A Theory of Economic Coercion and Fragmentation

Christopher Clayton[*] Matteo Maggiori[†] Jesse Schreger[‡]

March 2024

Abstract

Global powers, like the United States and China, exert influence on other countries by threatening the suspension or alteration of financial and trade relationships. We show that the mechanisms that generate gains from integration and specialization, such as external economies of scale, also increase these countries' power to exert economic influence because in equilibrium they make other relationships poor substitutes for those with a global hegemon. We study how smaller countries can insulate themselves from geoeconomic pressure from the great powers by pursuing anti-coercion policy. We show that while an individual country can make itself better off, uncoordinated attempts by multiple countries to limit their dependency on the hegemon lead to unwinding the global gains from integration and fragmenting the global financial and trade system. Countries resort to inefficient home alternatives, the more so hegemons are expected to want to exert their influence in disruptive ways. An integrated liberal world order emerges as an equilibrium when the hegemon's incentives are well aligned with the world economy, politically and economically. Generically, the world economy fragments along political and economic alignments. We study a leading application focusing on financial services and payment systems as both a tool of coercion by the hegemon and an industry with strong strategic complementarities at the global level.

Keywords: Geoeconomics, Geopolitics, AntiCoercion Policy, Economic Security, Economic Statecraft, Global Value Chains, Payment Systems, International Role of the Dollar, Dollar Diplomacy.
JEL Codes: F02, F05, F12, F15, F33, F36, F38, P43, P45.

[*]Yale School of Management; christopher.clayton@yale.edu.
[†]Stanford University Graduate School of Business, NBER, and CEPR; maggiori@stanford.edu.
[‡]Columbia Business School, NBER, and CEPR; jesse.schreger@columbia.edu.
We thank Doug Diamond, Maryam Farboodi, Diego Perez, Adrien Verdelhan, Christoph Trebesch for useful comments. We thank Ziwen Sun and Max Guo for excellent research assistance.

1 Introduction

The emergence of China as a world power, the increased use of sanctions and economic coercion by the United States, and large technological shifts are inducing governments around the world to re-evaluate their policies on economic security and global integration. Governments fear their economies becoming dependent on inputs, technologies, or financial services ultimately controlled by a hegemonic country, such as the US or China. They fear being coerced by these foreign powers into taking costly political or economic actions whenever their incentives are not well aligned. In this paper, we explore how governments responding to these concerns by pursuing anti-coercion policies that attempt to insulate their economies from undue foreign influence may result in destroying the gains from global trade and financial integration.

We show that traditional rationales for the gains from integration, such as economies of scale and gains from specialization, also leave countries more susceptible to economic coercion. For example, in the presence of strategic complementarities there are efficiency gains from the creation of a global financial payment system rather than each country having its own system. In equilibrium, however, this makes all other systems poor substitutes for the globally dominant one. If a hegemon, like the United States, controls the dominant system it will have a powerful tool for coercion because threats to suspend or reduce access to a targeted entity would generate more leverage over that entity. The more other countries expect the hegemon to use this instrument to exert its power, the higher the incentives they face to employ anti-coercion policy and create a more subsitutable domestic alternative. Such policies, however, can induce a global unwinding of integration. We show that the resulting fragmentation is inefficient as each country over-protects its own economy.

We build a simple two-period model of the world economy that features input-output linkages among productive sectors located in different countries. Crucially, we allow for production externalities such as external economies of scale or strategic complementarities in the usage of some inputs. A hegemon is a country that coordinates firms in its economic network to form threats across disparate economic activities to stop or alter the provision of inputs to other entities. These threats aim to induce the targeted entities to take costly actions demanded by the hegemon. The costly actions take three forms: monetary transfers to the hegemon, tariffs or quantity restrictions on trade of inputs, and political concessions. These instruments of geoeconomic power cover the most frequently used actions in practice. Clayton, Maggiori and Schreger (2023) provide a general analysis of these forces in an infinite horizon model with a repeated stage game.

The hegemon exerts two kinds of power. Micro-power over a targeted entity arises because, taking as given all other equilibrium quantities and prices, the hegemon can threaten the target with suspending or limiting the provision of some of its inputs (e.g. intermediate inputs or lending). To the extent that the loss of these inputs cannot be easily replaced by the targeted entity, the hegemon can exert power in the form of asking the entity to take costly actions on its behalf. Macro-power arises, instead, by the hegemon simultaneously contracting with multiple entities and setting their actions to manipulate the world equilibrium in the hegemon's favor. Interestingly, micro and macro power interact and build on each other, especially in the presence of production externalities. Returning to the example of an input with strong strategic complementarities, like a payment system, the hegemon could ask entities over which it has micro power to switch to the system that it controls. As more and more entities switch, so do other entities that the hegemon had no power over, and on the margin the threats of the hegemon become more powerful since its system is becoming more dominant (i.e., higher losses from switching to the alternative for the marginal user).

The hegemon makes a take-it-or-leave it offer to entities in the rest of the world to participate in its economic network. Since these are foreign entities over which the hegemon has no direct legislative control, they need to voluntarily accept the hegemon's terms, thus generating a participation constraint. Focusing first on micro-power, the hegemon can alter both the inside and outside option of each entity. If the entity rejects the contract, we assume that the hegemon can inflict punishment by triggering a suspension of provision of all inputs it controls to that entity. This worsens the entity's outside option. On the inside option, the hegemon demands costly actions and enforces the relationship by threatening to suspend the provision of inputs in the future if the contract is violated (incentive compatibility). Costly actions decrease the inside value to the targeted entity, but threats against the targeted entity increase its inside value by providing higher powered incentives that alleviate the target's limited commitment issues. Turning to macro-power, the hegemon can alter both the inside and outside option of each entity. Since each entity takes the world equilibrium as given, the hegemon maximizes its power by engineering allocations (demanding costly actions) that make rejecting the hegemon's contract expensive for each individual entity.

We study the optimal anti-coercion policy of countries in the rest of the world to insulate themselves against these tools of economic coercion by a hegemon. These policies are currently employed or being newly introduced by a number of governments. For example, the European Commission set forth a European Economic Security Strategy to counter the "risks of weaponisation of economic dependencies or economic coercion."[1] We allow the governments in the rest of the world to incentivize their domestic firms to reject the hegemon's contract. Formally, this is a subsidy to the outside option of an entity approached by the hegemon. This policy tool encourages private entities to reject the hegemon's contract. It is an anti-coercion tool in the sense that, all else equal, it reduces the feasible set of costly actions that the hegemon can demand by using its threats. It helps us capture one of the most commonly used policy tools in practice: industrial policy in the form of subsidies to particular sectors. While the subsidy could in principle be so strong as to lead an entity to reject the hegemon's contract on the equilibrium path, it is interesting to consider its equilibrium effects when the subsidy is off-path. The aim of the policy in this latter case is to counteract the hegemon's power and decrease those demands that the foreign government perceives as detrimental for its economy.

[1] See the June 2023 announcement and January 2024 proposals. Relatedly, see the G7 governments communique on Economic Resilience and Economic Security.

We assume that each foreign government takes into account the equilibrium impact of its anti-coercion policy but takes as given the anti-coercion policies of other countries. We also assume that the governments first decide their anti-coercion policies and then the Hegemon offers its contract to all entities. The amount of anti-coercion policy a country wants to implement depends on how closely aligned the objectives of this country are with those of the hegemon. As a first pass, consider a world in which macro-amplification (via general equilibrium prices and quantities) is shut-off, then the source of misalignment is sharp: the hegemon only demands monetary transfers. Each country implements ex-ante anti-coercion policy purely to reduce the transfers that the hegemon can extract ex-post.

In the presence of macro amplification via prices and production externalities, the hegemon implements global policies with entities in multiple countries to manipulate externalities and prices. To the extent that a country's government finds these policies undesirable, anti-coercion policy can be used to reduce the hegemon's power. Even when the policies are desirable, the individual choices of countries might lead to an excess of anti-coercion policy from a global perspective. Since each country takes as given other countries' anti-coercion policies, it has an incentive to free ride by stepping up its own policy to extract a better deal from the hegemon while letting other countries bear the costs of implementing policy changes. As a result, in equilibrium, anti-coercion policies can be too strong and cause an inefficient loss to the extent that the policies implemented by the hegemon were good for the world outcomes. Coordination of anti-coercion policies among multiple countries can improve outcomes. This is of practical policy relevance for coordinating economic security policy within the European Union as well as for understanding the potential role for international organizations such as the International Monetary Fund (IMF).

We show how anti-coercion policy can lead to fragmentation in the presence of production externalities. To make it concrete, we focus on an application to payment systems, but the economics is more general. We think of payment systems as an input into production (being able to process transactions for inputs as well as sales). The key characteristics is that this input exhibits strong complementarities within and across sectors. On the margin, each firm finds it more productive to use a payment system the more that other firms in its sectors and/or in other sectors use the same system.

We consider a world in which each country could use a domestic payment system rather than the global one provided by the hegemon. The domestic system also has strategic complementarities from multiple domestic firms adopting it, but cannot be used by foreign firms. This set-up captures the notion of a globally efficient payment system and multiple home versions that are inefficient substitutes. Purely in terms of production efficiency, the optimal outcome is for countries to primarily use the globally efficient technology. We show that, in the absence of anti-coercion policy, the hegemon offers a contract that demands each country shift away from their domestic system and use the hegemon's payment system. The hegemon is correcting production externalities and maximizing efficiency gains of the payment system. This correction also maximizes the hegemon's power by making it more costly for any given entity to reject the hegemons' demands. The hegemon uses its power to demand transfers or political concessions. The problem here is that those forces that traditionally lead to efficient specialization in traditional trade leave countries exposed to coercion by a hegemon.

We show that countries implement anti-coercion policy to reduce the costly actions that the hegemon demands of them. Ideally, anti-coercion policy would reduce transfers and political coercion while leaving intact the gains from technological specialization. Unfortunately, uncoordinated anti-coercion policy leads to an equilibrium that both lowers transfers and other concessions to the hegemon, but also causes economic fragmentation. Each country wants to self-insure against the hegemon's demands and does not internalize the impact that its anti-coercion policy has on other countries. In this case, the external economies of scale that would have led to more and more integration work in reverse. As other countries fragment the equilibrium, each country on the margin has incentives to fragment it further.

The model also sheds light on configurations of the world economy that are more likely to generate fragmentation. A misalignment of political and economic incentives is clearly crucial. We think of the wave of globalization that occurred between the end of the cold war and the global financial crisis as a period with a world hegemon, the United States, that was closely aligned with its major trading partners. The hegemon sets world rules (i.e. wedges) that primarily correct production externalities. Other countries agree these actions are beneficial and perceive little need for anti-coercion policies, and there are few demands for onerous political concessions. After the global financial crisis, the emergence of China as a hegemon and the political shifts in the US with the Trump administration have increased misalignment in objectives of current or potential hegemons with their trading partners. Third party countries, such as emerging markets but also the European Union, are reacting by implementing anti-coercion policies and the world equilibrium is starting to feature some fragmentation as a result.

These fragmentation tensions are exacerbated and manifest themselves in technologies that feature strong external economies of scale. We focused on payment systems, but information technologies both in software and hardware feature similar properties, and it is an open question whether artificial intelligence will fall into this category. While we focused on technological externalities in production, similar economics can also arise from price based propagation and increasing (external) returns to scale in traditional manufacturing. For example, while it could be efficient to locate most basic manufacturing in China due to low costs of labor and economies of scale, such allocation of production increases China's ability to perform economic coercion. Each country, with little or no manufacturing left domestically, would find that deviations on the margin from China's demands are too unprofitable. Countries react by implementing anti-coercion policy and as a result re-balance to producing using an inefficient home manufacturing base.

Literature Review. Our paper is related to the literature on geoeconomics in both economics and political science. The notion of economic statecraft and coercion is put forward by Hirschman (1945) in a landmark contribution and discussed in detail by Baldwin (1985). We relate to his view of a hegemon proposing a liberal laissez faire order as a particular incarnation of economic statecraft that is optimal when some countries are closely economically aligned, rather than the absence of economic statecraft. Cohen (2015) and Cohen (2018) focus specifically on the interplay between the monetary system and geopolitics. Blackwill and Harris (2016), Farrell and Newman (2019), and Drezner et al. (2021) explore economic coercion and "weaponized interdependence" whereby governments can use the increasingly complex global economic network to influence and coerce other governments.

We also relate to the macroeconomics and trade literature that analyzed optimal industrial, trade, and capital control policies. From industrial policy Ottonello, Perez and Witheridge (2023), Liu (2019), Bartelme, Costinot, Donaldson and Rodriguez-Clare (2019), Juhász, Lane, Oehlsen and Pérez (2022), and Farhi and Tirole (2024).[2] From network resilience Acemoglu, Carvalho, Ozdaglar and Tahbaz-Salehi (2012) Baqaee and Farhi (2020, 2022), Liu (2019), Elliott et al. (2022), Acemoglu and Tahbaz-Salehi (2023), Bai, Fernández-Villaverde, Li and Zanetti (2024). From trade and commercial policy Bagwell and Staiger (1999, 2001, 2004); Grossman and Helpman (1995); Ossa (2014), as well as the recent literature on optimal policy along value chains as in Grossman et al. (2023). From capital controls and terms of trade manipulation Farhi and Werning (2016), Costinot et al. (2014), Sturm (2022). From multilateral regulation of banking flows Caballero and Simsek (2020) and Clayton and Schaab (2022).

2 Model Setup

There are two periods, $t = 0, 1$. 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 produces a differentiated good indexed by $i \in \mathcal{I}$ out of local factors and intermediate inputs produced by other sectors. Each sector is populated by a continuum of identical firms. The good produced by sector i is sold on world markets at price p_i. Local factor f has price p_f^ℓ. Local factors are internationally immobile. We take the good produced by sector 1 as the numeraire, so that $p_1 = 1$. We define the vector of all intermediate goods' prices as p, the vector of all local factor

[2] Juhász, Lane and Rodrik (2023) surveys the recent literature on industrial policy.

prices as p^ℓ, and the vector of all prices as $P = (p, p^\ell)$.

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 which we use to capture externalities a la Greenwald and Stiglitz (1986). Consumers take z as given. We assume U_n is increasing, concave, and continuously differentiable. The representative consumer in each country owns all domestic firms and the endowments of local factors. The representative consumer of country n faces a budget constraint given by:

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

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

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 set of local factors of country n, $\mathcal{F}_n$. 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 by firm i, x_{ij} is use of intermediate input j, $\ell_i = \{\ell_{if}\}_{f\in\mathcal{F}_n}$ is the vector of factors used by firm i, and ℓ_{if} is use of local factor f. Firms take the aggregate vector z as given. For expositional simplicity, we assume that for production functions that in principle 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.[3] We further assume that f_i is increasing, strictly concave, satisfies the Inada conditions in (x_i, ℓ_i), and is continuously differentiable in (x_i, ℓ_i, z). The sector-specific production function f_i allows us to capture technology, but also transport costs and relationship specific knowledge. We define the firm's profit function, if it were restricted to produce using only a subset $\mathcal{B}_i \subset \mathcal{J}_i$ of goods, as

$$\Pi_i(x_i, \ell_i, \mathcal{B}_i) = p_i f_i(x_i, \ell_i) - \sum_{j\in\mathcal{B}_i} p_j x_{ij} - \sum_{f\in\mathcal{F}_n} p^\ell_f \ell_{if}$$

which leaves implicit that $x_{ij} = 0$ for $j \notin \mathcal{B}_i$.

In the second date, $t = 1$, both input and factor purchases are perfectly enforced. If firm i retains access to goods $\mathcal{B}_i \subset \mathcal{J}_i$, then its value function is

$$\nu_i(\mathcal{B}_i) = \max_{x_i, \ell_i} \Pi_i(x_i, \ell_i, \mathcal{B}_i).$$

[3] 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.

At date 0, input purchases are imperfectly enforced while factor purchases remain perfectly enforced. In particular, at date 0, firm i places an order x_{ij} to all suppliers in sector $j \in \mathcal{J}_i$, who then decide to accept or reject that order. If the order is accepted, firm i can either choose to Pay suppliers in j the required payment $p_j x_{ij}$, or attempt to Steal from them. Under Steal, suppliers in sector j are only able to recover an exogenous fraction $1 - \theta_{ij}$ with $\theta_{ij} \in [0, 1]$ of the sale order value $p_j x_{ij}$. As in Clayton et al. (2023), we assume a set of individual and joint trigger strategies that describe which subset of suppliers, $K_{ij} \subset \mathcal{J}_i$, would sever their relationship with firm i in the second period (i.e., reject any order placed by i) if firm i Steals from suppliers in sector j at date 0. Clayton et al. (2023) shows that such trigger strategies can be represented as restricting the available stealing actions of the firm to a partition $\mathcal{S}_i$ of $\mathcal{J}_i$, where each element $S \in \mathcal{S}_i$ reflects the decision to Steal from the entire set of suppliers $j \in S$ when stealing from any one of them due to the presence of joint triggers. The incentive compatibility constraints at date 0 are therefore

$$\sum_{j \in S} \theta_{ij} p_j x_{ij} \leq \beta \Big[\nu_i(\mathcal{B}_i) - \nu_i(\mathcal{B}_i \backslash S_i) \Big] \quad \forall S \in \Sigma(\mathcal{S}_i(\mathcal{B}_i)) \tag{1}$$

where $\mathcal{S}_i(\mathcal{B}_i) = \bigcup_{S \in \mathcal{S}_i | S \cap \mathcal{B}_i \neq \emptyset} S$, and where $\Sigma(\mathcal{S}_i) = \{\bigcup_{X \in \mathcal{X}} X \mid \emptyset \neq \mathcal{X} \subset \mathcal{S}_i\}$ is the set of combinations of stealing decisions.

The date 0 optimization problem of firm i is to choose (x_i, ℓ_i) to maximize its objective,

$$V_i(\mathcal{S}_i | \mathcal{B}_i) = \max_{x_i, \ell_i} \Pi_i(x_i, \ell_i, \mathcal{B}_i) + \beta \nu_i(\mathcal{B}_i) \quad s.t. \quad \sum_{j \in S} \theta_{ij} p_j x_{ij} \leq \beta \Big[\nu_i(\mathcal{B}_i) - \nu_i(\mathcal{B}_i \backslash S_i) \Big] \quad \forall S \in \Sigma(\mathcal{S}_i(\mathcal{B}_i))$$

where $V_i(\mathcal{S}_i | \mathcal{B}_i)$ is the value function of a firm with action set $\mathcal{S}_i$ and remaining links $\mathcal{B}_i$.

Market Clearing, Externalities, and Equilibrium Denote $D_j = \{i \in \mathcal{I} \mid j \in \mathcal{J}_i\}$ the set of sectors that source from sector j, i.e. the sectors immediately downstream from j. Market clearing for good j is given by

$$\sum_{n=1}^{N} C_{nj} + \sum_{i \in D_j} x_{ij} = y_j.$$

Market clearing for factor f in country n is

$$\sum_{i \in \mathcal{I}_n} \ell_{if} = \bar{\ell}_f.$$

We assume that the vector of aggregates takes the form $z = \{z_{ij}\}$. In equilibrium $z^*_{ij} = x^*_{ij}$, where we use the $*$ notation to stress it is an equilibrium value. That is externalities are based on the quantities of inputs in bilateral sectors i and j relationships. This general formulation can be specialized to cover pure size externalities, in which it is the total output of a sector that matters, or export-import externalities, in which it is the fraction of output sold cross border that matters, but also thick market externalities, in which it is the extent to which an input is widely used by many sectors that matters.[4]

An equilibrium of the model is, at each date, 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.

2.2 Hegemon Problem

A single country, denoted m, is a hegemon in the model. A hegemon is able to coordinate trigger strategies among multiple supplying sectors of the same firm. The hegemon can propose take-it-or-leave-it contracts specifying joint threats, and also require firms to take costly actions. The hegemon can threaten to cut off supply to firms that reject its contract.

Joint Threats and Pressure Points. Following Clayton et al. (2023), we define coordination of trigger strategies as a *joint threat*, and a *pressure point* as a joint threat that strictly increases profits of the targeted entity. Joint threats are potentially valuable because coordination of trigger strategies across multiple suppliers increases the punishment of a firm that deviates, worsening its off-path value. This relaxes incentive compatibility and expands production possibilities.

Definition 1 *A* ***joint threat*** $\mathcal{S}_i'$ *is a partition of* $\mathcal{J}_i$ *such that* $\mathcal{S}_i'$ *is coarser than* $\mathcal{S}_i$*. A* ***pressure point*** *of firm* i *is a joint threat* $\mathcal{S}_i'$ *that strictly increases firm* i*'s profits, that is* $V_i(\mathcal{S}_i'|\mathcal{J}_i) > V_i(\mathcal{S}_i|\mathcal{J}_i)$*.*

Hegemon Contract. Recalling that D_i is the set of sectors downstream from sector i, let $\mathcal{D}_m = \bigcup_{i\in\mathcal{I}_m} D_i \backslash \mathcal{I}_m$ denote the set of foreign sectors that source at least one input from the sectors in the hegemon's country. We assume that the hegemon can contract with all its domestic sectors and their foreign downstream sectors, and denote $\overline{\mathcal{C}}_m = \mathcal{I}_m \cup \mathcal{D}_m$ to be this set. Let $\mathcal{J}_{im} = \mathcal{I}_m \cap \mathcal{J}_i$ denote the set of inputs that sector i sources from (sectors in) country m.

Hegemon m can choose any subset of firms $\mathcal{C}_m \subset \overline{\mathcal{C}}_m$ to offer contracts to.[5] Hegemon m proposes a take-it-or-leave-it offer to each firm $i \in \mathcal{C}_m$. The contract offered to firm i has four terms: (i) a joint threat $\mathcal{S}_i'$; (ii) nonnegative transfers $\mathcal{T}_i = \{T_{ij}\}_{j\in\mathcal{J}_{im}}$ from firm i to the hegemon's representative consumer (with $T_{ij} > 0$ representing a payment to the hegemon associated with stealing decision j of firm i); (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; (iv) a *punishment* $\mathcal{B}_i'$, that is a restriction to using inputs $j \in \mathcal{B}_i'$ if rejects the hegemon's contract. Naturally, remitted revenues x_{ij}^* and ℓ_{if}^* are determined by the contract terms, as made clear below.

[4]It is without loss of generality to assume that firm-to-firm sales, y_{ij}, do not cause externalities, since $x_{ji} = y_{ij}$ already captures such sales on the buyer side. It is straightforward to allow the z to also capture externalities coming from factor usage or consumption. In addition to externalities coming from the z the model features pecuniary externalities arising from prices in the constraints.

[5]This voluntary contracting of the hegemon is relevant when considering anti-coercion policies, since a strong enough anti-coercion policy can induce the hegemon to prefer simply not to contract with that firm.

We denote $\Gamma_i = \{\mathcal{S}_i', \mathcal{T}_i, \tau_i\}$ the contract terms offered to firm $i \in \mathcal{C}_m$ if accepted, denote $\Psi_i = (\Gamma_i, \mathcal{B}_i')$ the contract and punishment, and denote $\Psi = \{\Gamma_i, \mathcal{B}_i'\}_{i \in \mathcal{C}_m}$ the collection of all contract terms and punishments.

Taxes adjust the effective price the firm faces in its relationship to $p_j + \tau_{ij}$ for inputs and $p_f^\ell + \tau_{if}^\ell$ for factors. Factor rebates occur regardless of Pay/Steal decisions since factors cannot be stolen. Transfers and input rebates occur contemporaneously with the Pay/Steal decision. 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, it makes no payments. 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 $(1 - \theta_{ij}) \tau_{ij}(x_{ij} - x_{ij}^*)$.

Feasible Punishments and Joint Threats. We restrict the punishments and joint threats that the hegemon can make to involve sectors that are at most one step removed from the hegemon, that is involving either the hegemon's sectors or their immediately downstream sectors. In other words, both punishments and joint threats can be undertaken only via firms the hegemon contracts with.

Definition 2 *A joint threat $\mathcal{S}_i'$ and punishment $\mathcal{B}_i'$ is* ***feasible*** *under direct transmission if*

1. *The joint threat can be achieved by consolidating elements of $\mathcal{S}_i^D = \{S \in \mathcal{S}_i \mid S \cap \mathcal{C}_m \neq \emptyset\}$.*

2. *The punishment satisfies $\mathcal{J}_i \backslash \mathcal{C}_m \subset \mathcal{B}_i'$.*

We define $\overline{\mathcal{S}}_i' = \{\bigcup_{S \in \mathcal{S}_i^D} S\} \cup (\mathcal{S}_i \backslash \mathcal{S}_i^D)$ to be the maximal joint threat that can be achieved under direct transmission. We define $\underline{\mathcal{B}}_i' = \mathcal{J}_i \backslash \mathcal{C}_m$ to be the maximal punishment that can be achieved under direct transmission.

Firm Participation Constraint. Firm $i \in \mathcal{C}_m$ chooses whether or not to accept the take-it-or-leave-it offer made by the hegemon. If firm i rejects the hegemon's contract, it achieves value $V_i(\mathcal{S}_i | \mathcal{B}_i')$, given the specified punishment. Firm i, being small, does not internalize the effect of its decision to accept or reject the contract on the prevailing aggregate vector z and prices. If instead firm i accepts the offer, it chooses allocations to maximize profits given the contract terms. Given a contract Γ_i, the value to firm i of accepting the contract is given by[6]

$$V_i(\Gamma_i | \mathcal{J}_i) = \max_{x_i, \ell_i} \Pi_i(x_i, \ell_i, \mathcal{J}_i) - \sum_{j \in \mathcal{J}_i} [\tau_{ij}(x_{ij} - x_{ij}^*) + T_{ij}] - \sum_{f \in \mathcal{F}_m} \tau_{ij}^\ell(\ell_{if} - \ell_{if}^*) + \beta \nu_i(\mathcal{J}_i) \tag{2}$$

$$s.t. \sum_{j \in S} \left[\theta_{ij}[p_j x_{ij} + \tau_{ij}(x_{ij} - x_{ij}^*)] + T_{ij} \right] \leq \beta \left[\nu_i(\mathcal{J}_i) - \nu_i(\mathcal{J}_i \backslash S) \right] \quad \forall S \in \Sigma(\mathcal{S}_i')$$

[6]We extend the previous definition of firm i value function $V_i(\mathcal{S}_i)$ to incorporate the full terms of the hegemon contract $V_i(\Gamma_i)$ where $\Gamma_i = \{\mathcal{S}_i', \mathcal{T}_i, \tau_i\}$. We abuse notation and write $V_i(\mathcal{S}_i)$ as short hand for $V_i(\Gamma_i)$ when $\Gamma_i = \{\mathcal{S}_i, 0, 0\}$.

Recall that transfers and taxes are associated with the firm decision to Pay, and so enter the incentive constraint. Transfers T_{ij} tighten the incentive constraint, all else equal. At the level of the individual firm, taxes have two effects: (i) they affect the incentive constraint because they alter the perceived price of the input good; (ii) they affect the incentive constraint via loss of profits. In equilibrium, this latter effect washes out since taxes are rebated lump sum (i.e., $x_{ij} = x^*_{ij}$). The optimal allocation $x^*_{ij}(\Gamma_i)$, and hence remitted revenues, are defined implicitly as a function of contract terms by the above optimization problem.

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,

$$V_i(\Gamma_i|\mathcal{J}_i) \geq V_i(\mathcal{S}_i|\mathcal{B}'_i), \tag{3}$$

where $\Gamma_i = \{\mathcal{S}'_i, \mathcal{T}_i, \tau_i\}$ so that the participation constraint is comparing the hegemon's contract with joint threats, transfers, and wedges to the outside option with corresponding punishment. Slackness in this constraint when the hegemon demands no costly actions can achieved either through a joint threat that increases the left hand side, or a punishment that decreases the right hand side. We abuse notation and write $V_i(\Gamma_i)$ in place of $V_i(\Gamma_i|\mathcal{J}_i)$.

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. Since transfers from domestic sectors to the hegemon's consumer net out from the consumer's wealth, we only keep track of operating profits of the hegemon 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. The hegemon objective function is then:

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

The hegemon chooses its contracting set $\mathcal{C}_m \subset \overline{\mathcal{C}}_m$ and contract terms Ψ to maximize its utility, subject to firms' participation constraints (equation 3).[7] The following result extends Lemma 2 in Clayton et al. (2023).

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

[7] In this setup, we have not allowed the hegemon to inflict punishments $\mathcal{B}'_i$ on firms it chooses not to contract with. Such punishments could in principle be desirable in the presence of anti-coercion policies both as a way to discourage adopting anti-coercion policies, and also as a way to downscale activities that the hegemon views as having negative externalities. For simplicity we eliminate such tools. Another extension in the same spirit would be allow the hegemon to ask its firms to impose bilateral export tariffs on sales to these foreign firms, with infinite tariffs imitating a punishment severing the relationship.

Given Lemma 1, the hegemon's decision problem reduces to choosing costly actions to maximize its objective, subject to firm's participation constraints. We denote these policies Ψ^* and the hegemon's corresponding value $\mathcal{U}_m^*$.

2.3 Leading Simplified Environments

To build intuition for our model it is at times useful to simplify the modeling environment by shutting off several channels. This will also be helpful in separately highlighting the driving forces behind the results. We consider three classes of simplifications going forward. First, a "constant prices" environment in which we switch off pecuniary externalities and terms-of-trade manipulation incentives. Second, a "no z-externalities" environment in which we switch off the dependency of utility functions and production functions on the aggregates vector z. Third, a "perfect enforcement" environment in which we assume that inputs cannot be diverted. We briefly define each environment below so that it can easily be referred to when useful in the rest of the paper. Our main results do not use these simplified environments.

Definition 3 *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 $f_i(\ell_i) = \sum_{f \in \mathcal{F}_n} \frac{1}{\tilde{p}_i} \tilde{p}_f^\ell \ell_{if}$. We assume consumers are marginal in every good and factor-only firms are marginal in every local factor so that $p_i = \tilde{p}_i$ and $p_f^\ell = \tilde{p}_f^\ell$.*[8]

Definition 4 *The **no z-externalities** environment assumes that $u_n(z)$ and $f_i(x_i, \ell_i, z)$ are constant in z.*

The two environment above are useful to clarify which results depend on general equilibrium amplifications.

Definition 5 *The **perfect enforcement** environment assumes that inputs cannot be stolen: $\forall\ i, j$ $\theta_{ij} = 0$.*

This environment is useful in removing the incentive constraints. In this environment the hegemon can only use threats that condition on its contract being rejected. The environment also effectively makes the model static (two separate period with essentially no inter-temporal connection).

3 Optimal Anti-Coercion Policy

Our main analysis studies the pursuit of anti-coercion policies by the government of a single foreign country, denoted n_0. In this section, we begin by formally defining anti-coercion policies in our

[8]For example, we can guarantee this by assuming consumers and the factor-only firms can short goods and factors.

setting. The model then follows a Stackelberg game: first, the government of country n_0 chooses anti-coercion policies; then, the hegemon offers contracts, taking anti-coercion policies as given.

3.1 Defining Anti-Coercion Policies

We define anti-coercion policies to be a promised side payment $G_i \geq 0$ from the government of country n_0 to firm $i \in \mathcal{I}_{n_0}$, which is made contingent on firm i *rejecting* the hegemon's contract. This alters the participation constraint of firm i to be

$$V_i(\Gamma_i) \geq V_i(\mathcal{S}_i|\mathcal{B}'_i) + G_i. \tag{5}$$

This policy tool encourages firm i to reject the hegemon's contract. It is an anti-coercion tool in the sense that, all else equal, it reduces the feasible set of costly actions that the hegemon can demand of firm i.

Hegemon Incentive Constraints. It is helpful to think of the hegemon as sequentially choosing its contracting set, $\mathcal{C}_m$, and then choosing the optimal contract Ψ to offer given that contracting set. We define $\mathcal{U}_m(\mathcal{C}_m, G)$ to be the hegemon's (indirect) utility as a function of its contracting set and of anti-coercion policies, $G = \{G_i\}$. In the presence of anti-coercion, the hegemon may not find it optimal to offer a contract to every firm in $\overline{\mathcal{C}}_m$. We can define the hegemon's contracting set as a function of anti-coercion policies,

$$\mathcal{C}_m(G) = \arg\max_{\mathcal{C}_m \subset \overline{\mathcal{C}}_m} \mathcal{U}_m(\mathcal{C}_m, G).$$

Observe that if $G_i = 0$, then $i \in \mathcal{C}_m(G)$, since at $G_i = 0$ the hegemon could always offer firm i a trivial contract with no punishment and so mimic the outcome of that firm rejecting the contract. If country n_0 chooses anti-coercion policies such that $i \notin \mathcal{C}_m(G)$, we think of this as corresponding to a ban on firm i contracting with the hegemon.

Hegemon optimization yields an incentive constraint in the sense that the hegemon has to voluntarily contract with the subset $\mathcal{C}_m$. We can represent this voluntary contracting requirement equivalently by allowing country n_0 to choose the hegemon's contracting set $\mathcal{C}_m \subset \overline{\mathcal{C}}_m$, subject to that contracting set being optimal for the hegemon. That is, $\mathcal{C}_m$ has to satisfy the hegemon's incentive constraint, given by

$$\mathcal{U}_m(\mathcal{C}_m, G) \geq \mathcal{U}_m(\mathcal{C}'_m, G), \quad \forall \mathcal{C}'_m \subset \overline{\mathcal{C}}_m \tag{6}$$

Lastly, it should be noted that extending Lemma 1 to this environment is immediate.

It is useful to note that $\mathcal{U}_m(\mathcal{C}_m, G)$ is a weakly decreasing function of G_i.[9]

[9]This follows since for the hegemon, any allocation implementable under G is also implementable under $G' \leq G$.

Optimization Problem of Country n_0. We now define the optimization problem of country n_0. Country n_0 chooses anti-coercion policies $G = \{G_i\}_{i\in\mathcal{I}_{n_0}}$ in order to maximize its representative consumer's utility,

$$\mathcal{U}_{n_0}(G) = W_{n_0}(p, w_{n_0}) + u_{n_0}(z), \quad w_{n_0} = \sum_{i\in\mathcal{I}_{n_0}\cap\mathcal{C}_m(G)} V_i(\Gamma_i) + \sum_{i\in\mathcal{I}_{n_0}\setminus\mathcal{C}_m(G)} V_i(\mathcal{S}_i) + \sum_{f\in\mathcal{F}_m} p_f^\ell \bar{\ell}_f. \quad (7)$$

The objective function implicitly embeds the hegemon's optimal contract, and how equilibrium objects adapt to changes in anti-coercion policies as a result in changes in the hegemon's policies and firm behavior. We leave implicit the dependency of the hegemon's contract and equilibrium objects on anti-coercion policies to avoid cumbersome notation.

As described above, we can equivalently represent the problem of country n_0 as choosing both the contracting set $\mathcal{C}_m$ and anti-coercion policies G to maximize country n_0 utility, subject to incentive compatibility of the contracting set for the hegemon (equation 6). We adopt this representation when solving the problem.

3.2 Optimality of Binding Participation Constraints

We begin with an intermediate result: for any firm $i \in \mathcal{I}_{n_0}$ that is in the hegemon's contracting set, that is $i \in \mathcal{C}_m$, it is weakly optimal for country n_0 to employ an anti-coercion policy such that i's participation constraint with the hegemon just binds. We formalize this statement in the following Lemma.

Lemma 2 *If $i \in \mathcal{C}_m$, then it is weakly optimal for country n_0 to set anti-coercion policy so that i's participation constraint with the hegemon just binds, that is*

$$V_i(\Gamma_i) = V_i(\mathcal{S}_i|\underline{\mathcal{B}}_i') + G_i.$$

Lemma 2 tells us that optimal anti-coercion policies result in all firms in country n_0 that contract with the hegemon being held exactly to their participation constraints, that is they are indifferent between accepting and rejecting the hegemon's contract. It follows as an implementability result. In particular, if hypothetically country n_0 found it optimal to set G_i in a way that i's participation constraint did not bind, then n_0 could always increase G_i to the point where the constraint bound. The hegemon's contract would still be implementable and hence optimal, and moreover the hegemon's incentive constraint would be weakly relaxed because the value of deviating to other contracting sets weakly falls as a result of the greater anti-coercion policy. Thus the hegemon's contract and contracting set do not change, and the same outcome is achieved, yielding the result.

Lemma 2 is valuable because it equivalently tells us that the surplus that a firm in country n_0 obtains relative to the outside option (accounting for punishments) is exactly equal to the level of anti-coercion employed by its government, G_i. Because the outside option itself depends implicitly on the vector of anti-coercion policies G through the determination of equilibrium prices and aggregates, this allows us to cleanly identify two distinct motives for anti-coercion policies. The first motive is to directly increase profits of firm i by forcing the hegemon to offer better terms, reflected in the surplus G_i in its profits. The second motive is to counteract the hegemon's manipualation of equilibrium objects, appearing to the extent that changes in hegemon policy as a result of anti-coercion affect equilibrium prices and aggregates and, hence, the baseline outside option $V_i(\mathcal{S}_i|\underline{\mathcal{B}}_i')$.

We can use Lemma 2 to rewrite the wealth level of country n_0's representative consumer as

$$w_{n_0} = \sum_{i \in \mathcal{I}_{n_0} \cap \mathcal{C}_m} G_i + \sum_{i \in \mathcal{I}_{n_0} \cap \mathcal{C}_m} V_i(\mathcal{S}_i|\underline{\mathcal{B}}_i') + \sum_{i \in \mathcal{I}_{n_0} \setminus \mathcal{C}_m} V_i(\mathcal{S}_i) + \sum_{f \in \mathcal{F}_{n_0}} p_f^{\ell} \bar{\ell}_f.$$

Parallel to how transfers from foreign entities increased the wealth of the hegemon's representative consumer, anti-coercion policies first serve the role of shifting wealth back towards country n_0's own firms. Such implied wealth shifts happen both by directly reducing any transfers but also by reducing costly actions demanded, which from Lemma 2 are summarized by the level of anti-coercion. Thus, the direct profit effects of changes in contract terms as a result of anti-coercion are captured in the first term, the sum of anti-coercion policies. From the direct effect perspective, a marginal increase in anti-coercion has the same profit benefit at any firm. In addition, however, country n_0 cares indirectly about the effects of anti-coercion policies through how the world equilibrium changes in response to changes in the costly actions demanded by the hegemon, that is through the effects of the changes in equilibrium prices and aggregates on the outside options of firms in country n_0 and the utility of consumer n_0.

3.3 A First Pass: Optimal Anti-Coercion

We begin with a first-pass analysis of optimal anti-coercion policies. In our first pass, we shut off endogenous prices and z-externalities by assuming our constant prices environment (Definition 3) and our no z-externalities environment (Definition 4). We obtain the following result.

Proposition 1 *Assume constant prices (Definition 3) and no z-externalities (Definition 4). Then, optimal anti-coercion policies of country n_0 set $\mathcal{C}_m = \overline{\mathcal{C}}_m$ and*

$$G_i = V_i(\overline{\mathcal{S}}_i') - V_i(\mathcal{S}_i|\underline{\mathcal{B}}_i').$$

The hegemon responds by offering $\Gamma_i = \{\overline{\mathcal{S}}_i', 0, 0\}$ and $\mathcal{B}_i' = \underline{\mathcal{B}}_i'$ to every $i \in \mathcal{C}_m \cap \mathcal{I}_{n_0}$.

Proposition 1 shows that, when prices are constant and there are no z-externalities, optimal anti-coercion is set just large enough to force the hegemon to demand no costly actions as part of its contract. Thus, country n_0's firms achieve full surplus from engaging with the hegemon. Country n_0 uses anti-coercion not only to prevent the hegemon extracting costly actions by promising to match the expected surplus the hegemon can generate with joint threats, $V_i(\overline{\mathcal{S}}_i')-V_i(\mathcal{S}_i)$, but also by offering compensation to offset the threatened punishment for contract rejection, $V_i(\mathcal{S}_i)-V_i(\mathcal{S}_i|\underline{\mathcal{B}}_i')$. At this point, the hegemon has no ability to demand costly actions without having its contract rejected. The final step is then to verify that the hegemon is still willing to contract with the firms, rather than simply not offer a contract. Intuitively because prices are constant and there are no z-externalities, there is no cost to the hegemon, direct or indirect, of offering the contract. The hegemon is therefore willing to offer the contract for even vanishingly small or zero surplus. This allows country n_0 to implement anti-coercion policies that hold the hegemon to zero surplus.

The outcome of Proposition 1 coincides with a solution of a global planner that aims to maximize global welfare in the environment of constant prices and no z-externalities. The global planner's optimum is to maximize global wealth, which is achieved by supplying maximal joint threats with no required transfers, since transfers are at best zero sum.[10] Propsoition 1 provides a limiting case where the combination of anti-coercion policies and hegemonic power leads to a globally efficient outcome.

3.4 General Analysis: Optimal Anti-Coercion

We now turn to characterizing optimal anti-coercion policies in the general set up. We focus on providing necessary conditions that characterize optimal anti-coercion policies on firms in the hegemon's contracting set, $i \in \mathcal{C}_m$.

Employing Lemma 2, the objective function of country n_0 is given by

$$\mathcal{U}_{n_0}(\mathcal{C}_m, G) = W_{n_0}\left(p, \overline{G} + \sum_{i\in\mathcal{I}_{n_0}\cap\mathcal{C}_m} V_i(\mathcal{S}_i|\underline{\mathcal{B}}_i') + \sum_{i\in\mathcal{I}_{n_0}\setminus\mathcal{C}_m} V_i(\mathcal{S}_i) + \sum_{f\in\mathcal{F}_{n_0}} p_f^\ell \overline{\ell}_f\right) + u_{n_0}(z), \quad (8)$$

where $\overline{G} = \sum_{i\in\mathcal{C}_m} G_i$ is total anti-coercion summed across firms in country n_0 that are in the hegemon's contracting set (i.e., the implied direct increase in firm profits from anti-coercion). Anti-coercion policies G and the contracting set $\mathcal{C}_m$ must satisfy the hegemon's incentive constraint (equation 6). We obtain the following result.

Proposition 2 *For a firm $i \in \mathcal{C}_m$ located in country n_0, optimal anti-coercion satisfies*

$$0 \geq \frac{\partial \mathcal{U}_{n_0}}{\partial w_{n_0}} + \frac{\partial \mathcal{U}_{n_0}}{\partial P}\frac{dP}{dG_i} + \frac{\partial \mathcal{U}_{n_0}}{\partial z}\frac{dz}{dG_i} - \zeta_{n_0}\left(\eta_i - \eta_i^{Outside}\right) \quad (9)$$

where ζ_{n_0} is country n_0's Lagrange multiplier on the hegemon's incentive constraint, η_i is the hegemon's Lagrange multiplier on firm i's participation constraint, and $\eta_i^{Outside}$ is the hegemon's La-

[10] Even if transfers are purely zero sum, the outcome of Proposition 1 coincides to an efficient allocation associated with a particular wealth distribution.

grange multiplier on firm i's participation constraint under the best alternative contracting set for the hegemon.

Proposition 2 decomposes the marginal cost-benefit trade-off on anti-coercion policies at a sector in the hegemon's contracting set. First, an increase in anti-coercion increases the profits of sector i by reducing the costly actions demanded by the hegemon, which is valued at the marginal value of wealth, $\frac{\partial \mathcal{U}_{n_0}}{\partial w_{n_0}}$. Second, the change in costly actions that can be demanded then filters through general equilibrium, changing prices and the vector of aggregates. These changes affect the representative consumer in country n_0 directly, but also affect indirectly through changes in the wealth level as the baseline profits of all firms in country n_0 change. Changes in equilibrium objects are induced not only by how costly actions demanded of firm i change, but also by how costly actions the hegemon demands of other firms change on account of the hegemon's reduction in power over firm i. This reflects how anti-coercion policies undermine the ability of the hegemon to exert macro power via sector i, and how the hegemon is forced to alter and substitute how it exerts macro power via other sectors in the world. Finally, there is an effect on the hegemon's incentive constraint. The hegemon's on-path loss from a marginal increase in anti-coercion is exactly the Lagrange multiplier on the hegemon's firm i participation constraint, η_i. The extent to which the hegemon's constraint is relaxed is determined by the comparison to the Lagrange multiplier on the same participation constraint, but under the off-path best alternative contracting set of the hegemon. If firm i would not be in this best alternative contracting set, then $\eta_i^{Outside} = 0$, and this term reduces to the marginal value to the hegemon of slack in the participation constraint of firm i.

Costly Actions and Political Concessions. In our model, the transfer T_i can serve as a stand-in for non-economic objectives such as political lobbying or diplomatic concessions, where T_i is the cost to firm i of undertaking the lobbying/concession. We could extend the framework to allow more explicitly for a policy concession by assuming there is an element $z_n^m \in \{0, 1\}$ of aggregate vector z that represents country n's diplomatic policy. For example, it might enter positively into the hegemon's utility and negatively into country n_0's utility. Since governments care about consumer welfare, they internalize these utility costs and benefits. 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 the transfer is large enough to compensate for the cost of the action. We can also allow for differential costs and values of diplomatic concessions between countries. For example, a political action demanded by the hegemon might be perceived as inexpensive (no utlity cost) from a politically aligned country, and at the same time very costly if demanded out of a political enemy. In practice, this plays a large role in whether countries fear having their economies beholden to a particular hegemon.

Liberal World Order. Consider a hegemon that demanded no costly actions of the firms it contracted with. Such a situation arises when the hegemon's incentives are well-aligned with production, for example if the hegemon gets a sufficient utility benefit from profits of foreign firms (e.g., a stand in for foreign ownership or via positive externalities). In absence of the demand for costly actions by the hegemon, anti-coercion policies by country n serve no purpose on the intensive margin: a marginal increase or decrease in anti-coercion policies does not affect the hegemon's offered contract, since the hegemon demands nothing in return. As long as country n chooses to let its firms contract with the hegemon, it has no incentive to adopt anti-coercion policies. Provided that it benefits, accounting for changes in the world equilibrium, from allowing its firms to contract with the hegemon, the result is a liberal world order in which the hegemon acts as a global enforcer to expand production possibilities, but otherwise neither the hegemon nor country n_0 interferes with private decisions.

Fragmentation. When would a country n_0 fragment part or all of its domestic production from the hegemon in the sense of imposing sufficiently strong anti-coercion measures that the hegemon would not be willing to contract with (a subset of) sectors in country n_0? Intuitively, fragmentation of this form occurs when the costly wedges demanded by the hegemon of country n_0 either benefit countries other than n_0 or hurt country n_0 directly. For example, asking country n_0 to overuse an input with a global strategic complementarity benefits other users of that input, but is privately costly to country n_0. This can lead country n_0 to fight back to reduce the direct costs of over-adoption, since n_0 does not internalize the costs borne by other countries from it scaling back. We explore this idea in more detail in our main application.

A distinct motivation for fragmentation arises if country n_0 wishes to undermine the hegemon's power by blocking the hegemon from using its firms to transmit threats against other parties. For example, the hegemon might want to use country n_0's firms to form a threat for punishment of a third party country, n, to induce that country's firms to lobby for a change in n's diplomatic policy. If that change in policy is detrimental to country n_0, country n_0 could find it optimal to keep its firms from contracting with the hegemon in order to reduce the hegemon's power in other countries.

3.5 Uncoordinated Anti-Coercion Among Multiple Countries

We extend our analysis by allowing for the possibility that multiple countries conduct anti-coercion policies simultaneously in an uncoordinate manner. In particular, we now allow all foreign governments of countries $n \neq m$ to undertake anti-coercion measures.

Governments set anti-coercion policies in a Nash game, and then the hegemon offers contracts. We denote $G^n = \{G_i\}_{i \in \mathcal{I}_n}$ the vector of anti-coercion chosen by government n, and denote $G = \{G^n\}$ all anti-coercion policies. Country n chooses its anti-coercion measures, G^n, taking the anti-coercion policies G^{-n} of other countries as given. Lemma 2 holds by the same implementability argument.

Employing Lemma 2, the objective function of country n is

$$\mathcal{U}_n(G) = W_n\left(p, \overline{A} + \sum_{i \in \mathcal{I}_n \cap \mathcal{C}_m(G)} V_i(\mathcal{S}_i | \underline{\mathcal{B}}_i') + \sum_{i \in \mathcal{I}_n \setminus \mathcal{C}_m(G)} V_i(\mathcal{S}_i) + \sum_{f \in \mathcal{F}_n} p_f^{\ell} \overline{\ell}_f\right) + u_n(z), \tag{10}$$

where recall that country n takes the policies G^{-n} of other countries as given.

As before, we can re-express the decision problem of country n according to the primal approach of selecting $\mathcal{C}_m$ subject to incentive compatibility, but note that country n must take policies G^{-n} as given. We observe that country n can always achieve at least two possible contracting sets: (i) it can select $\mathcal{I}_n \cap \overline{\mathcal{C}}_m \subset \mathcal{C}_m$ by setting $G^n = 0$, that is ensuring all possible of its firms are in the hegemon's contracting set; (ii) it can select $\mathcal{I}_n \cap \mathcal{C}_m = \emptyset$ by setting G^n arbitrarily large, that is ensuring none of its firms are in the hegemon's contracting set. Thus the choice of contracting set is nontrivial. From here, we can represent the decision problem under the approach taken in main text, but with anti-coercion policies of other countries being potentially nonzero. This allows us to prove the following result.

Proposition 3 *For a sector $i \in \mathcal{C}_m(G)$ located in country n, optimal anti-coercion of country n satisfies*

$$0 \geq \frac{\partial \mathcal{U}_n}{\partial w_n} + \frac{\partial \mathcal{U}_n}{\partial P}\frac{dP}{dG_i} + \frac{\partial \mathcal{U}_n}{\partial z}\frac{dz}{dG_i} - \zeta_n\left(\eta_i - \eta_i^{Outside}\right) \tag{11}$$

where ζ_n is country n's Lagrange multiplier on the hegemon's incentive constraint, η_i is the hegemon's Lagrange multiplier on firm i's participation constraint, and $\eta_i^{Outside}$ is the hegemon's Lagrange multiplier on firm i's participation constraint under the best alternative contracting set for the hegemon.

Proposition 3 extends the basic analysis of Proposition 2 to the setting with all countries setting anti-coercion policies noncooperatively. The same underlying forces that drove optimal anti-coercion in that environment also drive it here. In our main application, we further develop how uncoordinated anti-coercion can lead to inefficient outcomes and promote a role for coordination.

4 Financial Services, Strategic Complementarities, and Fragmentation

We specialize the general framework derived in the previous section to both illustrate better the role of strategic complementarities in the production function and analyze the importance of financial services as a tool of coercion.

Financial services have become a major tool of either implicit or explicit coercion for the United States. Instances have included extensive financial sanction packages on Iran and Russia, but also pressure of SWIFT to monitor potential terrorists' financial transactions, as well as pressure on HSBC to reveal business transactions related to Huawei and its top executives.

The US heavy use of financial services to pressure foreign governments and private companies arises from the dominance of the US and Dollar centric financial system. The dominance is both in terms of reach, i.e. most world entities rely either directly or indirectly on this system, and in terms of absence of a viable alternative, i.e. only poor substitutes are available on the margin. For example, in a report assessing the feasibility of US sanctions on China, former Deputy Assistant U.S. Trade Representative for Investment and member of the National Security Council Emily Kilcrease stresses that: "The United States has a distinct advantage in sanctions intended to place pressure on China's economy, based on China's continued reliance on the U.S. dollar for its trade and financial operations internationally [...] Financial sanctions are among the most oft-used and powerful ways that the United States has to exert macroeconomic pressure. [...] Most of the financial sanctions leverage the privileged position of the United States in the global financial infrastructure." (Kilcrease (2023)).

Bartlett and Ophel (2021) emphasize the crucial role of the US dominance in financial services in exerting influence over foreign entities and activities that involve no direct US role. Traditionally, sanctions involve legal actions over activities that include at least one US entity or over which the US has legal jurisdiction. "In contrast, secondary sanctions target normal arms-length commercial activity that does not involve a U.S. nexus and may be legal in the jurisdictions of the transacting parties. [...] Secondary sanctions present non-U.S. targets with a choice: do business with the United States or with the sanctioned target, but not both. Given the size of the U.S. market and the role of the U.S. dollar in global trade, secondary sanctions provide Washington with tremendous leverage over foreign entities as the threat of isolation from the U.S. financial market almost always outweighs the value of commerce with sanctioned states." (Bartlett and Ophel (2021)).[11]

Our model helps us capture these crucial elements of US policy. First, we model financial services as a sector with strong strategic complementarities and show that a global planner, and certainly a hegemon, would want to engineer an equilibrium in which one financial system is dominant globally. From the global planner perspective there are efficiency gains from everyone using the same system. It is a standard argument in goods trade that also adapts to financial and liquidity services. Indeed, in the presence of some fixed costs natural monopoly arguments tend to produce one dominant system. The hegemon has incentives to integrate the global economy even more than the planner,

[11] The authors further remark that many of these threats are effective but not carried out in equilibrium: "Very few secondary sanctions have been enforced on European companies due to the high level of compliance by European firms. This is because access to the U.S. correspondent banking and dollar clearing systems is critical for their operations. Additionally, many European banks maintain American operations, such as branches in New York City, that fall directly under U.S. jurisdiction and therefore are subject to U.S. law enforcement. Together, these factors lead European financial institutions to comply with U.S. sanctions, regardless of their governments' policies. The high level of compliance by European financial institutions means it would be difficult for non-financial European firms interested in doing business with Iran to find a bank to process their transactions, and if subjected to U.S. sanctions, would be swiftly cut off from banking services in their own countries."

i.e. make its own system even more dominant, in order to maximize its power.

Second, at the core of our model is a mechanism for the hegemon to demand to a foreign entity that it ceases an activity with a third party. The hegemon has no direct control or legislative power over the foreign entity or the activity that is being affected. The hegemon uses a threat of suspension of access to US financial services to induce the foreign entity to voluntarily comply with its requests. For example, the US obtained both disclosures of information and suspension of services to certain entities in Iran and Russia by the messaging payment system SWIFT despite having no direct jurisdiction of this Belgian cooperative society. Similarly, the US put pressure on a foreign bank (HSBC) in its pursue of sanctions against a foreign company (Huawei) and its management (Meng Wanzhou, the company's CFO and the daughter of its founder).[12]

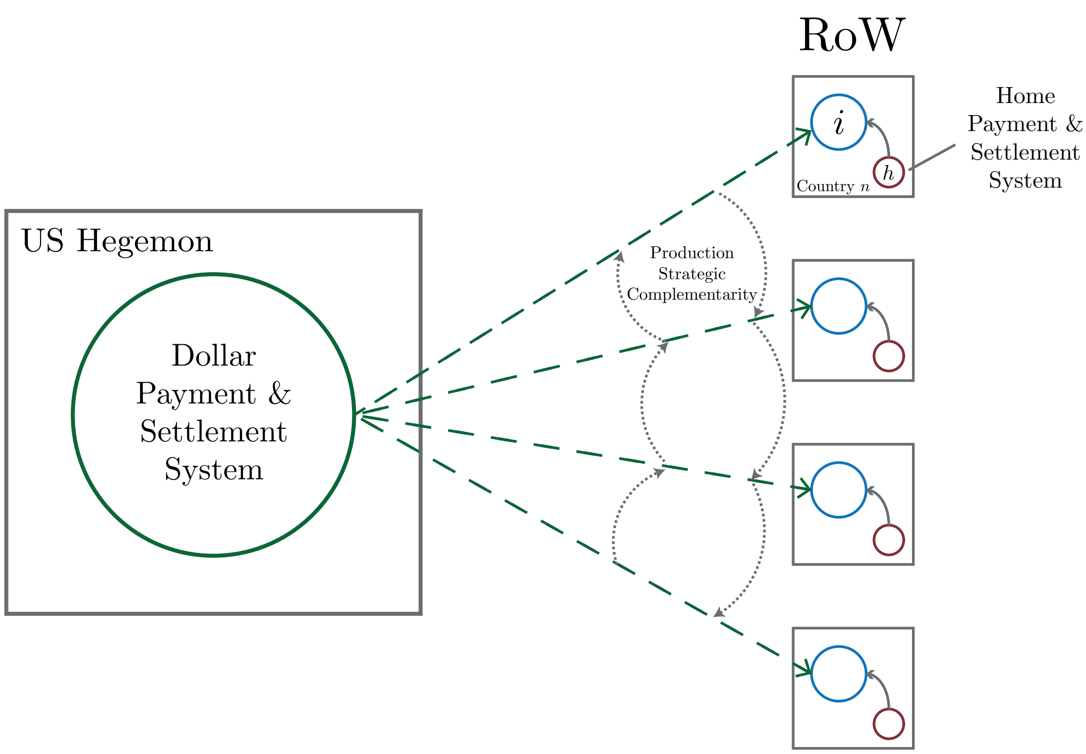
Third, we study how other countries might want to pursue anti-coercion policies by subsidizing their domestic firms to switch to a home financial services technology that is less efficient but insulates the country from the hegemons' coercion. Following an earlier sanction package applied to Russia in 2014, Russia developed a domestic messaging system called SPFS (System for Transfer of Financial Messages) that potentially helped Russia's cushion the blow of having some of its banks disconnected from SWIFT in 2023. China has been developing and growing its own messaging system CIPS (Chinese Cross-Border Interbank Payment System) in an attempt to isolate itself from potential US coercion, but also as a mean to offer an alternative to other countries that might fear US pressure.[13] India also launched its own system SFMS (Structured Financial Messaging System). For now, these alternatives are inefficient substitutes, but highlight a fragmentation response to diverging political and economic interests with the US hegemon.

We specialize the general model in the previous sections to the configuration in Figure 1. This set-up is minimalist to capture the essence of the problem. There are the US hegemon, country m, and foreign countries $n = 1, \ldots, N$. The US has one sector, the financial services sector (i.e. dollar payment and settlement system) denoted by j. Sector j produces out of a single factor ℓ_m, so that production is $f_j(\ell_{jm})$. Each foreign country n has two sectors, i_n and h_n, and a single local factor, ℓ_n. Sector h_n ("home financial services sector") produces solely out of the local factor, $f_h(\ell_{hn})$. These home sectors are alternatives to using the US based financial services for other industries in each country. Namely, in each country there is an identical (other than country of origin) manufacturing sector i_n that produces out of both h_n and j with a production function $f_i(A_j(\overline{z}_j)x_{i_nj}, A_h(z_{i_nh_n})x_{i_nh_n})$, where $\overline{z}_j = \frac{1}{N}\sum_{n=1}^{N} z_{i_nj}$ and where we use the notation f_i to indicate symmetry across countries. Productivity A_j and A_h are both non-decreasing in their arguments.

[12]Both examples are discussed in detail by Farrell and Newman (2023). The pressure and legal actions often involved either sub-entities of the foreign group that are present in the US (e.g. a US based SWIFT data center) or the threat of suspension of dealing with US entities (see also Scott and Zachariadis (2014) and Cipriani et al. (2023)).

[13]Clayton et al. (2022) point out that one of the reasons China is liberalizing access to its domestic bond market and also letting some domestic capital go abroad it to create two-way liquidity in RMB bonds that can serve as a store of value to complement the payment system (means of payment).

Figure 1: **US Financial Networks, Coercion, and Fragmentation**



Notes: Figure depicts the model set-up for the application on United States centric global financial networks.

This captures a strategic complementarity in use of either input among firms within sector i_n. There is also a strategic complementarity across sectors i_n in their use of the international good j.[14]

We assume constant prices (Definition 3) and perfect enforcement (Definition 5). We set $\beta = 0$ for simplicity, which avoids carrying continuation values without losing economic content. The resulting model is static, has no firm incentive constraints and only participation constraints, and has macroeconomic amplification occurs only because of production externalities (no terms of trade manipulation motives).

[14]This set-up abstracts from a number of realistic but inessential elements. First, it collapses many distinct financial services into a broad sector. Messaging systems, settlement systems, clearing, correspondent banks, custodians are of course meaningfully distinct. Each of them could be separately modelled with full foundations. Instead, we capture two essential and common features: these services are an important input into production (payments to acquire inputs and collect revenues, transfers to allocate production capital), and they feature strategic complementarities across firms and sectors. Second, we abstract from multiple layers in the network and assume the services are directly provided by the US entities. Our framework can clearly handle indirect threats via foreign entities that themselves are connected to the US (e.g. SWIFT).

4.1 Global Planner's Optimum

It is helpful to set a benchmark for efficiency of the global economy to then compare it with what the Hegemon implements in the presence or absence of anti-coercion policy from the rest of the countries. We create this benchmark by introducing a utilitarian global planner that has the same powers as the hegemon in terms of threats and costly actions, but maximizes global welfare.

Given constant prices, global welfare is the sum of sectoral profits. Since profits of sectors j, and h_n are constant in the presence of constant prices, we can drop them from global welfare and instead focus on maximizing the sum of profits of sectors i_n, $n = 1, \ldots, N$. Without loss of generality, we know that transfers are zero, $T_{i_n j} = 0$. From Lemma 1, we know that maximal joint threats and punishments is optimal. There are no joint threats available to the hegemon, so power derives more simply from the punishment, $V_i(\underline{\mathcal{B}}_i)$, where we abuse notation and drop the dependency on $\mathcal{S}_i$ given perfect enforcement. The threat is to exclude a firm in sector i_n from country m financial services if that firm rejects the planners' contract.

We focus on cases in which the participation constraint does not bind in the global planner's solution, or equivalently in which we are solving the unconstrained global planning problem. Therefore, the global planner's optimization problem is

$$\max_{\{x_{i_n j},\, x_{i_n h_n}\}} \sum_{n=1}^{N} \left[p_{i_n} f_{i_n}(A_{i_n j}(\overline{z}_j) x_{i_n j}, A_{i_n h_n}(z_{i_n h_n}) x_{i_n h_n}) - p_j x_{i_n j} - p_{h_n} x_{i_n h_n} \right],$$

All sectors i_n are identical, and the global planner's optimum features symmetry, $x_{i_n j} = x_{ij} = \overline{z}_j$. Therefore, we can equivalently write the global planner's problem as

$$\max_{x_{ij},\, x_{ih}} \; p_i f_i(A_j(x_{ij}) x_{ij}, A_h(x_{ih}) x_{ih}) - p_j x_{ij} - p_h x_{ih}.$$

The global planner's optimum features allocations given as solutions to the first order conditions

$$p_i \frac{\partial f_i}{\partial [A_j x_{ij}]} \frac{\partial [A_j(x_{ij}) x_{ij}]}{\partial x_{ij}} = p_j$$

$$p_i \frac{\partial f_i}{\partial [A_h x_{ih}]} \frac{\partial [A_h(x_{ih}) x_{ih}]}{\partial x_{ih}} = p_h$$

By comparison, private firms faced with wedges (τ_{ij}, τ_{ih}) would set allocations according to the optimality conditions $p_i \frac{\partial f_i}{\partial [A_j x_{ij}]} A_j = p_j + \tau_{ij}$ and $p_i \frac{\partial f_i}{\partial [A_h x_{ih}]} A_h = p_h + \tau_{ih}$, from which we can characterize optimal wedges. We collect the result in the following proposition.

Proposition 4 *The global planner's optimal wedges are*

$$\tau_{ij} = -p_j \frac{\xi_{ij}^A}{1 + \xi_{ij}^A} \tag{12}$$

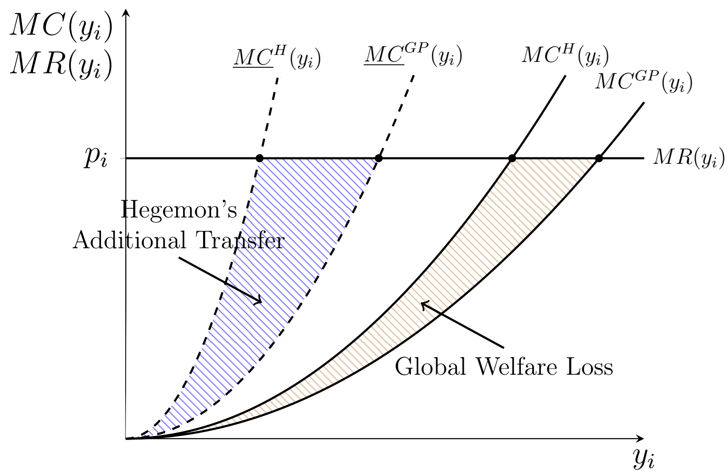


Figure 2: Global Planner and Hegemon Equilibria

$$\tau_{ih} = -p_h \frac{\xi^A_{ih}}{1 + \xi^A_{ih}} \tag{13}$$

where $\xi^A_{ij} \equiv \frac{x_{ij}}{A_j}\frac{\partial A_j}{\partial x_{ij}}$ *and* $\xi^A_{ih} \equiv \frac{x_{ih}}{A_h}\frac{\partial A_h}{\partial x_{ih}}$ *are the elasticities of the external economies of scale.*

The global planner (weakly) subsidizes use of both home and US financial services in order to get firms to internalize the positive spillover to other firms within (and across) countries of greater use of services. That is, the planner's equilibrium features more production by sectors i_n. The magnitude of the global planner's subsidy on j is the cost of the input, p_j, times the magnitude of the spillover measured by the elasticity of A_j with respect to greater use x_{ij}, ξ^A_{ij}. Intuitively, a larger strategic complementarity, that is a larger elasticity, motivates the planner to increase adoption by all firms in order to capitalize on the productivity gains through larger adoption. The same logic underlies the subsidy τ_{ih}.

Figure 2 illustrates the planner's solution. For a specific sector i in country n, it plots the marginal cost MC and marginal revenue MR curves of producing output y_i. The marginal revenue curve is constant at p_i given our assumption of constant prices, and the marginal cost curve is increasing in y_i given our decreasing returns to scale assumption on the production function f_i. Firm profits, which here coincide with welfare, are the area between the $MR(y_i)$ and $MC(y_i)$ curves. The planner solution in Proposition 4 maximizes this area by making the firms face lower prices (negative wedges) that stimulate usage of inputs that have aggregate economies of scale. The planner is effectively manipulating the marginal cost curve by setting prices at $p_h + \tau_{ih},\ p_j + \tau_{ij}$ and inducing sectoral input productivities of $A_j,\ A_h$ that themselves depend on the wedges via each firm choice of inputs. We denote $MC^{GP}(y_i)$ the marginal cost curve of firms in sector i in the resulting equilibrium.

4.2 Hegemon Problem under Small Anti-Coercion

Having characterized the global optimum, we now evaluate the hegemon's solution and compare it to the global optimum. The hegemon can impose transfers and wedges, taking as given anti-coercion policies G adopted by foreign countries. We begin with a simple case in which anti-coercion policies G are relatively small, so that the hegemon is able to extract positive transfers from all foreign sectors i_n.

Given perfect enforcement, the transfer T_{i_n} from firm i_n to the hegemon is a pure side payment that appears separably from production choices. Therefore, adopting the primal approach, we can write the hegemon's decision problem under as maximizing transfers,

$$\max \sum_{n=1}^{N} T_{i_n}$$

subject to firm participation constraints,

$$p_{i_n} f_{i_n}(A_{i_n j}(\overline{z}_j) x_{i_n j}, A_{i_n h_n}(z_{i_n h_n}) x_{i_n h_n}) - p_j x_{i_n j} - p_{h_n} x_{i_n h_n} - T_{i_n} \geq \underline{V}_{i_n} + G_{i_n}.$$

The outside option of firms, which involves being excluded from accessing country m financial services, is given by

$$\underline{V}_{i_n} = \max_{x^o_{i_n h_n}} p_{i_n} f_{i_n}(0, A_{i_n h_n}(z_{i_n h_n}) x^o_{i_n h_n}) - p_{h_n} x^o_{i_n h_n}.$$

Under the assumption that anti-coercion policies are sufficiently small that the hegemon can extract positive transfers from each foreign sector, we use the binding participation constraint to define the level of the transfer. Moreover given identical foreign sectors, we can focus on a representative sector and write the transfer maximization problem as

$$\max_{x_{ij}, x_{ih}} T_i = p_i f_i(A_j(x_{ij}) x_{ij}, A_h(x_{ih})) - p_j x_{ij} - p_h x_{ih} - \underline{V}_i - G_i,$$

where as in the hegemon's problem we adopt the more compact notation and drop the country specific subscripts n. Whereas the global planner sought to maximize the profits of each foreign sector, the hegemon maximizes transfers instead. This results in the hegemon maximizing slack between foreign firm profits and their outside option, which leads to the largest possible transfer.

Importantly, the outside option itself depends on the hegemon's choice of x_{ih} due to the strategic complementarity in home financial service usage. In particular, we have

$$\underline{V}_i(x_{ih}) = \max_{x^o_{ih}} \; p_i f_i(0, A_h(x_{ih}) x^o_{ih}) - p_h x^o_{ih},$$

where we have defined x^o_{ih} the use of h by i when i deviates to the outside option. From Envelope

Theorem and using the firm's first order condition at the outside option, we have

$$\frac{\partial \underline{V}_i(x_{ih})}{\partial x_{ih}} = p_h \xi^A_{ih} \frac{x^o_{ih}}{x_{ih}} \geq 0.$$

Intuitively, greater use of the home financial services by firms that accept the hegemon's contract generates a positive spillover to firms that reject the hegemon's contract and have no choice but to rely on the home service. This increases their outside option and encourages them to reject the hegemon's contract, reducing the size of the transfer that the hegemon can extract.

We are now ready to solve the hegemon's problem. The hegemon's first order conditions are

$$p_i \frac{\partial f_i}{\partial [A_j x_{ij}]} \frac{\partial [A_j(x_{ij}) x_{ij}]}{\partial x_{ij}} = p_j$$

$$p_i \frac{\partial f_i}{\partial [A_h x_{ih}]} \frac{\partial [A_h(x_{ih}) x_{ih}]}{\partial x_{ih}} = p_h + \frac{\partial \underline{V}_i(x_{ih})}{\partial x_{ih}}$$

Observe that these are identical to the global planner's first order conditions, except for the effect of home financial services on the outside option. The choice of firms, given wedges (τ_{ij}, τ_{ih}), is defined as above. We collect the optimal wedges of the hegemon into the following result.

Proposition 5 *The hegemon's optimal wedges are*

$$\tau_{ij} = -p_j \frac{\xi^A_{ij}}{1+\xi^A_{ij}} \tag{14}$$

$$\tau_{ih} = p_h \frac{\xi^A_{ih}}{1+\xi^A_{ih}} \left(\frac{x^o_{ih}}{x_{ih}} - 1 \right) \tag{15}$$

Comparing the hegemon's optimal wedges to those of the global planner, two key properties emerge. First, the hegemon sets the wedge on US financial services j according to the same formula as the global planner. This means that if the elasticity ξ^A_{ij} is constant, the hegemon sets exactly the same wedge as the global planner. Intuitively, the hegemon, like the global planner, internalizes the positive spillover achieved by increasing firms' use of j. Whereas the global planner values this increase in profits directly, the hegemon also values the profits of foreign firms because higher profits allow the hegemon to extract a larger transfer. This aligns the hegemon's incentives with the global planner's in terms of choice of the wedge on j.

In contrast, the hegemon imposes a smaller subsidy or even a tax on use of home financial services h. On the one hand, higher on-path firm profits lead the hegemon to want to subsidize h, exactly as it did for j, to increase the size of the transfer payment. On the other hand, increasing productivity A_h of home financial services also increases the outside option of a firm that opted to reject the hegemon's contract and rely on home financial services. The hegemon therefore trades off the on-path profit gains against not wanting to make rejecting the contract too appealing. As a result, the hegemon reduces the wedge on home financial service usage by i relative to that of the global planner. In contrast, there is no similar incentive to manipulate the outside option by changing A_j (US financial services productivity) since the threatened punishment of the outside option is being cut off from using j entirely.

Returning to Figure 2, suppose the hegemon was implementing the same wedges as the global planner. Then, a firm that rejects the contract would face the marginal cost curve $\underline{MC}^{GP}(y_i)$, and the hegemon could extract as a transfer the difference in profits between the inside option and the outside option for firm i. This is the area (below p_i) between the curves $\underline{MC}^{GP}(y_i)$ and $MC^{GP}(y_i)$. This is, however, not the best that the hegemon can do. By implementing wedges that shifts the firms that accept the contract to using more of the hegemon's payment system and less of the domestic alternative, the hegemon can further penalize firms that reject its contract. Visually, the inside option marginal cost curve is now $MC^H(y_i)$ that is to the left of $MC^{GP}(y_i)$, that is firms face higher costs and produce less on path, leading to a global welfare loss (the shaded brown area). The hegemon, like the planner, perceives this loss in firms' profits, but finds it optimal whenever it is more than offset by the increase in its transfers. This benefit to the hegemon occurs because the outside option marginal cost curve is now shifting to $\underline{MC}^H(y_i)$, and the hegemon additional ability to extract transfers is the blue shaded area. The hegemon is getting the rest of the world "addicted" to its financial services to increase the power it can achieve by threatening withdrawals. We make this intuition formal in the next proposition.

Excessive International Integration. Proposition 5 derives the hegemon's optimal wedges and compares them to those of the global planner. We now show that as long as home and US financial services are substitutes in production, then the hegemon increases use of its financial services and decreases use of home financial services relative to the global planner's optimum.

Proposition 6 *Assume that* $\frac{\partial^2 f_i}{\partial[A_j(x_{ij})x_{ij}]\partial[A_h(x_{ih})x_{ih}]} < 0$. *Then, the hegemon's optimum has weakly higher* x_{ij} *and weakly lower* x_{ih} *than the global planner's optimum.*

Proposition 6 maps the difference in the hegemon's chosen wedges into a different set of allocations. Intuitively when home and hegemon's financial services are substitutes in production, reducing the subsidy on home financial services has the effect of pushing firms towards greater use of hegemon's financial services. The hegemon, therefore, generically promotes "excessive international integration" that loads too heavily on use of its financial services. By encouraging firms to over-use the hegemon's services and under-use the home alternative, the hegemon makes rejecting its own contract more costly and increases the power it has over each firm, enabling it to collect larger transfers.

Does the Hegemon Add Value? An important question for the anti-coercion perspective is whether the hegemon actually increases foreign firms on-path profits. There are two forces at play. On the one hand, the hegemon efficiently subsidizes purchases of input j in order to maximize the on-path profits of firms and hence increase the size of the transfer that it can extract. This pushes the hegemon's solution towards the global planner's solution. However, while enacting the global planner's wedge on h maximizes firm on-path profits, by Envelope Theorem the hegemon always desires to decrease use of h by at least some relative to the planner's solution in order to reduce the outside option of firms that rejected the contract. The hegemon reduces firms in sector i on-path profits by doing so.

If there is no strategic complementarity in the usage of input h, the outside option is fixed, and the hegemon's only incentive is to maximize on-path profits. The hegemon therefore implements the efficient allocation, but charges as large a transfer as possible in the process.

At the other extreme, if there is no strategic complementarity in input j, the hegemon's maximization of slack leads to an ambiguous outcome. Whether the hegemon increases on-path profits depends on whether $x_{ih} \geq x_{ih}^o$, that is whether on-path use of home financial services is greater than off-path use of home financial services by a firm that hypothetically rejected the hegemon's contract. If $x_{ih}^o > x_{ih}$, that is firms would use more of the home financial services if they rejected the contract, then the hegemon introduces a tax on use of h and therefore is purely value-destroying. Intuitively, there are two competing forces here. On the one hand, exclusion from using input j and substitutability of goods tends to generate $x_{ih}^o > x_{ih}$. On the other hand, the un-internalized productive efficiency is a counterveiling force. It is straight-forward to show, and we do so in the CES example of Section 4.4, that at a low enough elasticity of the external economies of scale, the former effect dominates, the hegemon imposes a positive tax, and therefore the hegemon actually lowers value in equilibrium even while promoting integration.

4.3 Anti-Coercion and Fragmentation

We now allow countries to optimally choose their anti-coercion policies. We focus on a symmetric equilibrium. To build intuition, let us start with the case $N = 1$, that is there is only a single foreign country that the hegemon contracts with. The foreign country has two options: (i) implement a small enough anti-coercion policy that the hegemon will offer a contract; (ii) implement a large enough anti-coercion policy that the hegemon will not offer a contract. If it chooses a large anti-coercion policy, it receives profits from the competitive equilibrium. On the other hand, if it chooses a smaller anti-coercion policy, then employing Lemma 2 it solves

$$\max_{G_i} \; G_i + \underline{V}_i(x_{ih}(G_i))$$

subject to the hegemon's incentive constraint

$$0 \leq T_i(G_i).$$

Since the hegemon's wedges are invariant to anti-coercion policies conditional on i being in the hegemon's contracting set (i.e., the hegemon maximizes slack), then condition on small anti-coercion the foreign country finds it optimal to set G_i to the point where the incentive constraint of the hegemon just binds. Therefore, the country receives the full value of profits, $\Pi_i(x_i) = p_i f_i(A_j(x_{ij})x_{ij}, A_h(x_{ih})x_{ih}) - p_j x_{ij} - p_h x_{ih}$, under the hegemon's optimal allocation. Thus, the problem of optimal anti-coercion from the $N = 1$ perspective amounts to whether or not the hegemon has added value in the process of maximizing slack. Anti-coercion policies are therefore efficient in the sense that the country contracts with the hegemon as long as the hegemon increases the value of its firms. Letting x_i^* be the hegemon's optimal allocation under small anti-coercion and x_i^0 be the competitive equilibrium allocation, we summarize the $N = 1$ case in the following result.

Proposition 7 *Suppose that $N = 1$. Then:*

1. *If $\Pi_i(x_i^*) \geq \Pi_i(x_i^0)$, then optimal anti-coercion sets $G_i = \Pi_i(x_i^*) - \underline{V}_i(x_{ih}^*)$. The hegemon implements the optimal wedges and allocation of Proposition 5 with $T_i = 0$.*

2. *If $\Pi_i(x_i^*) < \Pi_i(x_i^0)$, then optimal anti-coercion sets G_i large enough that the hegemon does not offer i a contract.*

What if, instead, there are many foreign countries? Consider in particular the limit $N \to \infty$, so that every foreign country n takes A_j as given. In setting anti-coercion policies, every country therefore acts as-if it were in an $N = 1$ world in which A_j was fixed exogenously. Supposing, therefore, that the hegemon's optimal contract sets $\tau_{ih} > 0$, that is a tax on h, then country n would perceive the hegemon's optimal contract as purely costly: it provides an undesired (revenue-neutral) subsidy that distorts choice of j, while at the same time leading to an inefficiently low level of h. This induces the country to fight back, raising anti-coercion to eliminate the hegemon's ability to demand costly actions. Of course, since all countries have this incentive and the hegemon has maximized slack, when all countries raise anti-coercion the hegemon can no longer charge a weakly positive transfer, and switches to contracting with no countries instead. What is to be checked, then, is that no country would then want to deviate from the outcome in which all countries impose large anti-coercion and the hegemon contracts with no countries. The following result verifies that this fragmentation is an equilibrium whenever the hegemon would charge a tax to an $N = 1$ country facing A_j fixed at its competitive level.

Proposition 8 *Let $\tau_i^*(\overline{A}_j) = (0, \tau_{ih}^*(\overline{A}_j))$ be the hegemon's optimal contract to an $N = 1$ firm when $A_j = \overline{A}_j$ is fixed. If $\tau_{ih}^*(A_j(x_{ij}^0)) > 0$, then as $N \to +\infty$ a fragmentation equilibrium exists in which all countries implement large anti-coercion policies and the hegemon does not offer any contracts, that is $\mathcal{C}_m = \emptyset$.*

With a large number of foreign countries, a free rider problem can emerge that generates a fragmentation equilibrium. In particular, if a hegemon in the process of increasing welfare also distorts home financial services with a tax, then countries individually prefer to prevent their firms from contracting with the hegemon by employing large anti-coercion policies. This generates fragmentation and reversion to the competitive equilibrium. This fragmentation is inefficient when the hegemon would have increased global surplus, despite the tax on h, through a large enough subsidy of j. However, small foreign countries neglect the positive benefit of the subsidy on j and look to improve their individual position vis-a-vis the hegemon while letting other countries bear the cost of overproduction. This generates an inefficient international fragmentation.

4.4 Analytical Examples: CES Production

To shed further light on the analysis, we specialize the model to a constant elasticity of substitution (CES) production function by firms in sector i. In particular, we let $f_i(A_j x_{ij}, A_h x_{ih}) = \frac{1}{\xi}\bigg((A_j\ x_{ij})^\sigma + (A_h\ x_{ih})^\sigma\bigg)^{\xi/\sigma}$ and $A_j(\overline{z}_j) = \overline{z}_j^{\eta_j}$, $A_h(z_{ih}) = z_{ih}^{\eta_h}$. The parameter $\xi \in (0,1)$ governs the extent of decreasing returns to scale (for fixed A's). The parameter σ is the typical elasticity across the two inputs in the production basket. The parameters $\eta_j \geq 0$ and $\eta_h \geq 0$ govern the economies of scale, with higher values generating stronger spillovers. We restrict $\xi \leq \sigma$ so x_{ij} and x_{ih} are substitutes in production, and $(1+\eta_j)\xi < 1$ and $(1+\eta_h)\xi < 1$ for concavity in the aggregate production function.

Global Planner's Solution. The global planner's wedges are straightforward to characterize using Proposition 4. In particular, given our functional form assumptions on the external economies of scale, we have constant elasticities of spillovers: $\xi_{ij}^A = \eta_j$ and $\xi_{ih}^A = \eta_h$. The optimal planner wedges can then be expressed in closed form as:

$$\tau_{ij} = -p_j \frac{\eta_j}{1+\eta_j}.$$

$$\tau_{ih} = -p_h \frac{\eta_h}{1+\eta_h}.$$

Prices inclusive of the wedges are $p_j + \tau_{ij} = p_j \frac{1}{1+\eta_j}$ and $p_h + \tau_{ih} = p_h \frac{1}{1+\eta_h}$. The planner subsidizes the usage of both inputs by lowering their perceived price to realize the external economies of scale. The subsidy is bigger the stronger the economies of scale (the higher the η's).

Hegemon's Solution. To hegemon's wedges depend in part on firm i's outside option, so we start by solving the firm's problem at its outside option. A firm that rejects the hegemon's contract solves

$$\max_{x^o_{ih}} \; p_i \frac{1}{\xi}(z_{ih}^{\eta} x^o_{ih})^{\xi} - p_h x^o_{ih}$$

which yields a solution

$$x^o_{ih} = \left(\frac{p_i}{p_h}\right)^{\frac{1}{1-\xi}} z_{ih}^{\frac{\eta\xi}{1-\xi}}.$$

Note that given our restrictions on concavity of the production function, we have $\frac{\eta\xi}{1-\xi} < 1$. From here, we can evaluate the hegemon's optimal wedges from Proposition 5 as

$$\tau_{ij} = -p_j \frac{\eta_j}{1+\eta_j},$$

$$\tau_{ih} = p_h \frac{\eta_h}{1+\eta_h}\left(\left(\frac{p_i}{p_h}\right)^{\frac{1}{1-\xi}} x_{ih}^{\frac{\eta\xi}{1-\xi}-1} - 1\right),$$

where we substituted in the equilibrium condition $x_{ih} = z_{ih}$. As discussed above, the wedge on j is exactly equal to the global planner's solution, but that on h differs due to the impact on the outside option. A positive wedge, that is a tax, is optimal when x_{ih} is sufficiently low under the hegemon's solution.

It is instructive to revisit the limiting cases. When $\eta_h = 0$, $\tau_{ih} = 0$, and therefore the hegemon implements the global planner's optimum. On the other hand when $\eta_j = 0$, we have $\tau_{ij} = 0$. In this case, we show that for at least a range $0 < \eta_h \leq \overline{\eta}_h$ we have $\tau_{ih} > 0$, that is the hegemon demands a tax on the home financial services. In this case, the hegemon's contract is purely distortive: the hegemon demands that a tax be imposed on the home alternative to promote firms decreasing use of it, and therefore increase their dependency on the hegemon. In this scenario, any country would be better off instituting a strong enough anti-coercion policy to avoid coercion by the hegemon.

Returning to Figure 2, it is useful to derive the marginal cost curve for firm i in the CES specification. Consider the expenditure minimization problem of a firm in sector i facing wedges on the price of the inputs and taking as given input productivities:

$$\min_{\{x_{ij}, x_{ih}\}} (p_j + \tau_{ij})x_{ij} + (p_h + \tau_{ih})x_{ih} \qquad s.t. \quad \frac{1}{\xi}\left((A_j x_{ij})^{\sigma} + (A_h x_{ih})^{\sigma}\right)^{\xi/\sigma} \geq y_i$$

The solution to this problem for a given desired output level y_i defines the firm cost function. The marginal cost function is the derivative of the cost function with respect to y_i, and is given by

$$MC(y_i) = \left(\left(\frac{A_h}{p_h + \tau_{ih}}\right)^{\frac{\sigma}{1-\sigma}} + \left(\frac{A_j}{p_j + \tau_{ij}}\right)^{\frac{\sigma}{1-\sigma}}\right)^{-\frac{1-\sigma}{\sigma}} \left(\xi y_i\right)^{\frac{1}{\xi}-1}.$$

The marginal cost curve on the outside option can be derived by considering that setting $\tau_{ij} = \infty$

for a specific firm in sector i (but not other firms in the same sector) is equivalent to the hegemon suspending the provision of its financial services to that specific firm:

$$\underline{MC}(y_i) = \left(\frac{A_h}{p_h}\right)^{-1} \left(\xi y_i\right)^{\frac{1}{\xi}-1}.$$

The hegemon sets a tax (or lower subsidy) on home financial services on the firms that accept the contract in order to induce them to lower productivity in that sector. The lower the productivity A_h, the more the outside option marginal cost curve $\underline{MC}(y_i)$ shifts to the left in Figure 2. The resulting increased ability of the hegemon to demand transfers is the shaded blue area in the figure. The cost of inducing this worse outside option for firms that reject the hegemon's contract are the distortions induced on those firms that accept the contract. By setting a higher τ_{ih} than the global planner, the hegemon increases the term $\left(\frac{A_h}{p_h+\tau_{ih}}\right)^{\frac{\sigma}{1-\sigma}} + \left(\frac{A_j}{p_j+\tau_{ij}}\right)^{\frac{\sigma}{1-\sigma}}$ and makes the marginal cost curve $MC(y_i)$ shift to the left. This latter loss in global profits is the welfare cost of the hegemonic equilibrium (the brown shaded area in Figure 2).

5 Conclusion

Geoeconomic tensions have been on the rise given political shifts in the US, the rise of China as a great economic power, and changes in technology. These tensions have the potential to fragment the world trade and financial system, unwinding gains from international integration. A number of countries are introducing mixes of industrial, trade, and financial policy to insulate their economies from unwanted foreign influence. Collectively these policies come under the umbrella of anti-coercion tools. We provide a simple model to jointly analyze economic coercion by a hegemon and anti-coercion policies by the rest of the world. We show that precisely those forces, like economies of scale, that are traditional rationales for global integration and specialization can be used by a hegemon to increase its coercive power. The rest of the world countries react by implementing anti-coercion policies that shift their domestic firms away from the hegemon global inputs into an inefficient home alternative. We show that uncoordinated anti-coercion policy results in inefficient fragmentation as each country over insulates its economy. We study the financial services industry, e.g. global payments and settlement systems, as an industry with strong strategic complementarities at the global level. The US uses its dominance in these financial services as a tool of coercion. China and Russia have resorted to using inefficient home alternatives to insulate their economies from possible US pressure.

References

Acemoglu, Daron and Alireza Tahbaz-Salehi, "The Macroeconomics of Supply Chain Disruptions," *NBER Working Paper*, 2023, *27565.*

Acemoglu, Daron, Vasco M Carvalho, Asuman Ozdaglar, and Alireza Tahbaz-Salehi, "The network origins of aggregate fluctuations," *Econometrica*, 2012, *80* (5), 1977–2016.

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

Bagwell, Kyle and Robert W Staiger, "Domestic policies, national sovereignty, and international economic institutions," *The Quarterly Journal of Economics*, 2001, *116* (2), 519–562.

Bagwell, Kyle and Robert W Staiger, *The economics of the world trading system*, MIT press, 2004.

Bai, Xiwen, Jesús Fernández-Villaverde, Yiliang Li, and Francesco Zanetti, "The causal effects of global supply chain disruptions on macroeconomic outcomes: evidence and theory," 2024.

Baldwin, David A, *Economic Statecraft*, Princeton University Press, 1985.

Baqaee, David Rezza and Emmanuel Farhi, "Productivity and misallocation in general equilibrium," *The Quarterly Journal of Economics*, 2020, *135* (1), 105–163.

Baqaee, David Rezza and Emmanuel Farhi, "Networks, Barriers, and Trade," 2022.

Bartelme, Dominick G, Arnaud Costinot, Dave Donaldson, and Andres Rodriguez-Clare, "The textbook case for industrial policy: Theory meets data," Technical Report, National Bureau of Economic Research 2019.

Bartlett, Jason and Megan Ophel, "Sanctions by the Numbers: U.S. Secondary Sanctions," *Center for a New American Security*, 2021.

Blackwill, Robert D and Jennifer M Harris, *War by other means: Geoeconomics and statecraft*, Harvard University Press, 2016.

Caballero, Ricardo J and Alp Simsek, "A model of fickle capital flows and retrenchment," *Journal of Political Economy*, 2020, *128* (6), 2288–2328.

Cipriani, Marco, Linda S Goldberg, and Gabriele La Spada, "Financial sanctions, SWIFT, and the architecture of the international payment system," *Journal of Economic Perspectives*, 2023, *37* (1), 31–52.

Clayton, Christopher, Amanda Dos Santos, Matteo Maggiori, and Jesse Schreger, "Internationalizing like china," Technical Report, National Bureau of Economic Research 2022.

Clayton, Christopher and Andreas Schaab, "Multinational banks and financial stability," *The*

Quarterly Journal of Economics, 2022, *137* (3), 1681–1736.

Clayton, Christopher, Matteo Maggiori, and Jesse Schreger, "A Framework for Geoeconomics," Working Paper 31852, National Bureau of Economic Research November 2023.

Cohen, Benjamin J, *Currency power: Understanding monetary rivalry*, Princeton University Press, 2015.

Cohen, Benjamin J, "Currency statecraft: Monetary rivalry and geopolitical ambition," 2018.

Costinot, Arnaud, Guido Lorenzoni, and Iván Werning, "A theory of capital controls as dynamic terms-of-trade manipulation," *Journal of Political Economy*, 2014, *122* (1), 77–128.

Drezner, Daniel W, Henry Farrell, and Abraham L Newman, *The uses and abuses of weaponized interdependence*, Brookings Institution Press, 2021.

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

Farhi, Emmanuel and Iván Werning, "A theory of macroprudential policies in the presence of nominal rigidities," *Econometrica*, 2016, *84* (5), 1645–1704.

Farhi, Emmanuel and Jean Tirole, "Too Domestic to Fail Liquidity Provision and National Champions," *Review of Economic Studies*, 2024, p. rdae028.

Farrell, Henry and Abraham L Newman, "Weaponized interdependence: How global economic networks shape state coercion," *International Security*, 2019, *44* (1), 42–79.

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

Greenwald, Bruce C and Joseph E Stiglitz, "Externalities in economies with imperfect information and incomplete markets," *The quarterly journal of economics*, 1986, *101* (2), 229–264.

Grossman, Gene M and Elhanan Helpman, "Trade wars and trade talks," *Journal of political Economy*, 1995, *103* (4), 675–708.

Grossman, Gene M, Elhanan Helpman, and Hugo Lhuillier, "Supply Chain Resilience: Should Policy Promote International Diversification or Reshoring?," 2023.

Hirschman, Albert O, *National power and the structure of foreign trade*, Vol. 105, Univ of California Press, 1945.

Juhász, Réka, Nathan J Lane, and Dani Rodrik, "The New Economics of Industrial Policy," Technical Report, National Bureau of Economic Research 2023.

Juhász, Réka, Nathan Lane, Emily Oehlsen, and Verónica C Pérez, "The Who, What, When, and How of Industrial Policy: A Text-Based Approach," *What, When, and How of Industrial Policy: A Text-Based Approach (August 15, 2022)*, 2022.

Kilcrease, Emily, "No Winners in This Game," *Center for a New American Security*, 2023.

Liu, Ernest, "Industrial policies in production networks," *Quarterly Journal of Economics*, 2019, *134* (4), 1883–1948.

Ossa, Ralph, "Trade wars and trade talks with data," *American Economic Review*, 2014, *104* (12), 4104–4146.

Ottonello, Pablo, Diego Perez, and William Witheridge, "The Exchange Rate as an Industrial Policy," *Working paper*, 2023.

Scott, Susan V and Markos Zachariadis, *The Society for Worldwide Interbank Financial Telecommunication (SWIFT): Cooperative governance for network innovation, standards, and community*, Taylor & Francis, 2014.

Sturm, John, "A theory of economic sanctions as terms-of-trade manipulation," *Working paper*, 2022.