# Who Can Control Our Firms? National Security and Foreign Ownership Regulation*

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**Abstract**

Governments invoke national security to regulate foreign acquisitions of domestic firms. Why is ownership regulation a distinct policy margin beyond standard tools, like production subsidies and trade taxes? We show that contractual frictions make multinational firm boundaries central to geoeconomic policy. Within firms, ownership allocates residual control that affects outcomes through non-contractible decisions. Between governments, the absence of enforceable agreements makes the economic costs of conflict shape geopolitical bargaining. Foreign ownership depends on private returns to foreign control, but also determines national exposure to geopolitical conflict. It can increase foreign dependence, technology transfer, or sabotage scope. If such margins were contractible, the government could regulate them directly. When they are not, ownership regulation is the second-best tool that changes control rights and, thus, geopolitical outcomes. Consistent with our mechanism, U.S. regulation emphasizes the national-security risks of foreign control over firm decisions, has tightened with rising geopolitical tensions, and is tighter in sectors with higher exposure to defense demand and contractual frictions.

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# 1 Introduction

Governments regulate foreign acquisitions of domestic firms. They invoke national security concerns to review private transactions, restrict ownership, and block acquisitions. Recent examples include Australia's restrictions on Chinese investment in the mining company Northern Minerals, the Dutch government's intervention in the Chinese-controlled chipmaker Nexperia, and the U.S. requirement that China's COSCO divest the Long Beach Container Terminal. More systematically, the Committee on Foreign Investment in the United States (CFIUS) reviews foreign investments in the U.S. to mitigate risks to national security. CFIUS's scope has expanded alongside rising geopolitical tensions: 2022 reviews quadrupled relative to the average of 2005-2015 (CFIUS). The U.S. is not unique: more than four out of five OECD countries had formal investment-screening mechanisms in 2022 (Bauerle Danzman and Meunier, 2023).

Despite the growing prevalence of such interventions, their economic justification remains unclear. What market failure associated with national security leads governments to regulate foreign ownership of domestic firms engaged in voluntary transactions? Why is ownership regulation the preferred tool, rather than production subsidies or trade restrictions? How should such regulation be targeted across economic activities?

We argue that micro- and macro-level contractual frictions create a national security rationale for foreign ownership regulation. At the micro level of firm decisions, incomplete contracts make ownership consequential because it allocates control rights over decisions that cannot be fully specified or enforced. Economic outcomes depend on firms' organizational choices, including whether domestic production is foreign-owned. At the macro level of international relations, the absence of enforceable agreements between governments creates a geopolitical bargaining problem in which economic vulnerabilities affect bargaining positions during geopolitical crises.

These contractual frictions create a wedge between the private and social returns to firms' organizational choices. Firms choose whether to operate under foreign ownership based on private returns, but this choice affects non-contractible margins that create organizational exposure in geopolitical crises. For example, foreign owners may increase dependence on foreign relationship-specific inputs and capital, facilitate international technology transfer, or gain the ability to disrupt domestic production. If such margins were contractible, the government could regulate them directly. When they are not, ownership regulation provides a second-best tool that changes control rights and, thus, geopolitical outcomes. We show that U.S. ownership regulation is consistent with our main mechanism. It focuses on the national-security risks of foreign control over firm decisions. Regulation has tightened with rising geopolitical tensions, and is tighter in sectors with higher exposure to defense demand and contractual frictions.

To formalize this argument, we adapt the property-rights theory of multinational firms in Antràs (2003) and Antràs and Helpman (2004). For each good, a domestic producer initially owns a production blueprint. Producing requires relationship-specific inputs from the domestic producer and a second supplier, which may be domestic or foreign. The domestic producer can transact with the supplier at arm's length or vertically integrate with it. Vertical integration transfers ownership of the firm's blueprint and assets to the supplier; when that supplier is foreign, we refer to the firm as foreign-owned.

Following Grossman and Hart (1986) and Hart and Moore (1990), ownership matters because it determines residual control rights when contracts are incomplete. Because suppliers' actions cannot be fully specified or verified, contracts cannot condition directly on input provision (Hart and Moore, 1999; Segal, 1999). Suppliers' payoffs depend on ex post bargaining over the firm's surplus.[1] If bargaining breaks down, the owner retains greater control over the blueprint and assets, which strengthens her bargaining position and increases her input provision. Foreign ownership thus makes domestic production more vulnerable to the separation of domestic and foreign parties.

Without geopolitical considerations, firms' organizational choices are constrained efficient. We assume that realized revenue is verifiable and can be contracted upon, but the actions determining input provision are not. Given these contractual frictions, firms maximize private surplus by choosing their supplier, ownership structure, and production scale. While incomplete contracts distort relative input provision, the government faces the same contractual constraints and cannot improve on the private allocation. If courts cannot verify input provision for private contracts, governments cannot condition policy on it either. As a result, there is no role for government intervention in this benchmark.

We then introduce macro-level contractual frictions between governments. Governments cannot commit not to use coercive actions to obtain concessions in a future geopolitical crisis. Formally, we consider a geopolitical bargaining game between the domestic and foreign governments, as in Kooi (2024). In a crisis, the foreign government can demand concessions from the domestic government, which can accept or enter conflict. Residual control rights imply that foreign-owned firms have greater organizational exposure to conflict: domestic production suffers larger losses when conflict forces the separation of domestic and foreign parties. This exposure weakens the domestic government's outside option, leading to a worse geopolitical bargaining outcome.

[1] The provision of relationship-specific inputs depends on non-verifiable actions. These may include investments in specialized machinery or proprietary technology and know-how, as well as complementary effort needed to make these assets productive. Ownership matters through residual control rights: following a breakdown in bargaining, the owner may retain control over part of the tangible or intangible capital created within the relationship, or withhold complementary inputs that reduce its value to the other party.

The interaction of the micro and macro contractual frictions overturns the constrained-efficiency benchmark. Firms choose their organization based on private returns but do not internalize how their organizational conflict exposure affects the government's bargaining position. The government cannot regulate the underlying non-contractible margins directly, so foreign ownership regulation provides a second-best tool. By shifting firms toward organizational modes with less exposure to conflict, tighter restrictions on foreign ownership improve the domestic government's outside option and, thus, its geopolitical bargaining outcome.

We show how foreign ownership regulation varies with geopolitical risk and sectoral characteristics. As geopolitical crises become more likely, the gap between the private and social returns to foreign ownership increases, leading to tighter restrictions. Across sectors, regulation is stricter where the marginal utility of consumption is higher in conflict. This occurs in sectors with greater exposure to defense demand and contractual frictions. Regulation is especially tight when these forces interact: high defense demand amplifies the negative effect of output losses associated with organizational conflict exposure.

Our rationale for ownership regulation is not that foreign ownership is itself directly relevant for geopolitical interactions. Instead, ownership matters because it allocates residual control rights that shape private decisions over non-contractible actions, which in turn affect the government's geopolitical bargaining position. More broadly, the same residual-control logic provides a common economic rationale for the three threats to national security identified by Moran (2009, 2017): supplier dependence, technology transfer, and production sabotage. We provide microfoundations in which ownership affects these threats through control over productive assets and inputs, proprietary technology, and non-verifiable actions following separation. Foreign ownership increases reliance on foreign parties for relationship-specific inputs and capital, facilitates the transfer of proprietary technology, or gives foreign owners greater ability to disrupt domestic production. The expropriation of foreign-owned domestic assets in a crisis does not eliminate these vulnerabilities, because transferring legal title cannot undo the consequences of prior foreign control.[2]

In the final part of the paper, we use our residual-control mechanism to interpret foreign

[2]Australia restricted foreign ownership of Northern Minerals, whose Browns Range critical-minerals project is located in Western Australia (Australian Treasury, 2025; Australian Industry Dept., 2023); in our framework, foreign control can make domestic assets depend on complementary foreign inputs or capabilities. The Dutch intervention in Nexperia followed concerns about transfers of technology and productive assets (Dutch Gov., 2025); in our framework, ownership can shift control over proprietary technology and assets away from domestic production. The U.S. required COSCO to divest the Long Beach Container Terminal under a national security agreement (OOIL, 2019); in our framework, foreign ownership can allocate control over operations and complementary services essential to domestic infrastructure. German prosecutors are investigating whether the attempted liquidation of Gazprom Germania was intended to disrupt Germany's gas supply (German Fed. Prosecutor, 2026); in our framework, foreign owners can reduce the value of domestic assets by withdrawing complementary inputs or disrupting operations.

ownership regulation in the United States. We first describe recent expansions of the U.S. regulatory framework in response to greater perceived geopolitical risk, consistent with the model's prediction. The framework focuses on how foreign ownership affects control over important business decisions, including those involving productive assets and investment, access to and transfer of technology, and the operation of critical infrastructure. The statutory mandate includes evaluating the risks these decisions pose to domestic production needed for national defense. Our model explains why these concerns can motivate ownership regulation: when the decisions themselves are non-contractible, the government can influence them by regulating who controls domestic firms.

We then construct an industry-level dataset of CFIUS filings, which we use as a proxy for the intensity of government scrutiny of foreign ownership. Our empirical analysis relates cross-industry variation in regulatory intensity to observable proxies for defense demand and organizational conflict exposure. Consistent with the model's predictions, regulatory intensity is higher in industries with greater defense demand, higher non-contractible input intensity, and higher knowledge production intensity. Importantly, the association between defense demand and regulatory intensity is stronger in industries with higher non-contractible input intensity or knowledge production intensity. Together, these measures explain 52 percent of the variation in our measure of regulatory intensity across four-digit industries.

**Related Literature.** Our goal is to understand the national-security motivations for regulating foreign ownership of domestic firms. This question relates to a growing geoeconomics literature that studies how economic dependencies affect countries' outside options in geopolitical bargaining and shape economic policy (e.g., Clayton et al., 2023, 2024; Becko and O'Connor, 2024; Kooi, 2024; see Mohr and Trebesch, 2025 for a review). A central insight of this literature is that governments may intervene in production to reduce strategic vulnerabilities by aligning private and social incentives. When the determinants of geopolitical outcomes can be directly targeted, this logic yields a Pigouvian prescription: governments encourage production of goods and services that are more valuable in conflict and discourage production that exposes the country to geopolitical risk. This logic, however, does not by itself explain foreign ownership regulation. As Antràs (2003) emphasizes, understanding where production takes place is not enough. One must also address "the crucial issue of internalization:" why production is organized within firm boundaries rather than through arm's-length relationships. The same distinction is essential for national-security policy. Without a theory of firm boundaries, existing geoeconomic models can explain why governments regulate domestic production, but

not why they regulate who owns domestic firms.[3]

We use the property-rights theory of firm organization to explain why ownership is a distinct margin of national-security policy. Two familiar hold-up problems are central to our analysis. At the "macro" level, the absence of enforceable agreements between countries implies that economic dependencies can affect geopolitical outcomes (Waltz, 1959; McLaren, 1997). At the "micro" level, incomplete contracts give rise to the property-rights theory of the firm, in which ownership allocates residual control rights and shapes incentives to take non-contractible actions (Grossman and Hart, 1986; Hart and Moore, 1990). We study the interaction between these two hold-up problems. The allocation of residual control rights determines which productive assets and knowledge remain under domestic control if domestic and foreign parties separate, and hence the organizational exposure of domestic production to a geopolitical crisis. Thus, ownership structures chosen to address private hold-up also shape the government's outside option in geopolitical bargaining. This interaction creates a wedge between the private and social returns to firm organization that justifies foreign ownership regulation.

Theoretically, we build on the property-rights models of multinational firms in Antràs (2003) and Antràs and Helpman (2004), in which contractual frictions make firms' sourcing and internalization decisions endogenous. In our baseline model, this takes the form of firms' reliance on foreign relationship-specific inputs and assets. The provision of these inputs is non-verifiable, and the inputs become partially unavailable in conflict. The government cannot directly regulate the underlying source of vulnerability, so ownership regulation emerges as a second-best instrument that changes control rights and firm organization.[4] The microfoundation allows us to derive comparative statics that identify the economic characteristics that make foreign ownership more costly and warrant tighter regulation.

Empirically, our theory disciplines the study of foreign ownership regulation in practice. We leverage the model's predictions to explain observed regulation of foreign ownership, a policy outside the scope of geoeconomics models without a theory of the firm. We follow an empirical tradition that uses models of incomplete contracting to connect theoretical mechanisms to observable industry characteristics, as in Nunn (2007), Levchenko (2007), and Nunn and Trefler (2013). In line with our model, we show that U.S. regulatory intensity is higher in sectors with greater exposure to defense demand and contractual frictions, and especially high where these two characteristics coincide.[5]

[3] Antràs (2003) argues that models without an endogenous choice of firm boundaries can explain why firms undertake production abroad but not "why this foreign production will occur within firm boundaries rather than through arm's-length subcontracting or licensing."

[4] Clayton et al. (2023, 2024) emphasize limitations to the government's policy tools, but focus on how these limitations depend on firm location, not its ownership structure.

[5] Our mechanism is also consistent with evidence that relationship-specific inputs can be difficult to replace following production disruptions in the foreign parent's home country (Boehm et al., 2019). Most of the geoeco-

# 2 Optimal Foreign Ownership of Domestic Firms

We start by introducing a model in which international firm boundaries arise from contractual frictions between suppliers of relationship-specific inputs, as in Antràs (2003) and Antràs and Helpman (2004). Domestic producers initially own domestic firms, but may find it optimal to transfer ownership to foreign partners given these frictions. Although contractual frictions make foreign ownership consequential for the firm's production decisions, they do not by themselves create a role for foreign ownership regulation. If the government is subject to the same contractual constraints as domestic producers, it cannot improve on the equilibrium structure of firm ownership. We rely on a simple model to establish our main insights. Section 3.3 shows that results also hold with more general preferences and technologies.

## 2.1 Environment

We consider a small open economy, the domestic country, with a representative household and a continuum of competitive firms producing homogeneous non-traded goods.

**Representative Household.** The representative household inelastically supplies $L$ units of labor and derives utility from consuming homogeneous goods, $q_g$ for $g \in \{0, 1, \ldots, G\}$:

$$U = q_0 + \sum_{g=1}^{G} \frac{\sigma_g}{\sigma_g - 1} (q_g)^{\frac{\sigma_g - 1}{\sigma_g}}, \tag{1}$$

where $\sigma_g > 1$ is the elasticity of demand for good $g$.

**Production of the tradable final good, $g = 0$.** Good 0 is freely traded internationally and produced competitively using only domestic labor under a linear technology, $y_0 = l_0$. Free trade in good 0 pins down the domestic wage and makes it the numéraire.

**Production of non-tradable final goods, $g \in \{1, \ldots, G\}$.** Other goods are homogeneous and non-traded. For each $g$, the representative household owns a unit mass of competitive domestic producers. Each domestic producer initially owns a unique production blueprint, $i \in [0, 1]$, that

nomics literature studies optimal policy without explicit military considerations; exceptions include Kooi (2024) and Alekseev and Lin (2026). Incorporating military considerations allows us to account for the evidence that defense demand is a central determinant of foreign ownership regulation.

yields a production function with decreasing returns to scale:

$$y_g(i) = \left[ \left(k_g(i)\right)^{\eta_g^k} \left(m_g(i)\right)^{\eta_g^m} \right]^{\psi_g}, \tag{2}$$

where $m_g(i)$ and $k_g(i)$ are blueprint-specific inputs.

This production structure has two key features. First, $\psi_g \in (0,1)$ governs decreasing returns to scale at the firm level. Second, $\eta_g^k \in (0,1)$ controls the relative importance of the two types of blueprint-specific inputs, with $\eta_g^m + \eta_g^k = 1$.

**Production of blueprint-specific inputs.** Each blueprint relies on specific inputs whose provision requires non-verifiable actions by specialized suppliers. These inputs are produced with linear technologies using labor. The underlying actions may involve investments in tangible and intangible capital or specialized tasks of labor that are tailored to the production blueprint. For each blueprint, the domestic producer that initially owns the blueprint supplies the specialized input $m$. This input is not internationally tradable and its domestic production entails a marginal cost of $c_{g,D}^m$. In contrast, the input $k$ can be sourced from a continuum of potential specialized suppliers in either the domestic country, $\ell = D$, or the foreign country, $\ell = F$. Within each country, suppliers are ex-ante identical and produce $k$ at a marginal cost of $c_{g,\ell}^k$.

**Government.** The government designs regulatory policy and produces defense services. National defense requires purchasing an exogenous amount $d_g$ of each good $g \in \{1, ..., G\}$. The government designs policy under the same contractual frictions faced by firms. It sets revenue-neutral wedges only on variables that are contractible to private agents. The next section describes these contractual restrictions in detail.

## 2.2 Contractual Frictions and Firm's Organization Choices

We now describe the contractual frictions faced by firms and the government. Figure 1 summarizes the timing of the decisions in the model.

**Figure 1:** Timing of decisions

| **Stage 0** | | **Stage 1** | | **Stage 2** | | **Stage 3** | | **Stage 4** |
|---|---|---|---|---|---|---|---|---|
| Government's regulation choice | → | Firm's organization choice | → | Firm's operating contract choice | → | Suppliers' non-verifiable actions | → | Suppliers' bargaining and production |

**Stage 0.** The government sets the regulatory wedges on firms' contractible decisions.

**Stage 1.** The domestic producer, which initially owns the blueprint and supplies $m$, selects the firm's organization mode, $(o, \ell)$. It makes a take-it-or-leave-it offer to a specialized supplier of $k$ located in country $\ell \in \{D, F\}$. The domestic producer can retain ownership of the blueprint and operate at arm's length, $o = A$, or sell the blueprint to the specialized supplier of $k$ and operate as a vertically integrated subsidiary, $o = V$. Each organizational mode entails a blueprint-specific fixed cost. If the specialized supplier rejects the offer, it obtains its non-production payoff of zero. If it accepts, the parties move to the next stage.

**Stage 2.** The blueprint owner chooses the firm's operating contract given contractual frictions and regulatory wedges. It makes two choices. First, it chooses a revenue-contingent payment to be divided between the suppliers of $k$ and $m$. This payment can depend on observable revenue but not on the non-verifiable actions determining the separate provision of $k$ and $m$. Second, it specifies an upfront transfer between the parties to ensure participation, given that either party can reject the contract and obtain its non-production payoff of zero.

**Stage 3.** Suppliers non-cooperatively choose the non-verifiable actions that determine the provision of $k$ and $m$. In doing so, each party takes into account its payoff in ex-post bargaining given the other party's input provision.

**Stage 4.** Suppliers Nash bargain over the division of the revenue-contingent payment. If bargaining succeeds, they deliver their inputs and production takes place. If bargaining breaks down, each party exercises its residual control rights over the firm's blueprint and inputs to produce on its own. The ownership structure affects the allocation of residual control rights between the two parties.

We solve next for the firm's problem backwards. We then solve for the government's optimal regulation. Appendix A.1 contains all formal derivations.

### 2.2.1 Suppliers' Bargaining Outcomes

In stage 4, suppliers Nash bargain over firm payments given their outside options. Following Grossman and Hart (1986) and Hart and Moore (1990), ownership matters because it determines residual control rights when contracts are incomplete. These rights determine the productive assets and knowledge that each party can retain and use if bargaining breaks down.

Following Antràs (2003) and Antràs and Helpman (2004), we summarize residual control rights by the fraction of the firm's output under agreement that each party can generate on its own following disagreement. Under ownership structure $o \in \{A, V\}$, let $\delta^k_{g,o}$ and $\delta^m_{g,o}$ denote these fractions for the suppliers of $k$ and $m$, respectively. Ownership gives the blueprint owner stronger residual control rights and, hence, a stronger outside option. Formally, we impose that $\delta^k_{g,V} \geq \delta^k_{g,A}$ and $\delta^m_{g,V} \leq \delta^m_{g,A}$, with at least one strict inequality and $\delta^k_{g,o} + \delta^m_{g,o} < 1$.

The parties Nash bargain over the division of the joint payment to non-contractible inputs. If bargaining breaks down, party $a$'s outside option corresponds to a fraction $\delta^a_{g,o}$ of the firm's joint payment.[6] Thus, party $a$'s payment share is

$$\beta^a_{g,o} = \delta^a_{g,o} + \beta^a_g(1 - \delta^k_{g,o} - \delta^m_{g,o}), \qquad a \in \{m, k\}, \tag{3}$$

where $\beta^a_g \in (0, 1)$ is party $a$'s bargaining weight, with $\beta^k_g + \beta^m_g = 1$.

Vertical integration increases the payment share accruing to the supplier of $k$, whereas arm's length increases the share accruing to the supplier of $m$:

$$\beta^k_{g,V} > \beta^k_{g,A} \qquad \text{and} \qquad \beta^m_{g,V} < \beta^m_{g,A}. \tag{4}$$

**Microfoundations of residual control rights.** Appendix A.2 provides three microfoundations for these disagreement-output shares based on residual control rights over (i) tangible and intangible productive assets and inputs, (ii) the firm's proprietary technology, and (iii) non-verifiable actions following disagreement. In the first case, ownership affects which productive assets and inputs each party can use after a breakup. In the second, it affects each party's ability to retain or replicate the firm's technology on its own. In the third, it determines which party can take a non-verifiable action that reduces the productive resources available to the other party and its disagreement output.

### 2.2.2 Suppliers' Non-Contractible Input Provision

In stage 3, suppliers decide non-verifiable actions that determine input provision. In our model, these choices are identical for all firms that select the same organization mode. To simplify notation, we then index firms only by $(o, \ell)$.

[6] We interpret the revenue-contingent payment as a court-enforceable contract based on observable revenue and backed by funds committed before suppliers take their non-verifiable actions. If bargaining succeeds, the payment depends on joint revenue. If bargaining breaks down, each party produces separately and its revenue is observable, so the same payment schedule applies. Since party $a$ produces a fraction $\delta^a_{g,o}$ of agreement output on its own, its disagreement payment is the same fraction of the joint production payment. We implement this commitment through a guaranteed escrow account, as detailed in Appendix A.1.

Each supplier chooses its input taking as given: (i) the other supplier's input choice; (ii) the domestic good price; (iii) the firm's revenue-contingent payment; and (iv) the government's regulatory revenue wedge. Thus, $k_{g,o\ell}$ and $m_{g,o\ell}$ solve

$$k_{g,o\ell} = \arg\max_{k} \left\{ \beta^{k}_{g,o} s_{g,o\ell} (p_g - \tau^{R}_{g,o\ell}) \left( (k)^{\eta^{k}_{g}} (m_{g,o\ell})^{\eta^{m}_{g}} \right)^{\psi_g} - c^{k}_{g,\ell} k \right\},$$
$$m_{g,o\ell} = \arg\max_{m} \left\{ \beta^{m}_{g,o} s_{g,o\ell} (p_g - \tau^{R}_{g,o\ell}) \left( (k_{g,o\ell})^{\eta^{k}_{g}} (m)^{\eta^{m}_{g}} \right)^{\psi_g} - c^{m}_{g,D} m \right\}.$$

where $p_g$ is the good price, $s_{g,o\ell}$ is the revenue multiplier that the firm's contract specifies for the joint payments for input suppliers, and $\tau^{R}_{g,o\ell}$ is the revenue wedge that the government specifies for firms with organization mode $(o, \ell)$.

The solution to this system yields the restriction that contractual frictions impose on the firm's relative input use:

$$\frac{k_{g,o\ell}}{m_{g,o\ell}} = \frac{\beta^{k}_{g,o}}{\beta^{m}_{g,o}} \frac{\eta^{k}_{g}}{\eta^{m}_{g}} \frac{c^{m}_{g,D}}{c^{k}_{g,\ell}}. \tag{5}$$

Expression (5) highlights two features. First, ex post bargaining distorts the firm's relative composition of non-contractible inputs. Under full contractibility, both inputs would receive their marginal revenue products, and the input ratio would depend only on technological intensity and relative marginal costs. Under incomplete contracting, relative input use is efficient if and only if $\beta^{k}_{g,o} = \beta^{m}_{g,o}$. When $\beta^{k}_{g,o}$ is higher—as under vertical integration—firms rely more heavily on $k$. Second, the firm's revenue-contingent payment does not affect relative input use, but it proportionally affects input provision by both parties.

### 2.2.3 Firm's Operating Contract Choice

In stage 2, the blueprint owner chooses the firm's operating contract to maximize its payoff. The contract specifies a transfer to the non-owner as well as the revenue multiplier of payments to non-contractible inputs. These contractual instruments lead to a simple primal problem in which the blueprint owner maximizes the firm's profit subject to the technological constraint in (2) and the bargaining implementability constraint in (5).

Consider first the transfer that guarantees the non-owner's participation in the relationship. At this stage, the non-owner is free to leave the relationship before any costly action has been taken. The owner therefore offers the exact amount that leaves the non-owner indifferent between staying in the relationship and receiving its non-production payoff of zero. If the firm wants to induce input provision from the non-owner, it makes a take-it-or-leave-it offer that compensates the non-owner for its input cost net of the share of the revenue-contingent

payment it receives after bargaining.

Having guaranteed participation, the blueprint owner can use $s_{g,o\ell}$ to induce any scale of non-contractible input provision consistent with the relative input use implied by ex-post bargaining. As discussed above, $s_{g,o\ell}$ controls the scale of non-contractible input provision, but not its composition. The firm can therefore choose the scale of non-contractible inputs to generate any scale of production consistent with (2) and the input ratio in (5).

Accounting for both the participation transfer and the revenue-contingent payment, the owner chooses the firm's operating allocation to maximize surplus under the regulatory wedges. Given the firm's organization mode, this problem is

$$\begin{aligned}(y_{g,o\ell}, k_{g,o\ell}, m_{g,o\ell}) \in \arg\max_{y,k,m} \quad & (p_g - \tau^R_{g,o\ell})y - c^k_{g,\ell}k - c^m_{g,D}m \\ \text{subject to} \quad y = \left[(k)^{\eta^k_g}(m)^{\eta^m_g}\right]^{\psi_g} \quad & \text{and} \quad \frac{k}{m} = \frac{\beta^k_{g,o}}{\beta^m_{g,o}}\frac{\eta^k_g}{\eta^m_g}\frac{c^m_{g,D}}{c^k_{g,\ell}}.\end{aligned} \tag{6}$$

### 2.2.4 Firm's Organization Choice

In stage 1, the domestic producer owns the firm's blueprint and chooses its organization mode. Each mode entails a fixed cost in terms of domestic labor, denoted by $\epsilon_{g,o\ell}(i)$. Each domestic producer draws the vector $\{\epsilon_{g,o\ell}(i)\}_{o,\ell}$ from a distribution with full support, $F_g$.

Given the organization mode, the subsequent stages generate a payoff of $\pi_{g,o\ell} - \tau^O_{g,o\ell} - \epsilon_{g,o\ell}(i)$, where $\pi_{g,o\ell}$ is the firm's profit and $\tau^O_{g,o\ell}$ is the organization wedge. If the domestic producer retains ownership, she obtains profits under $o = A$. If instead she sells the blueprint to the supplier of $k$, she obtains profits under $o = V$, since the largest transfer accepted by the supplier is $\pi_{g,V\ell}$ given the non-production payoff of zero at this stage. Given the distribution of fixed costs, the share of firms that select mode $(o, \ell)$ is

$$P_{g,o\ell} = \Pr\left((o,\ell) = \arg\max_{o',\ell'}\left\{\pi_{g,o'\ell'} - \tau^O_{g,o'\ell'} - \epsilon_{g,o'\ell'}\right\}\right), \tag{7}$$

where $\pi_{g,o\ell} = p_g y_{g,o\ell} - c^k_{g,\ell}k_{g,o\ell} - c^m_{g,D}m_{g,o\ell}$. Note that the revenue wedge has no direct effect on profits and affects them only indirectly through firms' decisions.[7]

[7]The revenue wedge can be implemented as a mode-specific tax on output together with a lump-sum rebate that offsets its direct effect on profits at the implemented allocation. In particular, the government sets a mode-specific neutralizing rebate such that $\tau^N_{g,o\ell} = \tau^R_{g,o\ell}y_{g,o\ell}$. The rebate is fixed from the firm's perspective and does not affect its production decisions. The government rebates any net revenue from the organization wedges through a lump-sum transfer that is independent of the firm's chosen mode and therefore does not affect organization choices. This reflects the well-known fact that many different policy instruments can decentralize a given allocation. Implementation through revenue-neutral wedges is common in the macroprudential policy literature (see, e.g., Costinot et al., 2014; Farhi and Werning, 2016). These wedges have a direct mapping to the economic

## 2.3 Competitive Equilibrium

We are now ready to define the competitive equilibrium in our model.

**Final demand.** The representative household's utility maximization problem and budget constraint imply final demand:

$$q_0 = E - \sum_{g=1}^{G} p_g^{1-\sigma_g}, \qquad q_g = p_g^{-\sigma_g} \quad \forall g \in \{1, \ldots, G\}, \tag{8}$$

where $E$ denotes aggregate income after taxes.

**Income and taxes.** The government finances its defense purchases with a lump-sum tax:

$$T = \sum_{g=1}^{G} p_g d_g. \tag{9}$$

The representative household supplies domestic labor and owns all domestic producers that initially hold the production blueprints. Hence, aggregate income is

$$E = L + \sum_{g,o,\ell} P_{g,o\ell} \pi_{g,o\ell} - \sum_{g=1}^{G} \Omega_g(\mathbf{P}_g) - T. \tag{10}$$

where $\Omega_g(\mathbf{P}_g)$ is the aggregate domestic labor cost of the idiosyncratic organization fixed costs implied by the vector of organization-mode shares $\mathbf{P}_g \equiv \{P_{g,o\ell}\}$.[8]

**Market clearing.** For each non-traded good $g \in \{1, \ldots, G\}$, the domestic price $p_g$ is determined by domestic market clearing:

$$q_g + d_g = y_g \equiv \sum_{o,\ell} P_{g,o\ell} y_{g,o\ell}, \tag{11}$$

where $y_g$ is domestic output of good $g$.

We assume that labor supply is sufficiently large so that the domestic country produces a

incentives faced by firms, which simplifies exposition and comparative statics.

[8] More formally, $\Omega_g(P_g)$ denotes the minimum aggregate organizational fixed cost associated with implementing the vector of organization-mode shares $\mathbf{P}_g$ given the distribution $F_g$.

strictly positive amount of good 0. Labor-market clearing therefore implies

$$y_0 = L - \sum_{g,o,\ell} P_{g,o\ell} c^m_{g,D} m_{g,o\ell} - \sum_{g,o} P_{g,oD} c^k_{g,D} k_{g,oD} - \sum_g \Omega_g(\mathbf{P}_g). \tag{12}$$

The demand for good 0 in (8) and the aggregate income in (9)–(10) imply that trade is balanced in equilibrium: exports of good 0 are equal to payments to foreign suppliers,

$$y_0 - q_0 = \sum_{g,o} P_{g,oF} c^k_{g,F} k_{g,oF}. \tag{13}$$

**Definition** We define a competitive equilibrium from the domestic perspective, summarizing foreign input requirements by their cost in units of the numeraire good.

**Definition 1.** *Given wedges* $\{\tau^R_{g,o\ell}, \tau^O_{g,o\ell}\}$ *and defense demand* $\{d_g\}$*, a competitive equilibrium consists of prices and quantities such that (i) firms' production and organization decisions satisfy* (6)–(7)*, (ii) the household demand satisfies* (8)*, (iii) the lump-sum tax satisfies* (9)*, (iv) aggregate income satisfies* (10) *and (v) markets clear according to* (11)–(13)*.*

## 2.4 Constrained Efficiency of International Firm Boundaries

This section establishes that the competitive equilibrium is constrained efficient. That is, given the same contractual frictions faced by private agents, the government cannot raise aggregate welfare using policy instruments that depend only on contractible outcomes. Using market clearing, the representative household's utility can be written as

$$U = L + \sum_{g=1}^{G} \left( \frac{\sigma_g}{\sigma_g - 1} (y_g - d_g)^{\frac{\sigma_g - 1}{\sigma_g}} - \sum_{o,\ell} P_{g,o\ell} (c^m_{g,D} m_{g,o\ell} + c^k_{g,\ell} k_{g,o\ell}) - \Omega_g(\mathbf{P}_g) \right). \tag{14}$$

At stage 0, the government chooses allocations subject to the same contractual constraints that determine firms' input choices. In particular, because non-contractible inputs are chosen under ex post bargaining, feasible allocations must satisfy the equilibrium input ratio (5). The government's problem is therefore

$$\begin{aligned} \max_{\{P_{g,o\ell}, y_{g,o\ell}, k_{g,o\ell}, m_{g,o\ell}\}} U \quad \text{subject to} \quad & \sum_{o,\ell} P_{g,o\ell} = 1, \quad \frac{k_{g,o\ell}}{m_{g,o\ell}} = \frac{\beta^k_{g,o}}{\beta^m_{g,o}} \frac{\eta^k_g}{\eta^m_g} \frac{c^m_{g,D}}{c^k_{g,\ell}}, \\ & y_{g,o\ell} = \left[ (k_{g,o\ell})^{\eta^k_g} (m_{g,o\ell})^{\eta^m_g} \right]^{\psi_g}. \end{aligned} \tag{15}$$

Appendix A.4 shows that the solution to this problem coincides with the competitive equi-

librium when $\tau^R_{g,o\ell} = \tau^O_{g,o\ell} = 0$, which establishes the following result.

**Proposition 1.** *Without geopolitical considerations, the competitive equilibrium is constrained efficient. It is optimal for the government to set*

$$\tau^R_{g,o\ell} = \tau^O_{g,o\ell} = 0. \tag{16}$$

The proposition implies that there is no role for policy in this benchmark economy without geopolitical considerations. When the government and firms face the same contractual frictions, private agents choose organizational modes efficiently given contractual constraints. Intuitively, because policy cannot be made contingent on the composition of non-contractible inputs, the government cannot directly undo the "micro" distortion in firms' relative input use induced by ex post bargaining.

**Alternative contractual structure.** Constrained efficiency depends crucially on the assumption that both firms and the government can write contracts contingent on revenue. If firms cannot condition payments on revenue (i.e., $s_{g,o\ell} = 1$ as in Antràs and Helpman (2004)) while the government can, then it is optimal to use revenue wedges to correct the standard underinvestment distortion implied by ex post bargaining: $p_g - \tau^R_{g,o\ell} = p_g(\eta^k_g \beta^k_{g,o} + \eta^m_g \beta^m_{g,o})^{-1}$. Note that policy does not depend on supplier location, since it does not affect the degree of underinvestment implied by ex post bargaining.

# 3 Geopolitical Motive for Foreign Ownership Regulation

In this section, we extend the model to incorporate a geopolitical hold-up problem in which the Domestic country can be coerced through the threat of conflict, as in Kooi (2024). This generates a motive for the government to intervene in international firm boundaries, even when it faces the same firm-level contractual frictions as private agents. As before, the hold-up problem arises from incomplete contracting. Here, however, the friction reflects the absence of an authority above the nation-state capable of enforcing international agreements.

## 3.1 Geopolitical Bargaining Game

We introduce geopolitical bargaining into the environment of Section 2. The timing and contractual structure remain unchanged, except for an additional geopolitical stage between suppliers' non-verifiable actions in Stage 3 and their ex-post bargaining and production in Stage 4.

**Stage G.** With probability $1-\theta$, no geopolitical crisis occurs and the economy proceeds to Stage 4 as described in Section 2. With probability $\theta$, a geopolitical crisis occurs in which the Foreign government attempts to coerce the Domestic government. The Foreign government makes a take-it-or-leave-it demand for a transfer of traded good 0. If the Domestic government accepts, Peace prevails and the economy proceeds to Stage 4. If it rejects, the countries enter Conflict. Conflict raises the Domestic government's defense demand from $d_g$ to $d_g^C$, with $d_g^C > d_g$. Given firms' organization choices, Conflict also affects domestic production, which goes from $y_{g,o\ell}$ to $y_{g,o\ell}^C$, with $y_{g,o\ell}^C \leq y_{g,o\ell}$.[9]

**Conflict output.** Conflict terminates the relationship between the domestic and foreign parties. As a baseline, we assume that the allocation of ownership rights that shapes the parties' private disagreement payoffs also affects which productive assets and knowledge remain available to domestic producers in Conflict. This assumption is most natural when de jure ownership also confers de facto control.

Because Stage G occurs after suppliers take their non-verifiable actions in Stage 3, there is no additional input choice in Conflict. We define the fraction of Peace output that can be produced in Conflict by

$$\Delta_{g,o\ell} \equiv \frac{y_{g,o\ell}^C}{y_{g,o\ell}}. \tag{17}$$

We refer to $1-\Delta_{g,o\ell}$ as the organizational conflict exposure. Two features of this structure are relevant for our purposes. First, firms with domestic suppliers retain all their output in Conflict, whereas firms with foreign suppliers lose a share $1-\Delta_{g,oF}$ of their output. Second, ownership affects this loss through the allocation of residual control rights. Relative to arm's-length sourcing, vertical integration shifts control toward the foreign owner and leaves less output under the control of domestic producers in Conflict.[10] Thus,

$$\Delta_{g,VF} \leq \Delta_{g,AF} < 1 = \Delta_{g,VD} = \Delta_{g,AD}. \tag{18}$$

[9] For simplicity, we assume that defense demand does not depend on firms' organization choices. In Appendix A.2, we show that foreign ownership may facilitate military technology transfer or sabotage actions, which may affect national defense during Conflict. We incorporate such a mechanism below by extending our model to allow defense demand to depend on foreign ownership shares in military-intensive goods. To generate finite transfers in equilibrium, we also assume that defense demand is lower than output so that private consumption remains positive in Conflict.

[10] To simplify exposition, we assume that $\Delta_{g,o\ell}$ is fixed conditional on the sector and organization mode. Input choices affect the level of Conflict output, but not the fraction of Peace output retained in Conflict. Section 3.3 relaxes this restriction by allowing $\Delta_{g,o\ell}$ to depend on the firm's non-contractible input choices. In that setting, $\Delta_{g,o\ell}$ depends on the input ratio chosen by the firm under each organization mode. In particular, because foreign-owned firms rely more on foreign non-contractible inputs, they have higher organizational conflict exposure. This extension preserves the main insights but complicates the analysis.

Intuitively, organizational exposure depends on the productive resources and capabilities that remain available domestically after separation in Conflict. Appendix A.3 relates $\Delta_{g,o\ell}$ to the three microfoundations for suppliers' bargaining outcomes. If the government respects the same property rights in Conflict as in private disagreement, then it is natural to assume that $\Delta_{g,oF} = \delta^m_{g,o}$. However, the government may override foreign property rights in a geopolitical conflict. In this case, the capacity to change legal ownership may not fully transfer the effective control that accompanies ownership or the capabilities required for production. In the asset microfoundation, taking possession of domestic plant and machinery need not recover the tacit knowledge or implementation capabilities withheld by prior foreign owners. In the technology microfoundation, transferring ownership may not prevent the foreign owner from rapidly moving essential blueprints or data abroad before Domestic can secure access to them. In the sabotage microfoundation, a foreign owner acting under pressure from its government may use its operational access to disable productive resources before Domestic can secure them.[11]

In these cases, expropriation in Conflict need not undo the consequences of prior foreign control for domestic production. The domestic government may also have limited ability to deter such behavior through ex-post punishment. Limited liability and enforcement constraints can restrict the penalties collected from foreign owners, while foreign state pressure may outweigh their deterrent effect. In Appendix A.3, we formalize a case in which this pressure induces the foreign owner to act to reduce domestic production in Conflict, despite the penalties the Domestic government can impose or the rewards it can offer for refusal.

### 3.1.1 Geopolitical Bargaining Outcome

In equilibrium of the geopolitical ultimatum game, the Foreign government demands the largest transfer that the Domestic government is willing to accept in order to remain in Peace. Such a transfer leaves the Domestic government indifferent between Peace and Conflict. The Domestic government accepts the offer, and the equilibrium geopolitical outcome is Peace.

Let $y^C_g$ denote domestic output of good $g$ in Conflict, while $y_g$ denotes output in Peace. The equilibrium transfer is

$$\mathcal{T} = \sum_{g=1}^{G} \frac{\sigma_g}{\sigma_g - 1} \left[ (y_g - d_g)^{\frac{\sigma_g - 1}{\sigma_g}} - (y^C_g - d^C_g)^{\frac{\sigma_g - 1}{\sigma_g}} \right]. \tag{19}$$

The transfer captures the utility loss generated by Conflict. This loss arises both from the

[11] These mechanisms correspond to the examples discussed in the introduction. The asset mechanism captures dependence on foreign-controlled productive capabilities, as in Northern Minerals and Long Beach; the technology mechanism captures the potential loss of domestic technological capabilities, as in Nexperia; and the sabotage mechanism captures the use of foreign control to disrupt domestic production, as in Gazprom Germania.

production disruption caused by the termination of relationships with foreign parties and from the increase in defense demand. Conditional on firms' choices, the international transfer affects welfare through the lower consumption of good 0.[12]

The ultimatum game gives rise to national security concerns about reliance on foreign non-contractible inputs. When selecting their organization modes, firms take as given the geopolitical outcome. Because Conflict does not occur in equilibrium, firms solve the same problems described in Section 2. However, firms' choices determine domestic consumption in the event of Conflict and therefore the equilibrium international transfer in (19). Firms do not internalize how their decisions affect geopolitical bargaining, creating a wedge between the private and social returns to different organization modes. Resilience to Conflict has value even though Conflict never materializes in equilibrium: a stronger outside option reduces the concessions required to preserve Peace.

## 3.2 National-Security Concerns and International Firm Boundaries

We return to the government's problem of designing economic policy, now accounting for the outcome of geopolitical negotiations. The government internalizes the expected utility cost of the international transfer, $\theta\mathcal{T}$, with $\mathcal{T}$ given by (19). Because this transfer depends on the Domestic government's outside option, the government also internalizes how firms' organization and production decisions affect output in Conflict through $\Delta_{g,o\ell}$. The government's problem is

$$\begin{aligned}\max_{\{P_{g,o\ell},y_{g,o\ell},k_{g,o\ell},m_{g,o\ell},y^C_{g,o\ell}\}} U-\theta\mathcal{T} \quad \text{subject to} \quad \sum_{o,\ell} P_{g,o\ell}=1, \quad \frac{k_{g,o\ell}}{m_{g,o\ell}}=\frac{\beta^k_{g,o}}{\beta^m_{g,o}}\frac{\eta^k_g}{\eta^m_g}\frac{c^m_{g,D}}{c^k_{g,\ell}},\\ y_{g,o\ell}=\left[\left(k_{g,o\ell}\right)^{\eta^k_g}\left(m_{g,o\ell}\right)^{\eta^m_g}\right]^{\psi_g}, \quad \text{and} \quad y^C_{g,o\ell}=\Delta_{g,o\ell}y_{g,o\ell}.\end{aligned} \tag{20}$$

The government faces both "micro" and "macro" contractual frictions. As in Section 2, it cannot freely choose the non-contractible input composition and must respect the ratio of $k$ to $m$ generated by ex-post bargaining between suppliers. In addition, geopolitical bargaining makes the government value firms' off-equilibrium output in Conflict. Firm organization affects the international transfer through its impact on Conflict output, given by $\Delta_{g,o\ell}$. For each good $g$, the social value of changes in Conflict output is summarized by the marginal value of consumption

[12] Transfers made before Stage G are sunk, while funds backing revenue-contingent payments have already been committed through the escrow arrangement in Section 2. We assume that these committed funds are not released for domestic consumption in Conflict. If Conflict instead releases resources associated with contractual payments that have not yet been made, these resources would enter the Domestic government's Conflict payoff and reduce the equilibrium transfer.

in Conflict,

$$p_g^C = \left(y_g^C - d_g^C\right)^{-1/\sigma_g}. \tag{21}$$

Note that $p_g < p_g^C < \infty$, since our framework entails $y_g - d_g > y_g^C - d_g^C > 0$.

Appendix A.4 establishes the following proposition characterizing the optimal regulatory wedges under geopolitical bargaining.

**Proposition 2.** *With geopolitical considerations, the competitive equilibrium is inefficient. It is optimal for the government to set*

$$\tau_{g,o\ell}^R = \bar{\tau}_{g,o\ell}^O = \theta(p_g - p_g^C) + \theta p_g^C(1 - \Delta_{g,o\ell}), \tag{22}$$

*where* $\bar{\tau}_{g,o\ell}^O \equiv \tau_{g,o\ell}^O / y_{g,o\ell}$.

The first component of the optimal wedge, $\theta(p_g - p_g^C) < 0$, reflects the incentive to subsidize production of goods that become scarcer in Conflict. The subsidy accounts for the value of production in improving the Domestic government's outside option, which private firms do not internalize. This force is independent of firm organization. For instance, higher defense demand reduces private consumption in Conflict, raises $p_g^C$, and strengthens the incentive to expand production. This is the standard Pigouvian logic emphasized in the geoeconomics literature, in which policy encourages higher domestic production of goods that improve the country's outside option in geopolitical bargaining (e.g., Clayton et al., 2023, 2024; Becko and O'Connor, 2024; Kooi, 2024).

The second component, $\theta p_g^C(1 - \Delta_{g,o\ell})$, arises from the impact of firm organization on output in Conflict. The wedge is larger for modes with greater output losses in Conflict (i.e., smaller $\Delta_{g,o\ell}$), since these are precisely the modes that exacerbate scarcity in Conflict. The government has a stronger incentive to discourage organizational modes that expose domestic production to larger losses following the termination of foreign relationships in Conflict. Given (18),

$$\bar{\tau}_{g,VF}^O \geq \bar{\tau}_{g,AF}^O > \bar{\tau}_{g,VD}^O = \bar{\tau}_{g,AD}^O.$$

Firms with foreign suppliers face a larger wedge than firms with domestic suppliers. In addition, because vertical integration reduces output under domestic control in Conflict, national security concerns lead to tighter regulation of foreign ownership.

Taken together, these wedges expand production of goods that are especially valuable in Conflict and reallocate production toward organizational modes that are less exposed to geopolitical risk. By improving the Domestic government's outside option, they reduce the equilibrium international transfer in a crisis and help align the private and social values of foreign sourcing and ownership.

## 3.3 Extensions

We now turn to extensions of our model. We give a brief summary in the main text, with details in Appendix A.5.

**Additional wedges.** In the baseline model, the government cannot directly regulate non-contractible input use, as in the literature following Hart and Moore (1990) and Antràs (2003). In this extension, we instead allow the government to set a regulatory wedge on the domestic input $m$ that can vary with the firm's organizational mode, $\tau^m_{g,o\ell}$.[13] This is a purely illustrative thought experiment, as it allows the government to condition policy on inputs that private parties cannot contract upon.

The additional instrument does not eliminate the motive for foreign ownership regulation when ownership determines exposure in Conflict. While it allows the government to correct the distortion in relative input use in Peace, it does not change the residual control rights that determine which resources remain available when domestic and foreign parties separate in Conflict. Organizational exposure therefore remains ownership-dependent, and the organizational wedge retains the same form as in Proposition 2.

**Generalized technology and preferences.** Our baseline model features a simple economic environment designed to isolate the key role of contractual frictions in shaping firm boundaries and foreign ownership regulation. It is useful, however, to understand how optimal policy changes under more general technologies and preferences. Accordingly, we extend the model to allow for an input-output network, additional factors of production that can be reallocated conditional on the geopolitical outcome, and more general demand and production structures. We also allow both preferences and technologies to depend directly on the geopolitical outcome in order to capture a broad range of supply and demand shocks in Conflict. In this extension, we take bargaining shares as exogenous and allow for a general backup technology in Conflict. Accordingly, the fraction of Peace output retained in Conflict depends on input choices, which yields higher exposure for foreign-owned firms because of their higher dependence on foreign non-contractible inputs. We maintain quasi-linear preferences and exogenous foreign input prices to shut down terms-of-trade motives for ownership regulation.

We show that our wedges generalize in a natural way. The revenue wedge remains a close analogue of (22), but the retained output share $\Delta_{g,o\ell}$ is multiplied by $d \ln y^C_{g,o\ell} / d \ln y_{g,o\ell}$. This elasticity captures how Conflict output responds to an increase in Peace output. Because of the

[13] Alternatively, we could allow wedges on all input choices, as in Kooi (2024). With two inputs, the revenue wedge and the wedge on $m$ suffice to implement any positive input allocation within a given organizational mode, making a separate wedge on $k$ redundant.

general backup technology in Conflict, it does not need to be equal to one or admit a closed-form expression in primitive parameters. The organizational wedge depends on the change in the firm's revenue net of costs with flexible inputs and factors. In the baseline model, this additional cost channel is absent because inputs cannot be reallocated during Conflict.

**Appropriation and endogenous defense demand.** In our baseline model, reliance on foreign parties can reduce domestic production in Conflict but does not confer a military advantage on Foreign. In practice, however, an adversary may become stronger when it gains control over productive resources or technology. To capture this mechanism, we extend the geopolitical framework to allow Foreign to use resources and capabilities lost by Domestic to gain a military advantage, which increases Domestic defense requirements in Conflict. Specifically, we assume that the increase in defense demand is proportional to the domestic output loss associated with reliance on foreign parties.

This extension introduces an additional component into regulatory wedges associated with foreign ownership. Organization choices not only determine domestic output in Conflict, but also affect the resources required for defense. Accordingly, both forces affect optimal organziational wedges. Because the increase in defense requirements is proportional to firm output, the revenue wedge and the organization wedge per unit of output remain equal and retain their baseline structure, with an additional component reflecting the social value of defense demand.

# 4 Determinants of Foreign Ownership Regulation

In this section, we use our baseline model to analyze the determinants of foreign ownership regulation. We first study how regulation responds to an increase in geopolitical risk. We then characterize how regulation varies across goods depending on their defense demand and organizational conflict exposure.

To isolate the role of firm organization in national security policy, we consider a special case in which all organization modes have the same marginal-cost function. This assumption abstracts from differences in variable production costs across organization modes, while allowing them to differ in their implications for output in Conflict.[14]

**Assumption 1.** *Within each sector, all organization modes have the same marginal-cost function.*

Given Assumption 1, we present comparative statics of optimal regulation, with proofs in Appendix A.6. We focus on relative wedges across organization modes, which isolate the dif-

[14] In Appendix A.6.1, we show that this assumption follows from a natural symmetric benchmark in our model: $\eta_g^m = \eta_g^k$, $c_{g,D}^m = c_{g,D}^k = c_{g,F}^k$, and $\beta_{g,V}^k = \beta_{g,A}^m$. Under these conditions, changes in ownership alter the composition of non-contractible inputs but not the marginal cost of production.

ferential regulatory incentives associated with firm organization. This removes the component of the optimal wedge that is common across modes, $\theta(p_g - p_g^C)$, and thus isolates the effect of organizational exposure on optimal regulation. Defining $\tau_{g,o\ell} \equiv \bar{\tau}^O_{g,o\ell} = \tau^R_{g,o\ell}$, equation (22) implies that

$$\tau_{g,o\ell} - \tau_{g,o'\ell'} = \theta p_g^C(\Delta_{g,o'\ell'} - \Delta_{g,o\ell}). \tag{23}$$

## 4.1 Geopolitical Risk

Our first set of comparative statics studies how geopolitical risk affects foreign ownership regulation. In the model, the parameter $\theta$ captures geopolitical risk through the probability of a crisis that triggers international bargaining between governments. It can be interpreted as the likelihood of geopolitical disputes that allow foreign countries to coerce the Domestic country. As $\theta$ increases, we move from a relatively stable environment to one in which geopolitical crises are perceived to be more frequent. The following proposition shows how geopolitical risk affects optimal policy.

**Proposition 3.** *Under Assumption 1, $\theta p_g^C$ is strictly increasing in $\theta$. If $\Delta_{g,VF} < \Delta_{g,AF}$, then*

$$\frac{d}{d\theta}\left(\tau_{g,AF} - \tau_{g,AD}\right) > 0, \quad \frac{d}{d\theta}\left(\tau_{g,VF} - \tau_{g,VD}\right) > 0, \quad \textit{and} \quad \frac{d}{d\theta}\left(\tau_{g,VF} - \tau_{g,AF}\right) > 0.$$

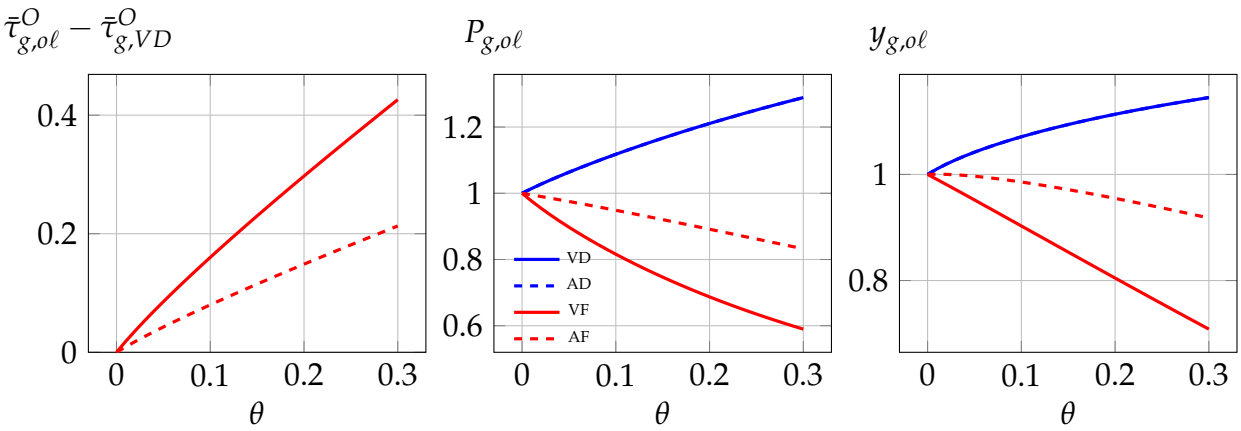
The key object in Proposition 3 is $\theta p_g^C$, which captures the expected marginal value of output available in Conflict. A higher probability of a geopolitical crisis directly raises the value of improving the Domestic government's outside option. At the same time, the resulting policy response makes the economy more resilient to Conflict and can reduce $p_g^C$. Under Assumption 1, this endogenous response does not offset the direct effect of the higher crisis probability, so $\theta p_g^C$ rises with $\theta$. The government places larger relative wedges on organization modes that expose domestic production to greater losses in Conflict. In particular, foreign ownership becomes more tightly regulated when vertical integration leaves less output under domestic control than arm's-length sourcing.

Figure 2 illustrates the broader equilibrium response in our baseline calibration.[15] As geopolitical risk increases, the government raises the relative wedges on organization modes that generate larger output losses in Conflict, as shown in Panel (a). These policies shift firm organization toward domestic suppliers and make the economy more resilient to Conflict. As a

[15] The baseline calibration sets $c^m_{g,D} = c^k_{g,D} = c^k_{g,F} = 1$ and $\eta^m_g = \eta^k_g = \frac{1}{2}$. It sets $\beta^k_{g,V} = 0.8$ and $\beta^k_{g,A} = 0.2$, so that $\beta^m_{g,V} = 0.2$ and $\beta^m_{g,A} = 0.8$. These restrictions imply the same marginal-cost schedule across organization modes. Together with i.i.d. Gumbel fixed costs, they imply $P_{g,o\ell} = 0.25$ in the absence of geopolitical concerns. The baseline further sets $\psi_g = 0.6$, $\sigma_g = 5$, $d_g = 0.025$, and $d^C_g = 5d_g$. The fixed-cost distribution has dispersion parameter $1/v_g$, with $v_g = 10$. For figures that hold geopolitical risk fixed it is set at $\theta = 0.3$.

result, the increase in scarcity associated with Conflict becomes less severe. To illustrate these adjustments, firms' organization shares and output are normalized relative to the no-policy competitive equilibrium at $\theta = 0$ and reported in Panels (b) and (c), respectively. Modes with domestic suppliers become more prevalent and expand relative to modes with foreign suppliers, with a stronger response for foreign-owned firms when $\Delta_{g,VF} < \Delta_{g,AF}$.

**Figure 2:** Optimal Foreign Ownership Regulation and Geopolitical Risk




*Note:* The figure illustrates wedges and outcomes as a function of the probability of a geopolitical crisis ($\theta$), given the baseline calibration described in footnote 15. Panel (a) reports relative wedges. Panels (b) and (c) report the share and output of firms across organizational modes, normalized relative to the competitive equilibrium at $\theta = 0$.

## 4.2 National Defense and Organizational Exposure in Conflict

Turning to comparisons across sectors, we consider two characteristics that shape the national-security motive for regulating foreign ownership: defense demand and organizational conflict exposure. We first consider each characteristic separately and then study their interaction. These results yield the three patterns that we investigate empirically in the next section. Throughout we focus on the case where $\theta > 0$.

**Defense demand.** We begin with Conflict defense demand, $d^C_g$. A higher $d^C_g$ makes good $g$ more important for national defense in the event of Conflict. The following proposition shows how this affects optimal regulation.

**Proposition 4.** *Under Assumption 1, $p^C_g$ is strictly increasing in $d^C_g$. If $\Delta_{g,VF} < \Delta_{g,AF}$, then*

$$\frac{\partial}{\partial d^C_g}\left(\tau_{g,AF} - \tau_{g,AD}\right) > 0, \quad \frac{\partial}{\partial d^C_g}\left(\tau_{g,VF} - \tau_{g,VD}\right) > 0, \quad \textit{and} \quad \frac{\partial}{\partial d^C_g}\left(\tau_{g,VF} - \tau_{g,AF}\right) > 0.$$

The intuition follows directly from the value of output in Conflict. Higher defense demand reduces private consumption of good $g$ in Conflict and raises its marginal value, $p_g^C$. Output that remains available domestically in Conflict becomes more valuable. The government responds by raising the relative wedges on organization modes that expose domestic production to larger losses. In particular, higher defense demand leads to tighter regulation of foreign ownership relative to arm's length sourcing. Panel (a) of Figure 3 illustrates this result. As Conflict defense demand rises, the relative wedge increases for organization modes with higher conflict exposure.

**Organizational exposure.** We next consider differences across sectors in their organizational exposure in Conflict. We parameterize organizational exposure through

$$\Delta_{g,oF} = 1 - \chi_g \xi_{g,o}, \qquad o \in \{A, V\}, \tag{24}$$

where $\xi_{g,V} \geq \xi_{g,A} > 0$ and $\chi_g \geq 0$ is restricted so that $\Delta_{g,oF} \geq 0$.

The parameter $\chi_g$ captures the sector's exposure to contractual frictions: a higher $\chi_g$ implies larger output losses when the two parts of the firm separate. The parameter $\xi_{g,o}$ determines how firm organization translates this exposure into output losses in Conflict. In particular, $\xi_{g,V} > \xi_{g,A}$ implies that vertical integration generates greater organizational exposure than arm's-length sourcing.

This parameterization summarizes the residual-control mechanisms described above. Appendix A.3 maps exposure to contractual frictions into sectoral primitives, including the importance for production of non-contractible inputs and proprietary knowledge, as well as production vulnerability to sabotage. These mechanisms explain why foreign sourcing and ownership may expose domestic production to different output losses across sectors. They guide our empirical measures in the next section.

The following proposition shows how organizational exposure affects optimal policy.

**Proposition 5.** *Under Assumption 1 and the parametrization in (24), $\chi_g \theta p_g^C$ is strictly increasing in $\chi_g$. If $\xi_{g,V} > \xi_{g,A}$, then*

$$\frac{\partial}{\partial \chi_g}\left(\tau_{g,AF} - \tau_{g,AD}\right) > 0, \quad \frac{\partial}{\partial \chi_g}\left(\tau_{g,VF} - \tau_{g,VD}\right) > 0, \quad \textit{and} \quad \frac{\partial}{\partial \chi_g}\left(\tau_{g,VF} - \tau_{g,AF}\right) > 0.$$

The intuition follows from the effect of organizational exposure on output in Conflict. A higher $\chi_g$ increases the output loss following the termination of foreign relationships. This raises the social cost of organization modes that rely on foreign suppliers. At the same time, the resulting policy response can make the economy more resilient and reduce $p_g^C$. Proposition 5

shows that this endogenous response does not offset the direct effect of higher exposure, so $\chi_g \theta p_g^C$ rises with $\chi_g$. The government therefore raises the relative wedges on organization modes that expose domestic production to larger losses. In particular, greater organizational exposure leads to tighter regulation of foreign ownership relative to arm's-length sourcing. Panel (b) of Figure 3 illustrates this result. As organizational exposure rises, the relative wedge increases more for organization modes with greater exposure in Conflict.

**Interaction.** Finally, we consider the interaction between defense demand and organizational exposure. The following proposition shows that these forces reinforce each other.

**Proposition 6.** *Under Assumption 1 and the parametrization in (24), Conflict defense demand and organizational exposure are complements in optimal regulation around $\chi_g = 0$. If $\xi_{g,V} > \xi_{g,A}$, then*

$$\left.\frac{\partial^2(\tau_{g,AF} - \tau_{g,AD})}{\partial d_g^C \partial \chi_g}\right|_{\chi_g=0} > 0, \qquad \left.\frac{\partial^2(\tau_{g,VF} - \tau_{g,VD})}{\partial d_g^C \partial \chi_g}\right|_{\chi_g=0} > 0, \qquad \left.\frac{\partial^2(\tau_{g,VF} - \tau_{g,AF})}{\partial d_g^C \partial \chi_g}\right|_{\chi_g=0} > 0.$$

*These inequalities continue to hold for sufficiently small positive values of $\chi_g$.*

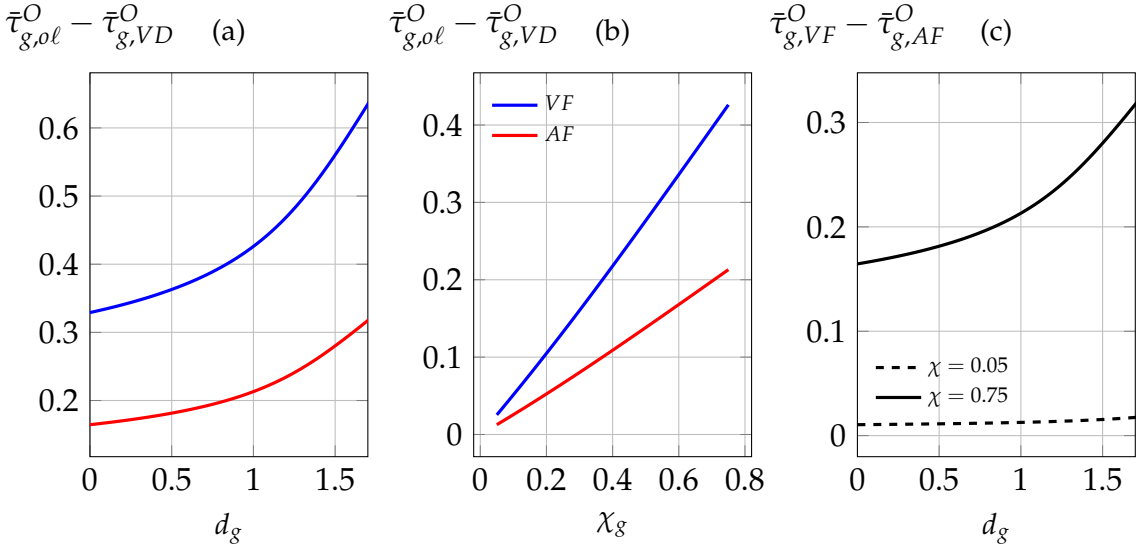
The intuition follows from the value of output in Conflict. Higher defense demand raises $p_g^C$ and thus the cost of production losses in Conflict. This makes an increase in organizational exposure more costly in sectors with greater defense demand. Hence, the government raises relative wedges more sharply as defense demand increases for goods with high organizational exposure. When vertical integration generates a larger output loss than arm's-length sourcing, this complementarity implies tighter regulation of foreign ownership. Panel (c) of Figure 3 illustrates this interaction. The relative wedge increases more steeply with defense demand for goods with higher organizational exposure in Conflict. In our calibration, this complementarity continues to hold away from $\chi_g = 0$, although the analytical result is guaranteed only locally.[16]

# 5 Foreign Ownership Regulation in Practice: The Case of the United States

In this section, we use our residual-control mechanism to analyze foreign ownership regulation in the United States. We first describe how our mechanism provides an interpretation of the

[16] To see why the result is local, consider a relative wedge of the form $\zeta \chi_g \theta p_g^C$. Its cross-derivative contains two effects. First, higher defense demand raises the marginal value of Conflict output, making additional organizational exposure more costly. Second, greater organizational exposure changes firm decisions and, therefore, how strongly $p_g^C$ responds to defense demand. This second general-equilibrium effect is not generally signed, but it is weak around $\chi_g = 0$.

**Figure 3:** Optimal Foreign Ownership Regulation Across Goods




*Note:* Panel (a) varies defense demand, panel (b) varies organizational exposure, and panel (c) compares the wedge between foreign integration and arm's-length sourcing across exposure levels. In panels (a) and (c), defense demand is normalized to its baseline and $d_g^C = 5d_g$. Other parameters follow the baseline calibration in footnote 15.

institutional setting through which the U.S. government regulates foreign acquisitions of domestic firms, and of its evolution with rising geopolitical tensions. We then relate cross-sector variation in regulatory intensity to proxies for two drivers of tighter regulation in our model: defense demand and organizational conflict exposure.

## 5.1 Regulatory Framework

The Committee on Foreign Investment in the United States (CFIUS) serves as the primary institution through which the U.S. government regulates foreign ownership of domestic firms. It is an interagency committee, chaired by the Secretary of the Treasury, that reviews foreign investment in U.S. businesses in order to identify and mitigate risks to national security. When national security risks are identified, CFIUS may negotiate mitigation agreements with the transacting parties or, in the most serious cases, recommend that the President block or unwind the transaction.

**Legislative background.** CFIUS was established by Executive Order in 1975 as an advisory body in response to concerns over investments by OPEC members in U.S. firms. In 1988, concerns about Japanese acquisitions of defense-relevant firms led Congress to give the President authority to block foreign acquisitions that threaten national security. CFIUS jurisdiction centered on transactions that could result in foreign control of a U.S. business. Control was defined

in terms of the power to direct important business decisions, including changes to production facilities, major investments, significant contracts, and treatment of proprietary information.[17] This focus remained largely unchanged even as the stock of foreign direct investment in the United States grew from $395 billion in 1990 to $3.1 trillion in 2015.

The emergence of China as a geopolitical rival renewed attention on the risks of foreign investment in U.S. firms. A central concern was that, without triggering CFIUS review, non-controlling investment structures allowed foreign investors to shape decisions within firms, access know-how, and facilitate technology transfers. The Foreign Investment Risk Review Modernization Act (FIRRMA) of 2018 marked a sharp expansion of CFIUS jurisdiction. In February 2020, FIRRMA's implementation introduced mandatory filing requirements, an expedited declaration pathway, and review authority over real estate transactions near sensitive government facilities. It also expanded jurisdiction to certain investments that, without conferring control, give foreign investors involvement in substantive decision-making, board rights, or information access.[18]

Our model provides an economic interpretation for this legislative background. The emphasis on control over firm decisions reflects the role of ownership in allocating residual control over non-contractible actions that shape organizational conflict exposure. Regulating who controls domestic firms provides a way to influence these actions when they cannot be regulated directly. The jurisdiction expansion amid rising geopolitical tensions with China is also consistent with the model's prediction that a higher probability of geopolitical crises, $\theta$, leads to tighter regulation of foreign ownership.

**National-security considerations.** CFIUS evaluates transactions through a risk-based assessment of the foreign investor, the vulnerabilities of the U.S. business, and the potential consequences for national security. One consideration explicitly identified in its statutory mandate is domestic production needed to meet national defense requirements.[19] This emphasis maps directly into defense demand, $d_g$, in our framework.

CFIUS's risk assessments cover several ways in which foreign investment can create national-security vulnerabilities. These include "supply assurance," when foreign control can threaten continued access to products or services needed for national security; "product integrity,"

[17] See James K. Jackson, *The Committee on Foreign Investment in the United States*, CRS Report RL33388, February 2020; and U.S. Treasury, 'Regulations Pertaining to Mergers, Acquisitions, and Takeovers by Foreign Persons," November 2008.

[18] See the Senate Banking Committee hearing, 'CFIUS Reform: Administration Perspectives on the Essential Elements," January 25, 2018; and U.S. Treasury, 'Fact Sheet: Final CFIUS Regulations Implementing FIRRMA," January 2020. This extension applies only to investments in U.S. businesses involving critical technologies, critical infrastructure, or sensitive personal data (TID U.S. businesses).

[19] See Section 721(f) of the Defense Production Act.

when control can be used to alter or degrade products or production processes; "technology transfer," when foreign access can enable the unauthorized transfer or use of sensitive technology or know-how; and "critical infrastructure," when foreign control can facilitate the impairment or disruption of essential systems.[20]

These considerations have natural counterparts in the mechanisms underlying organizational exposure, $\chi_g$, in our framework. Supply-assurance and product-integrity concerns can arise through our first microfoundation, in which foreign ownership can make domestic production depend on complementary inputs and capital controlled by foreign parties. Loss of access to these resources when foreign cooperation breaks down can reduce the quantity or quality of domestic output. Technology-transfer concerns relate to our second microfoundation through the role of ownership in determining which party can access and use technological knowledge after separation. Finally, concerns about the disruption of critical infrastructure have a counterpart in our third microfoundation, in which foreign ownership provides operational access that can be used to disable productive assets or interrupt their operation.[21]

**Review process.** Filing with CFIUS is voluntary for most transactions. Parties have an incentive to seek review because clearance provides safe-harbor protection against subsequent review. Without clearance, a transaction within CFIUS jurisdiction remains subject to review even after completion, which may result in mandated changes in operations or divestment.[22] Thus, for a given transaction, greater concern about subsequent government intervention increases the value of obtaining clearance.

Parties can seek clearance through two filing pathways. A *declaration* is a short-form submission that initiates a 30-day assessment upon acceptance. CFIUS may clear the transaction, request a full notice, state that it cannot conclude action on the basis of the declaration, or initiate a review on its own. A *notice* is a comprehensive submission that initiates a 45-day review, potentially followed by a 45-day investigation and, if referred to the President, a 15-day presidential decision period. When national-security risks are identified, CFIUS may negotiate mitigation agreements imposing conditions on the transaction. Mitigation can address verifiable firm decisions or restrict foreign control. For example, it can require continuity of supply to the U.S. government, restrict access to technology or facilities, or constrain the foreign investor's

[20] See CFIUS, "CFIUS Risk Analysis" and "CFIUS Risk Matrix."

[21] FIRRMA also expanded CFIUS jurisdiction to certain real estate transactions near military facilities, reflecting concerns about espionage. One can view espionage as another type of non-verifiable action associated with foreign control of land. This follows the logic of our sabotage microfoundation: control over a domestic asset can enable non-verifiable actions with national-security consequences.

[22] See CFIUS, "CFIUS Overview" and "Non-Notified Transactions." Safe harbor is obtained when CFIUS concludes all action on a transaction, not simply upon filing, and is subject to limited exceptions, including material misstatements or material breaches of mitigation agreements.

role in governance.

Filing volumes are higher today than in the early 2010s. In 2024, CFIUS received 209 notices and 116 declarations, compared with an annual average of approximately 125 notices during 2010–2016. Between 2021 and 2024, roughly 70% of declarations were voluntary. The share of notices cleared with mitigation rose from approximately 1.3% in 2008 to 15% in 2023, before falling to approximately 8% in 2024. Appendix Figures B.1 and B.2 show the evolution of filings and mitigation outcomes.

## 5.2 Data

We now describe the construction of our proxies for regulatory intensity, defense demand, and organizational exposure. We use variation across four-digit NAICS industries, which we map to goods $g$ in the model. Appendix B.1 provides additional details about data construction.

**Regulatory intensity.** Our measure of regulatory intensity is the total number of filings in each industry over 2021–2024. This period follows the implementation of the main FIRRMA regulations in 2020. We combine notices and declarations to capture filing activity through both pathways for seeking clearance. We use the CFIUS Annual Reports to Congress to obtain annual filings by the four-digit NAICS industry of the U.S. business under review. The reports provide public industry-level tabulations, while transaction-level submissions are protected by statutory confidentiality requirements.[23] We harmonize all industry codes to the 2017 NAICS classification.

Filings are a proxy for the intensity of government scrutiny of foreign ownership across industries. As discussed in Section 5.1, firms' incentives to seek clearance depend on their expectations of subsequent government intervention. Filing activity therefore provides information about anticipated scrutiny, rather than a direct measure of the regulatory wedges in the model. To account for differences in the volume of foreign acquisitions across industries, we report specifications controlling for industry size and M&A activity.[24]

Appendix Figure B.3 reports the distribution of filings across two-digit NAICS sectors. Appendix Table B.1 reports the ten industries with the largest number of filings. We relate this cross-industry variation to our proxies for defense demand and organizational conflict exposure.

[23]The data excludes filings related to real estate transactions near military areas. The reports do not provide filings jointly by buyer country and four-digit industry.

[24]Foreign buyers may abandon acquisitions in sensitive industries if they expect them to be blocked. This deterrence mechanism reduces number of filings and works against the positive relationship predicted by our theory. Section 5.3 discusses this concern in more detail and reports results conditional on observed M&A activity by foreign and domestic buyers.

**Defense demand.** To proxy for defense demand, we measure each industry's exposure to Department of Defense procurement. We obtain contract-level data from the Federal Procurement Data System (FPDS) via USAspending.gov for fiscal years 2014-2024 and classify contracts as defense-related based on the awarding agency. We first calculate average annual defense procurement spending in each industry over this period. To account for indirect supply-chain linkages, we then apply the Leontief inverse constructed from the 2017 BEA Input-Output Accounts to the vector of industry-level averages. Our measure is the log of the entries of the resulting vector. It captures each industry's exposure to defense demand, including both direct procurement and indirect demand through intermediate-input linkages. We assume that industries with greater observed defense demand also have greater defense demand in Conflict, consistent with the calibration in Figures 2 and 3.

**Organizational exposure.** We use three proxies for organizational exposure guided by the microfoundations in Appendix A.3.

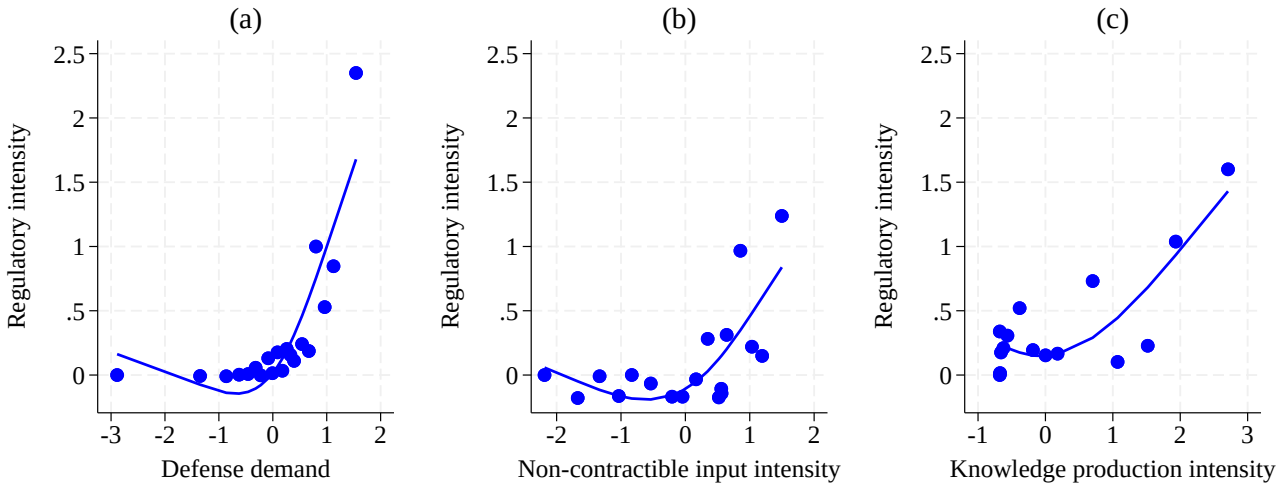
To measure exposure through non-contractible inputs, we use the measure of non-contractible input intensity of Nunn (2007). This index measures the share of an industry's intermediate inputs that are relationship-specific, based on the classification of differentiated goods in Rauch (1999). Following Nunn (2007), we use the 1997 U.S. Input-Output Table to construct the index for all industries in our sample. The measure proxies for reliance on complementary inputs that may become unavailable when cooperation with foreign parties breaks down.

To measure exposure through non-contractible knowledge, we use Compustat to construct a measure of knowledge production intensity, defined as the share of R&D expenditures in investment. Following Ladika and Sautner (2020), we define total current investment as the sum of R&D expenditures (XRD) and capital expenditures (CAPX). We calculate this share for each four-digit NAICS industry and fiscal year using expenditures aggregated across firms.Our industry-level measure is the average share over 2014-2024. We use this measure as a proxy for the importance of technological knowledge over which ownership allocates control.

Finally, we use an indicator for electric power generation, transmission, and distribution (NAICS 2211) to proxy for organizational exposure associated with the scope for sabotage. Access to the operational systems of electricity infrastructure can be used to disable equipment or interrupt the production and delivery of electricity. Our third microfoundation explains how foreign ownership can provide such access and expose domestic production to disruption in Conflict. This choice is consistent with CFIUS's stated concerns about energy infrastructure, including the provision of electricity to government and civilian customers.[25]

[25]See Treasury's December 2008 CFIUS guidance. As discussed in footnote 2, a related example is the low inventories at Gazprom-controlled gas storage sites in Germany before the 2022 energy crisis.

**Figure 4:** Regulatory Intensity, Defense Demand, and Organizational Conflict Exposure




*Notes:* The figure reports univariate relationships between CFIUS regulatory intensity and defense demand (panel a), non-contractible input intensity (panel b), and knowledge production intensity (panel c). Dots report means within bins formed by splitting the horizontal-axis variable into 20 quantiles. Because industries with identical values stay in the same bin, panels (b) and (c) contain 18 and 15 bins, respectively. The curves are three-knot restricted cubic splines fitted to the bin means. Each series is normalized relative to its lowest-value bin. The sample is described in Table 1, excluding utilities.

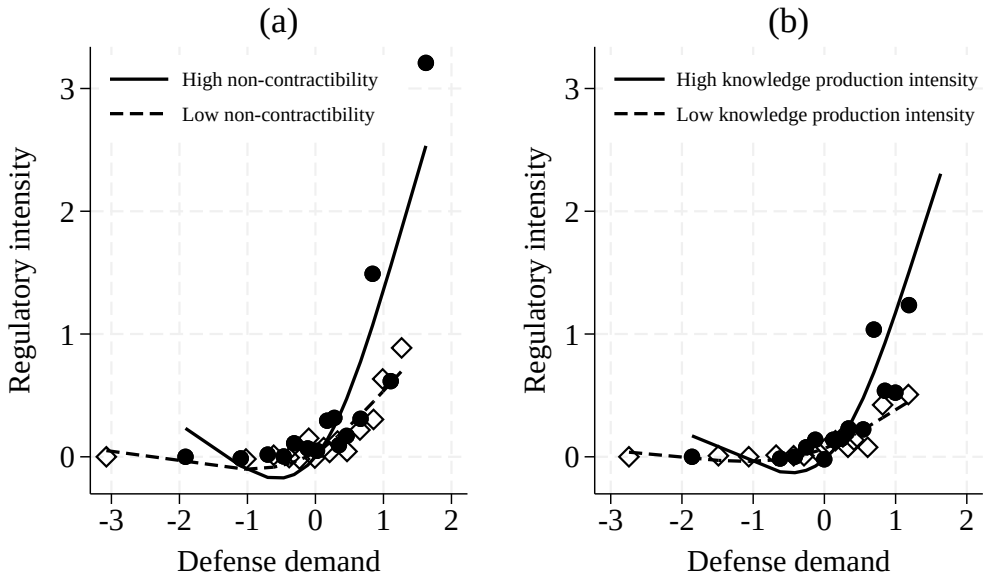
**Other variables.** In some specifications, the set of controls includes variables that may affect the number of filings in a sector. We measure industry size as the log of total output from the 2017 BEA Input-Output Use Table and the log of the number of firms from the 2021 Statistics of U.S. Businesses (SUSB). We measure acquisition activity for foreign and domestic buyers as the log of the number of publicly announced transactions over 2014–2024 targeting U.S. firms. We construct this measure using the SDC Merger and Corporate Transactions database, excluding buybacks, recapitalizations, and exchange offers (Erel et al., 2012; Frésard et al., 2017).

## 5.3 Foreign Ownership Regulation Across Industries

We begin by using our dataset to replicate the theoretical cross-sector comparison in Section 4. We report binscatter plots of the relationships between our measures of regulatory intensity, defense demand, and organizational exposure. These plots provide a non-parametric empirical counterpart to the model's predictions illustrated in Figure 3.

Panel (a) of Figure 4 shows that U.S. regulation is consistent with the first prediction in Section 4. It shows an increasing, convex relationship between regulatory intensity and defense demand. Through the lens of the model, higher defense demand raises the value of domestic output in Conflict. This increases the cost of production disruptions in geopolitical bargaining

**Figure 5:** Regulatory Intensity and Defense Demand by Level of Organizational Conflict Exposure




*Notes:* The figure relates CFIUS regulatory intensity to defense demand separately for industries above and below the median of non-contractible input intensity (panel a) and knowledge production intensity (panel b). Dots report means within bins formed by splitting defense demand into 15 quantiles within each group. The curves are three-knot restricted cubic splines fitted to the bin means. Each series is normalized relative to its lowest-defense-demand bin. The sample is described in Table 1, excluding utilities.

and, thus, strengthens the incentive to regulate foreign ownership.

Panels (b) and (c) of Figure 4 investigate the second prediction in Section 4. They show that regulatory intensity also increases with our two continuous proxies for organizational conflict exposure: non-contractible input intensity and knowledge production intensity, respectively. Under each microfoundation, greater reliance on non-contractible inputs or technological knowledge makes the loss of access to these capabilities more costly when cooperation with foreign parties breaks down in Conflict. The higher cost leads to tighter regulation.

In Figure 5, we investigate the third prediction in Section 4: defense demand is more strongly associated with regulatory intensity in industries with higher organizational exposure. Panels (a) and (b) show a steeper relationship in industries with higher non-contractible input intensity and higher knowledge production intensity, respectively. In our model, greater defense demand amplifies the national-security cost of output losses associated with organizational exposure. This implies that regulation increases more sharply with defense demand in industries that rely more heavily on non-contractible inputs or technological knowledge.

We now turn to a formal regression analysis of these relationships across industries. In

particular, we estimate the following linear regression:

$$\begin{aligned}\text{Regulatory intensity}_g = \beta_0 + \beta_D \text{Defense demand}_g + \boldsymbol{\beta}_O' \text{Organizational exposure}_g \\ + \boldsymbol{\beta}_I' \text{Defense–exposure interactions}_g + \boldsymbol{\gamma}' \text{Controls}_g + \epsilon_g,\end{aligned} \tag{25}$$

where Organizational exposure$_g$ is the vector containing the three measures of organizational exposure defined in Section 5.2. The vector Defense–exposure interactions$_g$ contains the interactions of defense demand with non-contractible input intensity and knowledge production intensity, and Controls$_g$ is a vector of control variables. In line with the predictions in Section 4, we expect positive estimates for $\beta_D$, $\boldsymbol{\beta}_O$ and $\boldsymbol{\beta}_I$.

Table 1 reports the estimates of specification (25). Column (1) shows that the univariate relationships in Figure 4 also hold jointly in our sample. The estimated coefficients are economically meaningful. Because all variables are standardized, the coefficients can be interpreted as the change in regulatory intensity (in standard deviations) associated with a one standard deviation increase in each explanatory variable. In particular, a one standard deviation increase

**Table 1: Regulatory Intensity, Defense Demand, and Organizational Conflict Exposure**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Defense demand | 0.290 | 0.324 | 0.188 | 0.198 |
| | (0.076) | (0.069) | (0.041) | (0.041) |
| × Non-contractible input intensity | | 0.285 | 0.257 | 0.228 |
| | | (0.088) | (0.069) | (0.061) |
| × Knowledge production intensity | | 0.338 | 0.290 | 0.305 |
| | | (0.085) | (0.072) | (0.069) |
| Non-contractible input intensity | 0.161 | 0.044 | 0.036 | 0.032 |
| | (0.051) | (0.035) | (0.036) | (0.035) |
| Knowledge production intensity | 0.230 | 0.148 | 0.114 | 0.129 |
| | (0.076) | (0.054) | (0.050) | (0.048) |
| Electricity sector dummy | 7.474 | 7.954 | 7.332 | 7.721 |
| | (0.096) | (0.180) | (0.170) | (0.162) |
| $R^2$ | 0.400 | 0.523 | 0.589 | 0.633 |
| Period | 2021–24 | 2021–24 | 2021–24 | 2014–24 |
| Controls | | | | |
| Industry size | No | No | Yes | Yes |
| M&A activity | No | No | Yes | Yes |

*Notes:* The table reports OLS estimates of equation (25) using a common sample of 250 four-digit NAICS industries for which all variables are observed. Columns (1)–(3) measure CFIUS regulatory intensity using all filings in 2021–2024, while column (4) uses all filings in 2014–2024. Column (1) reports the main effects, column (2) adds the interactions of defense demand with non-contractible input intensity and knowledge production intensity, and columns (3)–(4) add controls. The industry-size controls are log total output and log number of firms. The M&A activity controls are the log number of M&A transactions targeting U.S. firms over 2014–2024 by foreign and domestic buyers, separately. Regulatory intensity and the three continuous sector characteristics are standardized. Robust standard errors are reported in parentheses.

in defense demand is associated with an increase of 0.29 standard deviations in regulatory intensity. Similarly, a one standard deviation increase in non-contractible input intensity and knowledge intensity raise regulatory intensity by 0.16 and 0.23 standard deviations, respectively. Finally, electricity generation has a substantially higher number of filings than other sectors.

In column (2), we add the interaction between defense demand and the two continuous proxies for organizational exposure. The positive interaction term implies that regulation is especially tight in sectors that are both strategically important for national defense and intensive in non-contractible inputs and knowledge. Together, our proxies for the theoretical determinants of regulation explain 52% of the variation in regulatory intensity across the 250 industries in our sample.

Column (3) adds controls for industry size and acquisition activity. Larger industries may generate more filings because they contain more firms or larger targets for foreign buyers. If industry size is correlated with our measures of defense demand and organizational exposure, this scale effect could help explain the relationships above. We therefore include controls for the industry's output and number of firms, as defined in Section 5.2.

Acquisition activity raises a separate concern. Filing counts reflect two components: foreign acquisition activity and firms' propensity to seek clearance. Our interpretation of filings as a measure of regulatory intensity relies on the second component. Among acquisitions that firms pursue, greater anticipated scrutiny can strengthen incentives to seek clearance. However, expected rejection may also deter acquisitions and, consequently, reduce the number of filings. This force works against the positive relationships predicted by our theory. It is reassuring that these relationships nevertheless emerge in the data.[26] To account for differences in observed acquisition activity, column (3) also includes controls for M&A transactions by foreign and domestic buyers targeting U.S. firms. Since acquisitions may respond to anticipated scrutiny, we see this specification as a check that the relationships hold conditional on industry size and observed M&A activity.[27] Our conclusions are robust to these controls. This is consistent with our interpretation that filings capture anticipated scrutiny beyond observed differences in industry size and acquisition activity.

[26] Buyers from allied countries may still pursue acquisitions and seek clearance in sensitive industries. CFIUS grants limited exemptions to qualifying investors from designated countries, initially Australia, Canada, and the United Kingdom. Acquisitions that confer control remain subject to review (31 C.F.R. § 800.219; U.S. Treasury, *CFIUS Frequently Asked Questions*, May 2021). For example, CFIUS approved the acquisition of Ball Aerospace by the U.S. subsidiary of Britain's BAE Systems plc. Ball Aerospace supplied the U.S. Department of Defense and intelligence community. The transaction closed in February 2024 (Ball Corporation, 2023 Form 10-K, Note 4).

[27] In our model, the ratio of domestic to foreign acquisitions reflects both regulatory wedges and private returns. The sector characteristics considered here may affect both, so acquisition ratios alone do not isolate regulatory deterrence. We therefore report specifications both with and without acquisition controls to assess the sensitivity of our findings to conditioning on observed M&A activity.

Column (4) evaluates robustness to including the earlier regulatory regime. As discussed in Section 5.1, FIRRMA expanded the scope of CFIUS review. However, concerns about foreign control over firm decisions were already central to the regulatory framework. Hence, the residual-control mechanism in our model applies to both periods. We expand the filing window to 2014-2024, including years before the main FIRRMA regulations took effect in 2020. The estimates remain similar in the extended sample.

Appendix Table B.2 evaluates the robustness of the estimates in column (3) of Table 1. Column (2) shows that, when the sample excludes utilities, estimates remain similar, and the specification explains 48% of the cross-industry variation in filings. Column (3) adds quadratic terms in defense demand, non-contractible input intensity, and knowledge production intensity. The positive defense–exposure interactions are robust to allowing for curvature in these main effects. In line with Figure 3, the estimates suggest convex relationships between these variables and regulatory intensity. Finally, columns (4) and (5) measure regulatory intensity using declarations and notices separately. Estimates are similar for the two pathways.

# 6 Conclusion

This paper argues that contractual frictions make multinational firm boundaries central to geoeconomic policy. Our framework explains when national-security concerns justify foreign ownership regulation. Such regulation shapes cross-border acquisitions and the stock of foreign-controlled assets. The economic stakes are substantial: in 2025 alone, foreign investors spent more than $200 billion acquiring U.S. businesses.

Our key mechanism is the interaction of contractual frictions within firms and between governments. Ownership allocates residual control over non-verifiable decisions that shape both firms' economic outcomes and countries' geopolitical bargaining positions. Firms choose ownership structures based on private returns, without internalizing these geopolitical effects. Because governments cannot directly regulate these non-verifiable decisions, ownership regulation provides a second-best tool that changes control rights and geopolitical outcomes. We show that optimal regulation is tighter in activities with greater defense demand and organizational conflict exposure, especially where these characteristics coincide. Our analysis of U.S. regulation provides evidence consistent with these implications, both in the regulatory emphasis on foreign control over firm decisions and in the cross-sector relationships between regulatory intensity, defense demand, and contractual frictions.

More broadly, firm boundaries provide a margin through which governments can pursue geopolitical objectives. In the international trade literature, studying incentives within firms can help explain their organization and operations across countries. For national security pol-

icy, this approach opens questions about when governments can direct foreign investment to gain geopolitical leverage and how firm ownership affects governments' ability to achieve geopolitical goals. Understanding these incentives can help explain how firm boundaries shape both countries' exposure to geopolitical pressure and their capacity to exert it.

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# A Theoretical Appendix

## A.1 Derivations for Firm's Problem

Fix a sector $g$, organizational form $o$, and headquarters location $\ell$. We derive the firm's Stage-2 problem after the organizational decision has been made. Throughout, we focus on an interior solution and assume $p_g - \tau^R_{g,o\ell} > 0$.

**Guaranteed escrow.** We consider an escrow arrangement that implements revenue-contingent joint payments to the firms' suppliers. Suppress indices and write $R = (p - \tau^R)y$. Let $R^*$ denote the equilibrium revenue induced by the contract. In Stage 2, the owner assigns all net sales revenue to an independent guarantor and commits to a fixed net transfer $(s-1)R^*$. Under agreement, the guarantor pays $sR$ to the suppliers. Its resulting balance is $(s-1)R^* + R - sR = (s-1)(R^* - R)$: it retains any surplus and covers any deficit. The financing transfer remains fixed during input choices and bargaining. Under disagreement, the guarantor receives each party's separate revenue and pays that party $s\delta^a R$. This preserves the bargaining shares in (3), so supplier $a$'s input-stage payoff is $\beta^a sR(k,m) - c_a x_a +$ fixed transfers, where $x_k = k$ and $x_m = m$. At $R = R^*$, the guarantor breaks even. Financing commitments precede input choices; revenue-contingent payments are settled after bargaining and production.

**The full problem.** The owner offers an up-front transfer and chooses the revenue multiplier $s_{g,o\ell}$. The up-front transfer is set so that the non-owner's participation constraint binds. It therefore determines only the division of surplus: after substituting the binding participation constraint into the owner's payoff, the owner receives the firm's operating surplus. Using $\beta^k_{g,o} + \beta^m_{g,o} = 1$, the revenue-contingent payments cancel when the two parties' payoffs are consolidated:

$$-s_{g,o\ell}(p_g - \tau^R_{g,o\ell})y_{g,o\ell} + (\beta^k_{g,o} + \beta^m_{g,o})s_{g,o\ell}(p_g - \tau^R_{g,o\ell})y_{g,o\ell} = 0. \tag{26}$$

Up to the fixed neutralizing rebate, which does not affect choices, the owner's payoff after the participation transfer is therefore $(p_g - \tau^R_{g,o\ell})y_{g,o\ell} - c^k_{g,\ell}k_{g,o\ell} - c^m_{g,D}m_{g,o\ell}$.

The owner can thus choose $s_{g,o\ell}$, $k_{g,o\ell}$, and $m_{g,o\ell}$ directly, subject to the requirement that the chosen inputs solve the suppliers' investment problems. Because each supplier's problem is strictly concave in its own input, its first-order condition is necessary and sufficient. The

owner's full problem is therefore

$$\begin{aligned} \max_{s_{g,o\ell},k_{g,o\ell},m_{g,o\ell}} \quad & (p_g - \tau^R_{g,o\ell}) \left[ (k_{g,o\ell})^{\eta^k_g} (m_{g,o\ell})^{\eta^m_g} \right]^{\psi_g} - c^k_{g,\ell} k_{g,o\ell} - c^m_{g,D} m_{g,o\ell} \\ \text{subject to} \quad & \beta^k_{g,o} s_{g,o\ell} (p_g - \tau^R_{g,o\ell}) \eta^k_g \psi_g \frac{y_{g,o\ell}}{k_{g,o\ell}} = c^k_{g,\ell}, \\ & \beta^m_{g,o} s_{g,o\ell} (p_g - \tau^R_{g,o\ell}) \eta^m_g \psi_g \frac{y_{g,o\ell}}{m_{g,o\ell}} = c^m_{g,D}, \\ & y_{g,o\ell} = \left[ (k_{g,o\ell})^{\eta^k_g} (m_{g,o\ell})^{\eta^m_g} \right]^{\psi_g}. \end{aligned} \tag{27}$$

**Implementability.** Dividing the two incentive-compatibility conditions in (27) eliminates $s_{g,o\ell}$ and yields

$$\frac{k_{g,o\ell}}{m_{g,o\ell}} = \frac{\beta^k_{g,o}}{\beta^m_{g,o}} \frac{\eta^k_g}{\eta^m_g} \frac{c^m_{g,D}}{c^k_{g,\ell}}. \tag{28}$$

Conversely, every positive pair $(k_{g,o\ell}, m_{g,o\ell})$ satisfying (28) can be implemented. To see this, choose

$$s_{g,o\ell} = \frac{c^k_{g,\ell} k_{g,o\ell}}{\beta^k_{g,o} \eta^k_g \psi_g (p_g - \tau^R_{g,o\ell}) y_{g,o\ell}} = \frac{c^m_{g,D} m_{g,o\ell}}{\beta^m_{g,o} \eta^m_g \psi_g (p_g - \tau^R_{g,o\ell}) y_{g,o\ell}}. \tag{29}$$

The equality between the two expressions follows directly from (28). This choice of $s_{g,o\ell}$ satisfies both incentive-compatibility conditions in (27). Hence, equation (28) is both necessary and sufficient for a positive input allocation to be implementable.

**The primal problem.** Because $s_{g,o\ell}$ affects the owner's objective only through the input choices it implements, we can eliminate it from (27). The projection of the feasible set onto $(y_{g,o\ell}, k_{g,o\ell}, m_{g,o\ell})$ is characterized exactly by the production technology and (28). The full problem is therefore equivalent to

$$\begin{aligned} (y_{g,o\ell}, k_{g,o\ell}, m_{g,o\ell}) \in \arg\max_{y,k,m} \quad & (p_g - \tau^R_{g,o\ell}) y - c^k_{g,\ell} k - c^m_{g,D} m \\ \text{subject to} \quad & y = (k^{\eta^k_g} m^{\eta^m_g})^{\psi_g}, \qquad \frac{k}{m} = \frac{\beta^k_{g,o}}{\beta^m_{g,o}} \frac{\eta^k_g}{\eta^m_g} \frac{c^m_{g,D}}{c^k_{g,\ell}}. \end{aligned} \tag{30}$$

This is the primal problem stated in equation (6).

**The optimal revenue multiplier.** It remains to recover the multiplier that implements the solution to the primal problem. Holding the input ratio fixed and scaling both inputs propor-

tionally, the first-order condition for scale is

$$(p_g - \tau^R_{g,o\ell})\psi_g y_{g,o\ell} = c^k_{g,\ell} k_{g,o\ell} + c^m_{g,D} m_{g,o\ell}. \tag{31}$$

Multiplying the two incentive-compatibility conditions in (27) by $k_{g,o\ell}$ and $m_{g,o\ell}$, respectively, and adding gives

$$c^k_{g,\ell} k_{g,o\ell} + c^m_{g,D} m_{g,o\ell} = s_{g,o\ell}(p_g - \tau^R_{g,o\ell})\psi_g y_{g,o\ell} \left(\eta^k_g \beta^k_{g,o} + \eta^m_g \beta^m_{g,o}\right). \tag{32}$$

Combining (31) and (32) yields

$$s_{g,o\ell} = \frac{1}{\eta^k_g \beta^k_{g,o} + \eta^m_g \beta^m_{g,o}} > 1. \tag{33}$$

The inequality follows because $\eta^k_g + \eta^m_g = 1$, $\beta^k_{g,o} + \beta^m_{g,o} = 1$, and all four shares lie strictly between zero and one. In particular, if the two suppliers have equal payment shares, $\beta^k_{g,o} = \beta^m_{g,o} = \frac{1}{2}$, then $s_{g,o\ell} = 2$.

## A.2 Microfoundation for Suppliers' Bargaining Outcomes

The purpose of this appendix is to provide three microfoundations for the disagreement-output shares $\delta^k_{g,o}$ and $\delta^m_{g,o}$. The three mechanisms allocate residual control rights over (i) tangible and intangible assets, (ii) the firm's technology, and (iii) the parties' non-verifiable actions.

For each organizational mode $o \in \{A, V\}$ and party $a \in \{m, k\}$, let $y^{D,a}_{g,o}(i)$ denote the output that party $a$ can produce following disagreement. We define the disagreement-output share $\delta^a_{g,o}$ by

$$y^{D,a}_{g,o}(i) = \delta^a_{g,o} y_g(i), \qquad a \in \{m, k\}. \tag{34}$$

As in Section 2.2, the disagreement-output shares determine the shares of payments received by the two parties according to (3). In particular, $\delta^k_{g,V} \geq \delta^k_{g,A}$ and $\delta^m_{g,A} \geq \delta^m_{g,V}$, with at least one strict inequality and $\delta^k_{g,o} + \delta^m_{g,o} < 1$. The remainder of this appendix provides three allocations of residual control rights that generate these rankings.

### A.2.1 Residual Control Over Tangible and Intangible Assets

The first microfoundation derives $\delta^k_{g,o}$ and $\delta^m_{g,o}$ from the allocation of the firm's productive assets in case of disagreement between suppliers. For input $j \in \{k, m\}$ and supplier $a \in \{m, k\}$, let $\zeta^{j\to a}_{g,o} \in [0, 1]$ denote the share of input $j$ that $a$ can use after disagreement. These shares may capture residual control over tangible productive assets as well as intangible assets whose

productive use cannot be costlessly duplicated across the two parties.

We assume that disagreement prevents the most efficient allocation of these productive resources. Intuitively, if the relationship breaks down, each party may retain some of the assets under its control and may imperfectly capture productive value associated with the other party's assets. Such reallocation is costly and may destroy part of their value. Because these productive resources are rival, we assume

$$\zeta_{g,o}^{j\to k} + \zeta_{g,o}^{j\to m} \leq 1, \qquad j \in \{k, m\}. \tag{35}$$

In case of disagreement, each party $a$ can use its fraction of the firm's productive resources to produce output using the production technology in (2). Thus, party $a$ obtains the following fraction of agreement output:

$$\delta_{g,o}^{a} = \left(\zeta_{g,o}^{k\to a}\right)^{\eta_g^k \psi_g} \left(\zeta_{g,o}^{m\to a}\right)^{\eta_g^m \psi_g}, \qquad a \in \{m, k\}. \tag{36}$$

For interior values of the residual-control shares, a sufficient condition $\delta_{g,V}^{k} \geq \delta_{g,A}^{k}$ and $\delta_{g,A}^{m} \geq \delta_{g,V}^{m}$, with at least one strict inequality, is that vertical integration shifts residual control from supplier $m$ toward supplier $k$:

$$\zeta_{g,V}^{j\to k} \geq \zeta_{g,A}^{j\to k}, \qquad \zeta_{g,V}^{j\to m} \leq \zeta_{g,A}^{j\to m}, \qquad j \in \{k, m\}, \tag{37}$$

with at least one strict inequality among these conditions.

The framework also nests the standard property-rights specification. Under arm's-length sourcing, the parties cannot use each other's specialized inputs following disagreement, $\zeta_{g,A}^{k\to m} = \zeta_{g,A}^{m\to k} = 0$. Under vertical integration, the owner can retain some productive use of the non-owner's specialized input whereas the non-owner cannot use the owner's specialized input. If the supplier of $k$ is the owner under vertical integration, this corresponds to $\zeta_{g,V}^{m\to k} > 0$ and $\zeta_{g,V}^{k\to m} = 0$. This captures, for example, the residual-control allocation underlying the integration structure in Antràs and Helpman (2004).

### A.2.2 Residual Control Over Technology

The second microfoundation allows residual control to operate through the firm's technology or specific knowledge. This technology differs from the productive assets considered above because its content need not be fully rival. Some of the blueprint may be embodied in physical objects or records, such as prototypes, technical drawings, or process documentation. Other parts may consist of know-how, designs, production methods, or other information that a

party can continue to use after the relationship breaks down. Thus, transferring ownership of the blueprint may change which party controls its technological content without necessarily preventing the other party from retaining or replicating some of that content.

To capture this possibility, for each blueprint $i$ for good $g$, let $b_g > 0$ denote the endowment of blueprint-specific technology. We generalize the production technology in Section 2.1 to

$$y_g(i) = \left[ \left(k_g(i)\right)^{\eta_g^k} \left(m_g(i)\right)^{\eta_g^m} \left(b_g\right)^{\eta_g^b} \right]^{\psi_g}, \qquad \eta_g^k + \eta_g^m + \eta_g^b = 1, \tag{38}$$

where $\eta_g^k, \eta_g^m, \eta_g^b \in (0,1)$.

For party $a \in \{m,k\}$, let $\zeta_{g,o}^{b\to a} \in [0,1]$ denote the fraction of the blueprint's technological content that $a$ can use following disagreement. Unlike the productive assets in the previous subsection, we do not impose $\zeta_{g,o}^{b\to k} + \zeta_{g,o}^{b\to m} \leq 1$. If the blueprint consists entirely of rival assets, one party's control may exclude the other party from their use. If instead its technological content is non-rival, both parties may retain substantial access to it after disagreement.

Under arm's length, the supplier of $m$ owns the blueprint. Under integration, title passes to the supplier of $k$. We assume that this transfer shifts residual control over the blueprint toward the supplier of $k$:

$$\zeta_{g,V}^{b\to k} > \zeta_{g,A}^{b\to k} \quad \text{and} \quad \zeta_{g,V}^{b\to m} < \zeta_{g,A}^{b\to m}. \tag{39}$$

We assume that each party retains positive shares of both productive inputs following disagreement.In case of disagreement, each party can combine the technological content it retains with its shares of the other productive inputs. To isolate the role of residual control over technology, we hold the allocation of residual control over the other productive inputs fixed across organizational modes. The disagreement-output share is therefore

$$\delta_{g,o}^a = \left(\zeta_g^{k\to a}\right)^{\eta_g^k \psi_g} \left(\zeta_g^{m\to a}\right)^{\eta_g^m \psi_g} \left(\zeta_{g,o}^{b\to a}\right)^{\eta_g^b \psi_g}, \qquad a \in \{m,k\}. \tag{40}$$

Because $b_g$ is an endowment, changes in technology appropriation operate through $\zeta_{g,o}^{b\to a}$ rather than through an investment decision. Equations (39) and (40) imply $\delta_{g,V}^k > \delta_{g,A}^k$ and $\delta_{g,V}^m < \delta_{g,A}^m$.

### A.2.3 Residual Control Over Post-Disagreement Actions

The third microfoundation derives the disagreement-output shares from an action available to the blueprint owner following failed bargaining. We consider a timing similar to that in Figure 1, with one additional continuation stage after bargaining fails. If bargaining succeeds, production takes place. If bargaining fails, the blueprint owner can take a costless action that

destroys some of the services of input $k$ recoverable by the other party. Intuitively, ownership gives the owner access to the production system and, therefore, the ability to take a sabotage action after a breakup. This makes disagreement more costly for the non-owner and increases the owner's bargaining power.

Formally, we assume that, if the owner takes no action, each party $a$ receives an output share $\bar{\delta}^a_g$, with $\bar{\delta}^k_g + \bar{\delta}^m_g < 1$. If the owner takes this action, only a fraction $z_g \in (0,1)$ of input $k$ recoverable by the non-owner remains usable, while its recoverable input $m$ is unaffected. Since input $k$ enters the production technology in (2) with exponent $\eta^k_g \psi_g$, the action reduces the non-owner's disagreement output by a factor of $(z_g)^{\eta^k_g \psi_g}$. The action is costless and does not affect the owner's disagreement payoff. The owner is therefore indifferent between taking the action and not taking it. Hence, there exists an equilibrium continuation following failed bargaining in which the owner takes the action.[28]

Under arm's-length sourcing, the supplier of $m$ owns the blueprint and can reduce the supplier of $k$'s disagreement output. Under vertical integration, the supplier of $k$ owns the blueprint and can reduce the supplier of $m$'s disagreement output. The resulting disagreement-output shares are

$$\delta^k_{g,A} = (z_g)^{\eta^k_g \psi_g} \bar{\delta}^k_g, \qquad \delta^m_{g,A} = \bar{\delta}^m_g,$$
$$\delta^k_{g,V} = \bar{\delta}^k_g, \qquad \delta^m_{g,V} = (z_g)^{\eta^k_g \psi_g} \bar{\delta}^m_g.$$

Since $z_g \in (0,1)$, it follows that $\delta^k_{g,V} > \delta^k_{g,A}$ and $\delta^m_{g,V} < \delta^m_{g,A}$.

## A.3 Microfoundations for Organizational Exposure in Conflict

**De jure ownership and de facto control.** De jure ownership assigns legal rights over the firm's blueprint and assets. De facto control concerns the practical ability to use, withhold, or disable the productive capabilities associated with them. In private disagreement, the existing allocation of legal rights helps determine which resources each party can use. In Conflict, the Domestic government may expropriate foreign-owned assets within its jurisdiction and reassign legal title. Such intervention need not transfer all the capabilities required to make these assets productive. Access may still depend on complementary resources or knowledge held by foreign parties, and changing legal title does not repair damage already inflicted. Pre-Conflict ownership can therefore affect domestic production even when foreign ownership

[28] An arbitrarily small private benefit from harming the other party would make the action strictly optimal and select this continuation. If the action also reduced the owner's disagreement payoff, the same result would require either commitment to the action or a sufficiently large private benefit from taking it. The Conflict continuation in Appendix A.3.3 allows foreign state coercion to make the action strictly optimal.

rights are overturned. Throughout this appendix, the index $o$ records the ownership structure chosen before Conflict.

This distinction allows the recovery shares in Conflict to differ from those following private disagreement. Expropriation may expand domestic access to some assets, while the termination of foreign cooperation may reduce their productive use. Neither recovery share is determined by legal title alone. We extend the three mechanisms in Appendix A.2 to distinguish these environments.

**Recovery shares.** We denote private recovery shares by $\zeta_{g,o}^{j\to a}$ and Conflict recovery shares by $\zeta_{g,o}^{C,j}$. The former determine the disagreement-output shares $\delta_{g,o}^{a}$ and, through (3), suppliers' payment shares. The latter measure the productive resources available domestically after intervention in Conflict and determine $\Delta_{g,oF}$. We maintain $\Delta_{g,oD} = 1$. As in the baseline, inputs are chosen before the geopolitical stage and there is no additional input choice in Conflict. The restriction $\Delta_{g,oF} = \delta_{g,o}^{m}$ is recovered when the relevant recovery conditions coincide across the two environments. To match the strict output-loss restriction in (18), we restrict the recovery conditions below to imply $\Delta_{g,AF} < 1$.

### A.3.1 Residual Control Over Tangible and Intangible Assets

**Conflict output and expropriation.** Expropriation can give Domestic possession of the firm's local plant and machinery. It need not provide access to complementary equipment held abroad or to the specialized capabilities of foreign personnel required to operate those assets. Foreign ownership may leave more of these complementary resources under the foreign party's practical control. The resulting dependence can persist after legal title to domestic assets changes. Conflict recovery shares therefore measure usable input services after intervention, rather than the assets whose title can be transferred.

Following Appendix A.2.1, let $\zeta_{g,o}^{C,j} \in [0,1]$ denote the fraction of input $j \in \{k,m\}$ available domestically in Conflict under ownership structure $o$. Applying the production technology in (2) gives

$$\Delta_{g,oF} = \left(\zeta_{g,o}^{C,k}\right)^{\eta_g^k \psi_g} \left(\zeta_{g,o}^{C,m}\right)^{\eta_g^m \psi_g}. \tag{41}$$

Foreign ownership leaves weakly less of each productive resource available to Domestic if $\zeta_{g,V}^{C,j} \leq \zeta_{g,A}^{C,j}$ for $j \in \{k,m\}$. These restrictions imply $\Delta_{g,VF} \leq \Delta_{g,AF} \leq 1$. With interior recovery shares, the first inequality is strict when at least one resource is less available under foreign ownership. This ranking is a restriction on effective access after intervention, rather than a consequence of foreign legal title surviving expropriation. Setting $\zeta_{g,o}^{C,j} = \zeta_{g,o}^{j\to m}$ recovers the domestic party's private disagreement-output share in (36).

### A.3.2 Residual Control Over Technology

**Conflict output and expropriation.** Domestic authorities may take possession of technical records and prototypes held domestically and reassign rights to use the firm's technology. This need not recover the tacit knowledge, foreign-held documentation, or implementation capabilities required to use the blueprint. Pre-Conflict ownership may determine which party retains these complementary elements of the technology. Thus, legal access to the blueprint can coexist with a loss of productive knowledge after separation. If all the relevant knowledge remains usable domestically, foreign retention of a copy alone does not reduce $\Delta_{g,oF}$ through this mechanism.

Following Appendix A.2.2, let $\zeta_{g,o}^{C,b} \in [0,1]$ denote the fraction of the blueprint's technological content available domestically in Conflict. To isolate residual control over technology, we hold Conflict recovery shares for the other productive inputs fixed across organizational modes. The technology in (38) then implies

$$\Delta_{g,oF} = \left(\zeta_{g}^{C,k}\right)^{\eta_g^k \psi_g} \left(\zeta_{g}^{C,m}\right)^{\eta_g^m \psi_g} \left(\zeta_{g,o}^{C,b}\right)^{\eta_g^b \psi_g}. \tag{42}$$

If foreign ownership reduces domestic access to technological content in Conflict, $\zeta_{g,V}^{C,b} \leq \zeta_{g,A}^{C,b}$, then $\Delta_{g,VF} \leq \Delta_{g,AF}$. The inequality is strict when technological access is strictly lower and the other recovery shares are positive. As above, equating Conflict recovery shares to the corresponding private recovery shares yields $\Delta_{g,oF} = \delta_{g,o}^m$ from (40).

### A.3.3 Residual Control Over Post-Disagreement Actions

**Conflict output and expropriation.** Expropriation may remove the foreign owner's legal authority over domestic operations, but it does not repair damage already inflicted on productive resources. We consider a Conflict continuation in which the foreign party's operational access permits it to take the destructive action after Conflict begins and before Domestic can secure the production system. The resulting damage cannot be repaired within the production period. Ownership before Conflict matters because it determines access to the system when the action becomes possible. If Domestic can prevent the action and secure the assets in time, this additional source of output loss is absent.

**Limited liability and foreign coercion.** The Foreign government may use force or the threat of force to induce the foreign owner to comply with an order to sabotage domestic production. The action need not be verifiable to a court, while limited liability and limits on Domestic enforcement constrain the financial penalties that can be collected from the foreign party. We

assume that Foreign's pressure outweighs the owner's private cost of taking the action and the deterrence that Domestic can feasibly provide, including rewards for refusing the order. Under this condition, the foreign owner takes the action even if it would otherwise prefer not to do so.

Let $\bar{\Delta}_g^C \in [0,1]$ denote the fraction of Peace output available domestically in Conflict in the absence of this action. Let $z_g^C \in [0,1]$ denote the fraction of the domestic party's recoverable input $k$ that remains usable if a foreign owner takes the action; recoverable input $m$ is unaffected. Under the continuation described above, the resulting Conflict-output shares are

$$\Delta_{g,AF} = \bar{\Delta}_g^C, \qquad \Delta_{g,VF} = \left(z_g^C\right)^{\eta_g^k \psi_g} \bar{\Delta}_g^C. \tag{43}$$

Under arm's length, the domestic party owns the blueprint and its productive resources are not subject to this action by a foreign owner. Under integration before Conflict, the foreign party can reduce domestic output through the access described above. The parameter $z_g^C$ measures the fraction of recoverable input $k$ that survives, taking domestic protective intervention into account; successful prevention corresponds to $z_g^C = 1$. The parameters $(\bar{\Delta}_g^C, z_g^C)$ may differ from $(\bar{\delta}_g^m, z_g)$ because Conflict changes access to the production system and the scope for intervention. Equating these pairs recovers $\Delta_{g,oF} = \delta_{g,o}^m$.

### A.3.4 Comparative Statics of Conflict Output Retention

We now examine how the fundamentals in the three microfoundations affect the fraction of output retained in Conflict, $\Delta_{g,oF}$, for each ownership structure $o \in \{A, V\}$. The derivatives below hold other parameters fixed. When production shares vary, we maintain the restriction that they sum to one, and restrict attention to parameter values satisfying the private gains-from-agreement conditions in Appendix A.2. Recovery shares are strictly positive wherever logarithms appear. For domestic sourcing, $\Delta_{g,oD} = 1$ throughout.

**Productive assets.** The decreasing returns in (2) can be interpreted as reflecting a limited, firm-specific productive capacity. For this comparative static, we assume that this capacity remains fully usable domestically in Conflict. The parameter $\psi_g$ then measures the importance of the non-contractible input bundle relative to this fixed capacity.[29] Holding $\eta_g^k$, $\eta_g^m$, and the

[29] To make the production specification explicit, let $\bar{f}_g > 0$ denote fixed, firm-specific productive capacity and write

$$y_g(i) = \left[\bar{f}_g^{1-\alpha_g} \left(k_g(i)^{\eta_g^k} m_g(i)^{\eta_g^m}\right)^{\alpha_g}\right]^{\widetilde{\psi}_g}, \qquad 0 < \alpha_g \leq 1, \quad 0 < \widetilde{\psi}_g \leq 1.$$

recovery shares fixed, (41) implies

$$\frac{\partial \Delta_{g,oF}}{\partial \psi_g} = \Delta_{g,oF}\left[\eta_g^k \log \zeta_{g,o}^{C,k} + \eta_g^m \log \zeta_{g,o}^{C,m}\right] \leq 0, \qquad o \in \{A, V\}. \tag{44}$$

The derivative is strictly negative when an input with a positive production share is not fully recoverable. Thus, a greater importance of non-contractible inputs reduces Conflict output retention under either ownership structure when those inputs become partly unavailable. Equation (41) also implies that improving the recoverability of either input raises retention.

Changes in the composition of the non-contractible bundle depend on the relative recoverability of its inputs. Suppose that input $k$ is weakly less recoverable than input $m$ under each ownership structure, $\zeta_{g,o}^{C,k} \leq \zeta_{g,o}^{C,m}$ for $o \in \{A, V\}$. This restriction is natural when the services of foreign-supplied $k$ depend on complementary resources or capabilities held abroad, while the domestic supplier retains greater access to the services of $m$ after separation. Holding recovery shares and $\psi_g$ fixed, and setting $\eta_g^m = 1 - \eta_g^k$, gives

$$\frac{d\Delta_{g,oF}}{d\eta_g^k} = \psi_g \Delta_{g,oF} \log\left(\frac{\zeta_{g,o}^{C,k}}{\zeta_{g,o}^{C,m}}\right) \leq 0, \qquad o \in \{A, V\}. \tag{45}$$

Increasing the importance of $k$ therefore weakly reduces retention. The derivative is strictly negative when $\zeta_{g,o}^{C,k} < \zeta_{g,o}^{C,m}$.

**Technology.** To isolate the importance of technological content, set $\zeta_g^{C,k} = \zeta_g^{C,m} = 1$ in (42). The other production shares adjust as $\eta_g^b$ changes to preserve $\eta_g^k + \eta_g^m + \eta_g^b = 1$. For either ownership structure,

$$\Delta_{g,oF} = \left(\zeta_{g,o}^{C,b}\right)^{\psi_g \eta_g^b}, \qquad \frac{d\Delta_{g,oF}}{d\eta_g^b} = \psi_g \Delta_{g,oF} \log \zeta_{g,o}^{C,b} \leq 0. \tag{46}$$

The derivative is strictly negative when $\zeta_{g,o}^{C,b} < 1$. A greater importance of technological content therefore reduces retention when some of that content becomes unusable domestically. Improving access to technological content raises retention. If the other inputs also suffer recovery

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Defining $\psi_g \equiv \alpha_g \widetilde{\psi}_g < 1$ and the productivity term $A_g \equiv \bar{f}_g^{(1-\alpha_g)\widetilde{\psi}_g}$ gives $y_g(i) = A_g \left(k_g(i)^{\eta_g^k} m_g(i)^{\eta_g^m}\right)^{\psi_g}$. Measuring fixed capacity in units such that $\bar{f}_g = 1$ normalizes $A_g = 1$ and recovers (2). Since this capacity is unchanged between Peace and Conflict, $A_g$ cancels from the retention ratio even without the normalization. Holding $\widetilde{\psi}_g$ fixed, $\partial \Delta_{g,oF}/\partial \alpha_g = \widetilde{\psi}_g \, \partial \Delta_{g,oF}/\partial \psi_g \leq 0$, so the comparative static captures an increase in the importance of the non-contractible bundle. When $\widetilde{\psi}_g = 1$, fixed capacity has production share $1 - \psi_g$; more generally, $\psi_g$ combines the bundle's importance with the returns parameter $\widetilde{\psi}_g$.

losses, the sign of the production-share comparative static depends on whether technological content is less recoverable than the inputs whose production shares fall.

**Post-disagreement actions.** Let $s_g^C \equiv 1 - z_g^C \in [0,1)$ measure effective sabotage ability: the fraction of recoverable input $k$ that the foreign owner can disable despite domestic protective intervention. Holding $\bar{\Delta}_g^C$, $\eta_g^k$, and $\psi_g$ fixed, (43) gives

$$\frac{\partial \Delta_{g,VF}}{\partial s_g^C} = -\eta_g^k \psi_g \bar{\Delta}_g^C (1 - s_g^C)^{\eta_g^k \psi_g - 1} = -\frac{\eta_g^k \psi_g \Delta_{g,VF}}{1 - s_g^C} \leq 0, \qquad \frac{\partial \Delta_{g,AF}}{\partial s_g^C} = 0. \tag{47}$$

The first derivative is strictly negative for $\bar{\Delta}_g^C > 0$. Greater sabotage ability reduces retention under foreign integration. Under arm's-length sourcing, the foreign party does not have the operational control required to take this action, so retention is unaffected by sabotage ability.

Holding sabotage ability, $\psi_g$, and baseline retention $\bar{\Delta}_g^C$ fixed, increasing the importance of the input that can be disabled gives

$$\frac{d\Delta_{g,VF}}{d\eta_g^k} = \psi_g \Delta_{g,VF} \log z_g^C \leq 0, \qquad \frac{d\Delta_{g,AF}}{d\eta_g^k} = 0, \qquad \eta_g^m = 1 - \eta_g^k. \tag{48}$$

The first derivative is strictly negative for $\bar{\Delta}_g^C > 0$ and $0 < z_g^C < 1$. Production that relies more heavily on the input vulnerable to sabotage retains less output under foreign integration.

## A.4 Proofs of Propositions 1 and 2

We now establish the proofs of Propositions 1 and 2. Proposition 1 is the special case with $\theta = 0$.

The full problem of the government is given by

$$\max_{\{P_{g,o\ell}, y_{g,o\ell}, k_{g,o\ell}, m_{g,o\ell}\}} U + \theta \sum_{g=1}^{G} \frac{\sigma_g}{\sigma_g - 1} \left[ \left( y_g^C - d_g^C \right)^{\frac{\sigma_g - 1}{\sigma_g}} - \left( y_g - d_g \right)^{\frac{\sigma_g - 1}{\sigma_g}} \right]$$

$$\text{subject to} \quad \sum_{o,\ell} P_{g,o\ell} = 1, \quad k_{g,o\ell} = \frac{\beta_{g,o}^k \eta_g^k c_{g,D}^m}{\beta_{g,o}^m \eta_g^m c_{g,\ell}^k} m_{g,o\ell},$$

$$y_{g,o\ell} = \left[ k_{g,o\ell}^{\eta_g^k} m_{g,o\ell}^{\eta_g^m} \right]^{\psi_g}, \quad y_{g,o\ell}^C = \Delta_{g,o\ell} y_{g,o\ell}.$$

All input costs are incurred and all contractual payments are made before the geopolitical state is realized. These committed funds are not released for domestic consumption in Conflict. They therefore do not generate an additional state-contingent resource term in the gov-

ernment's problem. Under proportional conflict retention, $\Delta_{g,o\ell}$ is fixed within an organization mode when the government varies the firm's scale or input choices. In particular,

$$\frac{\partial y^C_{g,o\ell}}{\partial x_{g,o\ell}} = \Delta_{g,o\ell} \frac{\partial y_{g,o\ell}}{\partial x_{g,o\ell}} \qquad \text{for } x_{g,o\ell} \in \{k_{g,o\ell}, m_{g,o\ell}\}. \tag{49}$$

**Simplifying.** It is useful to allow the planner to choose the non-contractible bundle $X_{g,o\ell} \equiv k^{\eta^k_g}_{g,o\ell} m^{\eta^m_g}_{g,o\ell}$ directly. Define the equilibrium input ratio

$$\phi_{g,o\ell} \equiv \frac{\beta^k_{g,o} \eta^k_g c^m_{g,D}}{\beta^m_{g,o} \eta^m_g c^k_{g,\ell}}, \tag{50}$$

which is determined solely by parameters. The non-contractibility constraint then requires

$$k_{g,o\ell} = \phi_{g,o\ell} m_{g,o\ell}. \tag{51}$$

Given $\phi_{g,o\ell}$ and $X_{g,o\ell}$, the individual inputs are uniquely determined:

$$k_{g,o\ell} = \phi^{\eta^m_g}_{g,o\ell} X_{g,o\ell}, \qquad m_{g,o\ell} = \phi^{-\eta^k_g}_{g,o\ell} X_{g,o\ell}. \tag{52}$$

The associated unit cost of the bundle is

$$c^X_{g,o\ell} \equiv c^k_{g,\ell} \phi^{\eta^m_g}_{g,o\ell} + c^m_{g,D} \phi^{-\eta^k_g}_{g,o\ell}. \tag{53}$$

The planning problem can therefore be restated as

$$\begin{aligned} \max_{\{P_{g,o\ell}, y_{g,o\ell}, X_{g,o\ell}\}} \quad & L + \sum_{g=1}^{G} \frac{\sigma_g}{\sigma_g - 1} \left(y_g - d_g\right)^{\frac{\sigma_g - 1}{\sigma_g}} - \sum_{g,o,\ell} P_{g,o\ell} c^X_{g,o\ell} X_{g,o\ell} - \sum_{g=1}^{G} \Omega_g(\mathbf{P}_g) \\ & + \theta \sum_{g=1}^{G} \frac{\sigma_g}{\sigma_g - 1} \left[ \left(y^C_g - d^C_g\right)^{\frac{\sigma_g - 1}{\sigma_g}} - \left(y_g - d_g\right)^{\frac{\sigma_g - 1}{\sigma_g}} \right] \\ \text{subject to} \quad & \sum_{o,\ell} P_{g,o\ell} = 1,\ y_{g,o\ell} = X^{\psi_g}_{g,o\ell},\ y^C_{g,o\ell} = \Delta_{g,o\ell} y_{g,o\ell}. \end{aligned}$$

Let

$$p_g \equiv \left(y_g - d_g\right)^{-1/\sigma_g}, \qquad p^C_g \equiv \left(y^C_g - d^C_g\right)^{-1/\sigma_g}. \tag{54}$$

**Optimal scale subsidies** The first-order condition of the planner with respect to $X_{g,o\ell}$ is

$$p_g \frac{\partial y_{g,o\ell}}{\partial X_{g,o\ell}} + \theta \left[ p_g^C \frac{\partial y_{g,o\ell}^C}{\partial X_{g,o\ell}} - p_g \frac{\partial y_{g,o\ell}}{\partial X_{g,o\ell}} \right] - c_{g,o\ell}^X = 0. \tag{55}$$

The corresponding first-order condition for a firm is

$$\left( p_g - \tau_{g,o\ell}^R \right) \frac{\partial y_{g,o\ell}}{\partial X_{g,o\ell}} - c_{g,o\ell}^X = 0. \tag{56}$$

Using (49) and comparing these two conditions yields

$$p_g - \tau_{g,o\ell}^R = (1-\theta) p_g + \theta p_g^C \Delta_{g,o\ell}, \tag{57}$$

and therefore

$$\tau_{g,o\ell}^R = \theta \left( p_g - p_g^C \Delta_{g,o\ell} \right). \tag{58}$$

**Optimal Location Decision** The planner's first-order condition with respect to $P_{g,o\ell}$ is

$$p_g y_{g,o\ell} - c_{g,o\ell}^X X_{g,o\ell} + \theta \left[ p_g^C y_{g,o\ell}^C - p_g y_{g,o\ell} \right] - \frac{\partial \Omega_g(\mathbf{P}_g)}{\partial P_{g,o\ell}} = \mu_g, \tag{59}$$

where $\mu_g$ is the multiplier on $\sum_{o,\ell} P_{g,o\ell} = 1$.

The private-sector assignment problem solves

$$\mathbf{P}_g \in \arg\max_{\{P_{g,o\ell}\}} \left\{ \sum_{o,\ell} P_{g,o\ell} \left( \pi_{g,o\ell} - \tau_{g,o\ell}^O \right) - \Omega_g(\mathbf{P}_g) \;\middle|\; \sum_{o,\ell} P_{g,o\ell} = 1 \right\}, \tag{60}$$

with first-order condition

$$\pi_{g,o\ell} - \tau_{g,o\ell}^O - \frac{\partial \Omega_g(\mathbf{P}_g)}{\partial P_{g,o\ell}} = \hat{\mu}_g, \tag{61}$$

where $\hat{\mu}_g$ is the corresponding multiplier. Using

$$\pi_{g,o\ell} = p_g y_{g,o\ell} - c_{g,o\ell}^X X_{g,o\ell}, \tag{62}$$

the planner's condition becomes

$$\pi_{g,o\ell} + \theta \left[ p_g^C y_{g,o\ell}^C - p_g y_{g,o\ell} \right] - \frac{\partial \Omega_g(\mathbf{P}_g)}{\partial P_{g,o\ell}} = \mu_g. \tag{63}$$

Comparing this condition with (61) yields

$$\tau^O_{g,o\ell} = -\theta \left[ p^C_g y^C_{g,o\ell} - p_g y_{g,o\ell} \right] + \mu_g - \hat{\mu}_g. \tag{64}$$

**Scaling the $\tau^O_{g,o\ell}$** Equation (61) implies that a given allocation is consistent with wedges and multipliers satisfying $\pi_{g,o\ell} - \partial \Omega_g(\mathbf{P}_g)/\partial P_{g,o\ell} = \hat{\mu}_g + \tau^O_{g,o\ell}$. For any constant $A_g$, the wedge vectors $\tau^O_{g,o\ell}$ and $\widetilde{\tau}^O_{g,o\ell} = \tau^O_{g,o\ell} + A_g$ implement the same allocation, with a corresponding adjustment in $\hat{\mu}_g$. The organization wedges are therefore identified only up to a constant common to all $(o, \ell)$. We normalize by setting $\hat{\mu}_g = \mu_g$.

Using $y^C_{g,o\ell} = \Delta_{g,o\ell} y_{g,o\ell}$, the normalized organization wedge is

$$\bar{\tau}^O_{g,o\ell} \equiv \frac{\tau^O_{g,o\ell}}{y_{g,o\ell}} = \theta \left( p_g - p^C_g \Delta_{g,o\ell} \right). \tag{65}$$

**Comparing the optimal wedges.** Combining (58) and (65), the optimal wedges for every organization mode are

$$\tau^R_{g,o\ell} = \bar{\tau}^O_{g,o\ell} = \theta(p_g - p^C_g) + \theta p^C_g (1 - \Delta_{g,o\ell}). \tag{66}$$

When $\theta = 0$, all wedges are zero, proving Proposition 1. For domestic sourcing, $\Delta_{g,oD} = 1$, so

$$\tau^R_{g,oD} = \bar{\tau}^O_{g,oD} = \theta(p_g - p^C_g). \tag{67}$$

For foreign sourcing,

$$\tau^R_{g,oF} = \bar{\tau}^O_{g,oF} = \theta \left( p_g - p^C_g \Delta_{g,oF} \right). \tag{68}$$

Finally, for $\theta > 0$, $\Delta_{g,VF} \leq \Delta_{g,AF} < 1$ implies

$$\tau^R_{g,VF} - \tau^R_{g,AF} = \bar{\tau}^O_{g,VF} - \bar{\tau}^O_{g,AF} = \theta p^C_g \left( \Delta_{g,AF} - \Delta_{g,VF} \right) \geq 0, \tag{69}$$

and, for either ownership form,

$$\tau^R_{g,oF} - \tau^R_{g,oD} = \bar{\tau}^O_{g,oF} - \bar{\tau}^O_{g,oD} = \theta p^C_g \left( 1 - \Delta_{g,oF} \right) > 0. \tag{70}$$

## A.5 Proofs for the Extensions

### A.5.1 Additional policy instruments

**Setup** In this extension, we introduce an additional wedge $\tau^m_{g,o\ell}$ that enters the perceived marginal cost of the specialized input supplier $m_{g,o\ell}$. This is an illustrative relaxation of the

government's contractual constraints: the government can regulate $m$ even though private contracts cannot condition on its provision. We retain the baseline residual-control shares and proportional Conflict technology, so $\Delta_{g,oD} = 1$ and $\Delta_{g,oF} = \delta^m_{g,o}$ remain fixed within each mode.

We express the new wedge in input-price units, so the supplier faces $c^m_{g,D} + \tau^m_{g,o\ell}$. As in the baseline, operating wedges are neutralized by a mode-specific rebate fixed from the perspective of both the owner and suppliers. At the implemented allocation, the rebate is $\tau^N_{g,o\ell} = \tau^R_{g,o\ell} y_{g,o\ell} + \tau^m_{g,o\ell} m_{g,o\ell}$. Consequently, the input wedge enters operating choices but has no direct effect on realized profits used to compare organizational modes. We focus on interior allocations with $p_g - \tau^R_{g,o\ell} > 0$ and $c^m_{g,D} + \tau^m_{g,o\ell} > 0$.

**Decentralized input choices** Given the new wedge, the specialized supplier of intermediate inputs solves

$$m_{g,o\ell} = \arg\max_m \left\{ \beta^m_{g,o} s_{g,o\ell} (p_g - \tau^R_{g,o\ell}) \left( k^{\eta^k_g}_{g,o\ell} m^{\eta^m_g} \right)^{\psi_g} - (c^m_{g,D} + \tau^m_{g,o\ell}) m \right\}. \tag{71}$$

The supplier of $k$'s problem is unchanged. Combining the two first-order conditions yields

$$\frac{k_{g,o\ell}}{m_{g,o\ell}} = \frac{\beta^k_{g,o} \eta^k_g (c^m_{g,D} + \tau^m_{g,o\ell})}{\beta^m_{g,o} \eta^m_g c^k_{g,\ell}}. \tag{72}$$

**Planner's problem** Substituting for the transfer in (19), the planner's problem is

$$\begin{aligned} \max_{\{P_{g,o\ell}, y_{g,o\ell}, k_{g,o\ell}, m_{g,o\ell}\}} \; & U + \theta \sum_{g=1}^{G} \frac{\sigma_g}{\sigma_g - 1} \left[ \left( y^C_g - d^C_g \right)^{\frac{\sigma_g - 1}{\sigma_g}} - \left( y_g - d_g \right)^{\frac{\sigma_g - 1}{\sigma_g}} \right] \\ \text{subject to} \quad & \sum_{o,\ell} P_{g,o\ell} = 1, \quad y_{g,o\ell} = \left( k^{\eta^k_g}_{g,o\ell} m^{\eta^m_g}_{g,o\ell} \right)^{\psi_g}, \quad y^C_{g,o\ell} = \Delta_{g,o\ell} y_{g,o\ell}. \end{aligned} \tag{73}$$

Here $U$ is given by (14). The additional instrument removes the input-ratio constraint in Appendix A.4; the production and Conflict technologies are unchanged. Prices and organizational shares are jointly determined in general equilibrium.

**Wedge on input composition** The planner's first-order conditions with respect to $k_{g,o\ell}$ and $m_{g,o\ell}$, after dividing by $P_{g,o\ell}$, are

$$\begin{aligned} p_g \frac{\partial y_{g,o\ell}}{\partial k_{g,o\ell}} + \theta \left[ p_g^C \frac{\partial y_{g,o\ell}^C}{\partial k_{g,o\ell}} - p_g \frac{\partial y_{g,o\ell}}{\partial k_{g,o\ell}} \right] &= c_{g,\ell}^k, \\ p_g \frac{\partial y_{g,o\ell}}{\partial m_{g,o\ell}} + \theta \left[ p_g^C \frac{\partial y_{g,o\ell}^C}{\partial m_{g,o\ell}} - p_g \frac{\partial y_{g,o\ell}}{\partial m_{g,o\ell}} \right] &= c_{g,D}^m. \end{aligned} \tag{74}$$

Using $y_{g,o\ell}^C = \Delta_{g,o\ell} y_{g,o\ell}$ and taking the ratio of these conditions gives

$$\left( \frac{k_{g,o\ell}}{m_{g,o\ell}} \right)^* = \frac{\eta_g^k c_{g,D}^m}{\eta_g^m c_{g,\ell}^k}. \tag{75}$$

Equating (72) with (75) and rearranging yields

$$\tau_{g,o\ell}^m = c_{g,D}^m \left( \frac{\beta_{g,o}^m}{\beta_{g,o}^k} - 1 \right). \tag{76}$$

**Wedge on revenue** We obtain $\tau_{g,o\ell}^R$ by equating the supplier's and planner's first-order conditions for $k_{g,o\ell}$.

The first-order condition for the supplier of $k$ and the corresponding planner condition are

$$\begin{aligned} \beta_{g,o}^k s_{g,o\ell} (p_g - \tau_{g,o\ell}^R) \eta_g^k \psi_g \frac{y_{g,o\ell}}{k_{g,o\ell}} &= c_{g,\ell}^k, \\ \left[ (1-\theta) p_g + \theta p_g^C \Delta_{g,o\ell} \right] \eta_g^k \psi_g \frac{y_{g,o\ell}}{k_{g,o\ell}} &= c_{g,\ell}^k. \end{aligned} \tag{77}$$

To recover the firm's optimal revenue multiplier, note that its operating surplus, up to the fixed rebate, is $(p_g - \tau_{g,o\ell}^R) y_{g,o\ell} - c_{g,\ell}^k k_{g,o\ell} - (c_{g,D}^m + \tau_{g,o\ell}^m) m_{g,o\ell}$. Holding the input ratio fixed, its first-order condition for scale is

$$(p_g - \tau_{g,o\ell}^R) \psi_g y_{g,o\ell} = c_{g,\ell}^k k_{g,o\ell} + (c_{g,D}^m + \tau_{g,o\ell}^m) m_{g,o\ell}. \tag{78}$$

Multiplying the suppliers' first-order conditions by their respective inputs and adding shows that

$$s_{g,o\ell} = \frac{1}{\beta_{g,o}^k \eta_g^k + \beta_{g,o}^m \eta_g^m}. \tag{79}$$

The multiplier retains its baseline expression because the same input wedge enters both the

supplier's cost and the owner's operating surplus. Substituting (79) into (77) yields

$$\tau^R_{g,o\ell} = p_g - \left(\eta^k_g + \frac{\beta^m_{g,o}}{\beta^k_{g,o}}\eta^m_g\right)\left[(1-\theta)p_g + \theta p^C_g \Delta_{g,o\ell}\right]. \tag{80}$$

Using (76), this can also be written as

$$\tau^R_{g,o\ell} = \theta(p_g - p^C_g \Delta_{g,o\ell}) - \frac{\tau^m_{g,o\ell} m_{g,o\ell}}{\psi_g y_{g,o\ell}}. \tag{81}$$

The first term is the baseline geopolitical wedge evaluated at the new allocation. The second offsets the scale incentive created by the input wedge. Consequently, the revenue wedge need not vanish when $\theta = 0$ and need not be ownership-independent even for domestic sourcing. It cannot be interpreted as a purely geopolitical distortion in this extension.

For domestic firms, (80) applies with $\Delta_{g,oD} = 1$. Comparing across locations for a given ownership structure gives

$$\tau^R_{g,oF} - \tau^R_{g,oD} = \theta p^C_g \left(\eta^k_g + \frac{\beta^m_{g,o}}{\beta^k_{g,o}}\eta^m_g\right)(1 - \Delta_{g,oF}) \geq 0. \tag{82}$$

The inequality is strict when $\theta > 0$. Foreign firms therefore continue to face higher revenue wedges than domestic firms with the same ownership structure.

**Organizational wedge** The derivation of $\tau^O_{g,o\ell}$ is identical to that in Appendix A.4. The neutralizing rebate removes the direct effect of the operating wedges on the profit used in organizational choice, so $\pi_{g,o\ell} = p_g y_{g,o\ell} - c^k_{g,\ell} k_{g,o\ell} - c^m_{g,D} m_{g,o\ell}$. Comparing the private and planner organizational conditions, normalizing their multipliers to coincide, and dividing by output yields

$$\bar{\tau}^O_{g,o\ell} \equiv \frac{\tau^O_{g,o\ell}}{y_{g,o\ell}} = \theta(p_g - p^C_g \Delta_{g,o\ell}) = \tau^R_{g,o\ell} + \frac{\tau^m_{g,o\ell} m_{g,o\ell}}{\psi_g y_{g,o\ell}}. \tag{83}$$

The organizational wedge retains the baseline expression in (22), but equals the combined scale incentive of the revenue and input wedges rather than the revenue wedge alone. Because Conflict retention remains ownership-dependent,

$$\bar{\tau}^O_{g,VF} \geq \bar{\tau}^O_{g,AF} > \bar{\tau}^O_{g,VD} = \bar{\tau}^O_{g,AD}. \tag{84}$$

This ranking applies when $\theta > 0$, with the first inequality strict if $\Delta_{g,VF} < \Delta_{g,AF}$; all organizational wedges vanish when $\theta = 0$.

### A.5.2 Generalized model

In this extension we generalize the baseline model along three dimensions, while preserving the quasi-linear structure and fixed foreign input costs that isolate the national security motive for ownership regulation from terms-of-trade considerations. First, we allow for general preferences over non-numeraire goods that can shift across geopolitical states. Second, we introduce input-output linkages and additional contractible inputs, some committed before the geopolitical stage and others supplied conditional on its outcome. Third, we replace proportional Conflict output with a general backup technology. We take the bargaining shares $\{\beta^k_{g,o}, \beta^m_{g,o}\}$ as exogenous and independent of input choices. Unlike the baseline, we do not derive these shares and the backup technology from the same allocation of residual control rights.

We show that the optimal wedges generalize naturally. The revenue wedge depends on the marginal effect of Peace output on Conflict output. The organizational wedge depends on the change in the value of output net of intermediate inputs and flexible labor across states. Consequently, the equality between the revenue wedge and the organizational wedge per unit of output in (22) need not hold in this extension.

**Preferences** Conditional on state $z \in \{P, C\}$, household utility before the geopolitical transfer is

$$U^z = q_0^z + u^z(\mathbf{q}^z), \qquad \mathbf{q}^z \equiv (q_g^z)_{g=1}^G. \tag{85}$$

We assume that $u^z(\cdot)$ is increasing, strictly concave, and continuously differentiable, and allow preferences to differ across Peace and Conflict. We focus on positive output and consumption in both states. Quasi-linearity in the numeraire implies $p_g^z = \partial u^z / \partial q_g^z$. As in the main text, we omit the Peace superscript on prices and output, so $p_g^P = p_g$ and $y_{g,o\ell}^P = y_{g,o\ell}$.[30]

**Technologies** For each good $g$ and organizational mode $(o, \ell)$, gross output in state $z$ is

$$y_{g,o\ell}^z = F_g^z\left(k_{g,o\ell}^z, m_{g,o\ell}, l_{g,o\ell}, \mathbf{x}_{g,o\ell}^z, L_{g,o\ell}^z\right). \tag{86}$$

Here $k_{g,o\ell}^P = k_{g,o\ell}$ and $m_{g,o\ell}$ are the non-contractible inputs chosen before the geopolitical stage. The additional input $l_{g,o\ell}$ is contractible labor committed at the same stage. The vector $\mathbf{x}_{g,o\ell}^z \equiv (x_{g'g,o\ell}^z)_{g'=1}^G$ collects intermediate inputs, where $x_{g'g,o\ell}^z$ is the quantity of good $g'$ used to produce good $g$, and $L_{g,o\ell}^z$ is flexible labor. Intermediate inputs and flexible labor are supplied and paid for conditional on the geopolitical outcome. These contractible inputs are additions to the

[30] The baseline has $u^P(\mathbf{q}) = u^C(\mathbf{q}) = \sum_{g=1}^G \frac{\sigma_g}{\sigma_g - 1} q_g^{(\sigma_g - 1)/\sigma_g}$.

current baseline, which uses only $k$ and $m$ in non-numeraire production. We assume that $F_g^z(\cdot)$ is increasing, strictly concave, and twice continuously differentiable on the relevant domain.

Contracts specify the state-contingent quantities of the additional contractible inputs before suppliers take their non-verifiable actions. Their quantities can therefore differ between Peace and Conflict, but are held fixed when a supplier unilaterally changes its non-contractible input. The government can commit to state-contingent regulation of these contractible margins.[31]

The numeraire good is produced under a linear technology using either labor type,

$$y_0^z = l_0 + L_0^z. \tag{87}$$

The endowments of committed and flexible labor are $\bar{l}$ and $\bar{L}$, respectively. We assume that both types are used in numeraire production, so their wages equal one.

**Resource constraints** For each good $g$ and state $z$, the resource constraint is

$$q_g^z + d_g^z + \sum_{g'=1}^{G} \sum_{o,\ell} P_{g',o\ell} x_{gg',o\ell}^z = \sum_{o,\ell} P_{g,o\ell} y_{g,o\ell}^z, \qquad d_g^P = d_g. \tag{88}$$

Defense demand $d_g^z$ remains exogenous. The left-hand side sums household consumption, defense demand, and intermediate input use; the right-hand side sums production across organizational modes. Domestic labor markets clear as

$$\begin{aligned} l_0 + \sum_{g,o,\ell} P_{g,o\ell}(l_{g,o\ell} + c_{g,D}^m m_{g,o\ell}) + \sum_{g,o} P_{g,oD} c_{g,D}^k k_{g,oD} + \sum_g \Omega_g(\mathbf{P}_g) = \bar{l}, \\ L_0^z + \sum_{g,o,\ell} P_{g,o\ell} L_{g,o\ell}^z = \bar{L}. \end{aligned} \tag{89}$$

Foreign inputs $k$ are paid for in the traded numeraire, rather than using domestic labor. Combining these payments with the resource constraints gives numeraire consumption before the geopolitical transfer:

$$q_0^z = \bar{l} + \bar{L} - \sum_{g,o,\ell} P_{g,o\ell} \left( c_{g,\ell}^k k_{g,o\ell} + c_{g,D}^m m_{g,o\ell} + l_{g,o\ell} + L_{g,o\ell}^z \right) - \sum_g \Omega_g(\mathbf{P}_g). \tag{90}$$

As in the baseline, the costs of committed inputs are sunk and the funds backing revenue-contingent payments are not released for domestic consumption in Conflict. Only the addi-

[31] This timing makes explicit the commitment needed to obtain the conditional supplier first-order conditions below. If firms instead reoptimize flexible inputs after observing a non-contractible deviation, suppliers anticipate those responses and the corresponding implementability constraint must be changed.

tional state-contingent inputs generate new resource costs after the geopolitical outcome is determined.

**Firm problem in peace** The contracting structure follows the baseline, except that we directly assume $\beta^k_{g,o}, \beta^m_{g,o} \in (0,1)$ and $\beta^k_{g,o} + \beta^m_{g,o} = 1$. These exogenous shares can differ by ownership, but do not vary with input choices or the backup technology. They therefore need not satisfy the baseline link between bargaining shares and disagreement-output shares.

Conditional on organizational mode, the revenue multiplier $s_{g,o\ell}$, and the contractible input plans, the supplier of $k$ solves

$$k_{g,o\ell} \in \arg\max_k \left\{ \beta^k_{g,o} s_{g,o\ell} (p_g - \tau^R_{g,o\ell}) F^P_g(k, m_{g,o\ell}, l_{g,o\ell}, \mathbf{x}^P_{g,o\ell}, L^P_{g,o\ell}) - c^k_{g,\ell} k \right\}. \tag{91}$$

The supplier of $m$ solves

$$m_{g,o\ell} \in \arg\max_m \left\{ \beta^m_{g,o} s_{g,o\ell} (p_g - \tau^R_{g,o\ell}) F^P_g(k_{g,o\ell}, m, l_{g,o\ell}, \mathbf{x}^P_{g,o\ell}, L^P_{g,o\ell}) - c^m_{g,D} m \right\}. \tag{92}$$

We focus on interior choices with $p_g - \tau^R_{g,o\ell} > 0$. Combining the two first-order conditions eliminates $s_{g,o\ell}$ and gives the implementability constraint

$$\frac{\beta^k_{g,o}}{c^k_{g,\ell}} \frac{\partial F^P_g}{\partial k_{g,o\ell}} = \frac{\beta^m_{g,o}}{c^m_{g,D}} \frac{\partial F^P_g}{\partial m_{g,o\ell}}. \tag{93}$$

Unlike the Cobb–Douglas case, this condition need not imply a constant input ratio. Conversely, a positive input allocation satisfying (93) can be implemented by choosing $s_{g,o\ell} = c^k_{g,\ell} / [\beta^k_{g,o}(p_g - \tau^R_{g,o\ell})(\partial F^P_g / \partial k_{g,o\ell})]$. Thus, as in the baseline, the owner can choose output and contractible inputs subject to the production technology and this implementability constraint.

Together, (86) in Peace and (93) determine the non-contractible inputs as implicit functions:

$$\begin{aligned} k_{g,o\ell} &= \mathcal{K}^P_{g,o\ell}(y_{g,o\ell}, l_{g,o\ell}, \mathbf{x}^P_{g,o\ell}, L^P_{g,o\ell}), \\ m_{g,o\ell} &= \mathcal{M}^P_{g,o\ell}(y_{g,o\ell}, l_{g,o\ell}, \mathbf{x}^P_{g,o\ell}, L^P_{g,o\ell}). \end{aligned} \tag{94}$$

We assume that these equations define a unique differentiable input allocation on the relevant branch. The owner chooses the revenue multiplier and contractible input plans subject to these restrictions, while the initial producer chooses the organizational mode as in Section 2. All regulatory wedges on operating choices are neutralized by rebates fixed from the firm's perspective, as in the baseline. They therefore affect organizational profits through the allocation, but not through net operating tax payments.

**Technology during conflict** We treat the services of $k$ available in Conflict as a primitive backup mapping,

$$k^C_{g,o\ell} = \mathcal{K}^C_{g,o\ell}(k_{g,o\ell}, m_{g,o\ell}, l_{g,o\ell}, \mathbf{x}^C_{g,o\ell}, L^C_{g,o\ell}). \tag{95}$$

This mapping allows recovery to depend on committed inputs and on the additional resources supplied in Conflict. It is independent of the exogenous bargaining shares. In particular, we no longer impose $\Delta_{g,oF} = \delta^m_{g,o}$ or require $\Delta_{g,o\ell}$ to be constant as inputs vary. Unlike the baseline, the extension permits resources to be allocated to backup production after the geopolitical outcome is determined. The backup mapping and the production technology jointly describe feasible output: resources used for recovery must be included in the listed input requirements or netted out of output, and cannot be used twice.

Substituting (95) into (86) gives Conflict output as a function of committed and flexible inputs. Substituting (94) then expresses it in terms of Peace output, committed labor, and the flexible input plans in both states. Below, derivatives of $y^C_{g,o\ell}$ include these substitutions. We retain the definition

$$\Delta_{g,o\ell} \equiv \frac{y^C_{g,o\ell}}{y_{g,o\ell}}, \tag{96}$$

but this is now an endogenous output ratio rather than a fixed retention parameter.

**Planning problem** The geopolitical game is unchanged: $\theta$ is the probability of a crisis, not the probability of realized Conflict. The Foreign government demands the largest transfer consistent with Peace. Assuming that Conflict gives Domestic a weakly worse outside option, the transfer is

$$\mathcal{T} = U^P - U^C = u^P(\mathbf{q}^P) - u^C(\mathbf{q}^C) + \sum_{g,o,\ell} P_{g,o\ell}(L^C_{g,o\ell} - L^P_{g,o\ell}). \tag{97}$$

The additional term accounts for the difference in flexible labor costs. Intermediate inputs affect the transfer through household consumption in (88). Committed input costs cancel between the two states.

The planner maximizes $U^P - \theta\mathcal{T} = (1-\theta)U^P + \theta U^C$, subject to the same implementability constraint as private firms. Using (90), its problem is

$$\begin{aligned} \max_{\{P,y,l,\mathbf{x}^z,L^z\}} \quad & \bar{l} + \bar{L} + (1-\theta)u^P(\mathbf{q}^P) + \theta u^C(\mathbf{q}^C) - \sum_g \Omega_g(\mathbf{P}_g) \\ & - \sum_{g,o,\ell} P_{g,o\ell}\left[c^k_{g,\ell}k_{g,o\ell} + c^m_{g,D}m_{g,o\ell} + l_{g,o\ell} + (1-\theta)L^P_{g,o\ell} + \theta L^C_{g,o\ell}\right] \\ \text{subject to} \quad & \sum_{o,\ell} P_{g,o\ell} = 1, \quad \text{(86), (88), (94), and (95).} \end{aligned} \tag{98}$$

The non-contractible inputs are determined by (94); they are not independent planner controls.

We focus on a regular interior optimum. The first-order conditions below compare variations in an individual firm's allocation at fixed prices. General-equilibrium prices and organizational shares are jointly determined by these conditions and market clearing.

**Location and organizational choice** We first compare the planner's and private producer's organizational choices. Differentiating (98) with respect to $P_{g,o\ell}$, holding fixed the mode's input and output quantities, gives

$$\begin{aligned}(1-\theta)\left[p_g y_{g,o\ell} - \sum_{g'=1}^{G} p_{g'} x^P_{g'g,o\ell} - L^P_{g,o\ell}\right] + \theta\left[p^C_g y^C_{g,o\ell} - \sum_{g'=1}^{G} p^C_{g'} x^C_{g'g,o\ell} - L^C_{g,o\ell}\right] \\ - c^k_{g,\ell} k_{g,o\ell} - c^m_{g,D} m_{g,o\ell} - l_{g,o\ell} - \frac{\partial \Omega_g(\mathbf{P}_g)}{\partial P_{g,o\ell}} = \mu_g.\end{aligned} \tag{99}$$

Here $\mu_g$ is the multiplier on $\sum_{o,\ell} P_{g,o\ell} = 1$. The decentralized organizational choice satisfies

$$\pi_{g,o\ell} - \tau^O_{g,o\ell} - \frac{\partial \Omega_g(\mathbf{P}_g)}{\partial P_{g,o\ell}} = \hat{\mu}_g. \tag{100}$$

Here $\pi_{g,o\ell} = p_g y_{g,o\ell} - \sum_{g'=1}^{G} p_{g'} x^P_{g'g,o\ell} - L^P_{g,o\ell} - c^k_{g,\ell} k_{g,o\ell} - c^m_{g,D} m_{g,o\ell} - l_{g,o\ell}$. Comparing the two conditions yields

$$\tau^O_{g,o\ell} = \theta\left[p_g y_{g,o\ell} - p^C_g y^C_{g,o\ell} + \sum_{g'=1}^{G}\left(p^C_{g'} x^C_{g'g,o\ell} - p_{g'} x^P_{g'g,o\ell}\right) + L^C_{g,o\ell} - L^P_{g,o\ell}\right] + \mu_g - \hat{\mu}_g. \tag{101}$$

**Scaling the organizational wedge** As in the baseline, organizational wedges are identified up to a good-specific constant. We normalize $\hat{\mu}_g = \mu_g$ and divide by Peace output, not revenue:

$$\begin{aligned}\bar{\tau}^O_{g,o\ell} \equiv \frac{\tau^O_{g,o\ell}}{y_{g,o\ell}} &= \theta(p_g - p^C_g \Delta_{g,o\ell}) \\ &\quad + \frac{\theta}{y_{g,o\ell}}\left[\sum_{g'=1}^{G}\left(p^C_{g'} x^C_{g'g,o\ell} - p_{g'} x^P_{g'g,o\ell}\right) + L^C_{g,o\ell} - L^P_{g,o\ell}\right].\end{aligned} \tag{102}$$

The organizational wedge equals $\theta$ times the difference between the firm's Peace and Conflict output values net of intermediate inputs and flexible labor, per unit of Peace output. The additional terms capture state-dependent input costs that are absent from the baseline.

**Scale wedge** We next derive the revenue wedge by varying Peace output while holding the contractible input plans fixed. The non-contractible inputs adjust according to (94), so

$$\frac{dy^C_{g,o\ell}}{dy_{g,o\ell}} = \frac{\partial y^C_{g,o\ell}}{\partial k_{g,o\ell}} \frac{dk_{g,o\ell}}{dy_{g,o\ell}} + \frac{\partial y^C_{g,o\ell}}{\partial m_{g,o\ell}} \frac{dm_{g,o\ell}}{dy_{g,o\ell}}. \tag{103}$$

The partial derivatives on the right include the backup mapping (95), holding the other committed inputs and Conflict input plans fixed. The derivatives of $k$ and $m$ follow (94), holding $l$, $\mathbf{x}^P$, and $L^P$ fixed. The planner's scale condition is

$$(1-\theta)p_g + \theta p^C_g \frac{dy^C_{g,o\ell}}{dy_{g,o\ell}} - c^k_{g,\ell} \frac{dk_{g,o\ell}}{dy_{g,o\ell}} - c^m_{g,D} \frac{dm_{g,o\ell}}{dy_{g,o\ell}} = 0. \tag{104}$$

The firm's corresponding condition is

$$p_g - \tau^R_{g,o\ell} - c^k_{g,\ell} \frac{dk_{g,o\ell}}{dy_{g,o\ell}} - c^m_{g,D} \frac{dm_{g,o\ell}}{dy_{g,o\ell}} = 0. \tag{105}$$

Comparing the two gives

$$\tau^R_{g,o\ell} = \theta \left( p_g - p^C_g \frac{dy^C_{g,o\ell}}{dy_{g,o\ell}} \right) = \theta \left( p_g - p^C_g \Delta_{g,o\ell} \frac{d \ln y^C_{g,o\ell}}{d \ln y_{g,o\ell}} \right). \tag{106}$$

This is an additive wedge on the output price, as in the current baseline. The elasticity need not equal one and need not admit a closed-form expression. Since $\Delta_{g,o\ell}$ is now endogenous, the same condition can be written as

$$\tau^R_{g,o\ell} = \theta \left[ p_g - p^C_g \left( \Delta_{g,o\ell} + y_{g,o\ell} \frac{d\Delta_{g,o\ell}}{dy_{g,o\ell}} \right) \right]. \tag{107}$$

**Sticky labor wedge** Finally, we derive the wedge on the additional committed labor input. Because Peace output is already a choice variable, we vary $l_{g,o\ell}$ holding $y_{g,o\ell}$ and the flexible input plans fixed. The non-contractible inputs adjust to keep Peace output unchanged, which can affect Conflict output through the backup technology:

$$\left. \frac{dy^C_{g,o\ell}}{dl_{g,o\ell}} \right|_{y_{g,o\ell}} = \frac{\partial y^C_{g,o\ell}}{\partial l_{g,o\ell}} + \frac{\partial y^C_{g,o\ell}}{\partial k_{g,o\ell}} \frac{\partial \mathcal{K}^P_{g,o\ell}}{\partial l_{g,o\ell}} + \frac{\partial y^C_{g,o\ell}}{\partial m_{g,o\ell}} \frac{\partial \mathcal{M}^P_{g,o\ell}}{\partial l_{g,o\ell}}. \tag{108}$$

The planner's and firm's labor conditions are, respectively,

$$\begin{aligned} -1 - c^k_{g,\ell}\frac{\partial \mathcal{K}^P_{g,o\ell}}{\partial l_{g,o\ell}} - c^m_{g,D}\frac{\partial \mathcal{M}^P_{g,o\ell}}{\partial l_{g,o\ell}} + \theta p^C_g \left.\frac{dy^C_{g,o\ell}}{dl_{g,o\ell}}\right|_{y_{g,o\ell}} &= 0, \\ -(1+\tau^L_{g,o\ell}) - c^k_{g,\ell}\frac{\partial \mathcal{K}^P_{g,o\ell}}{\partial l_{g,o\ell}} - c^m_{g,D}\frac{\partial \mathcal{M}^P_{g,o\ell}}{\partial l_{g,o\ell}} &= 0. \end{aligned} \tag{109}$$

Hence,

$$\tau^L_{g,o\ell} = -\theta p^C_g \left.\frac{dy^C_{g,o\ell}}{dl_{g,o\ell}}\right|_{y_{g,o\ell}}. \tag{110}$$

Conditional on the scale adjustment implemented by the revenue wedge, labor is subsidized when substituting toward it raises Conflict output while holding Peace output fixed. The same comparison applies to the other contractible Peace input margins, accounting for their input prices. For $\theta > 0$, the Conflict input plans satisfy the usual marginal-value conditions $p^C_g\, \partial y^C_{g,o\ell}/\partial x^C_{g'g,o\ell} = p^C_{g'}$ and $p^C_g\, \partial y^C_{g,o\ell}/\partial L^C_{g,o\ell} = 1$, where the derivatives include their contribution to backup production.

**Relation to the baseline** With $\theta = 0$, the planner and private conditions coincide and all the displayed wedges are zero, as in Proposition 1. Removing the additional contractible inputs and imposing $y^C_{g,o\ell} = \Delta_{g,o\ell} y_{g,o\ell}$ with fixed $\Delta_{g,o\ell}$ gives $dy^C_{g,o\ell}/dy_{g,o\ell} = \Delta_{g,o\ell}$ and recovers (22). With general backup production, the revenue wedge instead depends on marginal Conflict output, while the organizational wedge depends on average output and state-dependent input costs. Their equality and the baseline ownership rankings therefore require additional restrictions; they do not follow from exogenous bargaining shares alone.

### A.5.3 Appropriation and endogenous defense demand

**Setup.** We retain the baseline economic environment and geopolitical bargaining game, but allow foreign appropriation to increase Domestic defense requirements in Conflict. Foreign can convert part of the productive resources or knowledge lost by Domestic after separation into a military advantage. Domestic must then purchase additional defense goods to maintain a given level of security. We assume that this additional demand is proportional to the firm's lost output, with a common conversion coefficient $\gamma_g \geq 0$ within each good:

$$d^C_g = \bar{d}^C_g + \gamma_g \sum_{o \in \{A,V\}} P_{g,oF}(1 - \Delta_{g,oF}) y_{g,oF} = \bar{d}^C_g + \gamma_g (y_g - y^C_g). \tag{111}$$

Here $\bar{d}_g^C > d_g$ is baseline defense demand in Conflict. The coefficient $\gamma_g$ combines the fraction of lost productive capacity that Foreign can appropriate with the additional defense purchases its military use requires.[32] The second equality uses $y_g = \sum_{o,\ell} P_{g,o\ell} y_{g,o\ell}$, $y_g^C = \sum_{o,\ell} P_{g,o\ell} \Delta_{g,o\ell} y_{g,o\ell}$, and $\Delta_{g,oD} = 1$. As in the baseline, $\Delta_{g,o\ell}$ is fixed within each organizational mode. Private consumption in Conflict is therefore

$$y_g^C - d_g^C = (1+\gamma_g) y_g^C - \gamma_g y_g - \bar{d}_g^C. \tag{112}$$

We maintain the baseline Peace equilibrium and restrict attention to parameters for which the relevant allocations have positive private consumption in both states and interior firm choices.

**Planner's problem.** The planner's objective is unchanged, but defense demand $d_g^C$ now satisfies (111):

$$\begin{aligned} \max_{\{P_{g,o\ell},\, y_{g,o\ell}\}} \quad & L + \sum_{g=1}^{G} \frac{\sigma_g}{\sigma_g - 1} \left[ (1-\theta)(y_g - d_g)^{\frac{\sigma_g - 1}{\sigma_g}} + \theta (y_g^C - d_g^C)^{\frac{\sigma_g - 1}{\sigma_g}} \right] \\ & - \sum_{g,o,\ell} P_{g,o\ell} c_{g,o\ell}^X y_{g,o\ell}^{1/\psi_g} - \sum_g \Omega_g(\mathbf{P}_g) \\ \text{subject to} \quad & \sum_{o,\ell} P_{g,o\ell} = 1, \quad y_g = \sum_{o,\ell} P_{g,o\ell} y_{g,o\ell}, \quad y_g^C = \sum_{o,\ell} P_{g,o\ell} \Delta_{g,o\ell} y_{g,o\ell}, \quad (111). \end{aligned} \tag{113}$$

The marginal values of consumption remain

$$p_g = (y_g - d_g)^{-1/\sigma_g}, \qquad p_g^C = (y_g^C - d_g^C)^{-1/\sigma_g}. \tag{114}$$

Equation (112) implies the following marginal effects, holding the other firm quantities and shares fixed:

$$\frac{1}{P_{g,o\ell}} \frac{d(y_g^C - d_g^C)}{dy_{g,o\ell}} = \frac{1}{y_{g,o\ell}} \frac{d(y_g^C - d_g^C)}{dP_{g,o\ell}} = (1+\gamma_g)\Delta_{g,o\ell} - \gamma_g. \tag{115}$$

The same coefficient governs both margins because the defense externality is proportional to firm output.

**Revenue wedge.** Using (115), the planner's first-order condition for firm output, after dividing by $P_{g,o\ell}$, is

$$(1-\theta) p_g + \theta p_g^C \left[ (1+\gamma_g)\Delta_{g,o\ell} - \gamma_g \right] - \frac{c_{g,o\ell}^X}{\psi_g} y_{g,o\ell}^{1/\psi_g - 1} = 0. \tag{116}$$

[32] This is an additional reduced-form assumption. We do not identify all output lost by Domestic with output appropriated by Foreign, or impose that the two private disagreement-output shares sum to one.

The unchanged private first-order condition is

$$p_g - \tau^R_{g,o\ell} - \frac{c^X_{g,o\ell}}{\psi_g} y^{1/\psi_g - 1}_{g,o\ell} = 0. \tag{117}$$

Comparing these conditions gives

$$\tau^R_{g,o\ell} = \theta \left[ p_g - p^C_g \left( (1+\gamma_g)\Delta_{g,o\ell} - \gamma_g \right) \right]. \tag{118}$$

**Organizational wedge.** We next differentiate the planner's objective with respect to the organizational share $P_{g,o\ell}$. Using the unchanged profit expression, the condition is

$$\pi_{g,o\ell} + \theta y_{g,o\ell} \left[ p^C_g \left( (1+\gamma_g)\Delta_{g,o\ell} - \gamma_g \right) - p_g \right] - \frac{\partial \Omega_g(\mathbf{P}_g)}{\partial P_{g,o\ell}} = \mu_g, \tag{119}$$

where $\mu_g$ is the multiplier on the adding-up constraint. The private organizational condition remains

$$\pi_{g,o\ell} - \tau^O_{g,o\ell} - \frac{\partial \Omega_g(\mathbf{P}_g)}{\partial P_{g,o\ell}} = \hat{\mu}_g. \tag{120}$$

Comparing the two yields

$$\tau^O_{g,o\ell} = \theta y_{g,o\ell} \left[ p_g - p^C_g \left( (1+\gamma_g)\Delta_{g,o\ell} - \gamma_g \right) \right] + \mu_g - \hat{\mu}_g. \tag{121}$$

**Scaling the organizational wedge.** As in the baseline, we normalize $\hat{\mu}_g = \mu_g$ and define $\bar{\tau}^O_{g,o\ell} = \tau^O_{g,o\ell}/y_{g,o\ell}$. Equations (118) and (121) then imply

$$\tau^R_{g,o\ell} = \bar{\tau}^O_{g,o\ell} = \theta(p_g - p^C_g) + \theta p^C_g (1+\gamma_g)(1-\Delta_{g,o\ell}). \tag{122}$$

**Implications.** The wedges retain the baseline structure. Organizational exposure now reduces Domestic supply and increases its defense requirements, adding $\theta p^C_g \gamma_g (1-\Delta_{g,o\ell})$ to each per-unit wedge. Using the common wedge $\tau_{g,o\ell} = \tau^R_{g,o\ell} = \bar{\tau}^O_{g,o\ell}$, the relative wedges are

$$\begin{aligned} \tau_{g,VF} - \tau_{g,AF} &= \theta p^C_g (1+\gamma_g)(\Delta_{g,AF} - \Delta_{g,VF}) \geq 0, \\ \tau_{g,oF} - \tau_{g,oD} &= \theta p^C_g (1+\gamma_g)(1-\Delta_{g,oF}) \geq 0. \end{aligned} \tag{123}$$

The first inequality is strict when $\theta > 0$ and $\Delta_{g,VF} < \Delta_{g,AF}$. The second inequality is strict when $\theta > 0$. Setting $\gamma_g = 0$ recovers (22), while all wedges vanish when $\theta = 0$. Prices, firm outputs, and organizational shares adjust in general equilibrium: they are jointly determined

by the unchanged private conditions, market clearing, and (111)–(114) evaluated at the optimal wedges. The factor $1+\gamma_g$ describes the additional direct military channel; $p_g^C$ is not held fixed across equilibria.

## A.6 Proofs of Propositions in Section 4

This appendix proves Propositions 3–6. We first state the two market-clearing equations that determine the marginal values of Peace and Conflict output. We then differentiate this system separately for each proposition. Firm output, organizational shares, and both prices adjust in general equilibrium throughout. We consider smooth interior equilibria with $0 < \theta < 1$ and positive private consumption in both states, holding technology, input costs, bargaining shares, and the fixed-cost distribution fixed. Write $j, j' \in \{AD, AF, VD, VF\}$ for organization modes.

**The objects of interest.** We begin by identifying which price responses determine the wedge comparisons. Proposition 2 implies

$$\tau_{g,j} - \tau_{g,j'} = \theta p_g^C(\Delta_{g,j'} - \Delta_{g,j}), \qquad \tau_{g,j} \equiv \tau_{g,j}^R = \bar{\tau}_{g,j}^O. \tag{124}$$

When retention shares are fixed, it is therefore enough to sign the response of $\theta p_g^C$. When exposure changes according to (24), the relevant object is instead $\chi_g \theta p_g^C$.

### A.6.1 Marginal Costs and the Equilibrium System

**Common marginal costs.** We first express production costs in terms of output so that input choices need not be carried through each proof. From (52)–(53), producing $y$ under mode $j$ requires $X = y^{1/\psi_g}$ and costs $c_{g,j}^X y^{1/\psi_g}$. Hence,

$$MC_{g,j}(y) = \frac{c_{g,j}^X}{\psi_g} y^{(1-\psi_g)/\psi_g}. \tag{125}$$

Assumption 1 is equivalent to $c_{g,j}^X = c_g^X$ across modes. The symmetric benchmark in the main text is sufficient: $\eta_g^k = \eta_g^m = 1/2$, $c_{g,D}^m = c_{g,D}^k = c_{g,F}^k$, and $\beta_{g,V}^k = \beta_{g,A}^m$ imply $\phi_{g,V\ell} = \phi_{g,A\ell}^{-1}$. The bundle cost is then $c_{g,o\ell}^X = c_{g,D}^m(\phi_{g,o\ell}^{1/2} + \phi_{g,o\ell}^{-1/2})$, which is the same across modes.

**Supply at given marginal values.** We next describe how firms' output and organizational shares respond to the value of production in each state. Write $u$ and $v$ for these two marginal values; in equilibrium, $u = (1-\theta)p_g$ and $v = \theta p_g^C$. For given retention shares, let $\Pi_g(u, v)$ be

the value of

$$\begin{aligned} \max_{\{P_{g,j},y_{g,j}\}} \quad & \sum_j P_{g,j}\left[(u+v\Delta_{g,j})y_{g,j} - c_g^X y_{g,j}^{1/\psi_g}\right] - \Omega_g(\mathbf{P}_g) \\ \text{subject to} \quad & \sum_j P_{g,j} = 1, \qquad P_{g,j} \geq 0, \qquad y_{g,j} \geq 0. \end{aligned} \tag{126}$$

For any $(u, v)$, this problem determines aggregate supply in both states. The envelope theorem gives

$$\begin{aligned} \Pi_{g,u}(u,v) &= \sum_j P_{g,j}(u,v)y_{g,j}(u,v) = y_g(u,v), \\ \Pi_{g,v}(u,v) &= \sum_j P_{g,j}(u,v)\Delta_{g,j}y_{g,j}(u,v) = y_g^C(u,v). \end{aligned} \tag{127}$$

The first identity follows because $u$ multiplies Peace output in the objective; the second follows because $v$ multiplies Conflict output. The envelope theorem allows us to differentiate these explicit terms at the optimal choices: adjustments in output and shares have no separate first-order effect on the maximized objective.

**Supply responses and their signs.** We now establish the signs needed to interpret the differentiated market-clearing equations. Since $y_g = \Pi_{g,u}$ and $y_g^C = \Pi_{g,v}$, $\Pi_{g,uu}$ is the response of Peace supply to $u$, $\Pi_{g,vv}$ is the response of Conflict supply to $v$, and $\Pi_{g,uv}$ is the response of Peace supply to $v$, or equivalently of Conflict supply to $u$. These derivatives allow both firm output and organizational shares to adjust, holding retention shares fixed.

The function $\Pi_g$ is convex in $(u, v)$ because it is a maximum of affine functions. Thus $\Pi_{g,uu} \geq 0$, $\Pi_{g,vv} \geq 0$, and $\Pi_{g,uu}\Pi_{g,vv} \geq \Pi_{g,uv}^2$. Common marginal costs also imply $\Pi_{g,uv} \geq 0$. To see this, a mode with higher retention faces a higher marginal value $u + v\Delta_{g,j}$ and produces more. For $\Delta_{g,j} > \Delta_{g,j'}$, the derivative of the difference in maximized operating surpluses with respect to $v$ is $\Delta_{g,j}y_{g,j} - \Delta_{g,j'}y_{g,j'} > 0$. Raising $v$ therefore shifts blueprint choices toward modes with weakly higher retention. Output weakly rises within each mode and cannot fall when a blueprint switches to a mode with higher retention. Aggregating establishes the nonnegative cross-supply response.

**The equilibrium system.** We can now determine the two marginal values by equating these supplies to total demand. Substituting $p_g = u/(1-\theta)$ and $p_g^C = v/\theta$ into the demand system gives

$$\begin{aligned} \Pi_{g,u}(u,v) &= d_g + \left(\frac{u}{1-\theta}\right)^{-\sigma_g}, \\ \Pi_{g,v}(u,v) &= d_g^C + \left(\frac{v}{\theta}\right)^{-\sigma_g}. \end{aligned} \tag{128}$$

The first equation clears the Peace market and the second clears the Conflict market. All quantities and supply derivatives below are evaluated at the equilibrium solution. We differentiate these same two equations in each proof, specifying which parameter changes and which parameters remain fixed.

### A.6.2 Effect of Geopolitical Risk

**Differentiating the two markets.** To prove Proposition 3, we raise $\theta$ while holding $d_g$, $d_g^C$, and retention shares fixed. On the supply side, the chain rule gives $\Pi_{g,uu}\, du/d\theta + \Pi_{g,uv}\, dv/d\theta$ for the change in Peace output, and $\Pi_{g,uv}\, du/d\theta + \Pi_{g,vv}\, dv/d\theta$ for Conflict output. On the demand side, $d\log p_g/d\theta = (du/d\theta)/u + 1/(1-\theta)$ and $d\log p_g^C/d\theta = (dv/d\theta)/v - 1/\theta$. Equating supply and demand responses and moving the price-dependent demand terms to the left gives

$$\begin{aligned} \left[\Pi_{g,uu} + \frac{\sigma_g(y_g - d_g)}{u}\right]\frac{du}{d\theta} + \Pi_{g,uv}\frac{dv}{d\theta} &= -\frac{\sigma_g(y_g - d_g)}{1-\theta}, \\ \Pi_{g,uv}\frac{du}{d\theta} + \left[\Pi_{g,vv} + \frac{\sigma_g(y_g^C - d_g^C)}{v}\right]\frac{dv}{d\theta} &= \frac{\sigma_g(y_g^C - d_g^C)}{\theta}. \end{aligned} \tag{129}$$

**Eliminating the Peace-price response.** We next solve the first equation for $du/d\theta$ and substitute it into the second. This isolates the response of $v = \theta p_g^C$:

$$\begin{aligned} &\left[\Pi_{g,vv} + \frac{\sigma_g(y_g^C - d_g^C)}{v} - \frac{\Pi_{g,uv}^2}{\Pi_{g,uu} + \sigma_g(y_g - d_g)/u}\right]\frac{dv}{d\theta} \\ &\qquad = \frac{\sigma_g(y_g^C - d_g^C)}{\theta} + \frac{\Pi_{g,uv}}{\Pi_{g,uu} + \sigma_g(y_g - d_g)/u}\frac{\sigma_g(y_g - d_g)}{1-\theta}. \end{aligned} \tag{130}$$

The subtracted term on the left accounts for the adjustment in Peace supply and its price. Convexity of $\Pi_g$ ensures that it cannot overturn the positive response coefficient:

$$\Pi_{g,vv} + \frac{\sigma_g(y_g^C - d_g^C)}{v} - \frac{\Pi_{g,uv}^2}{\Pi_{g,uu} + \sigma_g(y_g - d_g)/u} \geq \frac{\sigma_g(y_g^C - d_g^C)}{v} > 0. \tag{131}$$

The right-hand side of (130) is strictly positive because its first term is positive and $\Pi_{g,uv} \geq 0$. Therefore $d(\theta p_g^C)/d\theta = dv/d\theta > 0$. By (124), both foreign–domestic wedge differences increase, as does the VF–AF difference when $\Delta_{g,VF} < \Delta_{g,AF}$. This proves Proposition 3. At $\theta = 0$, the same conclusion holds for the right derivative whenever the limiting $p_g^C$ is finite, since $d(\theta p_g^C)/d\theta = p_g^C$ there.

### A.6.3 Effect of Conflict Defense Demand

**Differentiating the two markets.** To prove Proposition 4, we raise $d_g^C$ while holding $\theta$, $d_g$, and retention shares fixed. There is now no direct change in Peace demand, while total Conflict demand rises by one unit. Differentiating (128) gives

$$\begin{aligned} \left[\Pi_{g,uu} + \frac{\sigma_g(y_g - d_g)}{u}\right] \frac{du}{dd_g^C} + \Pi_{g,uv} \frac{dv}{dd_g^C} &= 0, \\ \Pi_{g,uv} \frac{du}{dd_g^C} + \left[\Pi_{g,vv} + \frac{\sigma_g(y_g^C - d_g^C)}{v}\right] \frac{dv}{dd_g^C} &= 1. \end{aligned} \tag{132}$$

**Signing the price and wedge responses.** We again solve the first equation for the Peace-price response and substitute into the second. Since $\theta$ is fixed, $dv/dd_g^C = \theta\, dp_g^C/dd_g^C$, so

$$\left[\Pi_{g,vv} + \frac{\sigma_g(y_g^C - d_g^C)}{v} - \frac{\Pi_{g,uv}^2}{\Pi_{g,uu} + \sigma_g(y_g - d_g)/u}\right] \theta \frac{dp_g^C}{dd_g^C} = 1. \tag{133}$$

The coefficient in brackets is positive by (131). Hence $dp_g^C/dd_g^C > 0$, including the induced adjustments in quantities and organizational shares. Equation (124) then gives the wedge comparisons in Proposition 4.

### A.6.4 Effect of Organizational Exposure in Conflict

For simplicity, we adopt the proportional-loss specification in (24), under which greater exposure widens the retention gap between arm's-length sourcing and foreign integration when $\xi_{g,V} > \xi_{g,A}$. Appendix A.3.4 provides a formal example of this widening through the sabotage mechanism: under the conditions stated there, greater sabotage ability reduces retention under foreign integration while leaving retention under arm's-length sourcing unchanged. For the asset and technology mechanisms, sufficiently high recovery shares likewise ensure that a greater importance of the non-contractible input bundle and proprietary knowledge, respectively, widens the retention gap.

**The relevant wedge comparisons.** To prove Proposition 5, we raise $\chi_g$ while holding $\theta$, $d_g$, $d_g^C$, and $\xi_{g,o}$ fixed. Under (24), the wedge differences are

$$\begin{aligned} \tau_{g,oF} - \tau_{g,oD} &= \xi_{g,o}\chi_g \theta p_g^C, \qquad o \in \{A, V\}, \\ \tau_{g,VF} - \tau_{g,AF} &= (\xi_{g,V} - \xi_{g,A})\chi_g \theta p_g^C. \end{aligned} \tag{134}$$

We therefore need to sign $d(\chi_g v)/d\chi_g$, where $v = \theta p_g^C$. Unlike the previous exercises, changing $\chi_g$ directly changes Conflict supply as well as inducing price responses.

**The direct supply effects.** We first identify this additional supply change so that it can be included when differentiating market clearing. Domestic modes face marginal value $u + v$, and foreign modes face $u + v - \chi_g v \xi_{g,o}$. Holding $u + v$ and $\chi_g v$ fixed therefore holds every mode's output and organizational share fixed. For $\chi_g > 0$, an increase in $\chi_g$ can be offset in these two values by changing $u$ at rate $v/\chi_g$ and $v$ at rate $-v/\chi_g$. Along this offsetting change, Peace output is unchanged and Conflict output falls at rate $-(y_g - y_g^C)/\chi_g$, since $y_g - y_g^C = \chi_g \sum_o P_{g,oF} \xi_{g,o} y_{g,oF}$.

Combining these observations with the price responses of supply gives the total supply changes

$$\begin{aligned} dy_g &= \Pi_{g,uu}\, du + \Pi_{g,uv}\, dv + \frac{v}{\chi_g}(\Pi_{g,uv} - \Pi_{g,uu})\, d\chi_g, \\ dy_g^C &= \Pi_{g,uv}\, du + \Pi_{g,vv}\, dv + \frac{v(\Pi_{g,vv} - \Pi_{g,uv}) - (y_g - y_g^C)}{\chi_g}\, d\chi_g. \end{aligned} \tag{135}$$

The last term in each equation is the direct effect of exposure holding $u$ and $v$ fixed. The other terms capture the induced changes in the two marginal values.

**Differentiating the two markets.** We now equate these supply changes to the demand responses from (128). Since $\theta$, $d_g$, and $d_g^C$ are fixed, the demand responses are $dy_g = -\sigma_g(y_g - d_g)\, du/u$ and $dy_g^C = -\sigma_g(y_g^C - d_g^C)\, dv/v$. Multiplying by $\chi_g$ and using $d(\chi_g v) = \chi_g\, dv + v\, d\chi_g$ gives

$$\begin{aligned} \left[\Pi_{g,uu} + \frac{\sigma_g(y_g - d_g)}{u}\right] \chi_g \frac{du}{d\chi_g} + \Pi_{g,uv} \frac{d(\chi_g v)}{d\chi_g} &= \Pi_{g,uu} v, \\ \Pi_{g,uv} \chi_g \frac{du}{d\chi_g} + \left[\Pi_{g,vv} + \frac{\sigma_g(y_g^C - d_g^C)}{v}\right] \frac{d(\chi_g v)}{d\chi_g} &= \Pi_{g,uv} v + y_g - y_g^C \\ &\quad + \sigma_g(y_g^C - d_g^C). \end{aligned} \tag{136}$$

**Signing the wedge responses.** We again eliminate the Peace-price response using the first equation. Substitution into the second yields

$$\begin{aligned} &\left[\Pi_{g,vv} + \frac{\sigma_g(y_g^C - d_g^C)}{v} - \frac{\Pi_{g,uv}^2}{\Pi_{g,uu} + \sigma_g(y_g - d_g)/u}\right] \frac{d(\chi_g v)}{d\chi_g} \\ &\quad = y_g - y_g^C + \sigma_g(y_g^C - d_g^C) + \frac{\Pi_{g,uv}}{\Pi_{g,uu} + \sigma_g(y_g - d_g)/u} \frac{\sigma_g(y_g - d_g)}{u} v. \end{aligned} \tag{137}$$

The coefficient on the left is the same positive coefficient in (131). The right-hand side is strictly positive because $y_g \geq y_g^C > d_g^C$ and $\Pi_{g,uv} \geq 0$. Thus $d(\chi_g \theta p_g^C)/d\chi_g > 0$. At $\chi_g = 0$, the right derivative is $\theta p_g^C > 0$. Equation (134) establishes Proposition 5: both foreign–domestic differences increase, and the VF–AF difference increases when $\xi_{g,V} > \xi_{g,A}$.

### A.6.5 Interaction Between Conflict Defense Demand and Organizational Exposure

**Differentiating the wedge difference.** Finally, we use the defense-demand result to sign the interaction in Proposition 6. Differentiate the VF–AF identity in (134) with respect to $\chi_g$ and $d_g^C$. At $\chi_g = 0$, the term multiplied by $\chi_g$ vanishes, leaving

$$\left.\frac{d^2(\tau_{g,VF} - \tau_{g,AF})}{dd_g^C\, d\chi_g}\right|_{\chi_g=0} = (\xi_{g,V} - \xi_{g,A})\, \theta \left.\frac{dp_g^C}{dd_g^C}\right|_{\chi_g=0} > 0, \tag{138}$$

where the inequality follows from (133) when $\xi_{g,V} > \xi_{g,A}$. For each foreign–domestic comparison, the same calculation replaces $\xi_{g,V} - \xi_{g,A}$ with $\xi_{g,o} > 0$. By continuity, all three interactions remain positive for sufficiently small positive $\chi_g$. Away from zero, the product rule also includes $\chi_g\, d^2 p_g^C/(dd_g^C\, d\chi_g)$; the preceding sign arguments do not determine the sign of this additional term.

# B Empirical Appendix

## B.1 Data Construction

This appendix supplements Section 5.2 by describing in detail how we construct our main dataset.

**Regulatory intensity.** We transcribe the four-digit industry tables from the CFIUS reports for notices filed in 2014–2024 and declarations filed in 2021–2024. Before 2014, the reports used less granular industry classifications, so the notice series starts in 2014. For declarations, the reports provide four-digit counts only from 2020, and until February 2020 declarations were subject to the rules of the pilot program for critical technologies. We thus use declarations filed between 2021 and 2024. CFIUS classifies each filing by the NAICS code of the U.S. business, using information from the parties or, when they provide none, publicly available information.[33]

[33] We map the few codes from other NAICS vintages to their 2017 counterparts: 5171 and 5172 to 5173, 5132 to 5112, and 4581 to 4481.

Industries that do not appear in the tables have zero filings. The counts measure the total number of filings rather than distinct transactions.

**Defense demand.** FPDS is the system in which federal agencies report their contract actions, and USAspending.gov publishes these records in annual files. Each record is an action on a prime contract, which the agency signs with its direct contractor: a new award, an order under an existing contract, or a modification of either. Each action carries the NAICS code that the contracting officer assigns to the product or service, rather than the industry of the contractor.[34] For each action awarded by the Department of Defense, we take its obligated amount in current dollars. The records report obligations when the agency takes the action rather than when it makes the payment; deobligations enter as negative amounts. We compute an industry's defense spending by summing these obligations over all actions associated with that industry's code.

To trace this spending through input-output linkages, we build the Leontief inverse from the detailed Use table of the 2017 benchmark accounts, after redefinitions and at producers' prices. The Use table records purchases of commodities by industries; we treat it as an industry-by-industry table by assigning each commodity to the industry with the same BEA code. The BEA concordance maps the roughly 400 detailed industries into 303 of the 311 four-digit industries. When a BEA industry corresponds to several four-digit industries, we split its output and sales equally among them. We then compute the direct requirements of each four-digit industry as the output-weighted average of the direct requirements of its constituent BEA industries. We invert the matrix only after this aggregation.

**Non-contractible input intensity.** We reconstruct the index of Nunn (2007) to cover all industries in our sample. The index is the share of an industry's inputs that consists of relationship-specific goods, defined as those that Rauch (1999) classifies as differentiated: neither sold on an organized exchange nor reference priced. The classification covers the four-digit products of the Standard International Trade Classification (SITC), Revision 2.[35] We link each commodity of the input-output table to SITC products through two concordances. The BEA concordance maps commodities to ten-digit Harmonized System (HS) import codes, which we truncate to six digits, and the World Integrated Trade Solution concordance maps 1996 HS codes to SITC.

[34] The codes span NAICS vintages from 2002 to 2022, since orders and modifications usually keep the code of the original contract. Codes that changed between vintages belong to a single vintage, so the code alone determines its conversion. We assign 2012 and 2022 codes to the 2017 industries specified in the Census Bureau concordances and keep the first four digits of older codes.

[35] Rauch (1999) provides a liberal and a conservative version of the classification. We follow Nunn (2007) by using the liberal version.

For each commodity, we compute the fraction of its linked products that are differentiated, giving each product equal weight. We then compute each industry's index as the average of these fractions, using its purchases of each commodity in the 1997 Use table at producers' prices as weights. We use only purchases of commodities that Rauch (1999) classifies. Inputs without a classification do not enter the index.

To map the index to 2017 four-digit NAICS industries, we first link each input-output industry to 1997 NAICS codes with the BEA concordance. We then convert these codes to 2017 NAICS by chaining the Census Bureau concordances between successive vintages. We compute the index of each four-digit industry as the average of the indices of its linked input-output industries, using their purchases as weights. An input-output industry linked to several four-digit industries enters each with its full weight. The index is available for 302 industries.

**Knowledge production intensity.** To compute knowledge production intensity, we use the Compustat North America Fundamentals Annual file, which we extracted from WRDS in September 2026. We keep observations for fiscal years 2014–2024 for companies headquartered in the United States that report in U.S. dollars, using consolidated statements in the standardized industrial format.[36] We assign each firm-year to a 2017 four-digit industry using the historical NAICS code that Compustat records for that year, converting codes from other vintages with the Census Bureau concordances. This leaves 57,159 firm-year pairs for 8,211 firms. We give equal weight in the average to each fiscal year in which the industry's total current investment is positive. The measure is available for 262 industries.

**Industry size.** We measure total output using industry output from the detailed BEA table described above, which we aggregate to four-digit industries. This measure is available for 303 industries. We use national SUSB firm counts across all enterprise sizes. These counts follow the 2017 NAICS classification and cover 288 industries.

**M&A activity.** We count M&A transactions using the SDC data. The counts include completed, pending, and withdrawn transactions. We classify a buyer as domestic when SDC records the acquirer's nation as the United States and as foreign when it records another nation. We drop transactions whose acquirer's nation is unknown. We assign transactions to industries by the primary SIC code of the target. We map this code to 2017 four-digit NAICS industries through the Census Bureau concordance from 1987 SIC to 2002 NAICS and the NAICS concordances from 2002 to 2017. When an SIC code maps to multiple four-digit NAICS industries, we

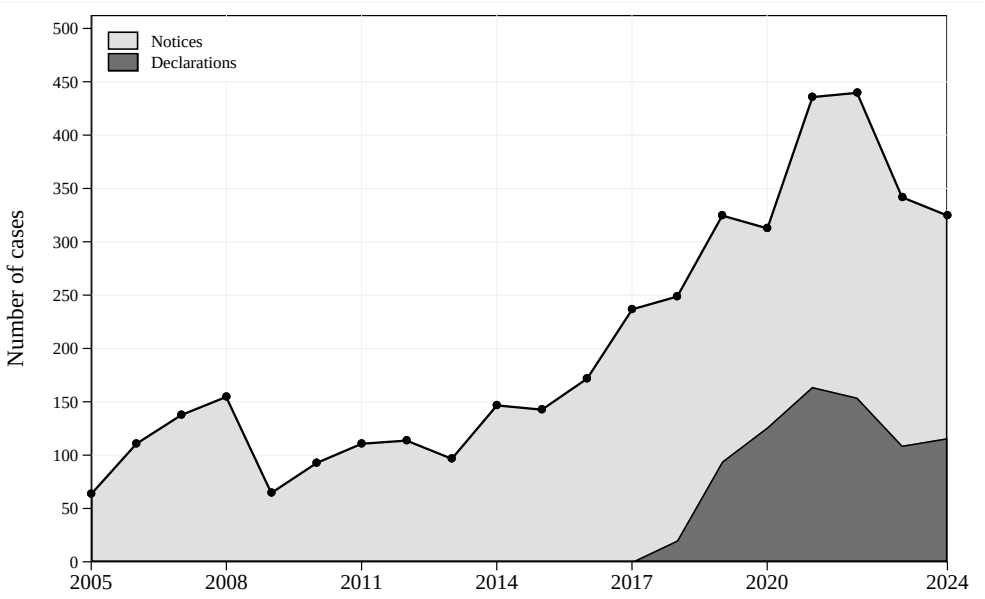
[36] When a firm has two records for the same fiscal year, we drop both. We drop firm-year pairs with negative values of the variables of interest.

split the transaction equally across those industries. We drop transactions whose SIC code has no NAICS counterpart. Over 2014–2024, the counts total about 18,400 transactions by foreign buyers and 117,300 by domestic buyers.

**Sample.** Our sample includes all four-digit industries with valid information for all variables. We exclude 61 industries that lack information for at least one variable. These industries account for 54 of the 1,516 filings in 2021–2024.

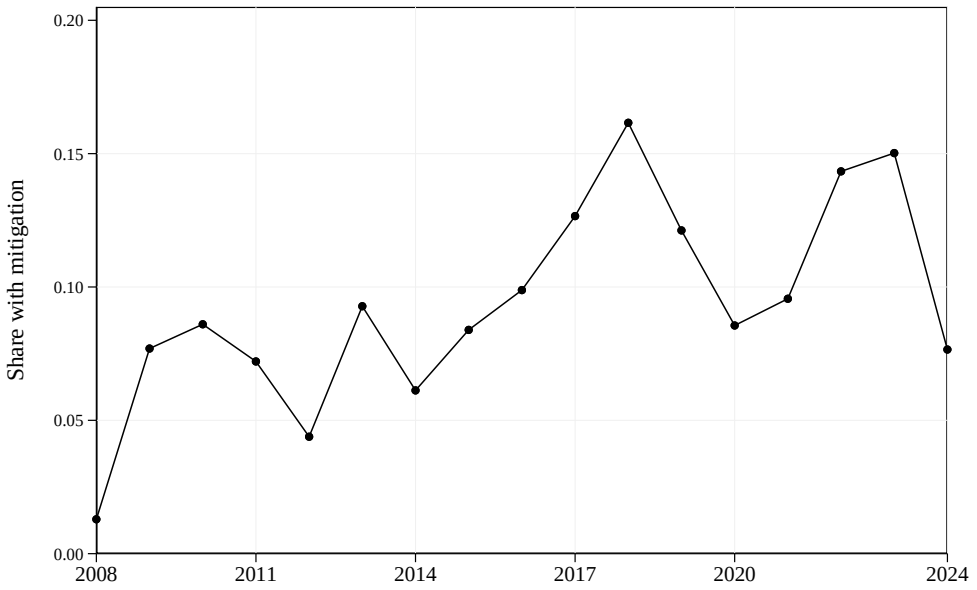
## B.2 Additional Figures and Tables

**Figure B.1:** CFIUS filings over time




*Notes:* The figure displays the total number of notices and declarations filed with CFIUS by calendar year. Declarations were introduced under the FIRRMA pilot program beginning in November 2018; the full declaration pathway took effect in February 2020. Source: CFIUS Annual Reports to Congress.

**Figure B.2:** Share of CFIUS notices concluded with mitigation



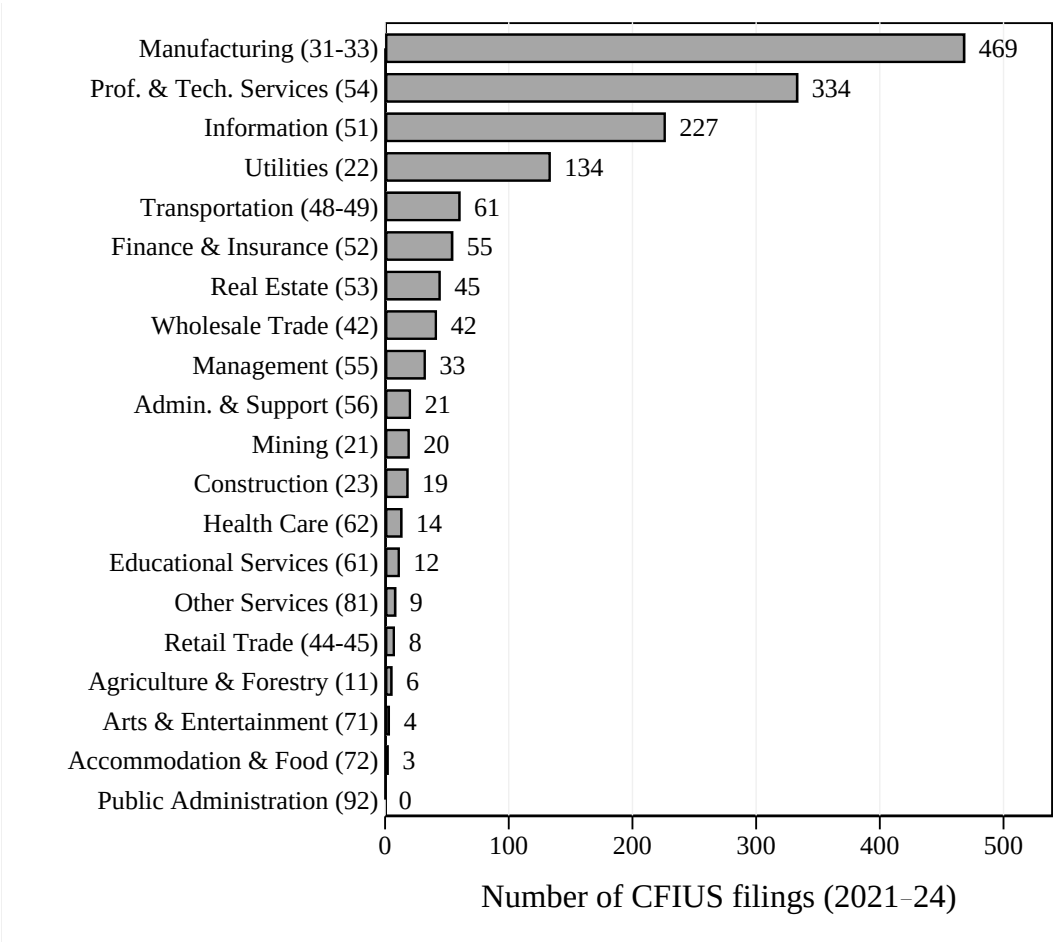

*Notes:* The figure displays the share of notices filed with CFIUS that resulted in mitigation agreements, such as national security agreements or letters of assurance, as a condition for clearance. Source: CFIUS Annual Reports to Congress.

**Table B.1: Top Ten Industries by CFIUS Filings**

| NAICS | Industry | Notices (2021–24) | Declarations (2021–24) | Total |
|---|---|---|---|---|
| 2211 | Electric Power Generation, Transmission and Distribution | 85 | 40 | 125 |
| 5417 | Scientific Research and Development Services | 76 | 38 | 114 |
| 5112 | Software Publishers | 86 | 24 | 110 |
| 5415 | Computer Systems Design and Related Services | 69 | 28 | 97 |
| 3344 | Semiconductor and Other Electronic Component Manufacturing | 43 | 21 | 64 |
| 5413 | Architectural, Engineering, and Related Services | 36 | 26 | 62 |
| 3364 | Aerospace Product and Parts Manufacturing | 28 | 22 | 50 |
| 3345 | Navigational, Measuring, Electromedical, and Control Instruments Manufacturing | 30 | 19 | 49 |
| 5182 | Data Processing, Hosting, and Related Services | 25 | 10 | 35 |
| 5311 | Lessors of Real Estate | 21 | 14 | 35 |

Notes: The table reports the ten four-digit NAICS industries with the largest number of CFIUS filings during 2021–2024 among the 250 industries in the estimation sample. Filings are the sum of notices and declarations. Source: CFIUS Annual Reports to Congress.

**Figure B.3:** CFIUS filings by sector




*Notes:* The figure displays the total number of CFIUS filings—notices plus declarations—during 2021–2024 by two-digit NAICS sector. Source: CFIUS Annual Reports to Congress.

## Table B.2: Regulatory Intensity, Defense Demand, and Organizational Conflict Exposure: Robustness

| Dep. var.: | All filings | | | Declarations | Notices |
|---|---|---|---|---|---|
| | Baseline | Excl. utilities | Quadratic terms | | |
| | (1) | (2) | (3) | (4) | (5) |
| Defense demand | 0.188 | 0.187 | 0.320 | 0.231 | 0.163 |
| | (0.041) | (0.041) | (0.072) | (0.050) | (0.039) |
| × Non-contractible input intensity | 0.257 | 0.256 | 0.212 | 0.268 | 0.246 |
| | (0.069) | (0.069) | (0.061) | (0.074) | (0.069) |
| × Knowledge production intensity | 0.290 | 0.289 | 0.264 | 0.300 | 0.278 |
| | (0.072) | (0.072) | (0.071) | (0.070) | (0.076) |
| Non-contractible input intensity | 0.036 | 0.040 | 0.100 | 0.024 | 0.041 |
| | (0.036) | (0.037) | (0.051) | (0.036) | (0.037) |
| Knowledge production intensity | 0.114 | 0.116 | 0.097 | 0.094 | 0.121 |
| | (0.050) | (0.050) | (0.078) | (0.047) | (0.053) |
| Square of defense demand | | | 0.066 | | |
| | | | (0.025) | | |
| Square of non-contractible input intensity | | | 0.065 | | |
| | | | (0.047) | | |
| Square of knowledge production intensity | | | 0.011 | | |
| | | | (0.059) | | |
| Electricity sector dummy | 7.332 | | 7.245 | 7.267 | 7.188 |
| | (0.170) | | (0.175) | (0.188) | (0.167) |
| $R^2$ | 0.589 | 0.477 | 0.612 | 0.580 | 0.567 |
| Observations | 250 | 247 | 250 | 250 | 250 |
| Controls | | | | | |
| Industry size | Yes | Yes | Yes | Yes | Yes |
| M&A activity | Yes | Yes | Yes | Yes | Yes |

*Notes:* The table reports OLS estimates of equation (25). Column (1) reproduces column (3) of Table 1. Each of the remaining columns changes one feature of that specification. Column (2) excludes utilities (NAICS 22), so the electricity sector dummy is not included. Column (3) adds the squares of the three standardized sector characteristics: defense demand, non-contractible input intensity, and knowledge production intensity. Columns (4) and (5) measure regulatory intensity using only declarations and only notices filed in 2021–2024, respectively. All columns control for industry size (log total output and log number of firms) and M&A activity (log number of M&A transactions targeting U.S. firms over 2014–2024 by foreign and domestic buyers, separately). The sample is the common sample of 250 four-digit NAICS industries in Table 1, or 247 industries after excluding utilities in column (2). Regulatory intensity and the three continuous sector characteristics are standardized using the moments of the common sample. Robust standard errors are reported in parentheses.