\Lambda}_i = \sum_{S\in\Sigma(\overline{S}_i')|S_i^D\subset S} \Lambda_{iS}$, which sums all multipliers involving a stealing action included in the hegemon's maximal joint threat. We track the hegemon's perceived externalities from an increase in z_{ij}^* as $\mathcal{E}_{ij}$, and similarly we track the hegemon's perceived externalities from a transfer of wealth from consumers in country n to those in country m as Ξ_{mn}. The proposition below and its proof characterize an optimal contract and provide formal definitions of these perceived externalities.[8]

[8]Proposition 3 provides necessary conditions for optimality, and we assume that an equilibrium exists. Formally, if for a foreign firm i we have $\eta_i = 0$, it instead characterizes the limit of a sequence of wedges, each

PROPOSITION 3: *An optimal contract of the hegemon has the following terms*:

1. *For foreign firms* $i \in \mathcal{D}_m$ *located in country* n, *if* $\overline{\mathcal{S}}_i'$ *is a pressure point on* i:
   (a) *Input wedges satisfy*: $\eta_i \tau_{ij}^* = -\mathcal{E}_{ij}$.
   (b) *Transfers satisfy*: $\overline{\Lambda}_i + \eta_i \geq \frac{\partial W_m}{\partial w_m} + \Xi_{mn}$, *with equality if* $\overline{T}_i^* > 0$.
2. *For domestic firms* $i \in \mathcal{I}_m$, *if* $\overline{\mathcal{S}}_i'$ *is a pressure point on* i:
   (a) *Input wedges satisfy*: $(\frac{\partial W_m}{\partial w_m} + \eta_i)\tau_{ij}^* = -\mathcal{E}_{ij}$.
   (b) *Transfers are zero*: $\overline{T}_i^* = 0$.
3. *If* $\overline{\mathcal{S}}_i'$ *is not a pressure point on firm* i, *then* $\overline{T}_i^* = 0$ *and* $\tau_i^* = 0$.

To provide intuition for the hegemon's optimal contract, consider a foreign firm i with a binding participation constraint. We can expand the optimal tax formula in Proposition 3, part 1(a) above to

$$\tau_{ij}^* = -\frac{1}{\eta_i}\mathcal{E}_{ij} = -\frac{1}{\eta_i}\Bigg[\underbrace{\varepsilon_{ij}^z}_{\text{Direct Impact}} + \underbrace{\overbrace{\varepsilon^{zNC}\frac{dz^{*NC}}{dz_{ij}}}^{\text{Aggregate Quantities}} + \overbrace{\varepsilon^{P^m}\frac{dP^m}{dz_{ij}}}^{\text{Prices}}}_{\text{Indirect Impact: Input-Output Amplification}}\Bigg]. \tag{5}$$

The hegemon uses the wedges to manipulate externalities in its favor. Activities that generate positive (negative) externalities $\mathcal{E}_{ij} > 0$ are subsidized (taxed). The first term in equation (5), ε_{ij}^z, measures the direct value to the hegemon of increasing sector i's use of input j:

$$\varepsilon_{ij}^z = \underbrace{\frac{\partial W_m}{\partial w_m}\sum_{k\in\mathcal{I}_m}\frac{\partial \Pi_k}{\partial z_{ij}} + \frac{\partial u_m(z)}{\partial z_{ij}}}_{\text{Externalities on Hegemon's Economy}} + \underbrace{\sum_{k\in\mathcal{C}_m}\eta_k\left[\frac{\partial \Pi_k}{\partial z_{ij}} - \frac{\partial V_k(\mathcal{S}_k)}{\partial z_{ij}}\right]}_{\text{Building Power}}. \tag{6}$$

The hegemon wants to increase foreign activity x_{ij} if it directly benefits one of the sectors in the hegemon's economy or if the consumer directly cares about that activity. An example of the first is a foreign firm's R&D activity that has a positive knowledge spillover on the productivity of domestic sectors. An example of the second is a foreign firm's R&D activity that is used by the military of a country hostile to the hegemon. The hegemon also cares about how its demands on activity x_{ij} affect the amount of power it has over all the sectors. All else equal, the hegemon asks for actions that make it less attractive on the margin for a firm to reject its contract (decrease the outside option $V_k(\mathcal{S}_k)$ or increase on-path profits Π_k), thus binding it more tightly to the hegemon and increasing its power. As an example, in the presence of strategic complementarities, the United States demands that more foreign firms rely on U.S. financial institutions, making it harder for any one firm to deviate from U.S. demands.

The second term in equation (5), $\varepsilon^{zNC}\frac{dz^{*NC}}{dz_{ij}}$, measures the indirect value of altering production via input-output amplification in sectors that the hegemon does not control. The

of which is part of a (different) optimal contract (see the proof for details). For technical reasons, we assume that if $\overline{\mathcal{S}}_i'$ is not a pressure point on firm i at the optimal (z^*, P), then it is also not a pressure point on i in a neighborhood of (z^*, P). Finally to streamline analysis, we assume that every foreign country contains at least one firm that the hegemon cannot contract with, meaning that the hegemon cannot directly mandate factor prices in foreign countries.

term ε^{zNC} is analogous to equation (6) but for firms not in the hegemon's network. The term $\frac{dz^{*NC}}{dz_{ij}}$ summarizes the Leontief amplification impact and is given by Proposition 2 taking z_{ij} to be the exogenous variable e. The hegemon demands more action in the x_{ij} relationship the more, via the network, these actions propagate and affect activities that the hegemon does not control but values. An example is the United States demanding European banks to curb financing of legitimate (from a European regulatory perspective) commercial activities of Iranian entities in order to affect the overall Iranian economy and in particular Iran's government budget and military sector.

The third term in equation (5), $\varepsilon^{Pm}\frac{dP^m}{dz_{ij}}$, is the indirect value of the induced changes in equilibrium prices. The term $\frac{dP^m}{dz_{ij}}$ summarizes the Leontief amplification impact and is given by Proposition 2 taking z_{ij} to be the exogenous variable e. Isolating the component of the vector ε^{P^m} corresponding to the value from changes in the price of input j, we have

$$\varepsilon_j^{Pm} = \underbrace{\frac{\partial W_m}{\partial w_m} X_{m,j}}_{\text{Terms of Trade}} - \underbrace{\sum_{k\in\mathcal{C}_m} \overline{\Lambda}_{kj}\theta_{kj}x_{kj}}_{\text{Pecuniary Externalities (IC)}} + \underbrace{\sum_{k\in\mathcal{C}_m} \eta_k \left[\frac{\partial \Pi_k}{\partial p_j} - \frac{\partial V_k(\mathcal{S}_k)}{\partial p_j}\right]}_{\text{Building Power}}, \tag{7}$$

where $X_{m,j}$ is exports of good j by country m (negative, i.e., imports, if $j \notin \mathcal{I}_m$). Much of the trade and international macroeconomics literature has focused on terms of trade manipulation as the motive for imposing tariffs, capital controls, and entering multilateral trade agreements. Similarly, the macro-finance literature has focused on pecuniary externalities, which are also present in our framework since prices enter the incentive constraints. The last term, "Building Power," is analogous to the last term in equation (6) and key to our analysis of international power. The hegemon takes into consideration how its demands change prices and how those affect the marginal willingness of firms to accept its demands.

Proposition 3, part 1(b) shows that the hegemon has an incentive to extract transfers from foreign firms, but is limited because higher transfers tighten both the participation constraint and the incentive constraint. The hegemon also internalizes how shifting wealth between consumers alters equilibrium prices and aggregates z.

Consider next a domestic firm. The hegemon's optimal wedge formula (Proposition 3, part 2(a)) is almost identical to that for foreign firms, except that the magnitude of wedges (whether tax or subsidy) is lower because the hegemon values the profits of domestic firms. Domestic firms are never charged transfers since the firms are owned by the hegemon's consumers and transfers tighten the incentive constraints.[9]

Our theory gives a way to think about who are the "friends or enemies" of the hegemon based on the sign of the spillover term $\mathcal{E}_{ij}$ (see Supplemental Appendix B.3.9 for a formal treatment). Friendship occurs when the spillovers are positive, which can be driven by direct or indirect linkages, and by economic or non-economic motives (the term $\frac{\partial u_m(z)}{\partial z_{ij}}$

[9]The wedges applied to domestic firms are akin to industrial policy, and in our framework this policy can be driven by domestic (e.g., education and R&D) or foreign considerations. In particular the hegemon uses the wedges to build up domestic industries that increase the country's power. For example, the U.S. recently imposed export restrictions on U.S. semiconductor firms (such as Nvidia and Intel) selling their output to certain Chinese sectors. While the U.S. government overall subsidizes the American semiconductor industry to build hegemonic power, it also restricts its exports to Chinese firms given the technology (even indirect) usage in the military sector.

in equation (6)). For example, we think of defense alliances such as NATO as the hegemon placing positive utility on defense sectors of allied countries. In our framework, the hegemon would use its global enforcement power to push those allies to increase those activities, making them internalize more of the national security externalities, and might do so at the expense of its own firms' profits or consumers' consumption. Indeed, the hegemon might leave surplus to allied countries' sectors and (optimally) not fully exercise its coercive power on them.

3.4. *Strategic Sectors and the Nature of Geoeconomic Power*

Controlling, defending from foreign influence, and growing strategic sectors is core government policy in democracies and autocracies alike. While governments frequently protect or control industries claiming they are strategic for the "national interest," there is a concern that the "strategic" label is in reality a cover for protectionism or for subsidies to politically connected entities. This ambiguity is possible because of a lack of clarity on what makes an activity strategic and a clear framework for policy evaluation.[10]

In our framework, a sector is strategic in two dimensions: first, a sector can be strategic because the hegemon can use it to form (off-path) threats on other entities; second, because the hegemon can demand (on-path) costly actions from this sector that shape the world equilibrium in the hegemon's favor. We distinguish two notions of power that are what make sectors strategic: Micro-Power and Macro-Power.

Micro-Power: Strategic Sectors in Threatening Target Output. Micro-Power is the maximum private cost to the target of the hegemon's demanded costly actions. It is the most the hegemon could demand before its contract gets rejected. This notion of power is related in political science to the Dahl (1957) conception of power as: "A has power over B to the extent that he can get B to do something that B would not otherwise do" (pp. 202–203). The source of this power in our framework is the value to the targeted entity of the hegemon's threats, that is, whether the hegemon has a pressure point on that entity. The amount of Micro-Power is given by $V_i(\overline{\mathcal{S}}_i^{\prime}) - V_i(\mathcal{S}_i)$, holding fixed equilibrium aggregate quantities and prices. The hegemon maximizes its Micro-Power by making maximal joint threats (Proposition 1), and then uses it to demand costly actions (Proposition 3).

To isolate Micro-Power, consider a special case in which equilibrium prices are constant and z-externalities are switched off both in the firms' production functions and in consumers' utility functions (Definitions 1 and 2). Then, by Supplemental Appendix Proposition 8, all foreign sectors are neutral and no wedges are applied. Instead, the hegemon uses all its Micro-Power to extract transfers from foreign firms until their participation constraint binds.[11]

A crucial source of Micro-Power arises from the loss for the target from the hegemon cutting off access to some of its inputs. Despite the hegemon threats being off-path, this loss in continuation value can be computed, using the model structure, as a counterfactual based on the observed on-path data. While a full empirical analysis is beyond the scope of this paper, in Supplemental Appendix B.3.3, we offer some initial empirical

[10]See Baldwin (1985)["Strategic Goods" section, pages 223–233] for a review of many informal definitions of strategic goods, including a quote from Soviet leader Nikita Khrushchev: "Anything one pleases can be regarded as strategic material, even a button, because it can be sewn onto a soldier's pants. A solider will not wear pants without buttons, since otherwise he would have to hold them up with his hands. And then what can he do with his weapon?".

[11]Proposition 8 assumes identical homothetic preferences. In the case of constant prices, we do not need this restriction since wealth transfers across consumers do not cause terms of trade movements.

guidance by specializing the production function to be Cobb–Douglas across industries and CES within industries. With this standard production function, the counterfactual loss can be measured using available estimates of the elasticity of substitution within sectors and trade data on a country's expenditure share on a sector and the expenditure share on goods each country buys from the hegemon as a share of spending on the sector. These losses are in the spirit of Hirschman's (1945) notion of asymmetric power in trade relationships with the hegemon.

Goods that are strategic in this micro-sense are those widely used, with high value added for targets, and with poor substitutes. Some goods have these properties due to physical constraints like rare earths, oil, and gas. However, in identifying Micro-Power, it is necessary to know the parameters of the production function, but also which inputs the hegemon controls. As emphasized by Schelling (1958), the notion of strategic has to be defined in the context of an equilibrium and cannot be determined solely from ex ante characteristics of a sector. For example, controlling one variety of natural gas is ineffective since there is a high degree of substitutability in production with other types of natural gas. However, if the hegemon controls a joint threat among all varieties of natural gas, that threat is very valuable since the input is essential for many sectors. This logic also applies to joint threats for inputs that might seem rather unrelated without guidance from a theoretical framework, for example, a joint threat involving loans and manufacturing inputs.

Macro-Power: Strategic Sectors in General Equilibrium. Macro-Power is the social value to the hegemon's country of the costly actions it demands of targeted entities. It arises from the hegemon's ability to extract value from the world economy indirectly, via shaping the externalities and prices. By collectively asking entities that it can pressure to take costly actions, such as curbing the usage of some inputs, the hegemon indirectly influences a larger part of the input-output network than what it directly controls. The propagation and amplification through the network structure, our externality-based Leontief inverse, is key to this effect. In this macro sense, strategic sectors tend to be those that have a high influence on world output due to endogenous amplification. Sectors like research and development, finance, and information technology are good candidates for being strategic in this sense.

Proposition 3 shows that the marginal value to the hegemon of having more power over sector i is given by the Lagrange multiplier η_i on that sector's participation constraint. This multiplier reflects the benefit to exerting both Micro- and Macro-Power over sector i. A hegemon particularly values having Micro-Power over sectors that increase its Macro-Power because it can exploit the difference between the private costs to targeted entities and the social benefit to itself. In accepting the hegemon's demands, the targeted entities consider only their private costs, but the hegemon internalizes the social benefits of the outcomes of these actions. Our notion of Macro-Power is related in political science to the notion of structural power (Bachrach and Baratz (1962), Cohen (1977), Strange (1988)), in which an actor is powerful because it influences an entire environment; as opposed to a lower (relational) aspect of power in which an actor induces a target to take a desired action taking the environment as given.

Rearranging equation (5) into $\eta_i = -\frac{\mathcal{E}_{ij}}{\tau^*_{ij}}$ highlights that the marginal value of power over a sector, η_i, is related to the ratio of how much the hegemon wants to control activities in that sector, $\mathcal{E}_{ij}$, versus how much the hegemon actually controls activities in that sector, τ^*_{ij}. When desired control $\mathcal{E}_{ij}$ is high relative to actual control τ^*_{ij}, the hegemon has little correction in place over an activity that it perceives to have high general equilibrium influence. Macro-Power is thus highly valuable in such circumstances.[12]

Finally, the theory helps interpret a type of reduced-form empirical analysis that has become common in both economics and political science: regressing measures of political affinity among countries on bilateral trade or investment, the loose prediction being that as geopolitical tensions rise between two countries, one must observe a fall in bilateral economic activity. In terms of equation (5), the loose prediction appears to rely on the direct term ε^z_{ij}, and in particular, the direct representative consumer disliking activity in a geopolitical rival (the $u_m(z)$ term). Our analysis makes clear that indirect effects might well dominate the direct ones, and increases in geopolitical rivalry might still generate more bilateral trade in some sectors.

3.5. *Efficient Allocations*

We provide an efficiency benchmark by taking the perspective of a global planner that has exactly the same powers and constraints as the hegemon, but cares about global welfare. Formally, the planner chooses a contract Γ to maximize global welfare:

$$\sum_{n=1}^{N} \Omega_n\big[W_n(p, w_n) + u_n(z)\big], \quad w_n = \sum_{i \in \mathcal{I}_n} V_i(\Gamma_i) + \sum_{f \in \mathcal{F}_i} p^\ell_f \overline{\ell}_f + \mathbf{1}_{n=m} \sum_{i \in \mathcal{C}_m} \sum_{j \in \mathcal{J}_{im}} T_{ij}, \tag{8}$$

subject to the participation constraints of firms (equation (3)), the feasibility of joint threats, the determination of aggregates, and the determination of prices via market clearing. The Pareto weight placed on the welfare of country n's consumer is Ω_n. As is common in the literature, we mute the planner's motive to redistribute wealth between countries by setting the welfare weights to equalize the social marginal value of wealth across consumers. The following proposition characterizes the global planner's solution.

PROPOSITION 4: *An optimal contract of the hegemon from the global planner's perspective features maximal joint threats $\mathcal{S}'_i = \overline{\mathcal{S}}'_i$, zero transfers $\overline{T}_i = 0$, and wedges given by $(\Omega_n \frac{\partial W_n}{\partial w_n} + \eta_i)\tau^*_{ij} = -\mathcal{E}^p_{ij}$ for all sectors $i \in \mathcal{C}_m$ on which the hegemon has a pressure point. Wedges and transfers are zero if $\overline{\mathcal{S}}'_i$ is not a pressure point on i.*

The planner and the hegemon agree that supplying maximal joint threats is optimal since it relaxes the targeted entities' incentive problems and in principle allows more economic activity to take place. The planner and the hegemon, however, disagree on the value of transfers and on the optimal wedges to be applied.

Both the planner and the hegemon understand that the transfers are negative-sum globally since they tighten incentive problems. The planner, therefore, chooses never to demand transfers. The hegemon, instead, values receiving positive transfers from foreign firms.[13] Both the global planner and the hegemon want to use the wedges in equilibrium

[12]Our framework can be extended to allow the hegemons to buy controlling stakes (FDI) in foreign sectors. We think of purchasing a controlling stake as a way to bypass the participation constraint since then the hegemon can simply dictate the actions. Interestingly, the private market value of such stake should be lower than the social value to the hegemon that internalizes its geoeconomic use, thus providing a rationale for the investment screening policies such as CFIUS in the U.S.

[13]If we allowed hegemon consumers to own foreign sectors this would contribute to aligning the hegemons' incentives with those of the planner by making the hegemon care about the profits of foreign sectors that it owns. Exogenous ownership of foreign sectors would be easy to introduce in this framework.

to affect externalities. However, the global planner implements wedges that are different from those implemented by the hegemon. Intuitively, the planner and hegemon might disagree on who their friends and enemies are. Formally, $\mathcal{E}_{ij}^{p}$ tracks the impact of activity x_{ij} on the planner's Lagrangian rather than the hegemon's one.

In political science, Kindleberger (1973), Krasner (1976), Gilpin (1981), and Keohane (1984) debated whether hegemons can generate better world outcomes by providing public goods globally than configurations with no hegemons (or multiple hegemons). In our framework, the hegemon acts as a global enforcer, echoing the public good provision, and some of its policies correct negative externalities. Indeed, the global planner also provides the same enforcement (maximal joint threats) and, in some dimensions, might correct externalities similarly to the hegemon. However, the hegemon destroys value at the global level compared to the global planner by demanding transfers and manipulating the externalities in its favor. Because of the externalities, the equilibrium with the hegemon can even be worse for some entities than the equilibrium without the hegemon depending on whether the enforcement and positive correction of externalities are more than offset by the externality manipulation.

The view of the hegemon as a global enforcer also brings up the scope and focus of this paper. There are alternative means of enforcement via military actions that also have a long history (Findlay and O'Rourke (2009)). Military build-up as an enforcement deterrent could be accommodated in the framework, for example by the hegemon being able to offer lower θ's, thus expanding the target inside option, but at a fiscal (resource) cost to the hegemon (see also Section 4.2 and SupplementalAppendix B.3.7). Other aspects of military power and war are instead further removed from the focus of this paper (Fearon (1995), Powell (2006)).

4. APPLICATIONS

We specialize the model to capture two leading applications of geoeconomics in practice.

4.1. *National Security Externalities*

In this application, we take as inspiration the U.S. government demand to European governments and firms that they stop using information technology infrastructure produced by China's Huawei (Farrell and Newman (2023)). We assume the hostile technology is a national security threat from the perspective of the hegemon, but a positive production externality for firms in third party countries. This captures the notion that this infrastructure could be used for spying and/or military uses, but that for a private firm the technology is attractive (privately profitable) and the more so the more other firms are using it. That is, the technology has a strategic complementarity in its adoption capturing interoperability. The application both is of practical interest and helps us illustrate the importance of production externalities and network amplification in how a hegemon pressures strategic sectors.

There are three regions: the hegemon country m, a hostile foreign country h, and "rest of world" *RoW* which may comprise multiple countries. Figure 2 illustrates the setup of this application. We assume constant prices (Definition 1). The hostile foreign country h has a single sector, which we denote by H. We take the output of this sector to be the numeraire, $p_H = 1$. Sector H and sectors in the hegemon country are not subject to externalities from z, that is, $f_H(x_H, \ell_H, z)$ and $f_k(x_k, \ell_k, z)$ for $k \in \mathcal{I}_m$ are constant in z.

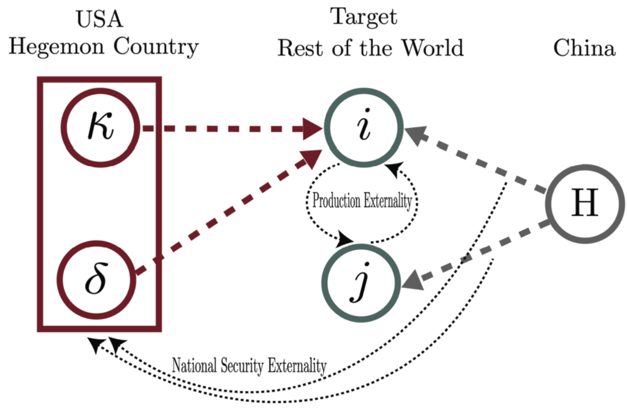


FIGURE 2.—*Application: national security externality. Notes*: Figure depicts the model setup for the application on national security as described in Section 4.1.

We assume that sectors in the hegemon country do not source from the hostile country's sector H and vice versa, ensuring that H cannot be used by the hegemon as part of a joint threat.

The main action in this application comes from *RoW* sectors. We assume that all *RoW* sectors source from H, and define $z^H \equiv \{z_{iH}\}_{i\in\mathcal{I}_{RoW}}$ to be the vector of purchases by *RoW* sectors of input H. For simplicity, we assume sectors in *RoW* have production that is separable in H: $f_i(x_i, \ell_i, z) = f_{i,-H}(x_{i,-H}, \ell_i) + f_{iH}(x_{iH}, z^H)$, where $x_{i,-H}$ denotes the vector of all inputs except input H. We introduce external economies of scale by setting

$$f_{iH}(x_{iH}, z^H) = A_{iH}(z^H) g_{iH}(x_{iH}). \tag{9}$$

We assume that $\frac{\partial A_{iH}}{\partial z_{jH}} > 0$ for all $i, j \in \mathcal{I}_{RoW}$, so that there are positive spillovers from greater usage of H. This helps us capture technologies, such as 5G infrastructure, that have strategic complementarities in adoption and usage. We further assume that $A_{iH}(z^H) g_{iH}(z_{iH})$ is concave in z^H. Observe that $f_{i,-H}$ is constant in z. For simplicity, we assume $\theta_{iH} = 0$, so that firms are unconstrained in their use of input H. We assume that in absence of a hegemon, there are no joint triggers.

Hegemon Negative Externality From H. We assume that the hegemon's representative consumer's utility function has a negative externality from rest-of-world production using H, that is, $u_m(z) = u_m(z^H)$ and $\frac{\partial u_m}{\partial z_{iH}} < 0$ for all $i \in \mathcal{I}_{RoW}$. This simple reduced-form utility term in the objective function of the hegemon helps us capture a direct disutility from the *RoW* usage of the technology of a hostile country. In practice, the U.S. government concerns regarding Huawei technology stemmed from the possibility that it could be used for spying or in military applications; we capture the direct U.S. government goal of shrinking the usage of the technology.

From Proposition 1, maximal joint threats are optimal for the hegemon. Since there are no z-externalities in production by domestic firms and prices are constant, Proposition 3 tells us $\overline{T}_i = 0$ and $\tau_i = 0$ is an optimal contract for all domestic sectors. To characterize the optimal contracts for sectors in the *RoW*, the relevant part of the objective function (equation (4)) reduces to $\mathcal{U}_m = u_m(z^H) + \sum_{i\in\mathcal{D}_m} \overline{T}_i$.

Network Amplification. Network amplification occurs due to the strategic complementarity in the use of H. We can capture the interesting economics even considering only two sectors in *RoW*: one sector, which we denote i, that the hegemon can contract with; and one sector, which we denote j, that the hegemon cannot contract with. In this environment, employing Proposition 2, we have $\Psi^{z,NC} = (1 - \frac{\partial x^*_{jH}}{\partial z_{jH}})^{-1} = \frac{\gamma_j}{\gamma_j - \xi_{jj}}$, where $\xi_{ij} = \frac{z_{jH}}{A_{iH}(z^H)} \frac{\partial A_{iH}(z^H)}{\partial z_{jH}}$ is the elasticity of productivity A_{iH} with respect to the externality z_{jH}, so that ξ_{jj} are sector j external economies of scale, and where $\gamma_i = \frac{-x^*_{iH} g''_{iH}(x^*_{iH})}{g'_{iH}(x^*_{iH})}$. Applying Proposition 2, we have that the total transmission of a change in the targeted sector i usage of input H to the usage by sector j of the same input is given by

$$\frac{dz^{NC}}{dz_{iH}} = \frac{dz_{jH}}{dz_{iH}} = \Psi^{z,NC} \frac{\partial x^*_{jH}}{\partial z_{iH}} = \frac{\xi_{ji}}{\gamma_j - \xi_{jj}} \frac{z_{jH}}{z_{iH}}.$$

Optimal Contract. The hegemon's optimal tax formula of Proposition 3 and equation (5) reduces to $\tau_{iH} = -\frac{1}{\eta_i} \varepsilon^z_{iH} - \varepsilon^z_{jH} \frac{dz_{jH}}{dz_{iH}}$ since the term $\varepsilon^{P^m} \frac{dP^m}{dz_{ij}}$ is zero given constant prices. Using equation (6), we can further unpack this formula to write

$$\tau_{iH} = -\overbrace{\frac{1}{\eta_i}\frac{\partial u_m}{\partial z_{iH}}}^{\text{Externalities on Hegemon's Economy}} + \overbrace{p_i A_{iH}(z^H)\big[g_{iH}\big(x^o_{iH}(z^H)\big) - g_{iH}\big(x^*_{iH}\big)\big]\xi_{ii}\frac{1}{z_{iH}}}^{\text{Building Power}}$$
$$+ \underbrace{\left[-\frac{1}{\eta_i}\frac{\partial u_m}{\partial z_{jH}} + p_i A_{iH}(z^H)\big[g_{iH}\big(x^o_{iH}(z^H)\big) - g_{iH}\big(x^*_{iH}\big)\big]\xi_{ij}\frac{1}{z_{jH}}\right]\frac{\xi_{ji}}{\gamma_j - \xi_{jj}}\frac{z_{jH}}{z_{iH}}}_{\text{Network Amplification}},$$

where $x^o_{iH}(z^H)$ is what firm i's optimal usage of input H would be if it rejected the hegemon contract. In the presence of national security externalities, the optimal tax is positive, $\tau_{iH} > 0$, reflecting the hegemon's desire to mitigate the negative externality. Three key forces underlie the tax formula.

The first term in the tax formula is the direct externality from an increase in z_{iH} on representative consumer m. The negative externality contributes to a positive tax. This tax is higher when η_i is lower, that is, when the marginal cost of using the hegemon's power over firm i (the slack in that firm's participation constraint) is lower.

The second term captures the hegemon's desire to build Micro-Power over firms in sector i by leveraging the external economies of scale. Each firm that accepts the hegemon's contract and reduces its usage of input of H increases on the margin the hegemon's power over other firms in the same sector by lowering productivity A_{iH} and making it less attractive to reject the contract to use more of the H input. The hegemon is manipulating the external economies of scale to get firms to downscale the undesirable technology. Once it is successfully downscaled, no individual firm has a high desire to use it on the margin.

Finally, the third term is the indirect effect of the hegemon's demands on the sector it can pressure (sector i) on the sector it cannot pressure (sector j). As sector i usage of input H falls, that is, z_{iH} falls, the productivity A_{jH} of firms in sector j in using input H also falls, prompting firms in sector j to reduce the use of H. This leads to a fall in z_{jH}, which has a positive externality effect on the hegemon consumer and also increases Micro-Power over firms in sector i. Both effects mirror those described in the previous two paragraphs but are now arising from the equilibrium choices of a sector the hegemon does not directly control. The Leontief amplification $\Psi^{z,NC} = \frac{\xi_{ji}}{\gamma_j - \xi_{jj}}$ captures the magnitude of this response by sector j. This effect contributes toward a higher tax rate, since reducing usage by sector i of input H has a positive externality by also reducing demand by sector j for input H.

In this application, sector i is strategic from a Macro-Power perspective because, by influencing its actions, the hegemon impacts the actions of sectors it could not pressure directly. As a consequence, the hegemon makes higher demands (more positive τ_{iH}) and manipulates the difference between the private cost to the target of the actions (Micro-Power) and the social value to the hegemon (Macro-Power) to build more power over other targets within and across sectors. In practice, this explains that the strong pressure applied by the United States on European firms to prevent usage of Huawei technology aimed at making the technology less valuable to adopt for other entities, which the U.S. could not directly pressure, once European entities were also not using it.

4.2. *Official Lending, Infrastructure Projects, and Political Concessions*

China's flagship Belt and Road Initiative (BRI) has sought to jointly provide official loans and manufacturing inputs, often in exchange for political concessions (DFPS+ (2022)). Our model explains how China acts as a global enforcer in emerging economies by providing pressure jointly across lending and manufacturing relationships while extracting surplus in terms of political concessions.

We specialize the model to the configuration in Figure 3. The hegemon country, in this application China, has two sectors: sector k is a lender and sector j is a manufacturer. For simplicity, both sectors produce only using local factors. The target country, in this application a developing economy, has a single sector i that uses both inputs from China to produce. To focus the application on the essentials, we further assume constant prices (Definition 1), no z-externalities (Definition 2), and that sector i has a separable production function $f_i(x_i) = f_{ij}(x_{ij}) + f_{ik}(x_{ik})$. We think of the lending sector, k, as providing a loan to or buying a bond issued by sector i. The loan is for amount $x_{ik} = b$ and the gross interest rate is $p_k = R$. Like in the sovereign default literature, we assume limited or nonexistent loan legal enforceability, so that $\theta_{ik} > 0$.

To build intuition, consider a configuration with no hegemon, only individual triggers on j and k, and no loan legal enforceability $\theta_{ik} = 1$. Lending can be sustained by the future surplus of the lending relationship, along the lines of the sovereign default model of Eaton and Gersovitz (1981). In particular, $Rb \leq \beta[\nu_i(\{j,k\}) - \nu_i(\{j\})] = \beta\nu_i(\{k\})$, where the latter equality follows from the separable production function and individual triggers. The Markov equilibrium value of $\frac{p_i f_{ik}(b^*) - Rb^*}{1-\beta}$ is the present discounted value of all future borrowing by sector i. Solving for the borrowing limit, we obtain $b \leq (\beta \frac{p_i}{R})^{\frac{1}{1-\xi}}$ under the assumption that $f_{ik}(b) = b^{\xi}$ for $\xi \in (0,1)$. The IC (borrowing limit) binds whenever $\xi > \beta$.

To sharpen the application, we assume that $\theta_{ij} = 0$ so that firms in sector i can never steal input j. Thus, the incentive constraint for stealing j does not bind. Without a hegemonic China, the equilibrium features limited lending and an unconstrained manufacturing relationship. As a hegemon, China can impose a joint threat that links together the provision of lending and manufacturing goods. If the target country defaults on either input, both are withdrawn in the future. Under the joint threat, the incentive constraint of the target country sector i is

$$\theta_{ik} Rb + \overline{T}_i \leq \beta\nu_i(\{j,k\}) = \beta \frac{p_i f_{ik}(b') - Rb'}{1-\beta} - \beta \frac{\overline{T}_i'}{1-\beta} + \beta \frac{p_i f_{ij}(x_{ij}^*) - p_j x_{ij}^*}{1-\beta},$$

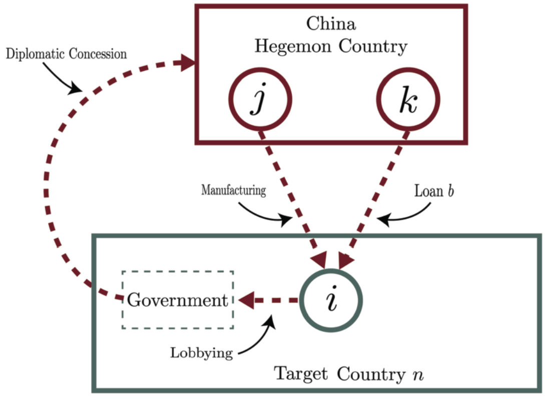


FIGURE 3.—*Application: Belt and Road Initiative. Notes*: Figure depicts the model setup for the application on the Belt and Road Initiative as described in Section 4.2.

where $\prime$ variables are exogenous continuation values from the perspective of this period, with equilibrium consistency condition $b = b' = b^*$, and $\overline{T}_i = \overline{T}_i' = \overline{T}_i^*$. The present value of the manufacturing relationship provides additional incentives to repay the debt in the joint threat, an endogenous cost of default on the loan. Under the joint threat, and assuming a binding IC under individual threats, the equilibrium features the same level of manufacturing activity but an increase in borrowing. The surplus is extracted by China via a transfer $\overline{T}_i^* > 0$. Supplemental Appendix B.3.8 fully characterizes this equilibrium.

Our mechanism is related to that proposed in Bulow and Rogoff (1989), whereby lenders seize the exports of a country conditional on a default, thereby generating a cost of default.[14] It is also related to Cole and Kehoe (1998), where government reputation is common across multiple relationships. In Mendoza and Yue (2012), a country faces an endogenous productivity loss in case of default due to being shut off from trade finance, hence losing the ability to import intermediate goods and being forced to switch to imperfect domestic substitutes. In our framework, joint threats offer a means for a country to voluntarily raise its cost of default, thereby allowing it to borrow more. In particular, the more input varieties and the more profitable those input varieties that are sourced from China, the more the borrowing constraint is relaxed. This application also helps us to visualize economic enforcement versus a military one. Historically, enforcement of sovereign debt could include sending the navy to threaten the blockade or shelling of a foreign port. Such military threats share the enforcement aspect of our commercial joint threats, but might differ substantially in their resource and human cost.

One interpretation of the transfers is mark-ups on the manufacturing goods being sold by China to the target country, or equivalently, an interest rate on the loan above the market rate R. This application cautions against empirical work that assesses China's lending programs in isolation, that is, focusing only on the loans and their returns. Both the sustainability of the loans and the economic returns from the lending have to be assessed jointly with other activities, such as manufacturing exports, that are occurring jointly with the lending. The benefits to China might not even accrue in monetary form, as we explore below.

[14]Under isolated threats, our model features positive borrowing. The impossibility result of Bulow and Rogoff (1989) does not kick in because we are not allowing inter-temporal saving and up-front payment contracts as in Eaton and Gersovitz (1981).

Transfers as Costly Actions and Political Concessions. Our framework could be extended to allow for a rich model of political lobbying and influence (Grossman and Helpman (1994), Bombardini and Trebbi (2020)). The costly actions that the hegemon demands can take the form of political lobbying or diplomatic concessions. In this case, the transfer $\overline{T}_i$ represents the private cost to the firm of an action. Here, we focus on a leading example for geoeconomics in which China asks the firms to lobby their governments for a political concession. We necessarily keep the modeling reduced form, but it provides a starting point for future research interested in introducing a deeper model of lobbying.

We assume that a bilateral geopolitical concession can be made from country n to China. We let the concession be the element $z_n^c \in \{0, 1\}$ of aggregate vector z and assume that it enters positively in China's utility, $u_m(z_n^c)$ with $u_m(1) > u_m(0)$, and negatively in the target country's utility, $u_n(z_n^c)$ with $u_n(0) > u_n(1)$. We assume that no utility is derived by either country from all other elements of z. Governments care about consumer welfare and therefore internalize these utility costs and benefits. Governments also care about the profits of the firms in their country net of transfers. We assume that a hegemon asking a firm to make a positive transfer can alternatively ask that firm to transfer part or all of that transfer to the government in exchange for the government undertaking the geopolitical action, with any money not transferred being paid as usual to the hegemon. The geopolitical action is feasible to implement as long as country level transfers exceed the government utility cost of the concession. These concessions can account, for example, for China asking countries that are part of the Belt and Road Initiative not to recognize Taiwan (DFPS+ (2022)).

5. CONCLUSION

Geoeconomics is a topic of practical importance but for which a formal treatment has proven elusive. This paper provides a general and formal framework that derives precise economic concepts to analyze this important topic. We show how concepts such as pressure, economic coercion, power, interdependence, strategic sectors, and third party sanctions emerge based on three core ingredients: limited enforceability and trigger punishments, input-output amplification, and externalities. Voluntary compliance with the hegemon's demands gives rise to a participation constraint that reflects its limits to power. We show how the framework can be used to make sense of many geoeconomic activities in practice, like the U.S. demands that European firms not use Huawei's technology, or China's flagship Belt and Road Initiative. The framework is flexible and can be extended for future analyses of a rich set of issues in geoeconomics as well as to guide the necessary empirical measurement.

APPENDIX A: PROOFS

PROOF OF LEMMA 1: Let $M_{ij} \subset \mathcal{J}_i$ be the (possibly empty) set of joint triggers of suppliers in j in its relationship with firm i. The assumption that joint triggers are symmetric means $k \in M_{ij} \iff j \in M_{ik}$. Let $B'_{ij}(S) \in \{0, 1\}$ indicate whether suppliers in j Trust firm i in the next period following stealing action S. Trigger strategies are formally defined by

$$B'_{ij}(S) = \begin{cases} B_{ij}, & S \cap K_{ij} = \emptyset, \\ 0, & otherwise, \end{cases} \qquad K_{ij} = \{j\} \cup \bigcup_{k \in M_{ij}} K_{ik}, \tag{10}$$

where $K_{ij} \subset \mathcal{J}_i$ is the full set of individual and joint trigger relationships (including chaining) and is constructed below. Chaining of joint triggers is reflected by $K_{ik} \subset K_{ij}$ for $k \in M_{ij}$. Following Stealing action S, suppliers $\mathcal{B}_i'(S) = \mathcal{B}_i \backslash (\bigcup_{j \in S} K_{ij})$ Trust firm i.

To construct the partition $\mathcal{S}_i$, we first construct the smallest sets K_{ij} consistent with equation (10), that is, involving minimal retaliation. Let $\{X_{ij}^n\}_{n=0}^{\infty}$ be a sequence of sets constructed iteratively as follows. Let $X_{ij}^0 = \{j\}$ and, for $n \geq 1$, let $X_{ij}^n = X_{ij}^{n-1} \cup \bigcup_{x \in X_{ij}^{n-1}} M_{ix}$.[15] Since $\mathcal{J}_i$ is a finite set, since $X_{ij}^{n-1} \subset X_{ij}^n \subset \mathcal{J}_i$, and since $X_{ij}^n = X_{ij}^{n-1} \Rightarrow X_{ij}^{n+1} = X_{ij}^n$, then $\exists \overline{N}_{ij} > 0$ such that $X_{ij}^{\overline{N}_{ij}} = X_{ij}^n$ for all $n \geq \overline{N}_{ij}$. Define the *minimum retaliation set* as $X_{ij}^* = X_{ij}^{\overline{N}_{ij}}$.

We next show that $k \in X_{ij}^*$ if and only if $X_{ik}^* = X_{ij}^*$. The if statement is immediate since $k \in X_{ik}^*$ by construction. Consider then the only if statement and let $k \in X_{ij}^*$. Since $k \in X_{ij}^*$, then $\exists N > 0$ s.t. $k \in X_{ij}^N$ and therefore $X_{ik}^* \subset X_{ij}^*$. Moreover, since $k \in X_{ij}^*$, by construction there is a sequence $x_0, \ldots, x_N$, with $x_0 = j$ and $x_N = k$, such that $x_n \in M_{ix_{n-1}}$ for $n = 1, \ldots, N$. Reversing that sequence and using symmetry of joint triggers, we have a sequence $x_N, \ldots, x_0$ such that $x_{n-1} \in M_{ix_n}$. Hence, $j \in X_{ik}^N$, and hence, $j \in X_{ik}^*$. But then $X_{ij}^* \subset X_{ik}^*$, and hence, $X_{ij}^* = X_{ik}^*$.

Next, consistent with equation (10), we define $K_{ij} = X_{ij}^*$. Define $\mathcal{S}_i = \bigcup_{j \in \mathcal{J}_i} \{K_{ij}\}$. Observe that $\mathcal{S}_i$ is a partition of $\mathcal{J}_i$ since: (i) $\bigcup_{j \in \mathcal{J}_i} X_{ij}^* = \mathcal{J}_i$; (ii) $\forall j, k \in \mathcal{J}_i$, either $X_{ij}^* = X_{ik}^*$ or $X_{ij}^* \cap X_{ik}^* = \emptyset$. For any $\mathcal{B}_i \in \Sigma(\mathcal{S}_i)$, by definition of $\Sigma(\cdot)$ there exists a $\mathcal{S}_i(\mathcal{B}_i) \subset \mathcal{S}_i$ such that $\mathcal{B}_i = \bigcup_{X \in \mathcal{S}_i(\mathcal{B}_i)} X$.[16] Since $\mathcal{S}_i$ is a partition of $\mathcal{J}_i$, then $\mathcal{S}_i(\mathcal{B}_i)$ is a partition of $\mathcal{B}_i$.

Consider a firm at the (on- or off-path) node $\mathcal{B}_i \in \Sigma(\mathcal{S}_i)$ at which it is Trusted by suppliers $\mathcal{B}_i$ and Distrusted by suppliers $\mathcal{J}_i \backslash \mathcal{B}_i$. The incentive compatibility constraint associated with firm i preferring no stealing over stealing action $S \in P(\mathcal{B}_i)$ is

$$\Pi_i(x_i, \ell_i, \mathcal{B}_i) + \sum_{j \in S} \theta_{ij} p_j x_{ij} + \beta \nu_i\big(\mathcal{B}_i'(S)\big) \leq \Pi_i(x_i, \ell_i, \mathcal{B}_i) + \beta \nu_i(\mathcal{B}_i),$$

which reduces to $\sum_{j \in S} \theta_{ij} p_j x_{ij} \leq \beta[\nu_i(\mathcal{B}_i) - \nu_i(\mathcal{B}_i'(S))]$. Parallel to the main text, the notation $\Pi_i(x_i, \ell_i, \mathcal{B}_i)$ indicates that $x_{ij} = 0$ for $j \notin \mathcal{B}_i$.

We now complete the proof of the lemma (at all $\mathcal{B}_i \in \Sigma(\mathcal{S}_i)$). The only if statement holds trivially since $\Sigma(\mathcal{S}_i(\mathcal{B}_i)) \subset \Sigma(\mathcal{B}_i) = P(\mathcal{B}_i) \backslash \{\emptyset\}$ since $\mathcal{S}(\mathcal{B}_i)$ is a partition of $\mathcal{B}_i$. Thus, consider the if statement. Suppose that (x_i, ℓ_i) is incentive compatible with respect to $\Sigma(\mathcal{S}_i(\mathcal{B}_i))$. Let $S \in P(\mathcal{B}_i)$. If $S \in \Sigma(\mathcal{S}_i(\mathcal{B}_i))$, then incentive compatibility holds by assumption, so let $S \notin \Sigma(\mathcal{S}_i(\mathcal{B}_i))$. Given a stealing action S, all suppliers $k \in \bigcup_{j \in S} X_{ij}^*$ Distrust firm i. Since elements of $\mathcal{S}_i(\mathcal{B}_i)$ are disjoint and since $X_{ij}^* = X_{ik}^* \iff j \in X_{ik}^*$, there is a unique subset $\mathcal{X}_i(S) \subset \mathcal{S}_i(\mathcal{B}_i)$ such that $\bigcup_{X \in \mathcal{X}_i(S)} X = \bigcup_{j \in S} X_{ij}^*$. Define $\Xi_i(S) = \bigcup_{X \in \mathcal{X}_i(S)} X$. For any $S \in P(\mathcal{B}_i)$, the stealing choice S is weakly dominated by the stealing choice $\Xi_i(S)$, since S and $\Xi_i(S)$ yield the same continuation value $\nu_i(\mathcal{B}_i \backslash \Xi_i(S))$ but $\Xi_i(S)$ yields higher flow payoff. Since $\Xi_i(S) \in \Sigma(\mathcal{S}_i(\mathcal{B}_i))$ and since $\Xi_i(S)$ weakly dominates S, then if (x_i, ℓ_i) is incentive compatible with respect to $\Sigma(\mathcal{S}_i(\mathcal{B}_i))$, it is also incentive compatible with respect to S. But since S was generic, then incentive compatibility with respect to $\Sigma(\mathcal{S}_i(\mathcal{B}_i))$ implies incentive compatibility with respect to $P(\mathcal{B}_i)$. *Q.E.D.*

[15]The first element $X_{ij}^0 = \{j\}$ is the individual trigger. The second element, $X_{ij}^1 = \{j\} \cup M_{ij}$, adds in the joint triggers of suppliers in j, and so on.

[16]We slightly abuse notation by denoting $\mathcal{S}_i = \mathcal{S}_i(\mathcal{J}_i)$.

PROOF OF PROPOSITION 1: Consider a hypothetical optimal contract $\Gamma^o = \{\mathcal{S}_i^{\prime o}, \mathcal{T}_i^o, \tau_i^o\}_{i \in \mathcal{C}_m}$ that is feasible and satisfies firms' participation constraints, and suppose that $\mathcal{S}_i^{\prime} \neq \overline{\mathcal{S}}_i^{\prime}$. We use (x^o, ℓ^o) to denote firm allocations under this contract (and so on). The proof is one of implementability: we show that the hegemon can achieve the same allocations, prices, and transfers using a feasible contract with maximal joint threats, $\Gamma^* = \{\overline{\mathcal{S}}_i^{\prime}, \mathcal{T}_i^o, \tau_i^*\}$.

We first construct τ^* by $\tau_{ij}^* = \frac{\partial \Pi_i(x_i^o, \ell_i^o, \mathcal{J}_i)}{\partial x_{ij}}$ and $\tau_{if}^{\ell *} = \frac{\partial \Pi_i(x_i^o, \ell_i^o, \mathcal{J}_i)}{\partial \ell_{if}}$. The relaxed problem (not subject to incentive compatibility) of firm i is

$$\max_{x_i, \ell_i} \Pi_i(x_i, \ell_i, \mathcal{J}_i) - \sum_{j \in \mathcal{J}_i} \left[\tau_{ij}^* \left(x_{ij} - x_{ij}^*\right) + T_{ij}\right] - \sum_{f \in \mathcal{F}_m} \tau_{if}^{\ell *} \left(\ell_{if} - \ell_{if}^*\right),$$

which yields solution $\frac{\partial \Pi_i}{\partial x_{ij}} = \tau_{ij}^*$ and $\frac{\partial \Pi_i}{\partial \ell_{if}} = \tau_{if}^*$, that is, $x_i = x_i^o$ and $\ell_i = \ell_i^o$. It remains to verify this allocation is incentive compatible. Since $\overline{\mathcal{S}}_i^{\prime}$ is a joint threat of $\mathcal{S}_i^{\prime o}$, then $\Sigma(\overline{\mathcal{S}}_i^{\prime}) \subset \Sigma(\mathcal{S}_i^{\prime o})$, and hence (x_i^o, ℓ_i^o) is incentive compatible under contract Γ_i^*. Since (x_i^o, ℓ_i^o) solves firm i's relaxed problem and is incentive compatible, it is optimal for firm i.

Next, conjecturing $(z^*, P^*) = (z^o, P^o)$, then every firm $i \notin \mathcal{C}_m$ and every consumer n faces the same decision problem as under the original contract. Hence, every firm and every consumer has the same optimal policy. Hence, $x^* = z^o$ and markets clear at prices $P^* = P^o$, consistent with the conjecture.

Finally, since allocations, transfers, and prices are the same, then since firm i's participation constraint is satisfied under contract Γ^o, it is also satisfied under contract Γ^*. Since prices, allocations, and transfers are unchanged, the hegemon's objective attains the same value as under the original contract. Thus, the hegemon is indifferent between feasible contracts Γ^o and Γ^*, completing the proof. *Q.E.D.*

PROOF OF PROPOSITION 2: To clarify the ordering for matrix algebra, $z_i^* = (z_{i,\min \mathcal{J}_i}^*, \dots, z_{i,\max \mathcal{J}_i}^*)^T$ is a $|\mathcal{J}_i| \times 1$ vector and $z^* = (z_1^{*T}, \dots, z_{|\mathcal{I}|}^{*T})^T$ is a $\sum_{i \in \mathcal{I}} |\mathcal{J}_i| \times 1$ vector. Let $|z^*| = \sum_{i \in \mathcal{I}} |\mathcal{J}_i|$. We stack x^* from x_{ij}^* in the same manner. Since $x^*(\Gamma, z^*, P) = z^*$, then totally differentiating yields $\frac{\partial x^*}{\partial e} + \frac{\partial x^*}{\partial P} \frac{dP}{de} + \frac{\partial x^*}{\partial z^*} \frac{dz^*}{de} = \frac{dz^*}{de}$, where $\frac{\partial x^*}{\partial e}$ is a $|z^*| \times 1$ vector, and $\frac{\partial x^*}{\partial z^*}$ is a $|z^*| \times |z^*|$ matrix with each row corresponding to the vector $\frac{\partial x_{ij}^*}{\partial z^*}$. Rearranging yields $\frac{dz^*}{de} = \Psi^z \frac{\partial x^*}{\partial e} + \Psi^z \frac{\partial x^*}{\partial P} \frac{dP}{de}$, where $\Psi^z = (\mathbb{I} - \frac{\partial x^*}{\partial z^*})^{-1}$.

Next, define the excess demand for good i as $ED_i = \sum_{n=1}^N C_{ni} + \sum_{j \in \mathcal{D}_i} x_{ji} - y_i$ and the excess demand for market f as $ED_f^\ell = \sum_{i \in \mathcal{I}_n} \ell_{if} - \overline{\ell}_f$. Define $ED = (ED_2, \dots, ED_{|\mathcal{I}|}, ED_1^\ell, \dots, ED_{|\mathcal{F}|})^T$, which is a $(|\mathcal{I}| + |\mathcal{F}| - 1) \times 1$ vector (excluding the numeraire). Market clearing requires $ED(\Gamma, z^*, P) = 0$, so that totally differentiating in e yields $\frac{\partial ED}{\partial e} + \frac{\partial ED}{\partial z^*} \frac{dz^*}{de} + \frac{\partial ED}{\partial P} \frac{dP}{de} = 0$. Substituting in for $\frac{dz^*}{de}$, rearranging, and inverting yields $\frac{dP}{de} = -(\frac{\partial ED}{\partial P} + \frac{\partial ED}{\partial z^*} \Psi^z \frac{\partial x^*}{\partial P})^{-1} (\frac{\partial ED}{\partial e} + \frac{\partial ED}{\partial z^*} \Psi^z \frac{\partial x^*}{\partial e})$, which completes the proof. *Q.E.D.*

PROOF OF PROPOSITION 3: For any prices and aggregates $Q = (P, z^*)$, define the subset $\mathcal{P}(Q) \subset \mathcal{C}_m$ of sectors that the hegemon has pressure points on. We divide the proof into the three regions in which the hegemon's optimal contract could lie: (i) the hegemon has no pressure points, $\mathcal{P} = \emptyset$; (ii) the hegemon has pressure points on all sectors, $\mathcal{P} = \mathcal{C}_m$; (iii) the hegemon has pressure points on some (but not all) sectors, $\mathcal{P} \neq \emptyset$ and $\mathcal{P} \neq \mathcal{C}_m$. Note that some of these regions may be empty and some points Q cannot be part of an equilibrium.

Case (i): Pressure points on no sectors. Suppose that $\mathcal{P}(Q)=\emptyset$. Then $V_i(\overline{\mathcal{S}}_i')=V_i(\mathcal{S}_i)$ for all $i\in\mathcal{C}_m$, and hence the hegemon must set $\overline{T}_i=0$ and $\tau_i=0$ for all i.

Case (ii): Pressure points on all sectors $i\in\mathcal{C}_m$. Suppose that $\mathcal{P}(Q)=\mathcal{C}_m$. As is common in the literature (e.g., Farhi and Werning (2016)), we assume the hegemon is able to select its preferred equilibrium (P,z^*) when there are multiple equilibria consistent with its contract. Since the hegemon has complete instruments for $i\in\mathcal{C}_m$, we adopt the primal approach whereby the hegemon directly selects allocations of firms $i\in\mathcal{C}_m$, and derive the wedges that implement these allocations.

The Lagrangian of firm i, with choice variables (x_i,ℓ_i), is

$$\begin{aligned}\mathcal{L}_i=\Pi_i(x_i,\ell_i,\mathcal{J}_i)-\sum_{j\in\mathcal{J}_i}\bigl[\tau_{ij}\bigl(x_{ij}-x_{ij}^*\bigr)\bigr]-\sum_{f\in\mathcal{F}_m}\tau_{if}^{\ell}\bigl(\ell_{if}-\ell_{if}^*\bigr)-\overline{T}_i+\beta\nu_i(\mathcal{J}_i)\\+\sum_{S\in\Sigma(\overline{\mathcal{S}}_i')}\lambda_{iS}\Bigl[\beta\bigl(\nu_i(\mathcal{J}_i)-\nu_i(\mathcal{J}_i\backslash S)\bigr)-\sum_{j\in S}\bigl[\theta_{ij}p_jx_{ij}-\mathbf{1}_{S_i^D\subset S}\overline{T}_i\bigr]\Bigr].\end{aligned}$$

Denoting $\overline{\lambda}_{ij}\equiv\sum_{S\in\Sigma(\overline{\mathcal{S}}_i')|j\in S}\lambda_{iS}$, the FOCs are

$$\tau_{ij}=\frac{\partial\Pi_i}{\partial x_{ij}}-\overline{\lambda}_{ij}\theta_{ij}p_j;\qquad\tau_{if}^{\ell}=\frac{\partial\Pi_i}{\partial\ell_{if}}.$$

Given that the firm's optimization problem is convex, given an incentive compatible allocation (x_i,ℓ_i), and given non-negative Lagrange multipliers $\lambda_{iS}\ge0$ such that complementary slackness holds, these equations define wedges that implement (x_i,ℓ_i).

Next, consider the hegemon's Lagrangian. Under the primal approach of choosing $\{x_i,\ell_i,\overline{T}_i\}_{i\in\mathcal{C}_m},P,z$, the hegemon's Lagrangian is

$$\begin{aligned}\mathcal{L}_m=W_m\Bigl(p,\sum_{i\in\mathcal{I}_m}\Pi_i(x_i,\ell_i,\mathcal{J}_i)+\sum_{f\in\mathcal{F}_m}p_f^{\ell}\overline{\ell}_f+\sum_{i\in\mathcal{D}_m}\overline{T}_i\Bigr)+u_m(z)\\+\sum_{i\in\mathcal{C}_m}\eta_i\bigl[\Pi_i(x_i,\ell_i,\mathcal{J}_i)-\overline{T}_i+\beta\nu_i(\mathcal{J}_i)-V_i(\mathcal{S}_i)\bigr]+\sum_{i\in\mathcal{C}_m}\gamma_i\overline{T}_i\\+\sum_{i\in\mathcal{C}_m}\sum_{S\in\Sigma(\overline{\mathcal{S}}_i')}\Lambda_{iS}\Bigl[\beta\bigl[\nu_i(\mathcal{J}_i)-\nu_i(\mathcal{J}_i\backslash S)\bigr]-\sum_{j\in S}\theta_{ij}p_jx_{ij}-\mathbf{1}_{S_i^D\subset S}\overline{T}_i\Bigr]\\+\sum_{f\in\mathcal{F}_m}\kappa_fED_f+ED^m\phi+\sum_{i\in\mathcal{C}_m}\sum_{j\in\mathcal{J}_i}\psi_{ij}[z_{ij}-x_{ij}]+\bigl[z^{NC}-x^{NC}\bigr]\psi^{NC},\end{aligned}$$

where for factor f located in country n, $ED_f=\overline{\ell}_f-\sum_{i\in\mathcal{I}_n\cap\mathcal{C}_m}\ell_{if}-\sum_{i\in\mathcal{I}_n\backslash\mathcal{C}_m}\ell_{if}(P,z)$, and for good i,

$$ED_i=\begin{cases}\displaystyle\sum_{n=1}^{N}C_{ni}(P,w_n)+\sum_{j\in D_i\cap\mathcal{C}_m}x_{ji}+\sum_{j\in D_i\backslash\mathcal{C}_m}x_{ji}(P,z)-f_i(x_i,\ell_i,z), & i\in\mathcal{C}_m,\\ \displaystyle\sum_{n=1}^{N}C_{ni}(P,w_n)+\sum_{j\in D_i\cap\mathcal{C}_m}x_{ji}+\sum_{j\in D_i\backslash\mathcal{C}_m}x_{ji}(P,z)-y_i(P,z), & i\notin\mathcal{C}_m,\end{cases}$$

where $y_i(P,z)=f_i(x_i(P,z),\ell_i(P,z),z)$. We defined $\phi=(\phi_2,\dots,\phi_N,\{\phi_f^\ell\}_{f\notin\mathcal{F}_m})$ (Lagrange multipliers on market clearing) and ED^m analogously.[17] We defined $\psi^{NC}=\{\psi_{ij}\}_{i\notin\mathcal{C}_m}$ (Lagrange multipliers on determination of aggregates) and z^{NC}, x^{NC} analogously. $\gamma_i\geq 0$ is the Lagrange multiplier on transfer non-negativity. In principle, we should also include non-negativity constraints on allocations and prices ($x_{ij},z_{ij},\ell_{ij},P\geq 0$). When taking first-order conditions for allocations to determine equilibrium tax rates, we focus on cases in which these non-negativity constraints do not bind. Incorporating binding constraints adds terms related to these Lagrange multipliers to the planner's FOCs.[18]

We structure the proof by first deriving expressions for the Lagrange multipliers ψ_{ij}, ψ^{NC}, ϕ and then taking FOCs in contract terms. The FOC in z_{ij} for $i\in\mathcal{C}_m$ is

$$-\psi_{ij}=\varepsilon_{ij}^z+\frac{\partial ED^m}{\partial z_{ij}}\phi-\frac{\partial x^{NC}}{\partial z_{ij}}\psi^{NC}, \tag{11}$$

where $\varepsilon_{ij}^z=\frac{\partial W_m}{\partial w_m}\sum_{k\in\mathcal{I}_m}\frac{\partial\Pi_k}{\partial z_{ij}}+\frac{\partial u_m(z)}{\partial z_{ij}}+\sum_{k\in\mathcal{C}_m}\eta_k[\frac{\partial\Pi_k}{\partial z_{ij}}-\frac{\partial V_k(\mathcal{S}_k)}{\partial z_{ij}}]$. Next, defining $\Psi^{z,NC}=(\mathbb{I}-\frac{\partial x^{NC}}{\partial z^{NC}})^{-1}$, the (block) FOC in z^{NC} is

$$0=\Psi^{z,NC}\varepsilon^{z,NC}+\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\phi+\psi^{NC}. \tag{12}$$

Defining $P^m=(p_2,\dots,p_N,p_{-m}^\ell)$ to be the price vector (excluding country m factors and the numeraire), the block FOC in P^m is

$$0=\varepsilon^{P^m}+\frac{\partial ED^m}{\partial P^m}\phi-\frac{\partial x^{NC}}{\partial P^m}\psi^{NC}, \tag{13}$$

where

$$\varepsilon^{P^m}=\frac{\partial W_m}{\partial P^m}+\frac{\partial W_m}{\partial w_m}\frac{\partial w_m}{\partial P^m}+\sum_{i\in\mathcal{C}_m}\eta_i\left[\frac{\partial\Pi_i}{\partial P^m}-\frac{\partial V_i}{\partial P^m}\right]-\sum_{i\in\mathcal{C}_m}\sum_{S\in\Sigma(\overline{\mathcal{S}}_i')}\Lambda_{iS}\sum_{j\in S}\theta_{ij}\frac{\partial p_j}{\partial P^m}x_{ij}.$$

Equation (7) obtains since, by the Envelope theorem, $\frac{\partial W_m}{\partial P^m}=-\frac{\partial W_m}{\partial w_m}\sum_{i\in\mathcal{I}}\frac{\partial p_i}{\partial P^m}C_{mi}$ and $\frac{\partial w_m}{\partial P^m}=\sum_{i\in\mathcal{I}_m}[\frac{\partial p_i}{\partial P^m}y_i-\sum_{j\in\mathcal{J}_i}\frac{\partial p_j}{\partial P^m}x_{ij}]$, with $X_{m,j}=\mathbf{1}_{j\in\mathcal{I}_m}y_j-\sum_{i\in\mathcal{I}_m}x_{ij}-C_{mj}$.

Substituting equation (12) into equation (13) and rearranging,

$$\phi=-\left(\frac{\partial ED^m}{\partial P^m}+\frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\right)^{-1}\left(\varepsilon^{P^m}+\frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\varepsilon^{z,NC}\right).$$

Substituting into equation (12),

$$\psi^{NC}=\left[-\mathbb{I}+\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\left(\frac{\partial ED^m}{\partial P^m}+\frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\right)^{-1}\frac{\partial x^{NC}}{\partial P^m}\right]\Psi^{z,NC}\varepsilon^{z,NC}$$
$$+\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\left(\frac{\partial ED^m}{\partial P^m}+\frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\right)^{-1}\varepsilon^{P^m}.$$

[17] It is technically convenient to separate market clearing for factors in the hegemon's country from those in other countries since the hegemon contracts with all its domestic firms, that is, $\mathcal{I}_m\backslash\mathcal{C}_m=\emptyset$.

[18] Given Inada conditions, it will also push the planner toward using arbitrarily large wedges to prevent use of goods held to corner solutions.

Using Proposition 2, $\frac{\partial P^m}{\partial z_{ij}} = -[\frac{\partial ED^m}{\partial z_{ij}} + \frac{\partial x^{NC}}{\partial z_{ij}}\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}](\frac{\partial ED^m}{\partial P^m} + \frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}})^{-1}$ (after transposition). Substituting ϕ and ψ^{NC} into equation (11),

$$\psi_{ij} = -\varepsilon^z_{ij} - \frac{dP^m}{dz_{ij}}\varepsilon^{P^m} - \left(\frac{\partial x^{NC}}{\partial z_{ij}} + \frac{dP^m}{dz_{ij}}\frac{\partial x^{NC}}{\partial P^m}\right)\Psi^{z,NC}\varepsilon^{z,NC},$$

and again using Proposition 2, we have (after transposition)

$$\psi_{ij} = -\varepsilon^z_{ij} - \frac{dP^m}{dz_{ij}}\varepsilon^{P^m} - \frac{dz^{NC}}{dz_{ij}}\varepsilon^{z,NC}. \tag{14}$$

Next, since the hegemon contracts with every domestic firm (i.e., $\partial ED_f/\partial p^\ell_f = 0$) and since factors are internationally immobile (i.e., $\partial x^{NC}/\partial p^\ell_f = 0$), the FOC in factor price p^ℓ_f ($f \in \mathcal{F}_m$) is $0 = \sum_{i\in\mathcal{I}_m}\eta_i[\frac{\partial \Pi_i(x_i,\ell_i,\mathcal{J}_i)}{\partial p^\ell_f} - \frac{\partial V_i(\mathcal{S}_i)}{\partial p^\ell_f}] + \frac{\partial ED^m}{\partial p^\ell_f}\phi$. Consumer n wealth is unaffected by the factor price owing to market clearing (i.e., $\frac{\partial w_m}{\partial p^f_\ell} = \sum_{i\in\mathcal{I}_m}\ell_{if} - \overline{\ell}_f = 0$), so $\partial ED^m/\partial p^\ell_f = 0$ and therefore,

$$0 = \sum_{i\in\mathcal{I}_m}\eta_i\left[\frac{\partial \Pi_i(x_i,\ell_i,\mathcal{J}_i)}{\partial p^\ell_f} - \frac{\partial V_i(\mathcal{S}_i)}{\partial p^\ell_f}\right] = \sum_{i\in\mathcal{I}_m}\eta_i\left[\ell_{if} - \ell^{\text{Outside}}_{if}\right],$$

where the second equality follows by the Envelope theorem, and $\ell^{\text{Outside}}_{if}$ is factor usage of a firm that deviates to the outside option.

We are now ready to take FOC with respect to allocations $\{x_i, \ell_i, \overline{T}_i\}_{i\in\mathcal{C}_m}$. To streamline analysis, taking e to be one of the allocations $\{x_i, \ell_i, \overline{T}_i\}_{i\in\mathcal{C}_m}$ so that e is a scalar, we have

$$\begin{aligned}
&\frac{\partial}{\partial e}\left[ED^m\phi + \sum_{i\in\mathcal{C}_m}\sum_{j\in\mathcal{J}_i}\psi_{ij}[z_{ij} - x_{ij}] + \left[z^{NC} - x^{NC}\right]\psi^{NC}\right] \\
&= \frac{\partial ED^m}{\partial e}\phi - \sum_{i\in\mathcal{C}_m}\sum_{j\in\mathcal{J}_i}\psi_{ij}\frac{\partial x_{ij}}{\partial e} \\
&= \sum_{i\in\mathcal{C}_m}\sum_{j\in\mathcal{J}_i}\varepsilon^z_{ij}\frac{\partial x_{ij}}{\partial e} + \sum_{i\in\mathcal{C}_m}\sum_{j\in\mathcal{J}_i}\frac{dz^{NC}}{dz_{ij}}\frac{\partial x_{ij}}{\partial e}\varepsilon^{z,NC} + \sum_{i\in\mathcal{C}_m}\sum_{j\in\mathcal{J}_i}\frac{dP^m}{dz_{ij}}\frac{\partial x_{ij}}{\partial e}\varepsilon^{P^m} \\
&\quad - \frac{\partial ED^m}{\partial e}\left(\frac{\partial ED^m}{\partial P^m} + \frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\right)^{-1}\frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\varepsilon^{z,NC} \\
&\quad - \frac{\partial ED^m}{\partial e}\left(\frac{\partial ED^m}{\partial P^m} + \frac{\partial x^{NC}}{\partial P^m}\Psi^{z,NC}\frac{\partial ED^m}{\partial z^{NC}}\right)^{-1}\varepsilon^{P^m} \\
&= \sum_{i\in\mathcal{C}_m}\sum_{j\in\mathcal{J}_i}\varepsilon^z_{ij}\frac{\partial x_{ij}}{\partial e} + \frac{dz^{NC}}{de}\varepsilon^{z,NC} + \frac{dP^m}{de}\varepsilon^{P^m}.
\end{aligned} \tag{15}$$

FOC for ℓ_{if} for a domestic firm. The hegemon's FOC for (domestic) ℓ_{if} is (using (15))

$$0 = \frac{\partial W_m}{\partial w_m}\frac{\partial \Pi_i}{\partial \ell_{if}} + \eta_i\frac{\partial \Pi_i}{\partial \ell_{if}} - \kappa_f + \frac{dz^{NC}}{d\ell_{if}}\varepsilon^{z,NC} + \frac{dP^m}{d\ell_{if}}\varepsilon^{P^m}.$$

Defining $\mathcal{E}_{if}^{\ell} = \varepsilon^{zNC}\frac{dz^{*NC}}{d\ell_{if}} + \varepsilon^{P^m}\frac{dP^m}{d\ell_{if}}$, since the firm's problem yields a tax rate $\tau_{if}^{\ell} = \frac{\partial \Pi_i}{\partial \ell_{if}}$, then we have $(\frac{\partial W_m}{\partial w_m} + \eta_i)\tau_{if}^{\ell} = -\mathcal{E}_{if}^{\ell} + \kappa_f$.

FOC for ℓ_{if} for a foreign firm. The hegemon's FOC for (foreign) ℓ_{if} is $0 = \eta_i\frac{\partial \Pi_i}{\partial \ell_{if}} + \mathcal{E}_{if}^{\ell}$, so $\eta_i\tau_{if}^{\ell} = -\mathcal{E}_{if}^{\ell}$.

FOC for x_{ij} for a domestic firm. Let $\mathcal{E}_{ij} = \varepsilon_{ij}^{z} + \varepsilon^{zNC}\frac{dz^{*NC}}{dz_{ij}} + \varepsilon^{P^m}\frac{dP^m}{dz_{ij}}$ and let $\overline{\Lambda}_{ij} = \sum_{S\in\Sigma(\overline{\mathcal{S}}_i')|j\in S}\Lambda_{iS}$. For a domestic sector, the hegemon's FOC for x_{ij} is (using (15))

$$0 = \frac{\partial W_m}{\partial w_m}\frac{\partial \Pi_i}{\partial x_{ij}} + \eta_i\frac{\partial \Pi_i}{\partial x_{ij}} - \overline{\Lambda}_{ij}\theta_{ij}p_j + \mathcal{E}_{ij}.$$

To obtain the implementing taxes, construct the firm non-negative Lagrange multiplier as $\lambda_{iS} = \frac{\Lambda_{iS}}{\frac{\partial W_m}{\partial w_m}+\eta_i}$. The firm's FOC is therefore $\tau_{ij}(\frac{\partial W_m}{\partial w_m} + \eta_i) = (\frac{\partial W_m}{\partial w_m} + \eta_i)\frac{\partial \Pi_i}{\partial x_{ij}} - \overline{\Lambda}_{ij}\theta_{ij}p_j$, which, combined with the planner's FOC, yields $\tau_{ij}(\frac{\partial W_m}{\partial w_m} + \eta_i) = -\mathcal{E}_{ij}$.

FOC for x_{ij} for a foreign sector. The hegemon's FOC for (foreign) x_{ij} is $0 = \eta_i\frac{\partial \Pi_i}{\partial x_{ij}} - \overline{\Lambda}_{ij}\theta_{ij}p_j + \mathcal{E}_{ij}$. For a positive constant $\alpha > 0$, we add and subtract $\alpha\frac{\partial \Pi_i}{\partial x_{ij}}$ to obtain $(\eta_i + \alpha)\frac{\partial \Pi_i}{\partial x_{ij}} - \overline{\Lambda}_{ij}\theta_{ij}p_j = -\mathcal{E}_{ij} + \alpha\frac{\partial \Pi_i}{\partial x_{ij}}$. Constructing the non-negative firm Lagrange multiplier $\lambda_{iS} = \frac{\Lambda_{iS}}{\eta_i+\alpha}$ and combining the firm's FOC with the planner's FOC obtains $\tau_{ij}(\eta_i + \alpha) = -(\mathcal{E}_{ij} - \alpha\frac{\partial \Pi_i}{\partial x_{ij}})$. If $\eta_i > 0$, we set $\alpha = 0$ and obtain $\eta_i\tau_{ij} = -\mathcal{E}_{ij}$. If $\eta_i = 0$, at an interior value of x_{ij} either $\overline{\Lambda}_{ij} = \mathcal{E}_{ij} = 0$ or $\overline{\Lambda}_{ij}, \mathcal{E}_{ij} > 0$. In the former case, we can write $\eta_i\tau_{ij} = -\mathcal{E}_{ij}$ trivially. In the latter case, as $\alpha \to 0$, we have $-(\mathcal{E}_{ij} - \alpha\frac{\partial \Pi_i}{\partial x_{ij}}) \to -\mathcal{E}_{ij}$, and so we heuristically represent optimal wedges, taking very small α, by $\eta_i\tau_{ij} = -\mathcal{E}_{ij}$.

FOC for $\overline{T}_i$ for a domestic sector. Holding fixed allocations, a transfer $\overline{T}_i$ for a domestic sector has no impact on excess demand in any market, since it redistributes from country m's firms to country m's consumer. The FOC is $0 = -\eta_i - \overline{\Lambda}_i + \gamma_i$, so that $\overline{T}_i = 0$.

FOC for $\overline{T}_i$ for a foreign sector. Holding fixed allocations, a transfer $\overline{T}_i$ reallocates wealth from consumers in country n to consumers in country m. The FOC is $0 = \frac{\partial W_m}{\partial w_m} - \eta_i - \overline{\Lambda}_i + \Xi_{mn} + \gamma_i$ (for $\Xi_{mn} = \varepsilon^{z,NC}(\frac{dz^{*NC}}{dw_m} - \frac{dz^{*NC}}{dw_n}) + \varepsilon^{P^m}(\frac{dP^m}{dw_m} - \frac{dP^m}{dw_n})$), and the inequality follows from $\gamma_i \geq 0$.

Case (iii): Pressure points on a subset of firms. Suppose $\mathcal{I}_m^p \subset \mathcal{I}_m$ and $\mathcal{D}_m^p \subset \mathcal{D}_m$ (one of which may be empty) with $(\mathcal{I}_m^p \cup \mathcal{D}_m^p) \cap \mathcal{P}(Q) = \emptyset$. As in case (i), $\overline{T}_i = 0$ and $\tau_i = 0$ for $i \in \mathcal{I}_m^p \cup \mathcal{D}_m^p$. Redefine the contractible set as $\mathcal{C}_m^{\text{new}} = \mathcal{C}_m \backslash (\mathcal{I}_m^p \cup \mathcal{D}_m^p)$ and $\mathcal{D}_m^{\text{new}} = \mathcal{D}_m \backslash \mathcal{D}_m^p$ (one of $\mathcal{D}_m^{\text{new}}$ or $\mathcal{C}_m^{\text{new}} \cap \mathcal{I}_m$ may be empty). The hegemon's Lagrangian over $\{x_i, \ell_i, \overline{T}_i\}_{i\in\mathcal{C}_m^{\text{new}}}, P, z$ is

$$\begin{aligned}
\mathcal{L}_m = {} & W_m\Bigg(p, \sum_{i\in\mathcal{I}_m\backslash\mathcal{I}_m^p}\Pi_i(x_i, \ell_i, \mathcal{J}_i) + \sum_{i\in\mathcal{I}_m^p}V_i(\mathcal{S}_i) + \sum_{f\in\mathcal{F}_m}p_f^{\ell}\overline{\ell}_f + \sum_{i\in\mathcal{D}_m^{\text{new}}}\overline{T}_i\Bigg) + u_m(z) \\
& + \sum_{i\in\mathcal{C}_m^{\text{new}}}\eta_i\big[\Pi_i(x_i, \ell_i, \mathcal{J}_i) - \overline{T}_i + \beta\big(\nu_i(\mathcal{J}_i) - V_i(\mathcal{S}_i)\big)\big] \\
& + \sum_{i\in\mathcal{C}_m^{\text{new}}}\sum_{S\in\Sigma(\overline{\mathcal{S}}_i')}\Lambda_{iS}\Bigg[\beta\big[\nu_i(\mathcal{J}_i) - \nu_i(\mathcal{J}_i\backslash S)\big] - \sum_{j\in S}\theta_{ij}p_jx_{ij} - \mathbf{1}_{S_i^D\subset S}\overline{T}_i\Bigg]
\end{aligned}$$

$$+ED\phi+\sum_{i\in\mathcal{C}_m^{\text{new}}}\sum_{j\in\mathcal{J}_i}\psi_{ij}[z_{ij}-x_{ij}]+\big[z^{NC}-x^{NC}\big]\psi^{NC}+\sum_{i\in\mathcal{C}_m^{\text{new}}}\gamma_i\overline{T}_i.$$

Analysis parallels case (ii) and we highlight the differences. We have

$$\varepsilon_{ij}^z=\frac{\partial W_m}{\partial w_m}\bigg[\sum_{k\in\mathcal{I}_m\setminus\mathcal{I}_m^p}\frac{\partial\Pi_k}{\partial z_{ij}}+\sum_{k\in\mathcal{I}_m^p}\frac{\partial V_k(\mathcal{S}_k)}{\partial z_{ij}}\bigg]+\frac{\partial u_m(z)}{\partial z_{ij}}+\sum_{k\in\mathcal{C}_m^{\text{new}}}\eta_k\bigg[\frac{\partial\Pi_k}{\partial z_{ij}}-\frac{\partial V_k(\mathcal{S}_k)}{\partial z_{ij}}\bigg].$$

Let P^m be defined as before if $\mathcal{I}_m^p=\emptyset$ and otherwise let $P^m=P$. ε^{P^m} is formally defined as before (with $\mathcal{C}_m^{\text{new}}$ replacing $\mathcal{C}_m$) under the definition of P^m. The FOCs for x_{ij} and $\overline{T}_i$ are identical to case (ii) up to the new definitions. The FOCs for ℓ_{if} are identical to case (ii) up to the new definitions with ϕ_f in place of κ_f in the case that $\mathcal{I}_m^p=\emptyset$, and are identical with $\kappa_f=0$ up to the new definitions otherwise. *Q.E.D.*

PROOF OF PROPOSITION 4: Proposition 1 holds for the global planner by the same argument. The firm Lagrangian and FOCs are the same as in the proof of Proposition 3. The global planner's Lagrangian is the same as the hegemon's up to the new objective function, $\sum_{n=1}^N\Omega_n[W_n(p,w_n)+u_n(z)]$. Formal analysis proceeds as in the proof of Proposition 3 up to the new objective function. Absent a pressure point on sector i, $\overline{T}_i=0$ and $\tau_i=0$. For any sector i located in country n, the same derivations yield input wedges satisfying $(\Omega_n\frac{\partial W_n}{\partial w_n}+\eta_i)\tau_{ij}=-\mathcal{E}_{ij}^p$ (note this sector is valued by n's consumer). The externality vector $\mathcal{E}_{ij}^p$ is formally defined by the same equation, but replacing ε_{ij}^z and ε^{P^m} with

$$\varepsilon_{ij}^{zp}=\sum_{n=1}^N\Omega_n\bigg[\frac{\partial W_n}{\partial w_n}\frac{\partial w_n}{\partial z_{ij}}+\frac{\partial u_n}{\partial z_{ij}}\bigg]+\sum_{k\in\mathcal{C}_m}\eta_k\bigg[\frac{\partial\Pi_k}{\partial z_{ij}}-\frac{\partial V_k(\mathcal{S}_k)}{\partial z_{ij}}\bigg],$$

$$\varepsilon^{P^m p}=\sum_{n=1}^N\Omega_n\frac{dW_n}{dP^m}+\sum_{i\in\mathcal{C}_m}\bigg[\eta_i\bigg[\frac{\partial\Pi_i}{\partial P^m}-\frac{\partial V_i(\mathcal{S}_i)}{\partial P^m}\bigg]-\sum_{S\in\Sigma(\overline{\mathcal{S}}_i')}\Lambda_{iS}\sum_{j\in S}\theta_{ij}\frac{\partial p_j}{\partial P^m}x_{ij}\bigg],$$

where $\frac{dW_n}{dP^m}=\frac{\partial W_n}{\partial P^m}+\frac{\partial W_n}{\partial w_n}\frac{\partial w_n}{\partial P^m}$. The spillover Ξ_{mn}^p is defined as before, replacing ε_{ij}^z, ε^{P^m} with ε_{ij}^{zp}, $\varepsilon^{P^m p}$. The condition for no redistributive motive is therefore $\Omega_m\frac{\partial W_m}{\partial w_n}-\Omega_n\frac{\partial W_n}{\partial w_n}+\Xi_{mn}^p=0$. Finally, the FOC for a transfer $\overline{T}_i$ for a firm in country n is $0=-\eta_i-\overline{\Lambda}_i+\Omega_m\frac{\partial W_m}{\partial w_n}-\Omega_n\frac{\partial W_n}{\partial w_n}+\Xi_{mn}^p+\gamma_i=-\eta_i-\overline{\Lambda}_i+\gamma_i$, so that $\overline{T}_i=0$. This completes the proof. *Q.E.D.*

REFERENCES

Abreu, Dilip, David Pearce, and Ennio Stacchetti (1986), "Optimal Cartel Equilibria With Imperfect Monitoring." *Journal of Economic Theory*, 39 (1), 251–269. [0108]

Abreu, Dilip, David Pearce, and Ennio Stacchetti (1990), "Toward a Theory of Discounted Repeated Games With Imperfect Monitoring." *Econometrica: Journal of the Econometric Society*, 1041–1063. [0108,0111]

Acemoglu, Daron, Vasco M. Carvalho, Asuman Ozdaglar, and Alireza Tahbaz-Salehi (2012), "The Network Origins of Aggregate Fluctuations." *Econometrica*, 80 (5), 1977–2016. [0108]

Acemoglu, Daron, Michael Golosov, and Aleh Tsyvinski (2008), "Political Economy of Mechanisms." *Econometrica*, 76 (3), 619–641. [0110,0111]

Antràs, Pol and Davin Chor (2022), "Global Value Chains." In *Handbook of International Economics: International Trade*, Vol. 5, 297–376. [0108]

Antràs, Pol and Miquel Gerard Padró I (2023), "Exporting Ideology: The Right and Left of Foreign Influence." Tech. rep, National Bureau of Economic Research. [0108]

[BBBK+] Bachmann, Ruediger, David Baqaee, Christian Bayer, Moritz Kuhn, Andreas Löschel, Benjamin Moll, Andreas Peichl, Karen Pittel, and Moritz Schularick (2022), "What if? The Economic Effects for Germany of a Stop of Energy Imports From Russia." [0108]

Bachrach, Peter and Morton S. Baratz (1962), "Two Faces of Power." *The American Political Science Review*, 56 (4), 947–952. [0108,0120]

Bagwell, Kyle and Robert W. Staiger (1999), "An Economic Theory of GATT." *American Economic Review*, 89 (1), 215–248. [0108]

Baldwin, David A. (1985), *Economic Statecraft*. Princeton University Press. [0108,0119]

Baqaee, David Rezza and Emmanuel Farhi (2019), "The Macroeconomic Impact of Microeconomic Shocks: Beyond Hulten's Theorem." *Econometrica*, 87 (4), 1155–1203. [0108,0116]

Baqaee, David Rezza, and Emmanuel Farhi (2022), *Networks, Barriers, and Trade*. [0108,0116]

Bernheim, B. Douglas and Michael D. Whinston (1990), "Multimarket Contact and Collusive Behavior." *The RAND Journal of Economics*, 1–26. [0108]

Bigio, Saki and Jennifer La'O (2020), "Distortions in Production Networks." *The Quarterly Journal of Economics*, 135 (4), 2187–2253. [0108]

Blackwill, Robert D. and Jennifer M. Harris (2016), *War by Other Means: Geoeconomics and Statecraft*. Harvard University Press. [0108]

Blanchard, Emily J., Chad P. Bown, and Robert C. Johnson (2016), "Global Supply Chains and Trade Policy." Tech. rep, National Bureau of Economic Research. [0108]

Bombardini, Matilde and Francesco Trebbi (2020), "Empirical Models of Lobbying." *Annual Review of Economics*, 12, 391–413. [0127]

Bulow, Jeremy and Kenneth Rogoff (1989), "A Constant Recontracting Model of Sovereign Debt." *Journal of political Economy*, 97 (1), 155–178. [0126]

Clayton, Christopher and Andreas Schaab (2022), "Multinational Banks and Financial Stability." *The Quarterly Journal of Economics*, 137 (3), 1681–1736. [0113]

Clayton, Christopher, Matteo Maggiori, and Jesse Schreger (2026), "Supplement to 'A Framework for Geoeconomics'." *Econometrica Supplemental Material*, 94, https://doi.org/10.3982/ECTA23206. [0109]

Cohen, Benjamin J. (1977), *Organizing the Worlds Money*. Basic Books. [0108,0120]

Cole, Harold L. and Patrick J. Kehoe (1998), "Models of Sovereign Debt: Partial versus General Reputations." *International Economic Review*, 39 (1), 55–70. [0126]

Dahl, Robert A. (1957), "The Concept of Power." *Behavioral science*, 2 (3), 201–215. [0119]

[DFPS+] Dreher, Axel, Andreas Fuchs, Bradley Parks, Austin Strange, and Michael J. Tierney (2022), *Banking on Beijing: The Aims and Impacts of China's Overseas Development Program*. [0125,0127]

Drezner, Daniel W., Henry Farrell, and Abraham L. Newman (2021), *The Uses and Abuses of Weaponized Interdependence*. Brookings Institution Press. [0108]

Eaton, Jonathan and Maxim Engers (1992), "Sanctions." *Journal of political economy*, 100, 899–928. [0108]

Eaton, Jonathan and Mark Gersovitz (1981), "Debt With Potential Repudiation: Theoretical and Empirical Analysis." *The Review of Economic Studies*, 48 (2), 289–309. [0125,0126]

Elliott, Matthew, Benjamin Golub, and Matt V. Leduc (2022), "Supply Network Formation and Fragility." *American Economic Review*, 112 (8), 2701–2747. [0108]

Farhi, Emmanuel and Iván Werning (2016), "A Theory of Macroprudential Policies in the Presence of Nominal Rigidities." *Econometrica*, 84 (5), 1645–1704. [0108,0113,0130]

Farrell, Henry and Abraham Newman (2023), *Underground Empire: How America Weaponized the World Economy*. Henry Holt and Co. [0122]

Farrell, Henry and Abraham L. Newman (2019), "Weaponized Interdependence: How Global Economic Networks Shape State Coercion." *International Security*, 44 (1), 42–79. [0108]

Fearon, James D. (1995), "Rationalist Explanations for War." *International Organization*, 49 (3), 379–414. [0108,0114,0122]

Findlay, Ronald and Kevin H. O'Rourke (2009), *Power and Plenty: Trade, War, and the World Economy in the Second Millennium, the Princeton Economic History of the Western World*. Princeton University Press. [0122]

Gabaix, Xavier (2011), "The Granular Origins of Aggregate Fluctuations." *Econometrica*, 79 (3), 733–772. [0108]

Geanakoplos, John and Heracles M. Polemarchakis (1985), "Existence, Regularity, and Constrained Suboptimality of Competitive Allocations When the Asset Market Is Incomplete." [0108]

Gilpin, Robert (1981), *War and Change in World Politics*. Cambridge University Press. [0108,0113,0122]

Greenwald, Bruce C. and Joseph E. Stiglitz (1986), "Externalities in Economies With Imperfect Information and Incomplete Markets." *The quarterly journal of economics*, 101 (2), 229–264. [0108,0109]

Grossman, Gene, Elhanan Helpman, and Stephen Redding (2021), "When Tariffs Disrupt Global Supply Chains." Tech. rep. [0108]

Grossman, Gene M. and Elhanan Helpman (1994), "Protection for Sale." *The American Economic Review*, 84 (4), 833–850. [0108,0127]
Hausmann, Ricardo, Ulrich Schetter, and Muhammed A. Yildirim (2024), "On the Design of Effective Sanctions: The Case of Bans on Exports to Russia." *Economic Policy*, 39 (117), 109–153. [0108]
Hirschman, Albert (1945), "National Power and the Structure of Foreign Trade." Univ of California. [0108, 0120]
Hirschman, Albert O. (1958), *The Strategy of Economic Development*. Yale University Press. [0108]
Holmstrom, Bengt and Paul Milgrom (1991), "Multitask Principal–Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design." *The Journal of Law, Economics, and Organization*, 7, 24–52. [0108]
Keohane, Robert O. and Joseph S. Nye (1977), *Power and Interdependence*. Little Brown. [0108]
Keohane, Robert O. (1984), *After Hegemony: Cooperation and Discord in the World Political Economy*. Princeton university press. [0108,0122]
Kindleberger, Charles Poor (1973), "The World in Depression, 1929–1939." Univ of California. [0108,0122]
Kleinman, Benny, Ernest Liu, and Stephen J. Redding (2020), "International Friends and Enemies." Tech. rep, National Bureau of Economic Research. [0108]
Krasner, D. Stephen (1976), "State Power and the Structure of International Trade." *World politics*, 28 (3), 317–347. [0108,0122]
Limão, Nuno (2005), "Trade Policy, Cross-Border Externalities and Lobbies: Do Linked Agreements Enforce More Cooperative Outcomes?" *Journal of International Economics*, 67 (1), 175–199. [0108]
Liu, Ernest (2019), "Industrial Policies in Production Networks." *Quarterly Journal of Economics*, 134 (4), 1883–1948. [0108]
Maggi, Giovanni (2016), "Issue Linkage." In *Handbook of Commercial Policy*, Vol. 1, 513–564, Elsevier. [0108]
Martin, Philippe, Thierry Mayer, and Mathias Thoenig (2008), "Make Trade not War?" *The Review of Economic Studies*, 75 (3), 865–900. [0108]
Martin, Philippe, Thierry Mayer, and Mathias Thoenig (2012), "The Geography of Conflicts and Regional Trade Agreements." *American Economic Journal: Macroeconomics*, 4 (4), 1–35. [0108]
Mendoza, Enrique G. and Vivian Z. Yue (2012), "A General Equilibrium Model of Sovereign Default and Business Cycles." *The Quarterly Journal of Economics*, 127 (2), 889–946. [0126]
Powell, Robert (2006), "War as a Commitment Problem." *International organization*, 60 (1), 169–203. [0122]
Ray, Debraj (2002), "The Time Structure of Self-Enforcing Agreements." *Econometrica*, 70 (2), 547–582. [0110]
Schelling, Thomas C. (1958), *International Economics*. Allyn and, Bacon. [0120]
Strange, Susan (1988), *States and Markets*. Pinter Publishers, London. [0108,0120]
Thoenig, Mathias (2023), "Trade Policy in the Shadow of War: Quantitative Tools for Geoeconomics." [0108]
Waltz, Kenneth (1979), *Theory of International Politics*. Addison-Wesley, Reading, MA. [0108,0113]

Co-editor Francesco Trebbi handled this manuscript.

Manuscript received 21 June, 2024; final version accepted 6 August, 2025; available online 11 August, 2025.

The replication package for this paper is available at https://doi.org/10.5281/zenodo.16738614. The Journal checked the data and codes included in the package for their ability to reproduce the results in the paper and approved online appendices.

All authors assume responsibility for all aspects of the paper.