Hoover History Lab
ALLIED COORDINATION

Critical Conditions

An Operating Framework for Allied Economic Statecraft

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Executive Summary

The problem: Allied governments have no shared methodology for identifying and prioritizing the most dangerous economic dependencies. Many goods and technologies are called "critical" these days—but if everything is "critical," nothing is. Resources are spread too thin, allies are working at cross-purposes, and no one has institutional cover to say "this one can wait."

The tool: A four-layer rubric that systematically evaluates the key questions—geographic mapping, direct and indirect dependency risks, and adaptation options—and that covers natural resources, goods, and technologies. Its default presumptions are to exercise caution before deploying taxpayer money and to tackle the highest-criticality issues first.

What it does:

- Screens inbound proposals before they consume resources or capital
- Prioritizes across dependencies to identify investments with highest strategic leverage
- Flags hidden dependencies, including cross-domain enablers that amplify adversary leverage across multiple sectors and are missed by sector-by-sector analysis
- Identifies menus of options to reduce criticality as fast and cheaply as possible, including by leveraging private markets and allied and partner governments

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- Gives allied agencies (DFC, JBIC, UKEF/BII, EIB) a common framework so coordination involves more negotiation of burden sharing and less arguing about priorities

How it scales: The rubric is designed to bring together different areas of expertise to make a qualitative assessment. If human analysts are overloaded, AI can use the rubric to screen all inbound deals and proactively map tens of thousands of products to find hidden risks and flag priority items. Human analysts can focus on cases flagged as "high criticality" or "uncertain."

Proof of concept: The appendix includes three sample case studies that use the rubric for analysis and policy recommendations.

INTRODUCTION

The United States and its allies broadly agree that critical commodities, products, and technologies lie at the heart of strategic competition with China. But they lack a robust, shared framework for defining economic criticality and evaluating which resources, technologies, and products are more critical than others. Discussions of criticality tend to focus on risks in the abstract. Policymakers are rushing to action without weighing which dependencies are most likely to be weaponized, how the global economy and third countries would adapt to weaponization, and how much it would cost to "correct for" critical dependencies in advance.

Market interventions are democratically legitimate and politically sustainable only when the public accepts that they are necessary. Thus, our political institutions do not have unlimited space to trade efficiency for security. In an era of strategic competition with China, we need an ongoing conversation between the state and society about criticality, bringing together different areas of relevant expertise. Our rubric seeks to achieve this by addressing some specific problems with the current conversation.

This paper provides a rubric for a more coordinated and efficient approach. This is not just chokepoint analysis. Mapping bottlenecks in supply chains and identifying nodes where adversaries could exert leverage does not tell policymakers any of the following:

- Which chokepoints matter more than others
- How likely they are to be weaponized
- What second-order effects would follow if they are weaponized
- What to do to make our most critical dependencies less critical as fast and cheaply as possible

Our rubric presents a systematic set of questions that policymakers can ask to quickly get to the heart of the problem in a wide range of cases, prioritize quickly, and identify a menu of policy responses.

KEY CONSIDERATIONS

Markets become *critical* when adversary states can distort them to threaten US and allied national security. Weaponization can work through multiple channels. If a hostile state monopolizes production of a resource or product, it can disrupt supply. If it enjoys technological leadership in an area, it can regulate and selectively share access to intellectual property to build coalitions with other countries and disadvantage its rivals, eventually placing them in a position of entrenched technological subordination. Economic coercion involves the entire global economy. If production is concentrated within a state that is itself vulnerable to economic coercion, adversary states may be able to restrict supply indirectly. To understand the criticality of a certain resource, product, or technology, we need to understand it in the *context* of the world market and the global balance of power.

Governments tend to manage critical commodities, products, and technologies through separate bureaucracies—but this is an institutional choice. In the real economy, they are all interrelated. For example, export controls on a critical mineral are more damaging when the target also depends on the coercing state equipment to refine it. Similarly, a logistics data platform can provide visibility into the physical flows of many products and commodities, making it easier for an adversary to weaponize them. Our rubric therefore applies a single structure to all forms of economic criticality. The four layers hold whether the good in question is a natural resource, a manufactured product, or a digital platform. The questions within each layer shift in emphasis—geographic concentration and stockpiling for commodities; network effects, switching costs, and standard setting for tecnologies—but the basic architecture is the same.

Because relative levels of criticality between different products and technologies are constantly shifting, criticality is a *relative* metric, not an absolute one. It is a method of comparison, not a binary designation. To what extent would the weaponization of a resource, product, or technology actually threaten national security? How—if at all—should we intervene in markets to correct for these risks? How should we weigh the geopolitical and economic benefits of reducing dependency against the geopolitical and economic costs of the interventions themselves? These questions only really matter in comparison with other examples.

This paper is a tool for practitioners, not an academic exercise. The rubric is informed by existing scholarship in history, political science, and economics, but it has no footnotes, charts, data, or theory.

THE FOUR-LEVEL FRAMEWORK

We propose analyzing criticality on four levels. Each level is designed to bring together insights and expertise from economics, technology, industry, and national security. The four levels are these:

1. Mapping geographically the production process and use cases
2. Assessing whether countries in the production process represent direct dependency risks. *Direct dependency* means depending on a state that has both the capacity and the incentive to weaponize its position, including through coercion and espionage. Direct dependency results either from technological subordination or dependence on another state's monopoly production.
3. Assessing whether countries represent indirect dependency risks. *Indirect risks* can result from depending on states that have limited capacity or are vulnerable to sabotage or coercion.
4. Assessing the market's adaptability to weaponization (supply and demand elasticities), both at a national and a global level

This framework can be applied to analyze criticality in any market, with respect to any country. For our purposes, we focus here on criticality to the United States.

Once we have a shared understanding of criticality, it is easier to find effective, market-based interventions to reduce dependency risks. The goal of these interventions should be to reduce the level of criticality over time through the most temporary and narrowly tailored market interventions possible. Interventions should generally try to *leverage cooperation* with allied and neutral countries *to create the broadest and most competitive possible market*.

WHY WE NEED A RUBRIC

POLICYMAKERS NEED TO ESTABLISH THE HIERARCHY OF NEEDS

Criticality Is a Relative Concept

Some products, technologies, and resources are more critical than others. Nowadays, technologies ranging from artificial intelligence to marine batteries get labeled "critical" by some government agency or think tank. But if everything is critical, nothing is. Moreover, criticality is relative because it is defined in connection to national interests and national conditions. Policymakers in different countries will not always agree in their criticality assessments, because even close allies will not always share common assessments of geopolitical threats. However, they still need a common rubric to help identify what kinds of cooperation may be mutually beneficial.

Criticality Problems Are Not of Equal Priority

Ideally, policymakers should address criticality problems in strict descending order of priority. Governments have limited fiscal space and administrative bandwidth. The public has only limited tolerance for expensive and inconvenient policy interventions. Simply put, there is a natural limit of policy to address criticality: what voters desire and will accept.

A Shared Rubric Protects Policymakers—and the Policymaking Process

Policymakers charged with deploying taxpayer money to improve the nation's economic security are vulnerable to political attack, both institutionally and personally. Not every intervention to reduce criticality will succeed. Depending on how potential projects enter the pipeline for consideration, some actions may look, in retrospect, like waste or favoritism—even when the original decision was defensible on the evidence available at the time. Congressional oversight, inspector general investigations, opposition research, and the often-used tactic of attacking individuals rather than decisions amplify these risks, threatening to turn economic security into a political football.

This exposure has a chilling effect on the policy process. Officials who anticipate personal blame for future failures may hesitate to act, or they may act only where political cover is overwhelming—which is rarely where criticality is actually highest.

A shared rubric protects both the policymaker and the policy process. It distributes responsibility across participating agencies and across decisions made over time. It makes the basis for decisions legible to elected representatives, who can shape the rubric rather than ceding all judgment to unelected officials. It therefore provides a fair basis for judging the officials charged with allocating taxpayer dollars to improve the nation's economic security: Did they consider the best information available at the time, and did they apply the rubric correctly? The rubric is not insulation from democratic accountability; it is an essential vehicle for it.

CRITICALITY ASSESSMENT IS INHERENTLY INTERDISCIPLINARY

Criticality Is Hard to Measure

Measuring criticality requires detailed technical expertise in the specifics of any given supply chain or market. It also involves a subjective assessment of other states' interests and incentives. Finally, it requires a detailed analysis of potential policy interventions. Any rubric should aim to facilitate useful dialogue among economists, industry experts, and national security officials.

Quantitative Economic Expertise Remains Key

"Economic security" should not become a pretext for sidelining economic expertise. The goal should be to reduce the nation's most critical dependencies to manageable levels over time through limited, temporary, evidence-based interventions. Private actors lobbying for policy intervention in "critical" markets typically have different preferences. Economists have expertise in policy designs that can help deal with rent-seeking behavior.

UNDER-INTERVENTION AND OVER-INTERVENTION BOTH CARRY RISKS

Imprecise and inaccurate criticality assessments lead to two kinds of costly errors:

- *Under-intervention* can lead to deepening dependency, making the United States and its allies vulnerable to future coercion and increasing the costs of future corrective action.

- *Over-intervention* can waste taxpayer money, distort markets, distract policy attention from more important goals, and undermine the very innovation ecosystems and alliance relationships that sustain American prosperity and technological leadership.

THE LOUDEST INFORMATION SOURCES ON CRITICALITY ARE THE MOST BIASED

Economic actors have perverse incentives to confuse the public conversation about criticality. Companies that want subsidies, trade protection, or regulatory forbearance have incentives to exaggerate their products' criticality. Foreign governments and firms that want sustained access to foreign markets understate the criticality of certain products or technologies. US and allied policymakers therefore face a noisy and dynamic information environment. They need a consistent rubric in order to assess criticality independently and in coordination with one another.

CRITICALITY ASSESSMENTS CHANGE OVER TIME

Criticality Depends on Ever-Shifting Factors

Every resource, product, and technology is embedded in a complex, evolving market ecosystem. Many secular trends can affect supply chain concentration: technological change, ordinary market cycles, shifting geopolitical dynamics, policy interventions, switching costs, coalition dynamics, the availability of substitutes, etc. In combination, these factors can increase, or decrease, criticality over time without governments taking any action at all. Sometimes geopolitical shifts can change criticality assessments overnight. When a hostile state moves from threats to action, that affects criticality assessments, even when the market itself does not change.

Target States Adapt, Altering the Severity of the Threat

When one country weaponizes a good or technology, the target state adapts, which can change the criticality of the good or technology. Weaponization forces targeted states and firms to invest in alternatives, diversify supply, and reduce future exposure. China's restriction of rare earth exports to Japan in 2010 is a case in point. Within several years, Japanese firms and government agencies had built alternative supply chains and developed substitution technologies. Weaponization can thus be self-defeating over the long run, eroding the coercer's leverage. A good criticality assessment should account for this dynamic—asking not only how dangerous a dependency is today but also how rapidly and durably the target could adapt if the dependency were exploited.

AUTARKY IS EXPENSIVE

When a product or technology is labeled "critical," the political reflex is often to seek a blunt-force solution that maximizes sovereign control. For example, the United States is concerned about the spillover effects of China's steel dumping, so it has restricted steel and aluminum imports from Canada on national security grounds. The more countries are involved in a supply chain, the more complex the possible dependencies that have to be mapped, and the more tempting it is to try to bring everything onshore. Some firms will lobby for these autarkic policies. Who wouldn't want to enjoy indefinite, protected access to the US market?

Leveraging the Global Economy Is Advantageous

The impulse toward autarky is understandable. It is also—almost always—a mistake. The more of the global economy that is mobilized to mitigate a dependency, the lower the economic cost and the greater the geopolitical and technological benefits.

This logic is clearest for natural resources. The more states participate in reducing criticality, the smaller the price increase caused—and the better for the US economy. The same is broadly true for advanced products and technologies. It is far less distorting to encourage a function to move out of one country into the broader world economy than to force it out of the broader world into a single country. Roughly one-third of global gross domestic product (GDP) sits in countries that are neither formal US allies nor adversaries. Their participation in production networks can quickly diversify any single state's monopoly control over production.

There are limits to this principle. If neutral states can't enforce rules of origin or export controls, or if they are acutely vulnerable to coercion themselves, the United States may not be able to rely on them. There are also strategic technologies where the United States needs to control production to retain technological leadership.

But as a general rule, pursuing autarky in the name of "critical" production is both economically and strategically costly:

- Trade barriers invite retaliation, reduce access to foreign markets, and dampen innovation.

- Achieving autarky often involves heavy ongoing subsidies and forces consumers to pay higher prices for inferior products.

- Trying to copy China's strategy of building a "complete industrial system" forfeits the United States' main comparative advantage: its ability to mobilize its large and efficient capital market and organize broad coalitions of countries that need access to the US market and US technology.

SOME DEPENDENCIES AMPLIFY OTHERS

Not all dependencies are self-contained. Some create leverage that propagates across multiple domains—amplifying the adversary's ability to weaponize other, unrelated dependencies. These cross-domain enablers of economic coercion may not rank highest on any single-sector criticality assessment, but eliminating them yields compounding returns across multiple dependencies. Policymakers should treat them as a distinct priority category.

THE RUBRIC

We propose approaching criticality analysis in four layers:

1. Geographic mapping
2. Direct dependency risks (action by adversaries)
3. Indirect dependency risks (sabotage, coercion, or state failure)
4. Adaptive capacity

Each level of analysis can be conducted at any degree of detail.

The *default presumption* should be that most dependencies are of low to medium criticality. High criticality is an exceptional designation that must be earned. No single layer of analysis is sufficient to establish the degree of criticality: Production concentration, adversary intent, and adaptive capacity must be weighed together, against real-world evidence of how markets and states have actually responded to attempts at weaponization. The rubric should identify a small number of dependencies that demand urgent government action and a much larger number that are worth monitoring but do not warrant costly intervention.

Our rubric is designed to push analysts beyond a simple binary approach to classifying other countries as potential partners in dealing with criticality. It involves moving beyond "friend-shoring," which risks becoming a euphemism for a command-and-control approach to moving supply chains. It encourages policymakers to consider how much of the world—including neutral countries that work closely with China in other areas—can safely be enlisted to dilute adversaries' leverage and reduce criticality efficiently, ideally with strategic co-benefits.

LAYER 1: GEOGRAPHIC MAPPING

The first level of analysis is about mapping how the product, resource, or technology ("the good") in question is produced and used.

Start by mapping the supply chain:

- Where currently is a good produced and by what firms?
- Who owns these firms? Where are they registered? How do they finance their operations? Where are their production processes physically located?
- What intellectual property (IP) is necessary to the production process? Who owns it, and on what terms is it made available?
- What tools or systems are required to produce the good? Where are they made and in what quantities?
- What essential inputs are required to produce the good? Where are they currently produced? (If they are raw materials, how are resources of those raw materials geographically distributed? If they are industrial inputs, are they similar in nature to inputs for other products?)
- Which producers in the supply chain capture the greatest share of the value? Which have the highest operating margins? These answers may suggest which producers enjoy the widest competitive moats.
- What parts of the ecosystem are subsidized? Who provides the subsidies?
- For technologies and platforms:
    - What adoption dynamics drive uptake (e.g., network effects, subsidized pricing, standard setting)?
    - What switching costs does continued use create, and do these costs increase over time?
    - What ongoing relationship with the provider does use require (e.g., updates, maintenance, licensing, data access)?

Finally, map the product's use cases:

- Who consumes the good and in what quantities?
- Does the good have significant military applications? If so, what is the balance between military and civilian consumption? If a good has widespread civilian use as well as military, it will be produced in larger quantities and will be easier to access even if weaponized. The government can draw on civilian inventories if needed.
- For technologies, how generalized are their applications? What actual or potential engineered civilian products of strategic significance might be built out of them?

Bringing these mapping exercises together, we can identify state-level dependencies and develop hypotheses about who might weaponize them, how, and under what conditions.

LAYER 2: DIRECT DEPENDENCY RISKS

Next, consider the states that occupy significant positions in the supply chain, as identified above. This layer aims to understand why, when, and how they may try to coerce the United States.

- What is the country's current relationship with the United States? With US adversaries?
- Why might relations change negatively in the near future?
- What existing alliance relationships and political relations does the country have with third countries?
- Does it threaten other polities that the United States is committed to defending?
- Does it oppose the principle that the global commons should be free and open for all states to use?
- Is its model of government or economic policy antithetical to the United States?

The answers to these questions will largely emerge from existing national security strategies. They are worth listing here, if only as a check against circular reasoning.

Next, consider how a state could potentially weaponize a given dependency. It is helpful to consider two main kinds of dependency risk: technological subordination and monopoly power.

Technological Subordination

A state enjoys technological leadership when it establishes decisive advantages in innovation, productization and diffusion, and standard setting:

- *Innovation* is the pipeline of basic science and fundamental knowledge. University research, private R&D, talent pipelines, and venture capital feed into a knowledge funnel. Innovation may generate transformative future products and technologies.

- *Productization and diffusion* describes the ability to deploy fundamental knowledge to achieve useful goals in the civilian economy or the military. It also describes the ability to sell or proliferate the technology to other countries through trade and other agreements. Note that productization and diffusion is about product engineering, systems engineering, and commercialization; it is about the knowledge of how to make a product and the ability to use it. It is not the same thing as the industrial capacity to build the product from scratch. A robust international IP regime allows the separation of these two things.

- *Standard setting* is the process that decides international technical protocols, regulatory frameworks, and market architectures. Effective standard setting can strengthen a country's innovation capacity. It also helps to lock allied and neutral countries into a nation's networks. This can facilitate future geopolitical cooperation.

A country with technological leadership can persuade or pressure other states to participate in relevant infrastructures and production networks. This, in turn, can entrench its technological leadership, raising wider risks. Crucially, a state with technological leadership enjoys significant opportunities for intelligence collection. If foreign entities have no choice but to use a technological platform because it is the best or only available option, they have little or no leverage to protect sensitive data that the platform can access.

To evaluate the risks if a country attains technological leadership, we should ask the following questions:

- How might the country deploy the technology for direct military advantage over the United States or its allies?

- How might it collect information on the United States or US citizens that could be used for coercion?

- How might it use any technology to conduct espionage against the United States or its allies?

- How might it damage American institutions and undermine the American way of life?

- Could it deny the United States access to international networks upon which US military and civilian production depend?

Monopoly Power

A state enjoys monopoly power when it can coerce other states by weaponizing supply. Supply shortages cause price increases that stress firms and consumers. Supply gluts cause price decreases that pressure the operating margins of rival producers. When one state monopolizes production of a critical node in a supply chain, it can theoretically coerce all other participants in the supply chain, all rival producers worldwide, and all end buyers.

Furthermore, sometimes monopoly power is a cross-domain enabler that can provide an adversary with visibility, access, or leverage to exploit other critical dependencies. In such cases, eroding an adversary's monopoly power, even slightly, can mitigate many critical dependencies at once.

However, weaponization is never cost-free. In fact, it carries substantial risks for the coercing state. It can also be operationally hard to implement, since no state has perfect extraterritorial control over its exports.

We therefore ask the following questions:

- What would be the economic costs to the adversary of withholding the export of the good entirely?
- If the adversary sought to restrict the good's export *only* to the United States, what share of its total exports would this represent?
- How easy is the product to transship from neutral states?
- Which neutral countries could be enlisted to help with transshipment?
- If the adversary cut off supply to the entire world economy, what would be the political and strategic effects?
- How might weaponization backfire? Would it accelerate diversification efforts by victim states, ultimately weakening the adversary's market position?
- What is the adversary's own dependence on revenue from the good in question? Would lost export revenue impose significant fiscal or political costs?
- Has the adversary weaponized dependencies in this or related markets before? What were the medium-term consequences for its own leverage?

- If weaponization is not possible now, might it become so in the future? What is the most plausible timeline for weaponization?

LAYER 3: INDIRECT DEPENDENCY RISKS

This layer assesses the risk of depending on states that are themselves vulnerable to the adversary's economic coercion. Of course, being too cautious about economic dependence on third countries can push them to do more business with the adversary. This can make them even more vulnerable to coercion. These considerations need to be balanced.

We highlight three overlapping categories of indirect dependency risk: coercion, state failure, and sabotage.

Coercion

- Does an adversary claim part of this state's territory?
- Can an adversary destroy this state's production centers?
- Can an adversary use a physical blockade to cut off this state's ability to export?
- Does the state have a close security or treaty relationship with the United States? If so, any coercion risks should be substantially discounted.
- Could the state use its position in global supply chains to build international support against the adversary? If so, would this be advantageous to the United States?
- Does the state have a preexisting economic, political, or military relationship with the adversarial state that might make it susceptible to indirect coercion?

Capacity

- What is the risk that this state fundamentally breaks down, putting its production at risk of capture by adversaries or non-state actors?
- Does the state have the capacity to safeguard IP, preventing it from leaking to an adversary?
- Does the state have control over its borders, with the capacity to provide accurate data on trade and financial flows, especially for the enforcement of rules of origin?
- What is the risk of a rapid change in this country's political system (for instance, by a military coup or a decisive election) that would cause a rapid geopolitical realignment and change coercion risks?

Sabotage

By *sabotage*, we mean attacks on the networks by which the state trades and communicates with other states across the global commons. This might include international shipping lanes, undersea cables, and networks in cyberspace and outer space.

- How reliant is the economic process taking place in the state on networks across the global commons?

- What capabilities does the adversary have to attack the network, and what capabilities could it acquire in future?

- Could the adversary use this dependency to exploit other vulnerabilities?

- How technically robust is the network to attack?

- What is the scale of trade passing through that network in total, relative to the trade in the good itself?

- What would be the geopolitical and/or economic costs of sabotage to the adversary and/or the neutral community?

- What options might exist for the third state to respond unilaterally or multilaterally against the aggressor in response to such a sabotage attack?

LAYER 4: ADAPTIVE CAPACITY

The final layer of analysis asks how rapidly the United States and its allies could adapt to major price fluctuations or technological subordination where dependency risks exist. In other words, what is the *elasticity* of supply and demand?

First, this layer considers adaptive capacity, including stockpiles and reserves.

Domestic Adaptive Capacity

- If the adversary has already attempted to weaponize this dependency, what were the actual consequences? If the target adapted through market mechanisms, transshipment, allied production, or substitution, that adaptation is the single strongest evidence bearing on criticality—stronger than any projection of what could happen.

- Do US firms control or have access to the IP and technical know-how required to produce the good?

- Do US firms have access at competitive prices to the raw materials required to produce the good?

- Is this good linked to an area of current academic research among the United States and its allies? What are the likely future directions of that research?

- What are the current barriers to US and allied firms entering the market?

- How much buffer do existing military supply chains or capabilities have if the adversary maximally intervenes in the market? How much do allied and neutral militaries have?

- In the event of a complete embargo, how much of the US civilian economy would be affected? What inventories exist in the civilian economy?

- For technologies and platforms, what are the primary technical and financial barriers to moving to an alternative?

  - Is it a collective action problem that no single country can achieve alone, because of a network effect?

  - What role must the United States therefore play in convening participants, setting standards, or guaranteeing demand to move away from that platform?

Sustainability of Alternatives

Identifying that alternatives to adversary-dominated supply *exist* is not sufficient. The durability of alternative supply depends on whether it remains commercially viable and politically sustainable once the acute crisis passes.

- Under what price conditions would alternative supply sources be commercially competitive without ongoing government subsidies?

- If the adversary reversed its coercive action (for instance, by flooding the market to undercut new entrants), would alternative producers survive?

- What is the cost differential between adversary-sourced and alternative supply? Is the differential narrow enough that industry will voluntarily maintain diversified sourcing, or does it require sustained policy support?

- Is there an instructive historical analogy? In past episodes of weaponization in this or similar markets, did alternative supply persist after the immediate crisis, or did buyers revert to the cheapest source?

- What political mechanisms exist to sustain public and industry support for more expensive alternative supply over the medium term (e.g., strategic reserves, long-term procurement contracts, price stabilization mechanisms)?

Coalitional Dynamics

These questions consider how potential policy responses interact with alliance relationships, neutral country interests, and enforcement capabilities. Their purpose is to establish which countries are viable partners for various responsive options. Recall that neutral countries, by definition, have no rigid preference as to technological leadership. Their goal is to maximize their security, agency, and profit. There is therefore some risk that, deliberately or not, neutral countries could proliferate friendly technology to the adversary, helping it to achieve technological leadership. However, this risk must be weighed against the economic benefits of mobilizing a larger share of the global economy.

Allies and Neutrals

- Do allies share a similar understanding of the threat?
- Is this an area in which allies have substantial, legitimate competitive advantages over US firms?
- How will this ally react if the policy intervention is unilateral? What damage will this do to the wider US geopolitical position?
- How do allied governments coordinate with industry on economic security? Do they operate through formal consultative bodies (as Japan does through Keidanren and the Ministry of Economy, Trade and Industry's [METI] advisory councils), direct lobbying (as in the United States), or other mechanisms?
- What is the ally's institutional capacity to sustain costly economic adjustments over multiple political cycles? Is there bipartisan or cross-party support for the relevant policies?
- How sensitive is the ally's government to consumer price increases and industry complaints? What is the realistic tolerance for economic pain in service of security objectives?
- How do these institutional differences affect the *sequencing* of allied coordination? Should allies with greater institutional capacity for rapid adjustment act first, creating market conditions that make it easier for others to follow?

Neutral Countries

- Do neutral countries have the potential to significantly increase production in this area? What is preventing them from doing so?

- What is the risk that a specific neutral country could willingly proliferate friendly technology or products to the adversary, helping it to achieve technological leadership?

- What institutional and governance capacity does the neutral country have to enforce rules of origin, export controls, and IP protections? How corruptible or porous are these systems?

- How would the neutral country respond to secondary pressure from the adversary if it increased production for allied markets?

CONCLUSION

Economic coercion—the use of market interventions to achieve political goals—is a defining feature of our current international system. However, because almost any market can theoretically be weaponized, there is a dangerous temptation to label every dependency as a crisis. To avoid wasting resources, the United States and its allies should align around a robust method for speedily identifying the most acute vulnerabilities—then tackle them first.

A key theme in this paper is that criticality is not an absolute concept. Weaponization is rarely cost-free; it imposes pain on the aggressor and can backfire geopolitically by pushing neutral countries to deepen cooperation with the victim. Therefore, a robust assessment must distinguish between domains where adversaries have asymmetric leverage and those where their threats are effectively "self-deterring." By bringing together these insights from across industries and academic fields, we can categorize risks more accurately.

Higher-criticality dependencies involve goods essential to military functions or civilian survival, where an adversary enjoys technological leadership or monopoly power, and where adaptation would be slow and capital intensive. These specific cases demand urgent government action.

Lower-criticality dependencies are those that are less likely to be weaponized and those where potential victims are highly adaptable. Just because an adversary dominates production does not automatically make a good "critical." If a good serves a global civilian market and technical barriers are low, neutral third countries can often ramp up production quickly in response to price shocks.

Defining criticality correctly allows for smarter, less expensive policy responses. Rather than reflexively seeking autarky through domestic subsidies, the United States should prioritize broadening the coalition of producers. Leveraging allies and neutral nations lowers the fiscal cost of resilience and creates a better buffer against coercion.

Cross-domain enablers—dependencies that amplify the adversary's leverage across multiple sectors simultaneously and whose reduction yields compounding returns—should be a particular priority.

Ultimately, a sharper definition of criticality is a precondition for sustaining long-term competition with China. Voters are already concerned about the cost of living. If policymakers intervene too broadly in markets without clear justification, they risk eroding public support for costly policies that serve abstract geopolitical goals. Only by narrowing our focus to what is truly critical can we ensure that our economic security policies are not only strategically sound but also democratically sustainable.

APPENDIX: ILLUSTRATIVE CASE STUDIES

These case studies are designed to give a sense of how the rubric works at the highest level. The cost estimates and investment figures in these case studies are indicative only, drawn from publicly available sources. The recommended approaches would require substantial additional quantitative modeling and financial analysis before capital allocation decisions were made.

CASE STUDY 1: GALLIUM

Gallium is a metallic element with various uses, including in semiconductors and optoelectronic devices.

OVERALL CRITICALITY SCORE: MEDIUM (TRENDING HIGHER)

- **Layer 1 (geographic mapping): HIGH** China produces 95–98 percent of primary low-purity gallium as a by-product of highly subsidized aluminum refining. It also controls about 90 percent of specialized extraction resin. Gallium nitride (GaN) and gallium arsenide (GaAs) compound semiconductors are essential for active electronically scanned array (AESA) radars, electronic warfare, 5G cellular network technology, and electric vehicle (EV) charging. There is no near-term substitute for GaN in defense applications.

- **Layer 2 (direct dependency): HIGH** China has escalated from licensing (August 2023) to instituting a targeted US export ban (December 2024) to controls on extraction technology (January 2025) to coordinated antismuggling enforcement (May 2025). The cost of weaponization to China is negligible, since gallium is a minor by-product. China is building out an export control regime that could enable more effective crackdowns on transshipment to the US market.

- **Layer 3 (indirect dependency): LOW** The countries best positioned to expand production (Japan, Australia, Canada, Greece, US) are allied democracies with strong governance. The main indirect risk is that non-Chinese producers depend on Chinese extraction resin, adding a technology layer underneath the commodity dependency.

- **Layer 4 (adaptive capacity): MEDIUM** Despite nearly three years of escalating restrictions, there is no public evidence that GaN-based defense production has been halted. Transshipment, Japanese diversified production, private stockpiling, and high semiconductor margins have provided a near-term buffer. But: transshipment channels are being closed, no US stockpile exists, new Western facilities are years from scale, and non-Chinese producers face 30–50 percent cost disadvantages. The relevant precedent of rare earths shows that alternative supply can collapse if an adversary reverses controls.

HAS WEAPONIZATION BEEN ATTEMPTED?

Yes. Effects have been significant on price (150 percent or more international surge) and supply channels, but defense production has not been visibly constrained. Market adaptation has been stronger than concentration metrics would predict.

INTERVENTION MENU

Table 1 outlines various options for mitigating the threat of gallium weaponization.

TABLE 1 GALLIUM INTERVENTION MENU

Intervention	Ballpark cost	Timeline	Lead actor	Recommendation
Strategic stockpile (1 year of defense consumption)	\$50M–\$100M (gallium metal has ~1 year shelf life; requires active rotation)	12–18 months to establish	DLA/DOD	Proceed with allied coordination
Investment in allied extraction capacity (DOWA expansion in Japan, Metlen in Greece, Nyrstar in Tennessee)	\$200M–\$500M across 3–4 facilities	3–5 years to meaningful scale	DFC co-investment with allied DFIs	Proceed
Extraction resin R&D (breaking Sunresin monopoly)	\$30M–\$50M	2–4 years	DoE/DARPA, coordinated with allied research capacity (e.g., ARIA)	Proceed
US/EU/Japan coordinated price floor	Administrative cost; fiscal exposure depends on floor level	12–18 months to negotiate and implement	State/USTR with EU, UK, and METI	Not essential; should be set at minimum viable level

Abbreviations: ARIA = Advanced Research and Invention Agency (UK); DARPA = Defense Advanced Research Projects Agency (US); DFC = US International Development Finance Corporation (US); DFI = development finance institution; DLA = Defense Logistics Agency (US DOD); DOD = Department of Defense (US); DOE = Department of Energy (US); METI = Ministry of Economy, Trade and Industry (Japan); USTR = Office of the US Trade Representative

STAGING CRITERIA (TRIGGERS FOR ESCALATION TO HIGH CRITICALITY)

- Expiration of November 2026 trade suspension without renewal
- Confirmed closure of Belgium/Germany/Canada transshipment channels
- Extension of Chinese restrictions to gallium-containing wafers or manufactured products (not just metal)
- Defense contractor reports of production delays attributable to gallium shortages
- Failure of non-Chinese extraction resin development to reach pilot scale by 2028

RECOMMENDED APPROACH

The United States funds the stockpile and Tennessee recovery project. Japan sustains and expands DOWA production with METI support. EU funds Metlen (Greece) under the Critical Raw Materials Act. Australia restarts mothballed capacity near Alcoa's Pinjarra facility with co-financing by the US International Development Finance Corporation (DFC) and Export Finance Australia. A trilateral US/EU/Japan price floor mechanism protects all four production nodes from Chinese price dumping, but this is time limited and set low.

DO-NOTHING COUNTERFACTUAL

Continued tightening without allied production alternatives would increase defense procurement costs, extend production timelines for GaN-based radar systems, and reduce US capacity to arm partners (Ukraine, Israel, Taiwan) with advanced air defense. The cost of inaction compounds over time as civilian GaN demand (5G, EVs, data centers) grows and competes with defense for a constrained supply.

CASE STUDY 2: LOGINK

LOGINK is a new kind of global digital logistics and trade platform for port management administered by China's Ministry of Transport.

OVERALL CRITICALITY SCORE: HIGH

- **Layer 1 (geographic mapping): MEDIUM-HIGH** This state-controlled logistics platform has cooperation agreements with 24+ foreign ports and data-sharing partnerships covering over 90 percent of container ship tracking. Its current estimated reach includes half of global shipping capacity and is growing. LOGINK is offered free of charge, and there has been no Western competitor at scale since TradeLens shut down (January 2023).

- **Layer 2 (direct dependency): HIGH** There are technological subordination risks across innovation, productization, and standard setting. China is embedding LOGINK-compatible protocols into international standards through the International Port Community Systems Association (IPCSA). The intelligence value is high: LOGINK offers granular visibility into cargo flows, valuations, routing, and port capacity—including US military logistics through commercial ports. LOGINK data could allow China to calibrate commodity export controls with surgical precision, identify transshipment routes, observe allied logistics preparations during crises, and target supply chain bottlenecks for disruption.

- **Layer 3 (indirect dependency): HIGH** LOGINK's penetration of allied and partner port infrastructure creates coercion risks for other US dependencies in any crisis. The same access that delivers logistics intelligence to Beijing in peacetime could identify new economic vulnerabilities among allied countries that China could then use to exert pressure. LOGINK may also represent a sabotage risk.

- **Layer 4 (adaptive capacity): LOW-MEDIUM** The barrier to alternatives is primarily a collective action problem, not a technical one. Allied countries have the capability to build logistics platforms. The challenge is achieving critical mass of participants. Congress has acted defensively (the ban in the FY2024 National Defense Authorization Act [NDAA]). However, no competitive alternative exists, and building one could take five years.

HAS WEAPONIZATION BEEN ATTEMPTED?

No.

INTERVENTION MENU

Table 2 lays out various options for mitigating the threat of LOGINK weaponization.

STAGING CRITERIA (TRIGGERS FOR ESCALATION)

- Formal adoption by IPCSA of LOGINK-derived data standards as default protocols

- LOGINK coverage exceeding 60 percent of allied port traffic (note: risk of lagging data)

- Evidence that LOGINK data has been used to optimize Chinese export controls or sanctions evasion

- China beginning to charge for LOGINK access (indicating confidence in lock-in)

TABLE 2 LOGINK INTERVENTION MENU

Intervention	Estimated cost	Timeline	Lead actor	Recommendation
Allied logistics data platform (minimum viable product covering major US, EU, UK, Japanese, Korean ports)	$500M–$1B development; $50M–$100M/year operating	3–5 years to minimum viable coverage	DFC + EU + UK + Japan jointly	Proceed
Mandated interoperability standards for allied port community systems	Administrative/regulatory cost	18–24 months	G7 transport ministers/IPCSA reform	Proceed
Diplomatic removal of LOGINK from allied ports (per NDAA mandate)	Diplomatic cost; may require offering funded alternatives	2–4 years	US Department of State	Proceed following development of allied platform, with a 3-year adoption window
Intelligence assessment of LOGINK data access and military logistics exposure	Classified; minimal direct cost	6–12 months	DOD/IC	Proceed

Abbreviations: DFC = US International Development Finance Corporation; DOD = Department of Defense (US); IC = Intelligence Community (US); IPCSA = International Port Community Systems Association; NDAA = National Defense Authorization Act

RECOMMENDED APPROACH

The G7 governments jointly fund platform development, with the United States and Japan as anchor investors. The EU mandates interoperability standards under the European Maritime Single Window environment (EMSWe). Major allied port authorities commit to anchor participation. Governance structure is multilateral.

DO-NOTHING COUNTERFACTUAL

This is difficult to quantify precisely, which is part of the problem. The cost of inaction is not a single economic figure but a persistent Chinese information advantage across all future coercive scenarios. Every future mineral export control, blockade contingency, or sanctions enforcement action unfolds under conditions where China has better logistics intelligence than the United States and its allies. Over a decade, this compounds into a structural disadvantage.

CASE STUDY 3: COPPER

Copper is a highly conductive metal with many industrial uses, including renewable energy systems, power grids, and EVs.

OVERALL CRITICALITY SCORE: LOW

- **Layer 1 (geographic mapping): LOW** China accounts for about 50 percent of global refined copper production and over 90 percent of smelting capacity growth since 2005. However, copper mining is globally distributed (Chile, Peru, Democratic Republic of the Congo [DRC], Australia, Indonesia, United States, Canada), with Chile being the world's largest copper-mining country, and refining exists across multiple countries. The United States imports about 50 percent of its refined copper, primarily from allied and friendly countries: Chile (65 percent), Canada (17 percent), and Mexico (9 percent). Copper is not a by-product; it can be scaled independently. Copper processing does not provide China with intelligence or leverage that amplifies other dependencies. China's smelting dominance is a function of industrial policy and cost advantages, not a strategic chokepoint.

- **Layer 2 (direct dependency): LOW-MEDIUM** China dominates smelting but does not monopolize copper mining. Chile, the primary supplier of both concentrate and refined copper to the United States, is a democratic ally with a free trade agreement. China has not attempted to weaponize copper supply. Doing so would be extremely costly and logistically challenging given the size of the market (exceeding $200B annually) and China's own massive import needs. China is a net importer of copper concentrate—it needs Chilean supply more than Chile needs Chinese smelters.

- **Layer 3 (indirect dependency): LOW-MEDIUM** Chile faces domestic risks (labor disputes, water scarcity, declining ore grades, political uncertainty around mining regulation) but none that represent acute weaponization risk from China. Peru is somewhat more politically volatile. Neither country is specifically vulnerable to Chinese coercion in the way that, say, a rare earth processor in Myanmar might be.

- **Layer 4 (adaptive capacity): HIGH** Copper is a massive global market with deep liquidity, active futures markets, large inventories, and multiple producing countries. Substitution options exist for many applications (aluminum for some wiring, fiber optics for some telecommunications). The United States has domestic mining capacity (5.1 percent of global production) with significant expansion potential (Resolution Copper, Pebble Mine). Smelting capacity exists in allied countries (Japan, Chile, Canada, EU). Recycling is well established and economically viable. The market has powerful self-correcting mechanisms: Record copper prices in 2025–26 are already stimulating new mine development, scrap recovery, and demand substitution.

HAS WEAPONIZATION BEEN ATTEMPTED?

No.

TABLE 3 COPPER INTERVENTION MENU

Intervention	Estimated cost	Timeline	Recommendation
DFC investment in Chilean copper smelting	$1B–$3B per facility	5–7 years	Not recommended at this time. Chilean smelters are currently uncompetitive. Chinese smelter overcapacity has driven the treatment and refining charges, which miners pay smelters to process concentrate into metal, to zero, squeezing margins across the industry. Over time, this rebalancing may create more commercially viable conditions for non-Chinese smelting, but that outcome is uncertain and does not yet warrant government investment.
Strategic copper stockpile	Significant given market size	Ongoing	Not warranted. Deep futures markets and large commercial inventories provide adequate buffer.
Expedited permitting for US copper mines	Administrative cost	2–5 years	Already underway.
Support for copper recycling infrastructure	Modest ($100M–$300M)	2–3 years	Potentially warranted to reduce vulnerability to price shocks but not on criticality grounds.

Abbreviation: DFC = US International Development Finance Corporation

INTERVENTION MENU

Table 3 describes the intervention options to mitigate any potential threat of copper weaponization.

STAGING CRITERIA (TRIGGERS FOR ESCALATION)

- Chinese restriction of copper concentrate exports (a fundamental shift, since China is currently a net importer)
- Achievement by Chinese smelters of more than 65 percent of global refined output *and* Chinese restriction of refined copper exports
- Major simultaneous disruptions at multiple mines (e.g., Chile, Peru, and DRC)
- Rapid political deterioration in Chile affecting mining operations

RECOMMENDED APPROACH

Take no action. The copper market is large enough and diversified enough that private capital, commercial inventories, and market price signals provide adequate resilience. The role of government should be limited to permitting reform, trade policy (avoiding counterproductive tariffs on allied copper), and monitoring for changes that would warrant reassessment.

DO-NOTHING COUNTERFACTUAL

The situation is manageable. Copper prices are at record highs, stimulating new supply. Chinese smelter overcapacity is eroding, not strengthening, Beijing's leverage. The market is self-correcting. The primary risk—further concentration of smelting in China—is a gradual trend that warrants monitoring but not a near-term crisis that warrants government capital deployment.

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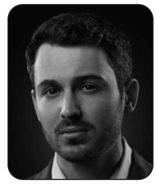

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Allied Coordination Working Group

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