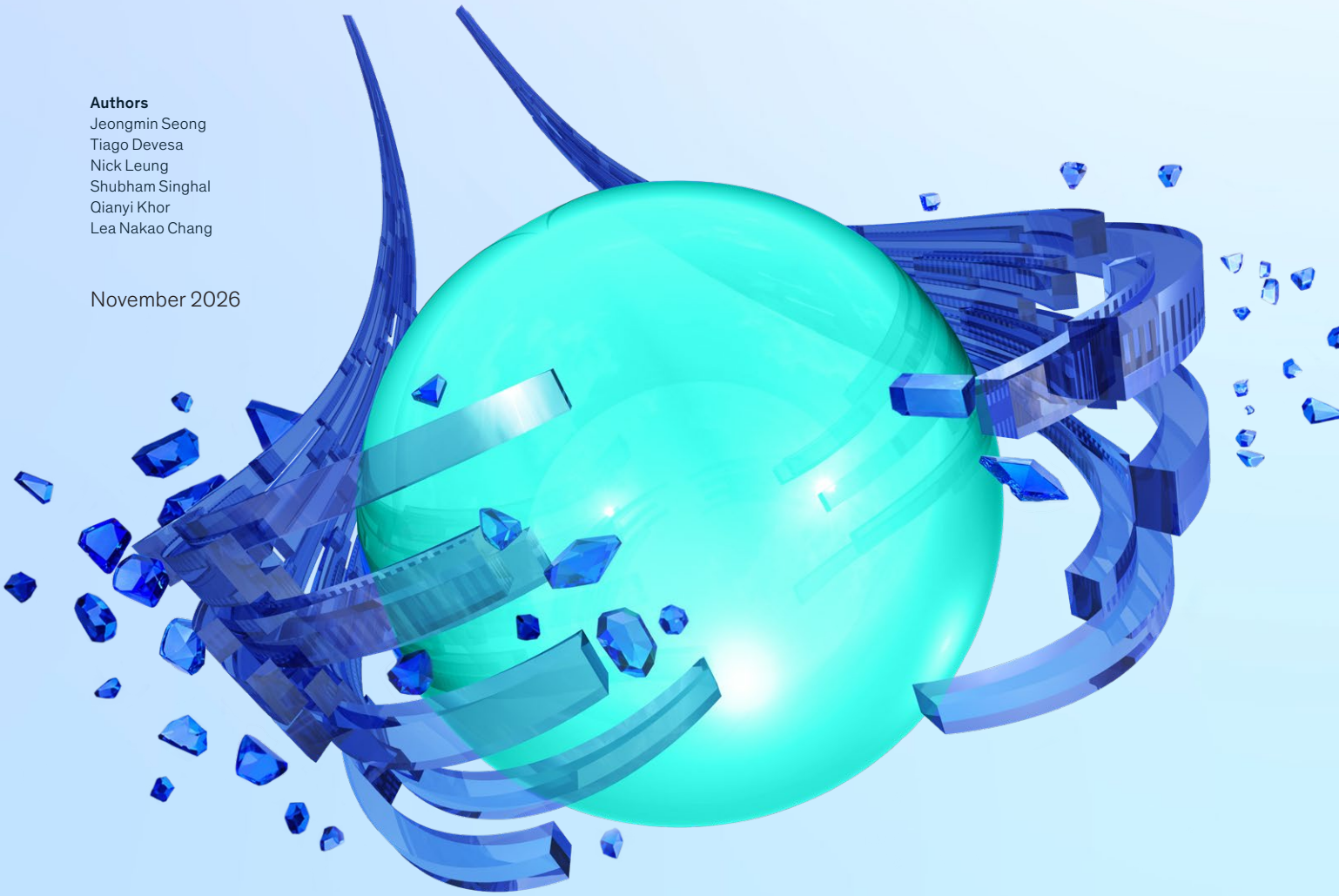
McKinsey Global Institute

The Achilles' heel of global trade

Building resilience where it matters most



Authors
Jeongmin Seong
Tiago Devesa
Nick Leung
Shubham Singhal
Qianyi Khor
Lea Nakao Chang

November 2026

Confidential and proprietary. Any use of this material without specific permission of McKinsey & Company is strictly prohibited.

Copyright © 2026 McKinsey & Company.
All rights reserved.
Cover image: © cybrain/Getty Images
All interior images: © Getty Images

McKinsey Global Institute

The McKinsey Global Institute was established in 1990. Our mission is to provide a fact base to aid decision making on the economic and business issues most critical to the world's companies and policy leaders. We benefit from the full range of McKinsey's regional, sectoral, and functional knowledge, skills, and expertise, but editorial direction and decisions are solely the responsibility of MGI directors and partners.

Our research is currently grouped into five major themes:

— Productivity and prosperity: Creating and harnessing the world's assets most productively

— Resources of the world: Building, powering, and feeding the world sustainably

— Human potential: Maximizing and achieving the potential of human talent

— Global connections: Exploring how flows of goods, services, people, capital, and ideas shape economies

— Technologies and markets of the future: Discussing the next big arenas of value and competition

We aim for independent and fact-based research. None of our work is commissioned or funded by any business, government, or other institution; we share our results publicly free of charge; and we are entirely funded by the partners of McKinsey. While we engage multiple distinguished external advisers to contribute to our work, the analyses presented in our publications are MGI's alone, and any errors are our own.

You can find out more about MGI and our research at www.mckinsey.com/mgi.

MGI directors

Shubham Singhal (chair)
Tanguy Catlin
Laura Furstenthal
Kweilin Ellingrud
Sylvain Johansson
Nick Leung
Dana Maor

MGI partners

Arvind Govindarajan
Anna Kortis
Mekala Krishnan
Jan Mischke
Jeongmin Seong

Contents

At a glance 3
Introduction 5

CHAPTER 1
Identifying the Achilles' heel 7

CHAPTER 2
Physical chokepoints amplify the Achilles' heel 21

CHAPTER 3
How Six R's could spell resilience 30

CHAPTER 4
Acting on the Achilles' heel: Agenda for decision-makers 38

Technical appendix 46

Acknowledgments 52
Endnotes 53

At a glance

— **Around 25 percent of $19 trillion in global imports confront significant vulnerabilities, representing the "Achilles' heel" of the world economy.** This means they face at least two of three vulnerabilities: product criticality; supplier concentration; and geopolitical distance. With around 80 percent of maritime trade passing through a geographic chokepoint, the economic risks compound further.

— **Trade dependencies are asymmetric but not one-sided, and no economy is immune to them.** For many economies, China supplies 30 to 60 percent of their Achilles' heel imports, while individual partners typically account for only 5 to 15 percent of China's. Yet dependence can run the other way at the product level: Australia supplies more than half of China's iron ore imports.

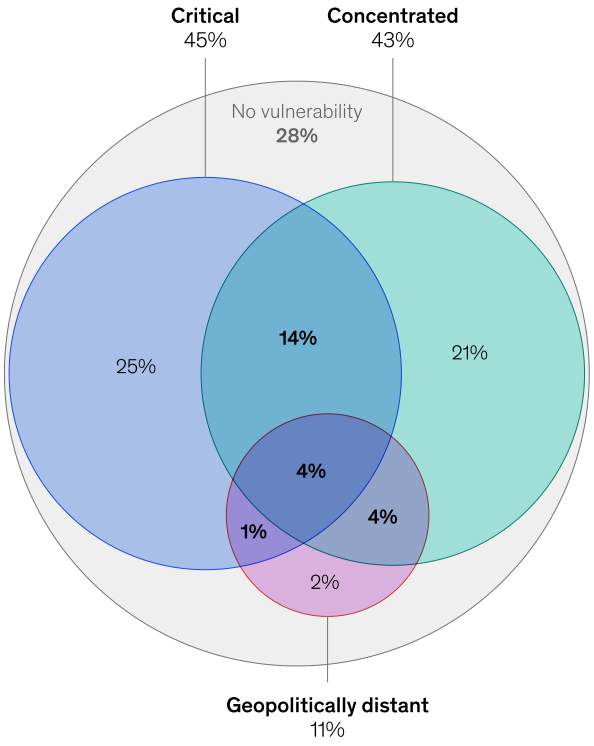
— **Building resilience means responding selectively to dependencies, not eliminating them.** Resilience strategies depend on alternative suppliers, domestic production capabilities, and ripple effects on value chains. Our "Six R's" framework (rearrange, relocate, ramp up, reserve, reduce, and rally) helps identify potential responses for specific products and economies. Rearranging supply may take weeks; ramping up production can take years.

— **The Achilles' heel can also be a map of opportunities for both resilience and growth.** As economies and businesses invest in addressing trade dependencies, new markets may emerge for companies offering alternative production capacity, materials and technologies, products designed for greater geopolitical optionality, and solutions that enhance supply chain visibility and resilience.

Exhibit 1

Around one-quarter of global trade falls into the "Achilles' heel."

Total imports and exposure to trade vulnerabilities, % of $19 trillion,[1] 2024



Selected products

All three

- Iron ore
- Smartphones
- Lithium-ion batteries
- Permanent magnets[2]

Critical and concentrated

- Memory chips
- Polypeptide and protein hormones
- Electronic screens

Critical and distant

- Semiconductor inspection equipment
- Transmission equipment

Concentrated and distant

- Toys
- Footwear
- Video game consoles

Note: Figures may not sum to 100 percent because of rounding. Concentration and geopolitical distance are assessed at the economy-product level and then consolidated globally. Product vulnerability is based on majority exposure: If more than 50 percent of imports come from geopolitically distant partners, all imports in that product category are classified as distant.
[1] Total trade of $19 trillion is the value of global goods imports in 2024, excluding intra-Europe-30 trade, where Europe-30 comprises the 27 member states of the European Union plus Norway, Switzerland, and the United Kingdom.
[2] Includes rare-earth magnets.
Source: UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

Introduction

Global trade has withstood a succession of shocks. A global pandemic, geopolitical tensions, and new conflicts have reshaped where and how countries trade but have not fundamentally disrupted how much is traded for many sectors.

Rather than retreating into deglobalization, trade has reconfigured. Flows are traveling greater geographic distances but shorter geopolitical ones, as economies shift toward trade partners with which they are more geopolitically aligned.[1] Public and private actors alike have shown agility in absorbing shocks: rerouting shipments; renegotiating sources of supply within weeks of a tariff announcement; or tapping strategic oil reserves in response to the closure of the Strait of Hormuz and other logistics "chokepoints."

As a result, global trade has remained strong. Global goods trade grew by around 7 percent in nominal terms in 2025, outpacing global gross domestic product growth, and continued to expand in 2026, supported in part by the AI boom and associated demand for technology goods.[2]

That resilience rests on a deeply interconnected global economy. Trade ties bring significant economic benefits.

But these connections may also create dependencies that are amplified by catalysts like geopolitical conflict. Critical goods and materials may get too expensive when there are tariffs, trade restrictions, or blockades. Economies need to be prepared for the supply of a key input to potentially be shut off.

This research focuses on the approximately one-quarter of global imports that is exposed to two or more compounding vulnerabilities—product criticality, supplier concentration, and geopolitical distance—which we refer to as the "Achilles' heel" of global trade. A smaller but consequential slice, 4 percent of global imports, faces all three simultaneously, concentrated in strategic goods like semiconductors, permanent magnets, and consumer electronics that can make economies especially vulnerable. Layered on top of this is physical exposure: Roughly 80 percent of maritime trade passes through a chokepoint, and many of these, including the Strait of Hormuz, have no viable seaborne alternative.

The geopolitical realignment of trade underway may just be the start, but it won't play out everywhere. Much of the reaction from businesses and policymakers could be centered on the one-quarter of global trade examined in this report. The remaining 75 percent, which includes a lot of the products people consume every day, is important, but the adjustments to global conditions may largely play out as they have for decades.

Our analysis finds that short-term responses to disruptions are not always adequate. Tariffs can be absorbed for a while through pricing and rerouting; a chokepoint closure can be buffered by drawing on strategic reserves and using more existing pipeline capacity. But the deeper vulnerabilities—concentrated suppliers, critical inputs with few substitutes, and exposed trade corridors—do not resolve themselves once the immediate shock passes. They can persist, compound across products and regions, and leave economies and companies exposed to a subsequent disruption.

Managing this exposure requires a different kind of response: a deliberate strategy on identifying which vulnerabilities are most material; understanding how they build on one another; and matching them to the tailored mix of interventions. These can range from rearranging supply networks and building domestic capacity to reserving critical stockpiles and shifting capital into domestic manufacturing. Building lasting resilience requires examining a broad tool kit and applying the right lever to the right problem.

This report offers a framework to consider for making that distinction. It addresses three questions:

1. *Where are the vulnerabilities?* Which products, economies, and trade relationships are most exposed to overlapping sources of vulnerabilities, and how do maritime chokepoints amplify them?
2. *What builds resilience?* Which levers are best suited to different vulnerabilities, products, and economies?
3. *How can decision-makers act?* How can businesses and policymakers translate these insights into targeted action?

The objective of this framework is not self-sufficiency. It is targeted resilience: identifying the parts of global trade where disruption warrants greater attention and action, while preserving the benefits of global connections elsewhere.



CHAPTER ONE

Identifying the Achilles' heel

Every economy has an Achilles' heel. Of the $19 trillion in global imports analyzed for this report, around one-quarter faces at least two of the three vulnerabilities: product criticality, supplier concentration, and geopolitical distance. Just ten products account for 35 percent of the global Achilles' heel. The scale and composition of vulnerabilities vary widely and are most pronounced where these exposures overlap, narrowing the options to mitigate risk.

Why does this matter? Trade risks are a fact of life in the global economy. But they become paramount during times of economic uncertainty, geopolitical risk, and conflict, all three of which are present in the world to varying degrees.

Achilles' heels are shaped by three factors: how critical a product is to economic activity; how many sources of supply are available; and the degree of geopolitical alignment with trading partners (The analysis in this report measures goods trade. Of course, there are other types of flows that are crucial for economies including services, data, and capital that are outside the scope of this report).[3]

These exposures reveal asymmetric relationships between countries. China supplies 31 percent of US Achilles' heel products, compared with just 8 percent in the reverse direction, a nearly fourfold difference. But vulnerability often runs both ways. While China accounts for 60 percent of Australia's most vulnerable imports, Australia supplies more than half of China's iron ore imports—one of China's largest imports exposed to all three dimensions of vulnerability, underscoring the mutual dependence embedded in global trade.

Of course, a country's position as a key supplier of Achilles' heel products or sectors doesn't necessarily mean it would seek to use the position it has for economic leverage, as that carries costs to both sides of a trade relationship.

Trade vulnerabilities can create economic risks

Just 4 percent of global imports face all three sources of vulnerabilities outlined above at once, including China's iron ore imports from Australia and US rare-earth magnets and smartphones from China.

But exposure to even two could have consequential impacts in the event of a sudden supply disruption, as illustrated by US reliance on a small number of economies, primarily Taiwan for advanced integrated circuits, Japan's dependence on the Middle East for crude oil, and most economies' reliance on Vietnam for electronic screens.

Even products that are not essential to economic activity—such as sneakers and toys—can remain highly exposed to supply disruption. Their disruption may not threaten essential economic functions but can still translate into shortages, higher prices, and adjustment costs for firms and consumers. All told, 23 percent of imports sit at the Achilles' heel of global trade, making these vulnerabilities difficult for economies to ignore.

These exposures have steadily intensified over the past two decades, where imports that face two or more vulnerabilities rose from 15 percent in 2000 to 23 percent in 2024, suggesting structural shifts entrenched within the global trading system. This increase reflects a shift toward more critical trade, rising from 30 to 44 percent, led by electronics, where concentrated supply and geopolitical distance have especially increased exposure between China and Western economies.

Ten products make up one-third of global import vulnerabilities

More than 60 percent of the Achilles' heel falls within three key sectors: electronics; basic manufacturing; and metals and minerals. Largely within these sectors, ten products account for roughly one-third of the global Achilles' heel (Exhibit 2).

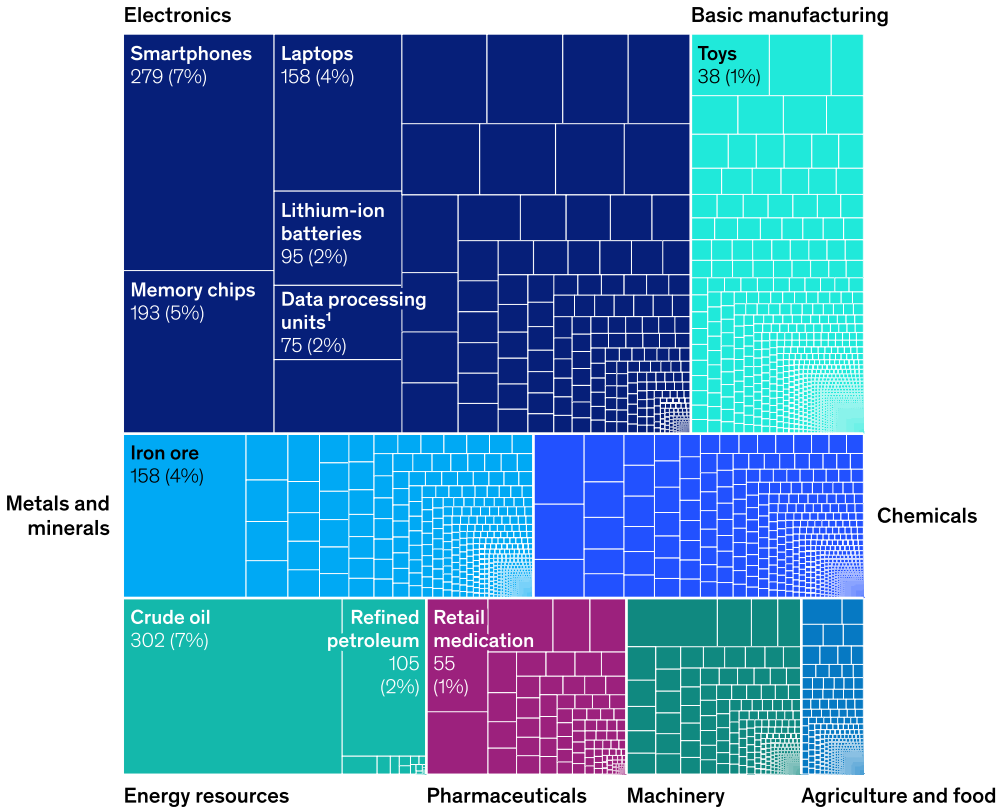
Crude oil accounts for the largest single product exposure at 7 percent, but the electronics sector remains the primary locus of vulnerability. Just five electronics products, including smartphones (7 percent), memory chips (5 percent), and laptops (4 percent), combine for about 20 percent of the global Achilles' heel. Iron ore is another at 4 percent, constrained by a highly concentrated supply base in Australia and Brazil.

The rapid expansion of AI could further amplify these vulnerabilities. Growing demand for AI infrastructure is increasing the strategic importance of advanced semiconductors, high-bandwidth memory, and other specialized components whose production is concentrated in a handful of economies. As AI adoption scales, existing supply concentration could become more consequential, while new dependencies emerge across computing infrastructure, energy, and critical materials.

Exhibit 2

10 products account for 35 percent of global trade vulnerabilities.

Product split of the global Achilles' heel, 2024, $ billion



Note: Achilles' heel refers to imports that are exposed to at least 2 of the 3 trade vulnerabilities: product criticality, supplier concentration, and geopolitical distance of trading partners. Basic manufacturing includes sectors such as textiles, rubber and plastics, wood and paper, and food and beverages.
[1] Refers to computer hardware that handles data processing (ie, server racks), but does not include a built-in screen, keyboard, or mouse.
Source: UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

Each economy has vulnerabilities, with Asian hubs, the United States, and Europe-30 economies having the largest

Larger economies are disproportionately exposed to all three sources of trade vulnerability, but their drivers are structurally different (Exhibit 3). While Asian industrial hubs (China, Japan, and South Korea) face vulnerabilities driven by their deep interdependence in electronics networks and inputs, the United States and Europe-30 are also exposed because of their reliance on a few, sometimes distant, Asian suppliers, especially for final electronic products.

Economies such as those in the Association of Southeast Asian Nations (ASEAN), the Middle East, and Latin America tend to rely less on geopolitically distant partners, reflecting their position on the geopolitical spectrum.

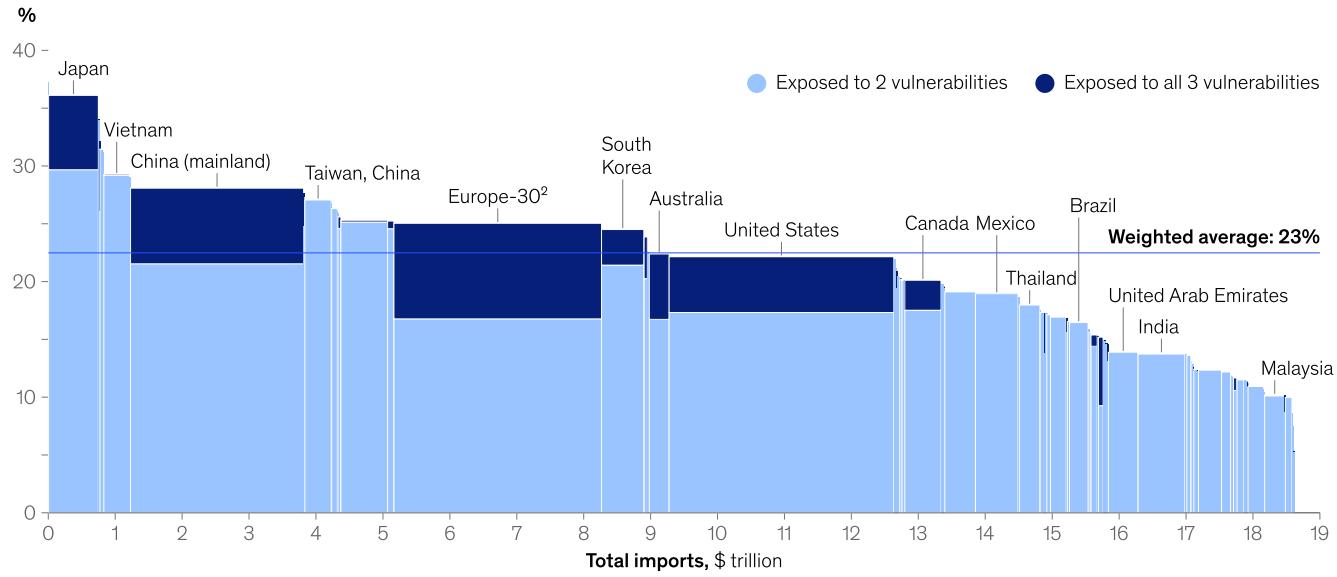
(For more detail on the geopolitical spectrum, see sidebar "Quantifying geopolitical distance.")

This helps explain the wide variation in Achilles' heels across these economies. Vietnam stands out, with around 30 percent of its imports being its Achilles' heel, especially due to concentrated imports of electronics components from China and South Korea. Conversely, exposure in India, Malaysia, and the United Arab Emirates is below the global average.

Exhibit 3

Asian economies, the US, and EU face the largest relative exposures.

Share of imports exposed to 2 or 3 vulnerabilities,[1] 2024, %



Note: Column width represents total imports.
[1] Trade vulnerabilities include product criticality, supplier concentration, and geopolitical distance of trading partners.
[2] Europe-30 includes the 27 member states of the European Union plus Norway, Switzerland, and the United Kingdom, excluding intra-Europe trade.
Source: UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

Sidebar

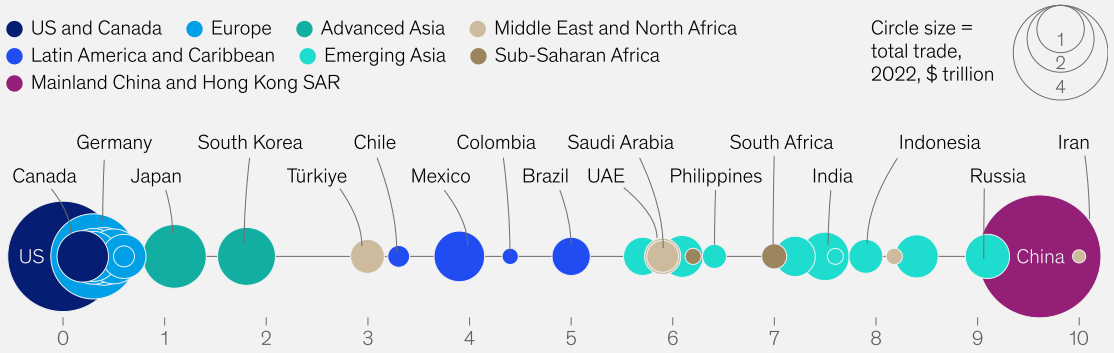
Quantifying geopolitical distance

To quantify geopolitical alignment in a way analogous to geographic distance, prior MGI research developed a measure based on UN General Assembly voting records from 2005 to 2022 (exhibit). Using principal component analysis, we map each voting economy onto a one-dimensional spectrum scaled from zero to ten. This spectrum is not defined relative to any single country or pair of economies. The geopolitical distance between two economies is the absolute difference between their positions on this scale. We treat this distance as fixed over the period analyzed; accordingly, changes in the geopolitical distance of trade reflect shifts in the mix of trading partners, not changes in the underlying distance between any specific pair.

Exhibit

Economies hold different geopolitical positions.

Geopolitical position based on UN General Assembly voting patterns,[1] 2005–22, 0–10 scale



[1] Calculated by principal component analysis of UNGA voting records in 2005–22, reduced to a 0–10 scale. To exclude procedural votes, a subset of UNGA votes are considered. For 2005–21, these exclude votes not designated as "important" in "Voting practices in the United Nations," US Department of State. For 2022, votes addressing the war in Ukraine are included.
Source: "Geopolitics and the geometry of global trade", McKinsey Global Institute, 2024; McKinsey Global Institute analysis

McKinsey & Company

From soybeans to chips: Criticality, concentration, and geopolitics shape exposures

The three sources of trade vulnerabilities reflect distinct shifts in how global trade is structured. We explore these drivers and differences across economies and sectors in turn.

Criticality: Most economies rely on imported commodities and electronics

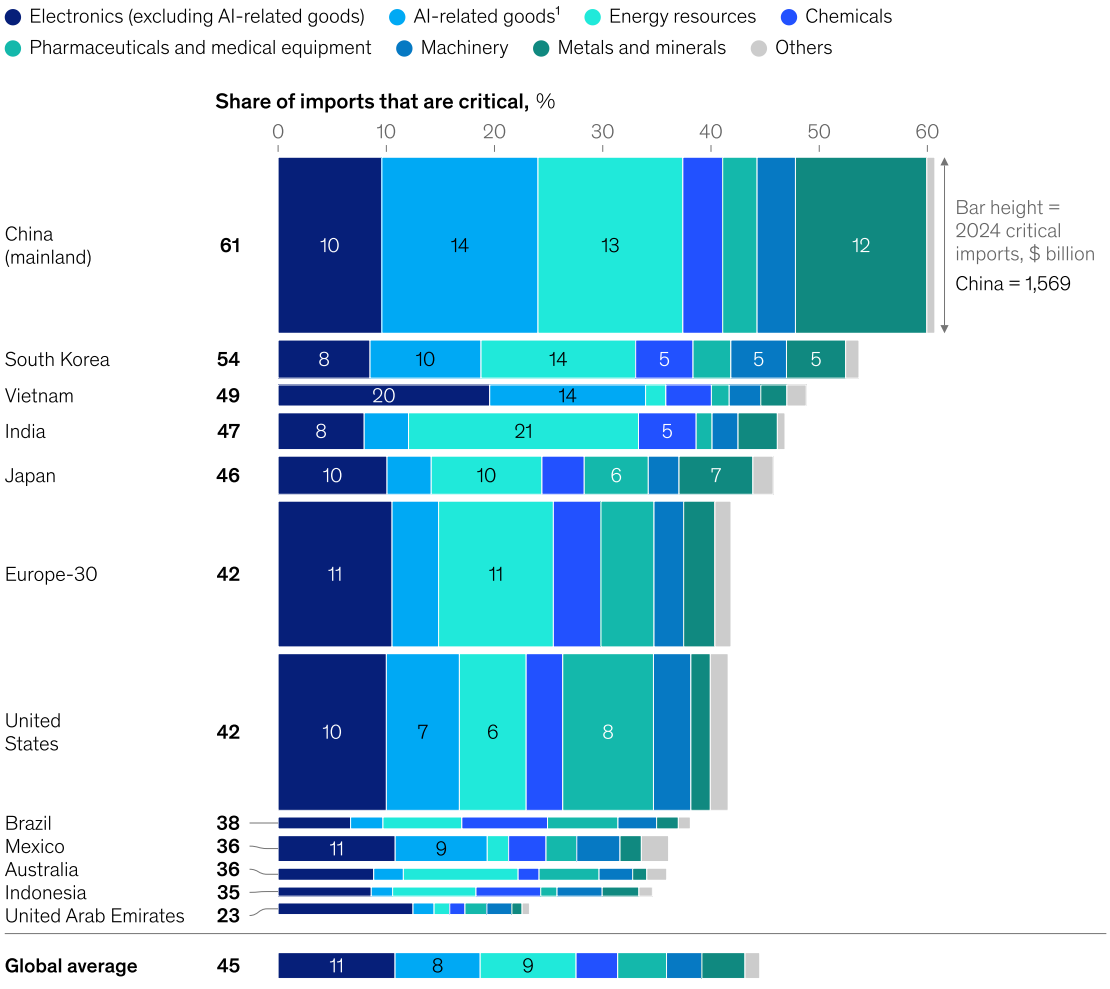
While all economies rely on a similar set of critical products, how much of those are imported is largely determined by an economy's core engine.[4]

China and other Asian economies including Vietnam and South Korea exhibit above-average exposure, with half or more of their imports being critical, due to their need for imported energy, raw commodities such as copper and aluminum as well as intermediate machinery to power their manufacturing capacity (Exhibit 4). In contrast, the United States and Europe-30 face lower exposure (at around 40 percent), reflecting less reliance on imported upstream inputs, even while remaining reliant on finished critical products such as smartphones and laptops.

Exhibit 4

Energy, AI-related goods, and other electronics make up most critical imports.

Share of imports that are critical per economy, 2024, %



Note: Pharmaceutical products include medical and scientific instruments. Others include sectors such as agriculture, food and beverages, textiles, transport equipment, wood and paper, and rubber and plastics. Global average is the weighted average of critical imports across total import value.
[1] AI-related goods include semiconductors, graphic cards, routers, and servers, which can also be used for non-AI applications.
Source: UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

The relative sectoral exposure of each economy is shaped by its economic structure. For example, Brazil and Indonesia experience elevated exposure primarily from imports of fertilizers and industrial chemicals needed to sustain their agricultural industries.

Concentration: Specialization and endowments can lead to many electronics and commodities having few sources of supply

Trade concentration can reflect unique endowments, comparative advantages, or choices to maximize efficiency. Nonetheless, concentration can also be a source of vulnerability.

In some cases, concentration is a choice; while there are many available suppliers, economies tend to prioritize only a few, resulting in trade that is "locally concentrated."[5] This is often the case of smaller nations in integrated regional ecosystems that trade with their larger neighbors, such as US–Mexico–Canada. While there are many suppliers in the world, Mexico imports essentially 98 percent of its refined petroleum fuels from the United States.

But many products offer limited alternatives at a global level, especially when there are three or fewer economies accounting for more than 90 percent of global exports. We describe trade in those products as "globally concentrated." Limited diversification options make these products difficult to replace in the event of disruption. Examples include soybeans with supply concentrated in Brazil and the United States, or palm oil from Indonesia and Malaysia.

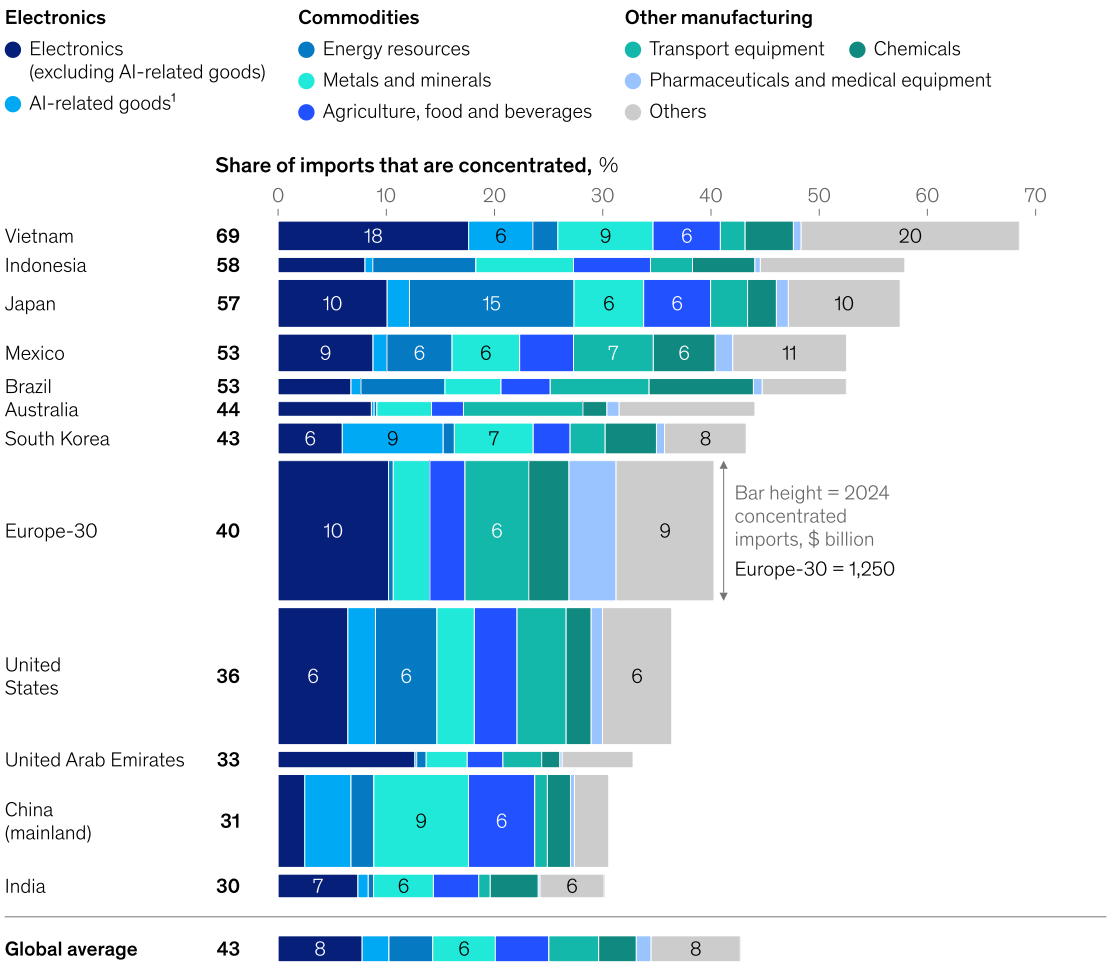
Most prominent are electronics, where production of critical components and finished goods is highly specialized, from advanced semiconductors and lithium-ion batteries to smartphones and laptops. Often each step is done primarily by one or two economies, often in China and the broader Asia–Pacific region. For example, more than 70 percent of the global supply of advanced integrated chips originates from Taiwan. Economies such as Japan and South Korea also play an integral role in advanced semiconductor substrates and high-bandwidth memory chip production globally (Exhibit 5).

Trade concentration can reflect unique endowments, comparative advantages, or choices to maximize efficiency.

Exhibit 5

Electronics and commodities make up most concentrated imports.

Share of imports that are concentrated per economy, 2024, %



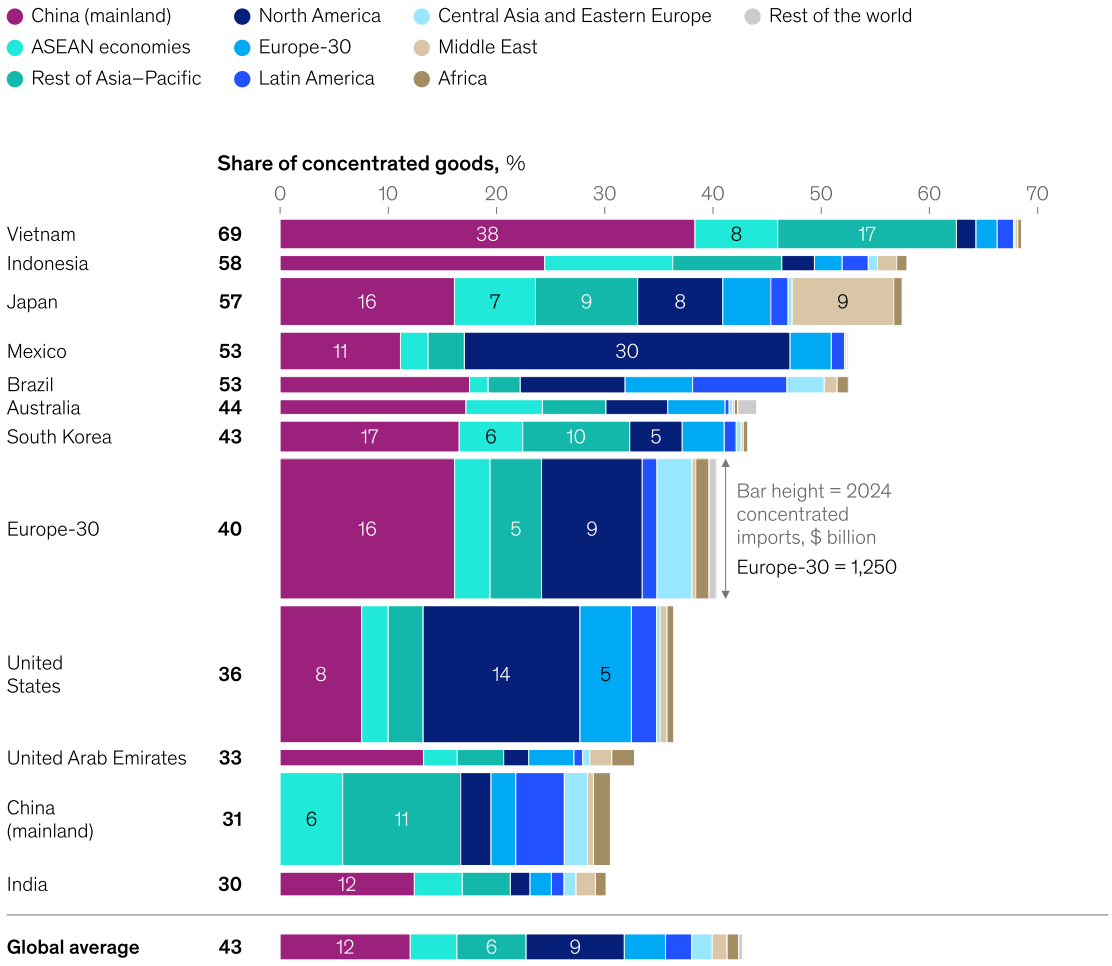
Note: Pharmaceutical products include medical and scientific instruments. Others include sectors such as textiles, wood and paper, machinery, and rubber and plastics. Bar height references the value of each economy's imports exposed to each dependency. Global average is the weighted average across total trade value.
[1] AI-related goods include semiconductors, graphic cards, routers, and servers, which can also be used for non-AI applications.
Source: UN Comtrade; McKinsey Global Institute analysis

McKinsey & Company

Exhibit 5 (continued)

Most concentrated imports originate in China or other Asian economies.

Share of imports that are concentrated[1] per economy, 2024, %



Note: Global average is the weighted average of concentrated imports across total import value.
[1] Concentration refers to the product-level concentration for the importing economy. In the underlying analysis, "concentrated trade" is defined as all imports with a Herfindahl-Hirschman Index (HHI) over 3,000; this approximately represents cases where a product is supplied to an importer by three or fewer economies.
Source: UN Comtrade; McKinsey Global Institute analysis

McKinsey & Company

Geopolitically distant trade is driven mostly by China either as a source or as a destination

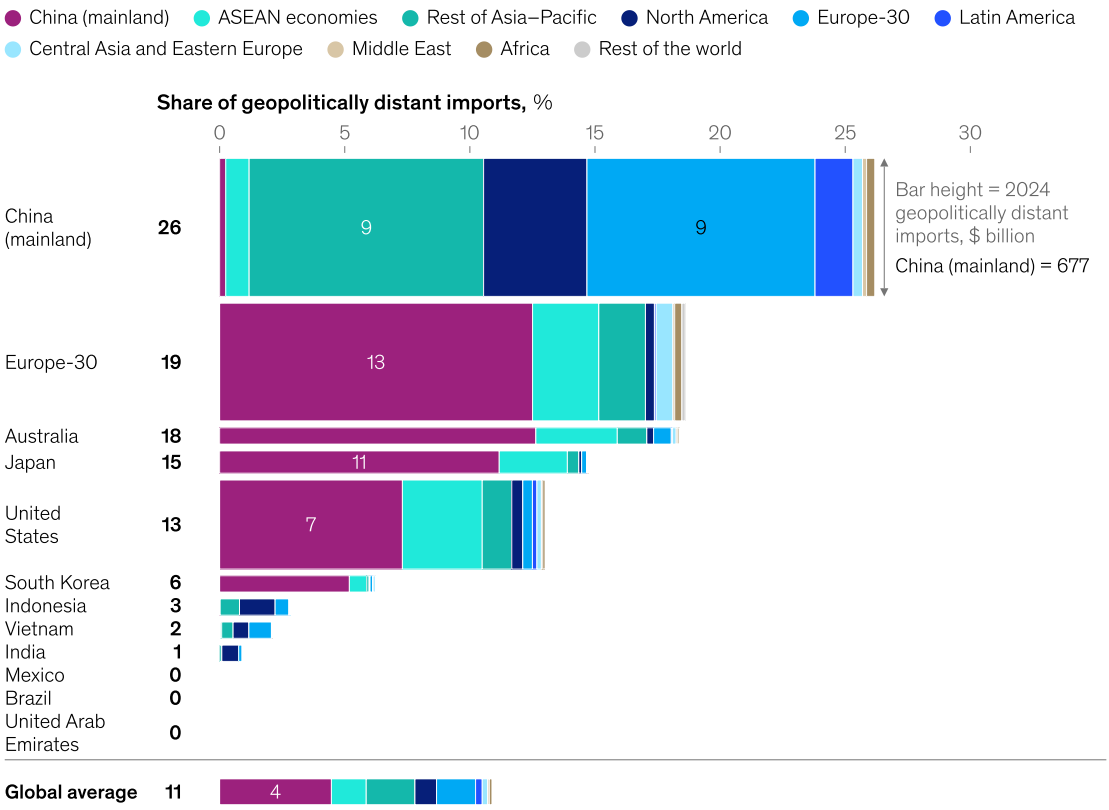
For advanced economies, exposure to geopolitical distance is often driven by imports of Chinese electronics (Exhibit 6). However, it flows in both directions. China's exposure stems from reliance on geopolitically distant partners for raw materials and advanced capital goods, notably Australian iron ore and semiconductor manufacturing equipment from Japan and the Netherlands.[6]

Economies across ASEAN, the Middle East, and Africa occupy a middle ground, allowing them to maintain trade relationships across the geopolitical spectrum.[7]

Exhibit 6

Most geopolitically distant trade starts or ends with China.

Share of imports that are geopolitically distant per economy, 2024, %



Note: Global average is the weighted average of distant imports across total import value. Trade flows with a value-weighted average distance above 7 are flagged as "geopolitically distant" because they represent interactions between economies positioned at opposite ends of this UN voting spectrum. Economies that have no distant partners sit in the middle of the UN voting spectrum, where all partners are not geopolitically distant.
Source: UN Comtrade; McKinsey Global Institute analysis

McKinsey & Company

Trade dependencies can be asymmetric but not one-sided

Dependence does not run equally in both directions. For many economies, China supplies 30 to 60 percent of their Achilles' heel imports, while individual partners typically account for only 5 to 15 percent of China's. This reflects its broad role as a supplier across value chains. For instance, the United States sources the majority of its vulnerable imports across a wide range of products from China, from rare-earth magnets to laptops, game consoles, ovens, Christmas decorations, and industrial chemicals.

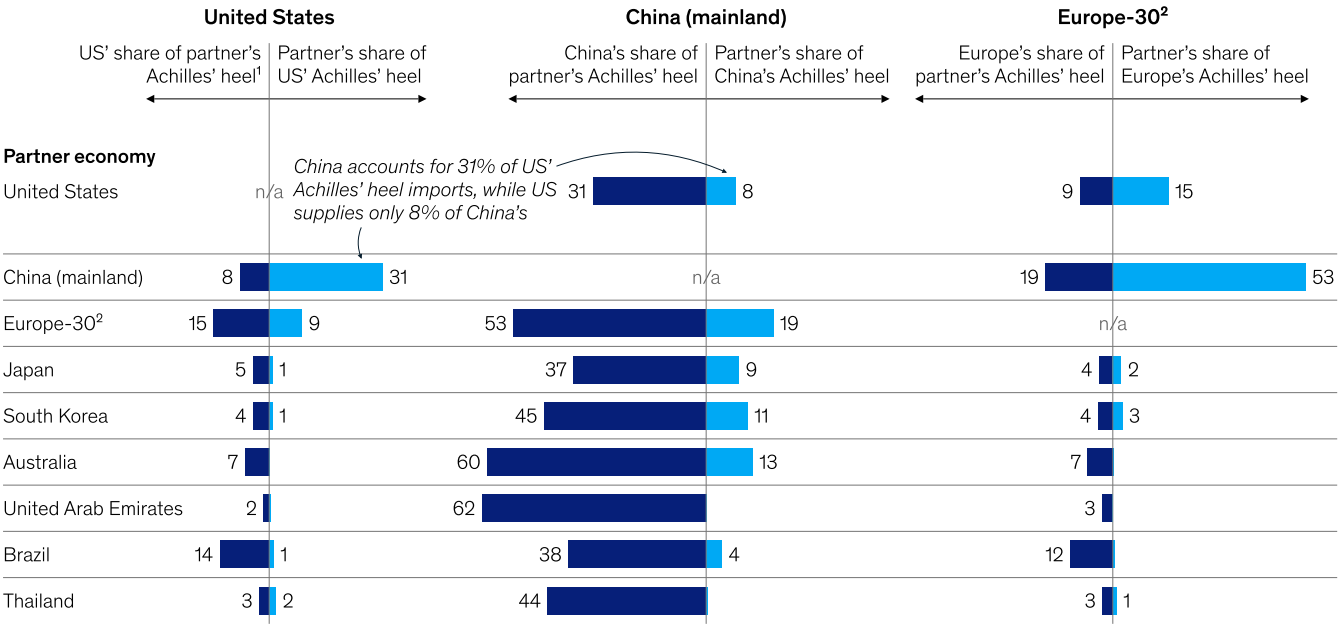
Comparatively, while China has its own "Achilles' heel," it tends not to rely on any single economy for much of it (Exhibit 7).

But aggregate asymmetries can mask important dependencies in the other direction where individual products depend on one another. The China–Australia relationship illustrates this interdependence: China supplies more than half of Australia's Achilles' heel products, while relying heavily on Australia for key commodities, most notably iron ore, as well as agricultural products such as live cattle, oats, and nuts. Europe-30 economies depend on China for 53 percent of their Achilles' heel, while China in turn relies on Europe-30 economies for more than half its imports of retail medication and vaccines.

Exhibit 7

Trade relationships are asymmetric.

Share of trade exposed to at least 2 trade vulnerabilities, by reporting and partner economy, 2024, %



[1] Achilles' heel refers to imports that are exposed to at least 2 of the 3 trade vulnerabilities: product criticality, supplier concentration, and geopolitical distance of trading partners.
[2] Europe-30 includes the 27 member states of the European Union plus Norway, Switzerland, and the United Kingdom, excluding intra-Europe trade.
Source: UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

This creates a more nuanced picture than bilateral trade balances suggest. A relationship can be highly asymmetric overall while containing individual products for which dependence runs strongly in the opposite direction. An economy that appears less dependent overall can still have specific Achilles' heels tied to the same trading partner.

This makes the product level crucial for understanding—and ultimately building—resilience. Economy-level exposure reveals where broad dependencies lie, but product-level analysis reveals vulnerabilities that aggregate figures can obscure. As chapter 3 explores, it can also help determine which resilience responses are most appropriate. While our analysis focuses on import vulnerabilities, dependencies can also arise on the export side, particularly when economies rely heavily on a few markets for their products (see sidebar "Export dependencies matter, too").

The Achilles' heel captures what and whom economies depend on. But vulnerability also depends on how goods physically reach them. The next chapter adds this geographic dimension, examining how maritime chokepoints can amplify existing vulnerabilities—and create distinct risks of their own.

Sidebar

Export dependencies matter, too

This report focuses on imports. But end-market concentration also creates dependencies for exporting economies. Systemic vulnerability is generally lower as most maintain diversified export mixes. However, asymmetric dependencies emerge at the product and regional levels, creating potential "export" Achilles' heels (exhibit).

These asymmetries become more distinct at a product level. For instance, Germany, South Korea, and the United States import 75 to 85 percent of their metal permanent magnets from China, while China sends 38 percent of its magnet exports to those three markets. Mutual reliance is evident in agriculture, where China sources 69 percent of its soybeans from Brazil, while China accounts for 73 percent of Brazil's total soybean exports, leaving Brazil highly exposed to any shifts in Chinese demand.

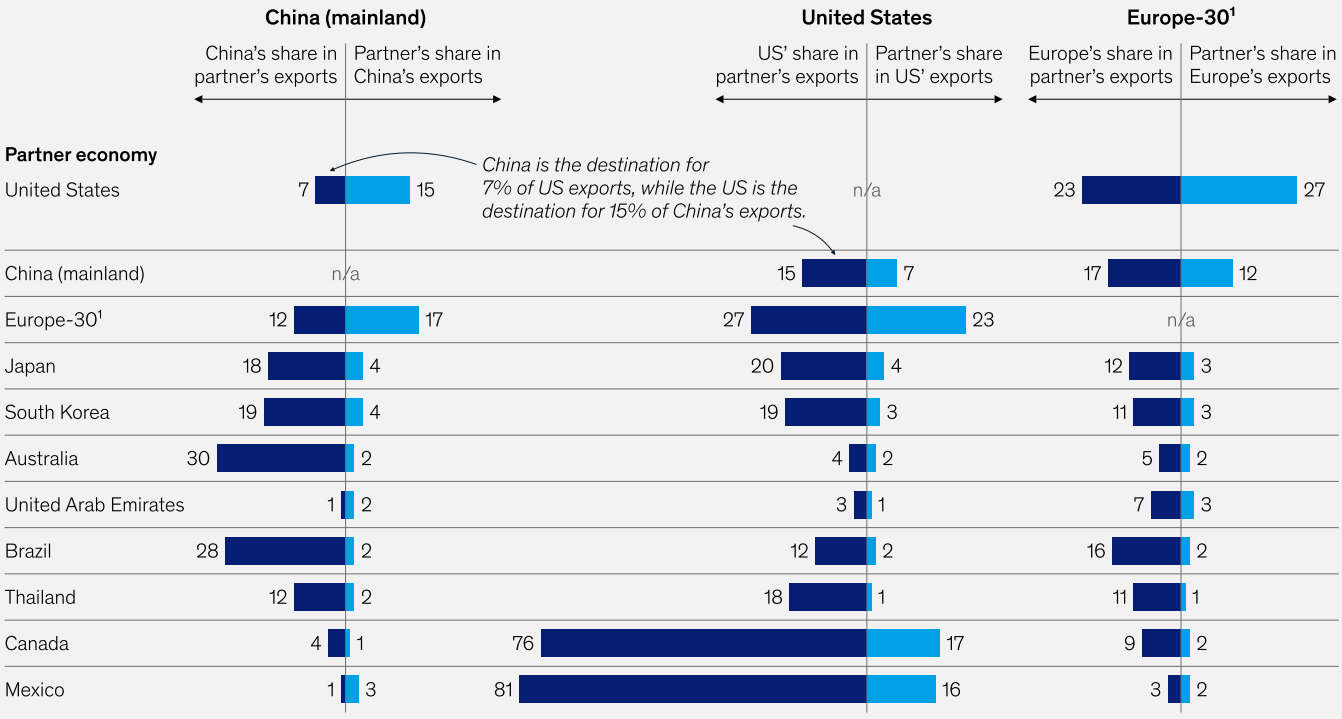
Regional integration creates sharper asymmetries. Canada and Mexico send 75 to 80 percent of their total exports to the United States, yet, combined, they represent around one-third of total US export demand. Sector-level concentration is even more pronounced: Canada exports 96 percent of its crude oil to the United States (constituting 59 percent of US imports), while Mexico sends 94 percent of its data processing units to the United States (67 percent of US imports). As partners prioritize resilience, these highly concentrated export corridors highlight critical vulnerabilities for export-oriented economies.

As trading partners increasingly prioritize supply chain resilience, export-oriented economies could also assess whether heavy reliance on a few key markets creates long-term demand risks and look to actively consider strategies such as diversifying their export destinations.

Exhibit

Export dependencies can also be asymmetric.

Share of total exports by reporting and partner economies, %



[1] Europe-30 includes the 27 member states of the European Union plus Norway, Switzerland, and the United Kingdom, excluding intra-Europe trade.
Source: UN Comtrade; McKinsey Global Institute analysis

McKinsey & Company


KAMOS

CHAPTER TWO

Physical chokepoints amplify the Achilles' heel

Chokepoints are a distinct amplifier of trade risk.[8] There are many kinds: geographic infrastructure; natural resources and commodities; trade networks and logistics; financial; technological; and regulatory.[9] The focus of this report is on the maritime variety, because the vast majority of trade is seaborne, and the 2026 Strait of Hormuz crisis highlighted how widespread the impact of its disruption can be.

Most seaborne trade passes through at least one of the 24 major passages examined in this report. Disruption at these narrow corridors can delay or interrupt trade, raise freight and insurance costs, and propagate through supply chains far beyond the passage itself. Where chokepoint exposure overlaps with an existing Achilles' heel, the consequences can compound.

The instinct to control these passages goes back centuries. Chokepoints were a major pillar of Portugal's strategy in the early 1500s under Afonso de Albuquerque—as evidenced by the seizure of the straits of Hormuz and Malacca and the attempt on Aden, the gateway to what is today the Bab el-Mandeb Strait. The logic was that control of these passages equated to control of the flow of spices from Asia to Europe without needing to hold territory in between.[10] This isn't just a history lesson. All three appear in our map of 24 key chokepoints today.

Most maritime trade crosses a chokepoint

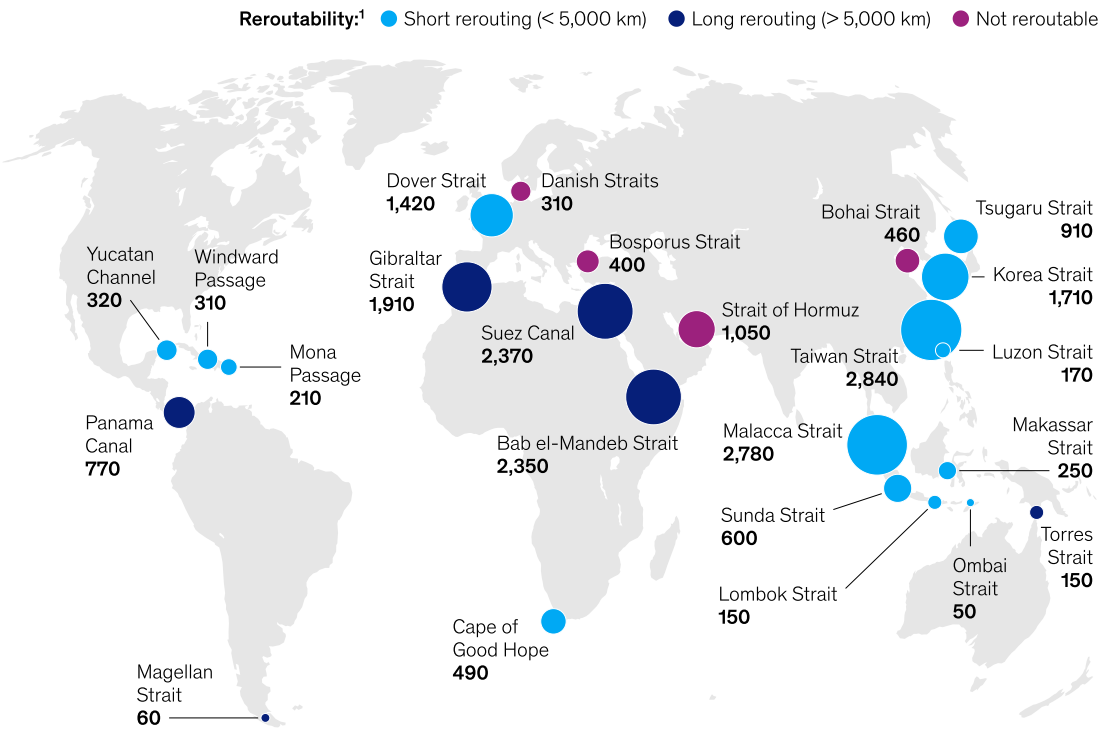
Eighty percent of seaborne trade transits at least one of these passages, but this trade is unevenly distributed across oceans, converging along optimal routes determined by where distances are shortest and historical patterns of commerce have concentrated infrastructure. As a result, a handful of straits and canals handle volumes far beyond their geographic footprint, and many major shipping lanes pass through several chokepoints in sequence (Exhibit 8).

Four of these chokepoints—the Strait of Hormuz as well as the Bosporus Strait, the Bohai Strait, and the Danish Straits—have no viable seaborne alternative.[11] Each carries a distinct sectoral signature. Additionally, an economy's exposure is driven as much by its partners' geography as by its own; for example, though South Korea sits in open water, it still sees higher-than-average exposure.[12]

Exhibit 8

Around 80 percent of all seaborne trade transits maritime chokepoints.

Global maritime chokepoints and trade values, 2024, $ billion



Note: The list of maritime chokepoints is based on IMF PortWatch, with the exclusion of Kerch, Bering, Balabac, and Mindoro straits due to their smaller volumes. Danish Straits is an accepted naming convention used by the UN General Assembly and refers to the entire gateway of chokepoints between the Baltic and North seas, including Oresund. UN Comtrade total trade (mode-agnostic) values are overlaid with World Trade Service data on the seaborne share by sector to yield by-sector seaborne trade values. Routing logic is then applied to determine the ports involved in each trade flow and consequently which chokepoint is relevant for which flows and values.

[1] The classification of the feasibility of rerouting through alternative maritime routes is based on Verschuur et al., "Systemic impacts of disruptions at maritime chokepoints" (2025).

Source: Container Trades Statistics; IMF PortWatch; S&P Global Trade Analytics Suite; UN Comtrade; Verschuur et al., "Ports' criticality in international trade and global supply-chains" (2022); McKinsey Global Institute analysis

McKinsey & Company

The long way home is not always an option

Chokepoint disruption generates two main types of economic damage. The first is immediate, lost route capacity showing up as delays, rerouting costs, higher freight and insurance premiums, or outright trade interruptions. The second follows as those disruptions propagate through supply chains and commodity markets, reaching producers and consumers far from the chokepoint itself. For example, the closure of Hormuz led to the price of urea jumping by as much as 80 percent in 2026, disproportionately affecting sub-Saharan African countries and major agricultural economies like Bangladesh, India, Indonesia, and Thailand.[13] What determines the severity of both is largely a function of whether disruption can be rerouted, and at what cost.

Of the 24 passages we study, 14 are readily reroutable (as shown on Exhibit 8) and include the Korea Strait, Malacca Strait, and Dover Strait. Even at this tier, rerouting still incurs costs and delays, and a single geopolitical event may disrupt multiple straits that would have otherwise been the other's alternative route.

An additional six passages require longer, more costly diversions. The 2021 Suez blockage, for example, held up an estimated $10 billion in trade per day, and Red Sea/Bab el-Mandeb disruptions since late 2023 forced widespread rerouting—adding roughly two weeks to many Asia–Europe lanes.[14] The 2023–24 El Niño drought cut Panama Canal daily transits by roughly one-third and led to the Panama Canal Authority initially projecting a $600 million to $800 million decline in revenue.[15] This event also underscored that chokepoint disruption is not limited to conflict or geopolitical upheaval—it could also be due to other causes such as environmental and major climate events.

The most severe exposure belongs to the four passages that have no viable maritime alternative at all: the Strait of Hormuz, the Bosporus Strait, the Bohai Strait, and the Danish Straits.[16] If one of these is pinched, both the first-order shock and its downstream ripples are felt more keenly, with little to no routing workaround to absorb them.

The impact can also depend on what flows through each chokepoint, and each has a unique fingerprint. Hormuz and Bosporus are energy-heavy, while Bohai is concentrated in metals and minerals, requiring different resilience responses (Exhibit 9).

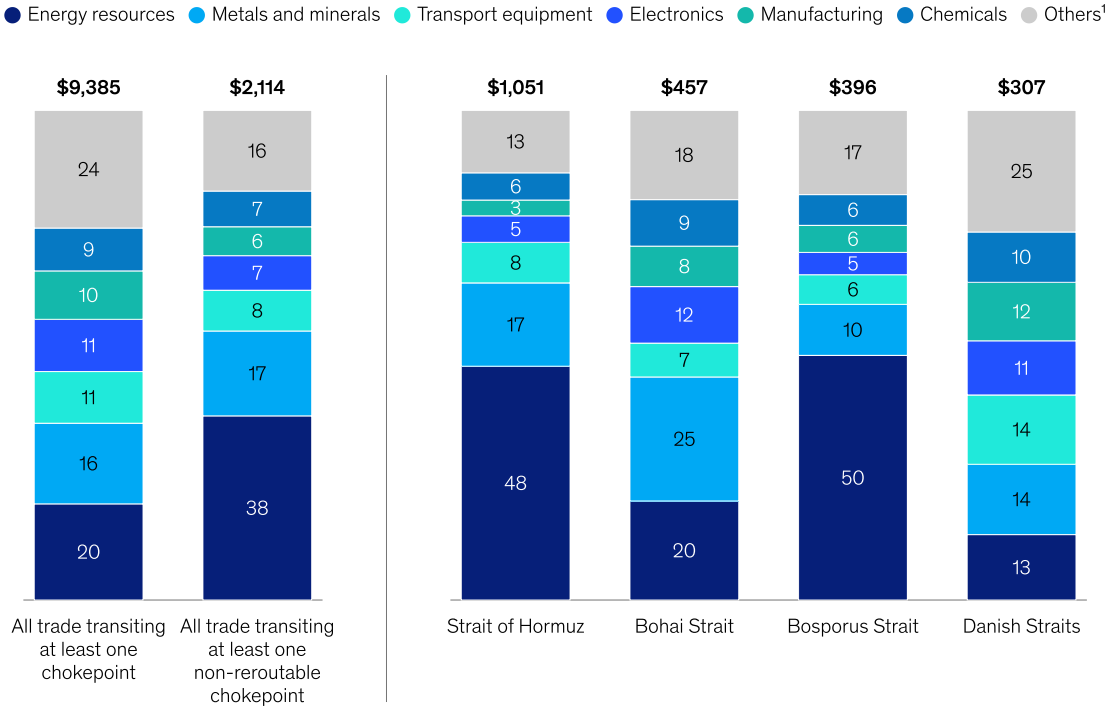
The 2026 Hormuz disruptions illustrate what this looks like in practice. Conflict-driven closures brought ship transits down by as much as 95 percent from pre-conflict baselines—a significant shock for a strait that carries roughly 20 percent of global oil trade, and a similar share of liquefied natural gas.[17] With no viable seaborne alternative, the only workaround was overland: existing pipeline bypass capacity. But this could address a small fraction of normal Hormuz flows; additional measures underway or in discussion could potentially offset 35 to 70 percent by 2030.[18] Pipelines, however, can carry their own risks—both as physical infrastructure vulnerable to disruption and as capital investments that could themselves become stranded if maritime trade through the strait eventually resumes.

Chokepoint disruption is not limited to conflict or geopolitical upheaval—it could also be due to other causes such as environmental and major climate events.

Exhibit 9

Non-reroutable chokepoints in aggregate have high energy exposure, but each chokepoint profile is unique.

Sector breakdown for each non-reroutable maritime chokepoint, 2024, $ billion and %



Note: The classification of the feasibility of rerouting through alternative maritime routes is based on Verschuur et al., "Systemic impacts of disruptions at maritime chokepoints" (2025). Total values for "All trade transiting at least one chokepoint" and "All trade transiting at least one non-reroutable chokepoint" are de-duplicated (trade flows transiting multiple chokepoints are not double counted) and will therefore not match, eg, the sum of individual values attributed to each chokepoint in Exhibit 8.
[1] Others include sectors such as agriculture, food and beverages, textiles, wood and paper, and rubber and plastics.
Source: Container Trades Statistics; IMF PortWatch; S&P Global Trade Analytics Suite; UN Comtrade; Verschuur et al., "Ports' criticality in international trade and global supply-chains" (2022); McKinsey Global Institute analysis

McKinsey & Company

Two maps matter: Yours and your partner's

An economy does not need to sit behind a chokepoint to depend on one. Exposure reflects both the routes into an economy and the routes out of its suppliers. This explains why South Korea, for example, has relatively easy navigation lanes into its own ports and yet sees relatively higher exposure to non-reroutable passages. In this case, it is the export geography of its partners, not its own bottlenecks, which drives exposure (Exhibit 10). Based on this dynamic, we find three main takeaways.

— *Geography can create unavoidable exposure.* Some of the most exposed economies are in the Middle East and Eastern Europe, where trade must pass through non-reroutable chokepoints. The United Arab Emirates, for example, has 78 percent of its seaborne imports exposed, while Ukraine is at 84 percent. Eastern Europe faces two layers of exposure, with significant trade volumes transiting both the Danish and Bosporus straits.

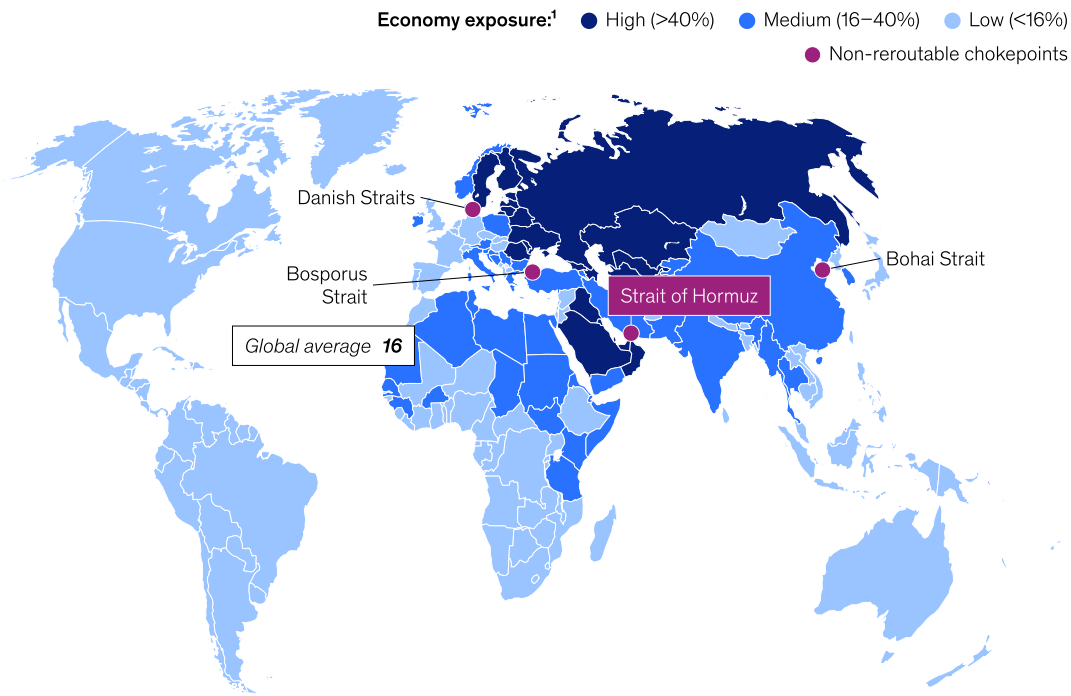
— *Geography can also provide a natural buffer.* At the other end of the spectrum, only 4 percent of US seaborne imports transit externally administered, non-reroutable chokepoints, reflecting the United States' geographic position and domestic energy production. For such countries with lower-than-average exposure to these chokepoints, supply chain vulnerability tends to be concentrated in product risk rather than routing risk. That said, even this group is not immune to them once they are disrupted. Asian countries, for example, have been heavily impacted by the Strait of Hormuz disruption and experienced fuel price hikes, work-from-home mandates, and declarations of national emergencies.[19]

— *Trading partners can transmit chokepoint exposure across borders.* An economy does not need to be located near a non-reroutable passage to depend on one. India, for example, relies heavily on Persian Gulf economies for energy resources through its suppliers.

Exhibit 10

Chokepoint exposure depends on an economy's own geography and that of its trade partners.

Import exposure to external, non-reroutable chokepoints, by economy, % of maritime imports



Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by McKinsey & Company.
[1] The thresholds reflect the global weighted-average exposure to external, non-reroutable chokepoints of 16 percent, with a higher threshold of 40 percent capturing economies geographically constrained by a non-reroutable strait outside their control.
Source: Container Trades Statistics; IMF PortWatch; S&P Global Trade Analytics Suite; UN Comtrade; Verschuur et al., "Ports' criticality in international trade and global supply-chains" (2022); McKinsey Global Institute analysis

McKinsey & Company

The origins of chokepoint exposure can also shape how to mitigate it. When exposure is inherited through trading partners, economies may have room to diversify suppliers or work with partners to develop alternative routes. Japan, for example, has sought to diversify energy sourcing away from the Gulf and explore routes that bypass the Strait of Hormuz.[20] When exposure is dictated by an economy's own geography, options are more constrained.

Chokepoints can amplify Achilles' heels—and create vulnerabilities of their own

Chokepoints are not correlated with the baseline trade vulnerabilities explored in the previous chapter but are instead a distinct amplifier of them. Most economies may therefore treat supply chain resilience (addressing the Achilles' heel) and physical routing resilience (addressing chokepoints) as distinct issues.

The United States combines average exposure to overlapping trade vulnerabilities with low exposure to non-reroutable chokepoints, making its Achilles' heel the more prominent source of risk. For economies in similar positions, the resilience agenda is primarily one of supplier diversification and import substitution. Thus, reducing concentration in critical inputs, rather than rerouting trade, becomes the priority.

Certain economies in the Middle East and Asia, such as India, Saudi Arabia, and Thailand, see the reverse: relatively modest exposure to sources of trade vulnerabilities at a product level but high exposure to non-reroutable passages, especially in energy flows, making physical routing a more prominent concern.

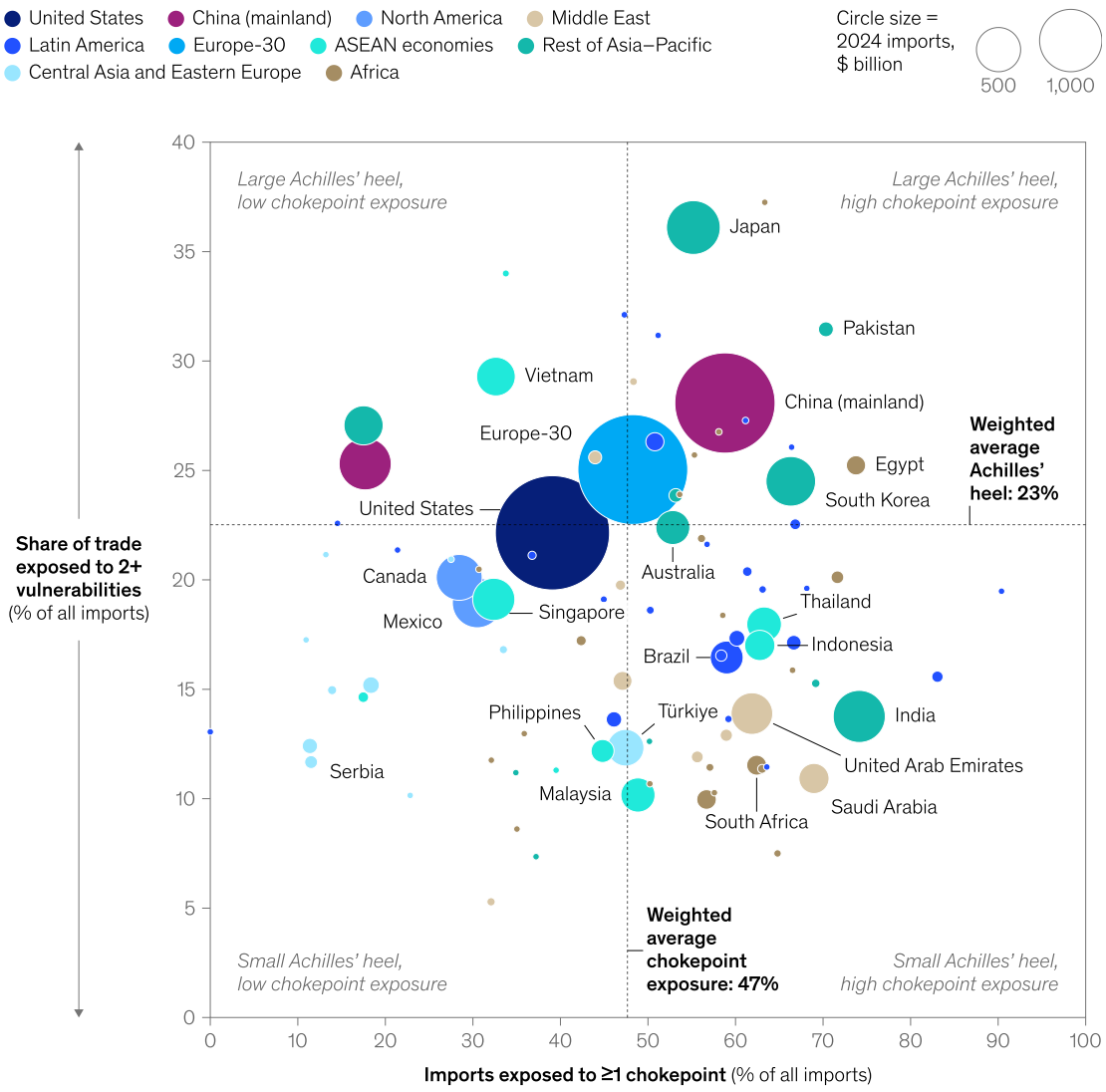
South Korea and Japan confront meaningful exposure on both dimensions, as vulnerabilities in their supply networks are compounded by chokepoints inherited through their trading partners. Certain pharmaceutical products like vaccines, cultures, and insulin-related medicaments, for example, are all Achilles' heels (critical and concentrated) for Japan. Much of these come from Europe, and while air freight tends to be the preferred method of transportation for many pharmaceutical products, any that take maritime routes may necessarily transit the Suez Canal, the Bab el-Mandeb Strait, or both. Canada has lower-than-average exposure on both dimensions (Exhibit 11).

Resilience is ultimately about both what economies depend on and how those goods reach them. Addressing an Achilles' heel does not necessarily secure the route, just as securing the route does not resolve the underlying exposure to trade vulnerabilities (see sidebar "Air transportation"). The next chapter turns from diagnosis to action, examining how different vulnerabilities call for different resilience responses.

Exhibit 11

Achilles' heel and chokepoint risk may be addressed independently.

Share of trade exposed to 2+ vulnerabilities vs chokepoint exposure, 2024, % of all imports



Note: Chokepoint exposure refers to the percentage of that economy's total imports that passes through at least one maritime chokepoint, regardless of reroutability. Achilles' heel refers to imports that are exposed to at least 2 of the 3 trade vulnerabilities: product criticality, supplier concentration, and geopolitical distance of trading partners. Europe-30 includes the 27 member states of the European Union plus Norway, Switzerland, and the United Kingdom, excluding intra-Europe trade.
Source: Container Trades Statistics; IMF PortWatch; S&P Global Trade Analytics Suite; UN Comtrade; Verschuur et al., "Ports' criticality in international trade and global supply-chains" (2022); McKinsey Global Institute analysis

McKinsey & Company

Sidebar

Air transportation

While this chapter focuses on maritime chokepoints, it is also important to note that air travel provides alternative transportation for a subset of globally traded goods, potentially making it especially relevant for the four passages with no other seaborne alternatives.

This is especially the case for lighter-weight, higher-value goods like certain electronics, pharmaceuticals, precision parts, and perishables. Advanced chips travel almost exclusively by air due to their value density and fragility, and cold chain requirements for vaccines meant that COVID-19 vaccines also relied on airplanes for cross-continental distribution.

Air transport also increasingly has chokepoints of its own, though these are less like canals or straits than concentrated air corridors, sovereign airspace, and hub airports, with examples including the Gulf/Middle East corridor, Russian/Siberian airspace, North Atlantic tracks, and East/Southeast Asian airspace around Taiwan and the South China Sea.[1]

The Iran conflict illustrates this dynamic: Closures and restrictions across Middle Eastern airspace disrupted the Gulf bridge between Europe and Asia, impaired hub operations at Dubai, Doha, and Abu Dhabi, and idled nearly one-fifth of global airfreight capacity.[2] Similarly to maritime chokepoints, even where aircraft can reroute, detours require additional fuel and can reduce payload, so capacity falls and costs rise for the high-value goods most likely to rely on air.

[1] Others have studied this topic, including Dabin Xue et al., "Airspace closure challenges: Exploring the impact of the Russia-Ukraine conflict on flight operations and pathways to solutions," *Transportation Research Interdisciplinary Perspectives*, March 2025, Volume 31, Number 2; Mohamed Ben Saed, "Air traffic in context: Geopolitical and technical factors affecting its safety and security," *International Science and Technology Journal*, February 2025, Volume 36; and David Ennen and Florian Wozny, "Airspace closures following the war of aggression in Ukraine: The impact on Europe-Asia airfares," *Transportation Research Procedia*, 2024, Volume 78; "North Atlantic operations and airspace manual," Edition V.2026-1, International Civil Aviation Organization, March 19, 2026; and "The territorialization of airspace in the East and South China Seas," *Asia Policy*, April 2020, Volume 15, Number 2.

[2] David J. Lynch, "War with Iran spreading economic damage far beyond oil and gas markets," *Washington Post*, March 8, 2026.



CHAPTER THREE

How Six R's could spell resilience

There is no single fix for an Achilles' heel. It depends on the product, the capabilities of the economy, and the consequences if supply is disrupted. Some vulnerabilities can be addressed by *rearranging* supply from existing producers or *relocating* to add new sources; others require *ramping* up new capacity, holding *reserves*, *reducing* demand, or *rallying* other partners. We use three questions to diagnose these vulnerabilities and a "Six R's" framework to identify a potential response.

But resilience doesn't stop at the end-product level. Vulnerabilities can sit deep upstream and propagate across value chains, meaning that securing a final product may simply shift the dependency elsewhere.

No single solution—each vulnerability demands a different response

Economies have multiple levers to address trade vulnerabilities, but their effectiveness varies by product. To determine the optimal path, our analysis maps each product's resilience footprint against three guiding questions for each economy.

— *Can alternative supply be secured?* Some products are produced by only a few economies, leaving few viable alternatives. China makes up roughly 65 to 75 percent of the global exports of smartphones, laptops, and permanent magnets. Conversely, while the United States sources 72 percent of its refined copper cathode imports from Chile and 15 percent from Canada, the global supply is relatively diversified with alternative suppliers in Japan and Australia. In these cases, economies can rearrange trading partners with available suppliers. We measure this using the concentration of global exports at the product level, as discussed in chapter 1.[21]

There is no single fix for an Achilles' heel. It depends on the product, the capabilities of the economy, and the consequences if supply is disrupted.

— *Can domestic supply be built?* Whether a product can be manufactured domestically depends on factors like infrastructure, ecosystem, and talent. Proximity to the existing manufacturing base eases scaling of certain products. China, for example, leveraged expertise in consumer electronics like lithium-ion batteries to scale electric vehicle battery production. Economies may try to leapfrog into lower-proximity sectors. Developing new, unfamiliar capacities entails high costs, long timelines, and execution risks. For example, South Korea provided patient state capital to its nascent chip industry in the 1980s and 1990s, enabling it to cement its position as a global leader in semiconductors.[22] We measure the fit with existing domestic capabilities based on how closely a product is related to what an economy already produces.[23]

— *How disruptive would a supply interruption be downstream?* Disruptions to inputs that everyone depends on, like industrial chemicals or semiconductors, may cause large shocks across the manufacturing ecosystem. Consequently, building resilience for these critical inputs is often more urgent than for final goods with isolated linkages. We measure this by estimating how much downstream trade relies on each product as an input.[24]

The six levers that could provide a menu for resilience

Economies could draw on six broad resilience levers—the Six R's—to address different types of trade vulnerability: rearrange; relocate; ramp up; reserve; reduce; and rally. The appropriate mix depends on the vulnerability, the product, and the economy.[25]

— *Rearrange:* Economies may diversify supply or reroute to avoid maritime chokepoints by working with existing suppliers. Japan has started diversification efforts to reduce reliance on Middle Eastern producers by securing long-term contracts with the United States, as well as exploring pipeline expansion projects that bypass the Strait of Hormuz.[26]

— *Relocate:* Companies may create new sources of supply, often requiring investment in new capacity. Apple has expanded its manufacturing footprint toward India and Vietnam as part of a broader diversification of its production base away from China.[27]

— *Ramp up:* This involves expanding domestic production. The United States has supported its semiconductor manufacturing through state investment, tax incentives, and R&D support.[28]

— *Reserve:* Strategic inventories can act as short-term shock absorbers. The United States maintains the Strategic Petroleum Reserve, while Japan, through the Japan Organization for Metals and Energy Security, stockpiles critical minerals, including rare metals.[29]

— *Reduce:* This addresses sudden supply shocks. In the short term, demand can be curbed through measures like rationing or remote work to limit energy consumption. Long-term demand may be reduced by substituting materials, redesigning products to use less of these imports, or adopting alternative technologies to decrease usage, such as deploying low-emissions technologies to lessen reliance on crude oil and petroleum imports.[30]

— *Rally:* This involves collaborating with allies to overcome vulnerabilities that can't be solved alone. For example, the Minerals Security Partnership brings together 14 countries and the European Union to develop more diverse and sustainable supply chains for critical energy minerals through coordination of governments, financial institutions, and the private sector.[31]

The optimal mix varies product by product

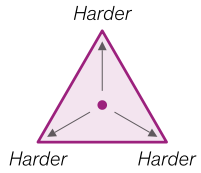
Each economy-product pair has a distinct resilience map, reflecting its vulnerabilities and manufacturing base (Exhibit 12). The appropriate mix depends on economic scale and capabilities, with larger and more advanced economies generally having greater scope to build domestic capacity while smaller economies typically rely more on international diversification and partnerships.[32]

Putting it all together, each economy–product pair calls for a different mix of resilience levers. Some vulnerabilities can be addressed relatively quickly by rearranging supply among existing suppliers

Exhibit 12

Resilience requires product- and economy-specific strategies.

ILLUSTRATIVE EXAMPLE **US smartphones resilience map,** total imports: $52 billion, 2024; each indicator shown as a percentile rank from 0 to 100 across all traded products



Read outward. Each corner runs from 0 to 100, with 100 leaning toward "no" on each of the three questions—fewer alternative suppliers, a wider capability gap, greater downstream impact.

Some levers move in opposite directions:

Rearrange vs Rally: Trade cannot be rearranged when alternative suppliers are scarce, but economies can rally others to develop new supply.

Ramp up vs Relocate: A wide capability gap makes ramping up difficult, favoring relocation. Where ramping up is feasible, relocation can still offer a more competitive option.

High Low

Materiality of levers. Shading indicates whether implementation feasibility or importance is high or low, based on the assessed variables.



[1] Supplier scarcity (global concentration in the methodology): Herfindahl-Hirschman Index of global exporter shares, converted to a percentile rank. A higher percentile means supply is held by fewer exporters.
[2] Capability gap (capability adjacency in the methodology): based on Harvard Growth Lab's Distance indicator, converted to a percentile rank. A higher percentile means the product sits further from the capabilities the economy already has.
[3] Ripple effect (trade adjacency impact in the methodology): trade value of downstream products that use the focal product as an input, converted to a percentile rank. A higher percentile means a disruption cascades further downstream.
Source: UN Comtrade; AI-Generated Production Network; Growth Lab at Harvard University, "The Atlas of Economic Complexity"; McKinsey Global Institute analysis

McKinsey & Company

or drawing on reserves, while relocating production or ramping up domestic capacity can take years. Where vulnerabilities are harder to resolve, reducing demand or rallying partners may also be needed. Resilience strategies therefore often require a portfolio of these Six R's, combining near-term buffers with longer-term changes to supply, capacity, and demand.

Resilience requires looking beyond individual products

Resilience cannot be assessed at the final product stage alone. A shift in final assembly may reduce one dependency while leaving vulnerabilities embedded several layers upstream. Mapping the full value chain can reveal where criticality, supplier concentration, and geopolitical distance persist beneath the final product to determine a suitable portfolio of "Six R's" for each product supply chain.

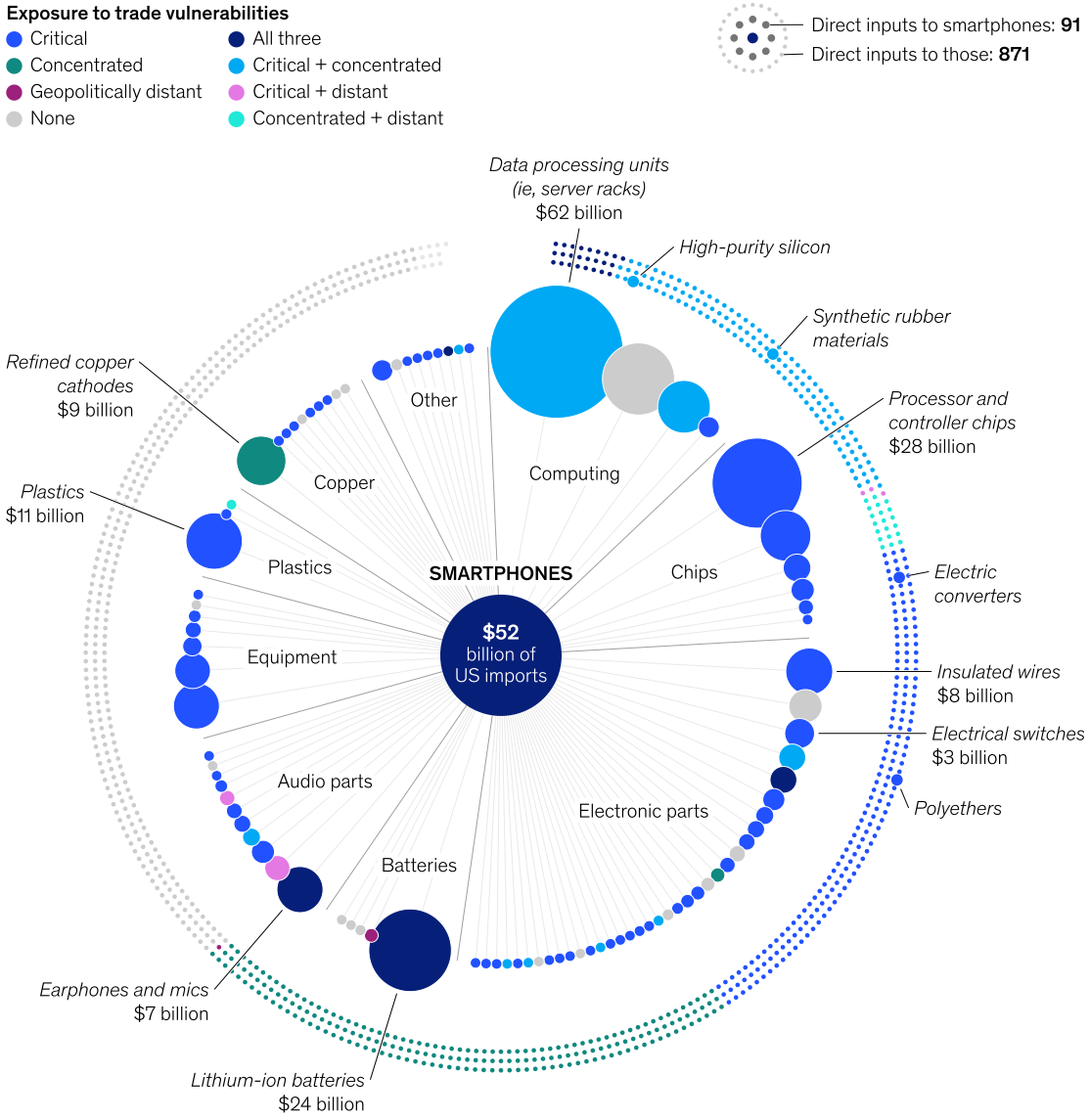
Identifying vulnerable nodes is the first step. For smartphones, 38 percent of their tier-one and tier-two upstream inputs are exposed to two or more sources of trade vulnerabilities, including lithium-ion batteries, rare earths, and processor and controller chips (Exhibit 13).[33]

Resilience strategies therefore often require a portfolio of these Six R's, combining near-term buffers with longer-term changes to supply, capacity, and demand.

Exhibit 13

Resilience requires a whole of supply-chain view—smartphones are vulnerable, but so are their components.

US smartphone case study, imports by product, 2024, $ billion



Note: Values are total US imports of each product across all end uses, not the share consumed by smartphones. Tier-1 inputs are directly linked to smartphone production in the production network, while tier-2 inputs are linked indirectly through tier-1 inputs. Tier-2 products are shown as a count, not by value, which the source does not record for them; 11 of the 871 are not classified by dependency and are shown in the lightest gray. The outer band is ordered by dependency rather than grouped by product family, because 479 of the 871 tier-2 products feed more than one family.
Source: AI-Generated Production Network; UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

Applying these considerations at the product level, coupled with product-specific analysis maps, points to very different combinations of resilience levers even within the same value chain.

Smartphones illustrate this challenge. Although rewiring downstream assembly from China to India may lower exposure of the United States to geopolitically distant trade, this does not necessarily protect the value chain. Advanced chips—where global supply is concentrated, domestic capacity is difficult to build, and disruption can propagate widely—warrant a broader mix of interventions, including ramping up, reserving, and reducing (Exhibit 14). Permanent magnets exhibit a similar resilience map, hence calling for a comparable portfolio of interventions to advanced chips.

On the other hand, while high-purity silicon also carries significant downstream impact, global supply is relatively diversified, with the United States among the top three global suppliers. This gives the United States greater flexibility to rearrange trade toward alternative suppliers, while also drawing on its own domestic production.

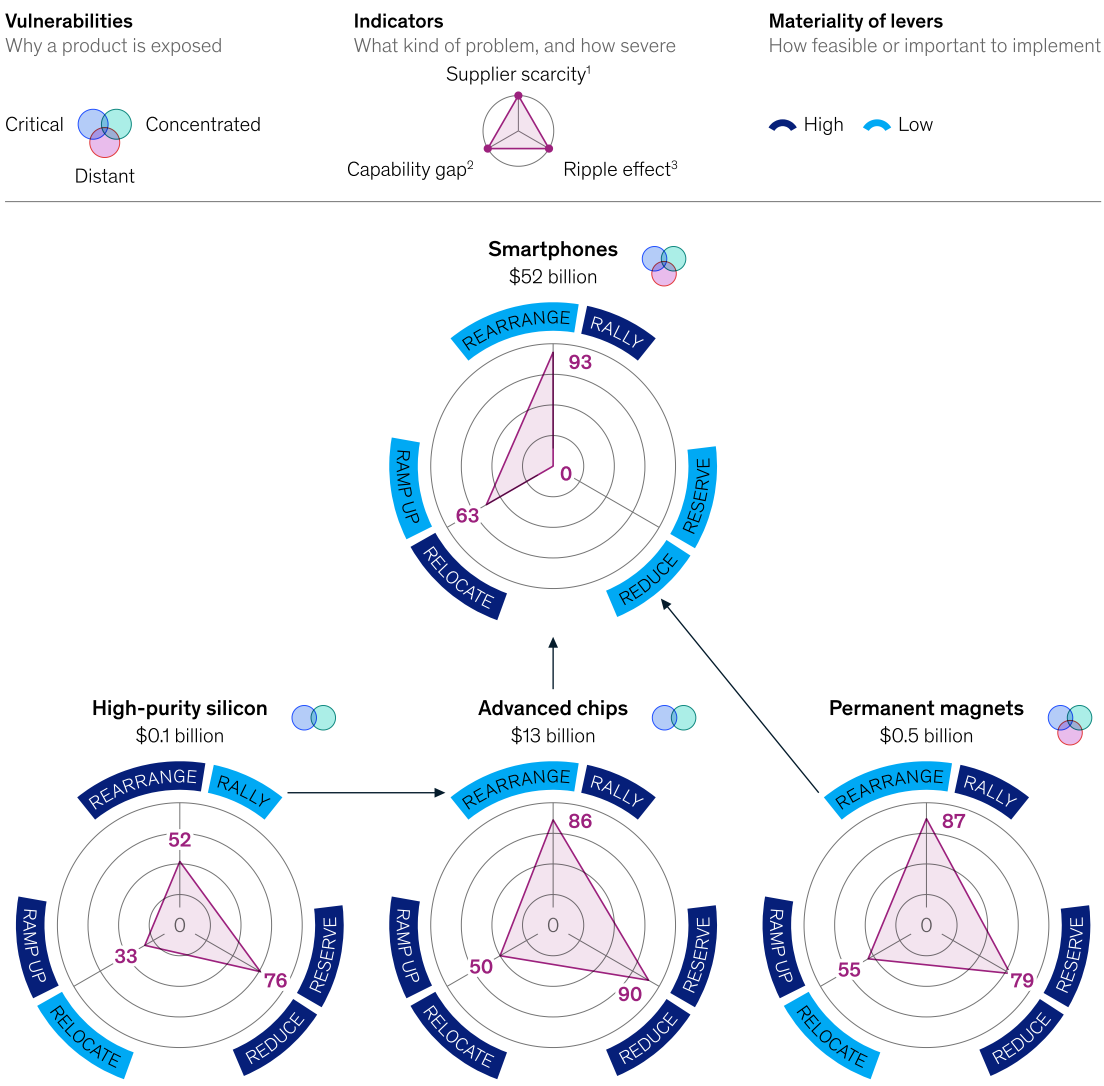
There is no universal recipe for resilience. The right mix of Six R's depends on the product, the economy, and where vulnerabilities sit across the value chain. The next step is for businesses and policymakers to turn that diagnosis into action.

Exhibit 14

Each economy-product combination has tailored resilience levers.

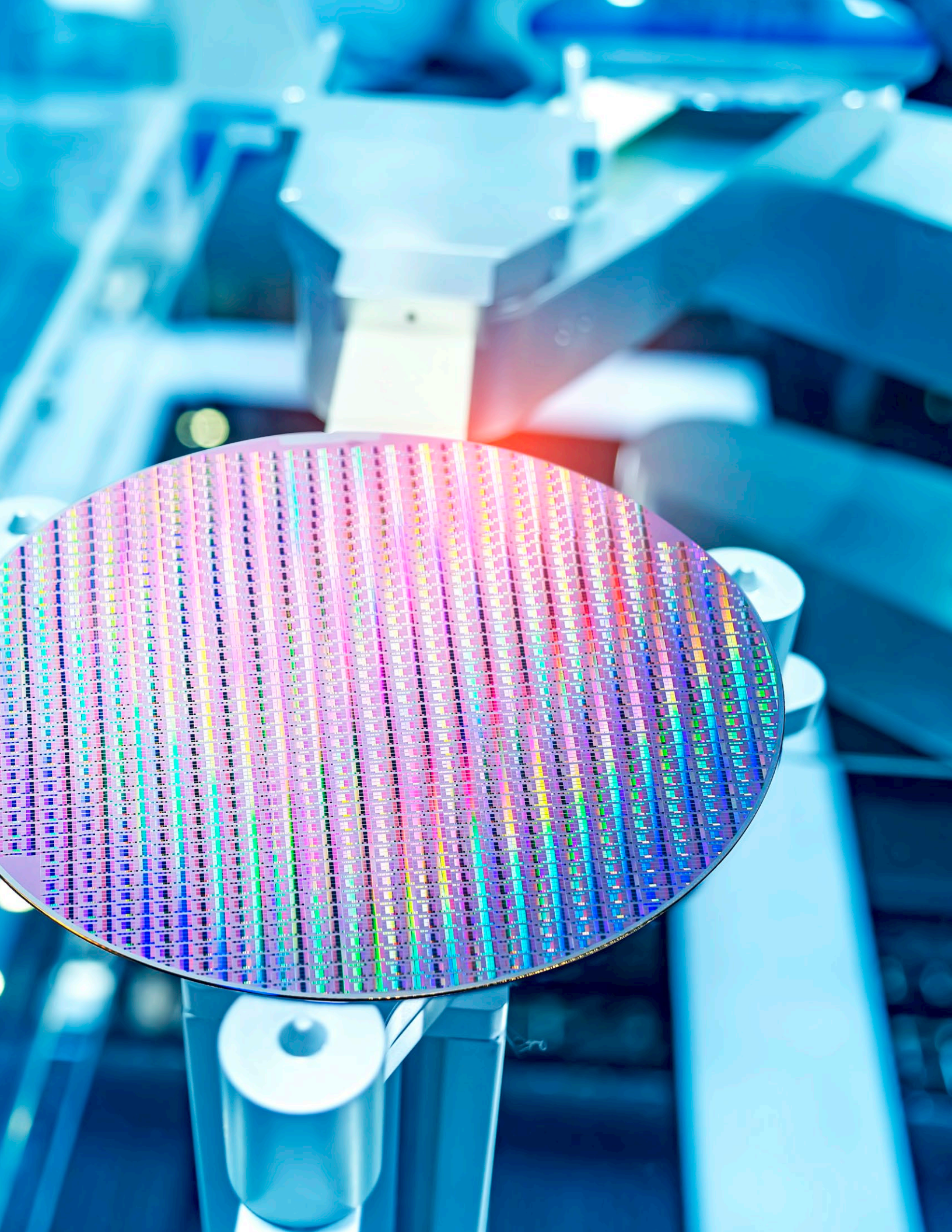
ILLUSTRATIVE EXAMPLE

Select US imports resilience map, 2024, $ billion; each indicator shown as a percentile rank from 0 to 100 across all traded products



[1] Supplier scarcity (global concentration in the methodology): Herfindahl-Hirschman Index of global exporter shares, converted to a percentile rank. A higher percentile means supply is held by fewer exporters.
[2] Capability gap (capability adjacency in the methodology): based on Harvard Growth Lab's Distance indicator, converted to a percentile rank. A higher percentile means the product sits further from the capabilities the economy already has.
[3] Ripple effect (trade adjacency impact in the methodology): trade value of downstream products that use the focal product as an input, converted to a percentile rank. A higher percentile means a disruption cascades further downstream.
Source: AI-Generated Production Network; Growth Lab at Harvard University, "The Atlas of Economic Complexity"; UN Comtrade; McKinsey Global Institute analysis

McKinsey & Company



CHAPTER FOUR

Acting on the Achilles' heel: Agenda for decision-makers

Resilience does not mean eliminating points of vulnerability or pursuing self-sufficiency.[34] Dependencies are inherent in an interconnected global economy, and global connections often bring significant economic benefits. The challenge is to distinguish those that create material vulnerabilities and respond in ways that preserve the benefits of global integration.

This would require action from both businesses and policymakers. Businesses can translate vulnerabilities into sourcing, production, investment, and operating decisions. Policymakers can create conditions for businesses to act, intervene where markets fall short, and work with partners where vulnerabilities cannot be addressed alone.

Businesses can translate vulnerabilities into targeted action

Translating vulnerabilities into action requires an understanding of how risk plays out in practice. The same product may carry different risks depending on where it is sourced and produced, what markets it serves, and which physical routes connect them. Mapping these exposures at a granular level could help companies translate economy-level vulnerabilities into targeted sourcing, inventory, production, investment, and product decisions. Of course, not every exposure requires the same degree of intervention. Our analysis helps frame the potential losses associated with potential disruptions to trade against the costs of investing in various resilience measures. Decision-makers can assess plausible disruption scenarios, their likelihood, and potential economic impact, alongside the costs and effectiveness of alternative responses.

Look beyond your sector to find hidden vulnerabilities

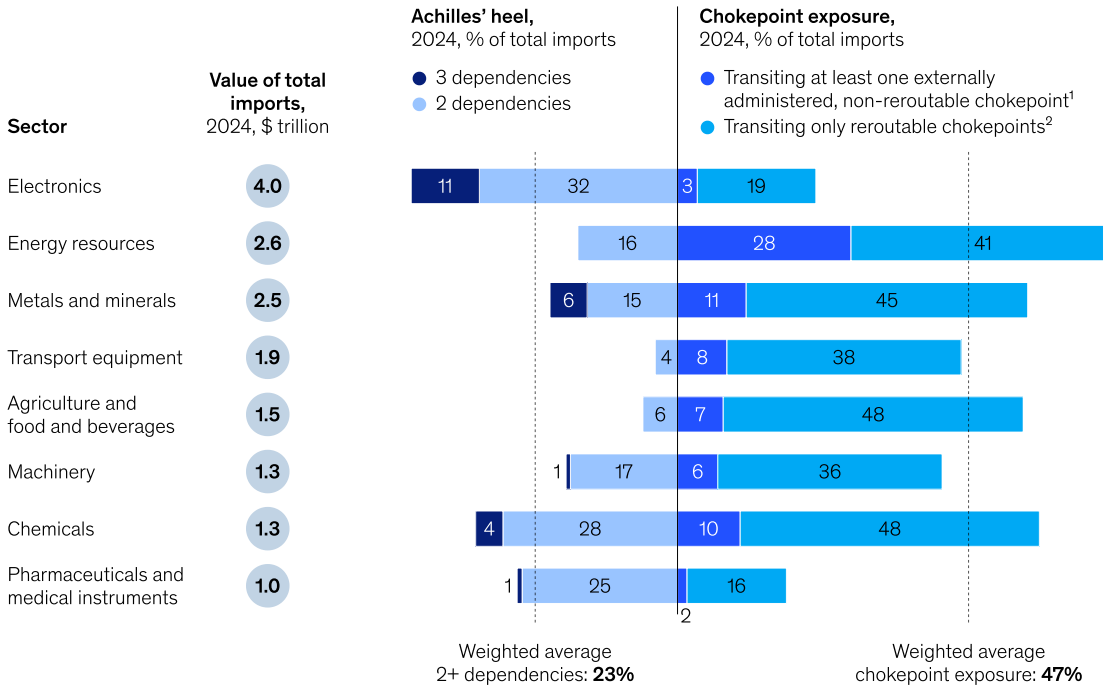
No business is an island. Companies depend on inputs from across sectors, meaning vulnerabilities in one can quickly create risks in others. Yet those vulnerabilities vary sharply across sectors. Electronics carries the largest Achilles' heel, with 43 percent of imports facing two or more trade vulnerabilities, while commodities are more exposed to physical chokepoints. Nearly 30 percent of energy imports and 11 percent of metals and minerals rely on maritime routes that cannot be easily rerouted (Exhibit 15).

These differences matter because sectors are deeply interconnected. Electronics, for example, are deeply embedded in machinery, automotive, and energy infrastructure, meaning disruption to the supply of concentrated semiconductors or components can propagate well beyond the sector itself.[35] Conversely, electronics production depends on energy, metals and minerals, and chemicals—sectors with very different exposure to chokepoints. Blockades in one place may cascade rapidly across other industries, as demonstrated in the recent Strait of Hormuz disruption, which saw knock-on effects extending to fertilizers and agriculture.[36]

For businesses, this means looking beyond their own sector and direct suppliers. They could map crucial dependencies further upstream, identify where those dependencies overlap with trade or chokepoint vulnerabilities, and monitor emerging disruptions that could affect them. This broader

Exhibit 15

Sector exposure to trade dependencies and chokepoints can diverge.



Note: Chokepoint exposure refers to the percentage of that economy's total imports that passes through at least one maritime chokepoint, regardless of reroutability. Dependencies refer to the following: product criticality, supplier concentration, and geopolitical distance of trading partners.
[1] Any non-reroutable chokepoint that is not domestically administered, eg, Bohai Strait for China, Danish Straits for Europe-30.
[2] Includes domestically administered non-reroutable chokepoints where relevant.
Source: Container Trades Statistics; IMF PortWatch; S&P Global Trade Analytics Suite; UN Comtrade; Verschuur et al., "Ports' criticality in international trade and global supply-chains" (2022); World Trade Service; McKinsey Global Institute analysis

McKinsey & Company

view can help inform sourcing, inventory, production, and investment decisions before vulnerabilities turn into operational disruptions.

Tailor the Six R's to your global footprint

Companies inherit vulnerabilities from the sectors they depend on. But their actual exposure more likely depends on their specific operating footprint—what they source, where they produce, which markets they serve, and the physical routes connecting them.[37] By mapping these footprint components, companies can expose hidden risks and target mitigation actions.

Illustrative example: Automotive manufacturing

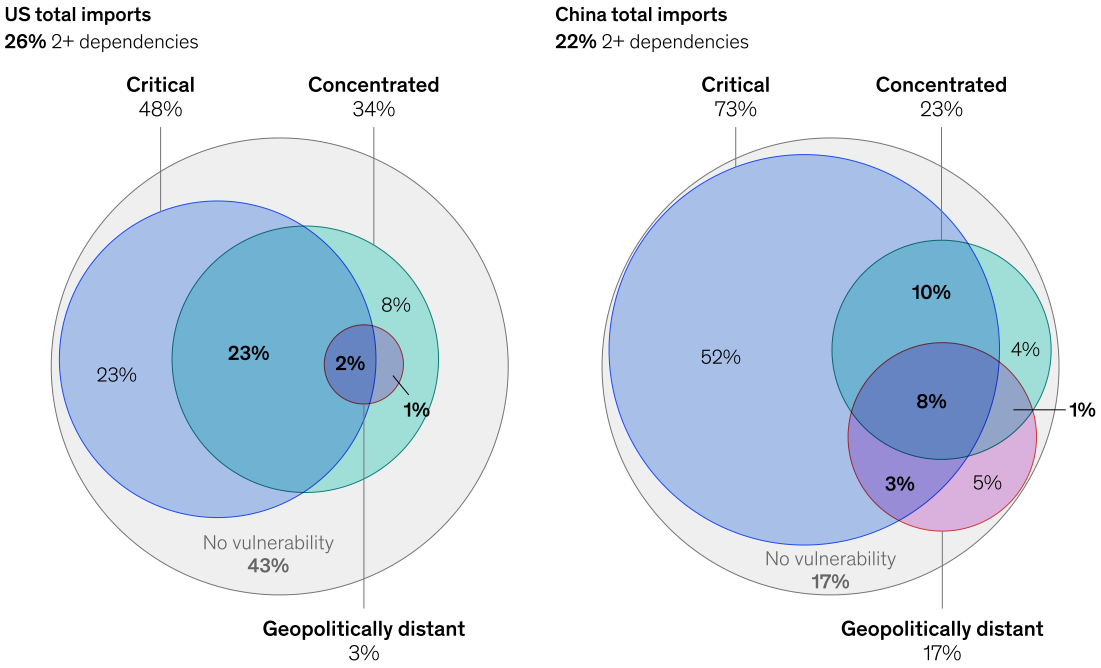
We illustrate this journey through a hypothetical automotive original equipment manufacturer with production facilities in Detroit and Shanghai. It serves markets across North America, Europe, the Middle East, ASEAN economies, and China. The analysis focuses on gas-powered passenger vehicles, whose production requires multitiered networks of power trains, electronics, metals, and structural body assemblies. Despite producing the same vehicle, the two hubs inherit very different vulnerabilities from their locations and trading relationships (Exhibit 16).

Exhibit 16

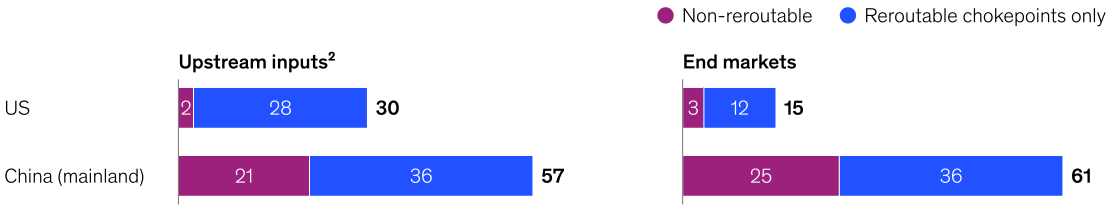
Businesses can map out whether their inputs sit in the Achilles' heel of economies where they are based.

Hypothetical case study: Automotive manufacturer with production hubs in US and China (mainland)

GAS-POWERED VEHICLES' SUPPLY CHAIN EXPOSURE TO ACHILLES' HEEL, %



GAS-POWERED VEHICLES' SUPPLY CHAIN EXPOSURE TO CHOKEPOINTS,[1] %



[1] The classification of the feasibility of rerouting through alternative maritime routes is based on Verschuur et al., "Systemic impacts of disruptions at maritime chokepoints" (2025), based on illustrative end markets across North America, Europe, the Middle East, ASEAN economies, and China (mainland).
[2] Exposure of upstream inputs to chokepoints is calculated by weighting gas-powered vehicle inputs by trade value at a sector level, multiplying each sector by its exposure to each type of chokepoint, then summing up the resulting percentages.
Source: AI-Generated Production Network; Growth Lab at Harvard University, "The Atlas of Economic Complexity"; UN Comtrade; US Draft List of Critical Supply Chains (2022); Verschuur et al.; McKinsey Global Institute analysis

McKinsey & Company

For the hypothetical Detroit facility, 26 percent of the upstream supply chain faces exposure to two or more trade vulnerabilities, including key inputs such as aluminum, copper, and rubber.[38] Upstream inputs include both those directly linked to production at the facility (tier one) and those linked indirectly through these direct inputs (tier two). In contrast, the Shanghai facility experiences lower exposure with 22 percent of its upstream supply chain facing overlapping vulnerabilities. Both facilities would require different resilience strategies depending on their location and exposure to import vulnerabilities, even though they make the same product.

From a physical chokepoint perspective, the United States is less exposed for its upstream imports as well as export markets than China in this hypothetical example. While exports from the US facility to Europe remain exposed to transatlantic passages such as the Danish Straits, Strait of Gibraltar, and Dover Strait, the Detroit hub can reach North American markets via secure overland routes. Cities like Shanghai are far more exposed, relying on maritime nodes like the Strait of Malacca and the Suez Canal to serve export markets in ASEAN economies, the Middle East, and Europe.

But companies are not limited to their existing footprints. They can shift production to locations that strengthen resilience while remaining competitive, weighing factors such as operating costs, supplier ecosystems, and access to end markets. But shifting manufacturing footprints requires balancing resilience with competitiveness. MGI research finds that levelized costs can vary substantially across locations, with the highest-cost locations in selected industries costing 40 to 260 percent more than the lowest-cost locations.[39] Companies can therefore assess where greater resilience justifies a potential cost premium—and where supplier ecosystems, market access, or industrial-policy support can narrow the gap enough to make an alternative location competitive. But today's cost gaps need not be fixed. Companies can also change the cost equation itself: Investments in automation and physical AI could reduce labor and operating-cost disadvantages, potentially making resilient locations that were previously uneconomic more competitive.

These localized footprints can translate into a different "Six R's" resilience portfolio. For example, while copper wires are concentrated for both hubs, both Detroit and Shanghai can mitigate this by shifting to globally available suppliers, building inventory buffers, and reducing material reliance.

Institutionalize geopolitical and supply chain intelligence

Companies could benefit from institutionalizing the capabilities to identify vulnerabilities early and respond quickly. Yet geopolitical preparedness is limited: Only 15 percent of surveyed executives have dedicated intelligence units, while less than one-third view their risk management capabilities as mature.[40] Closing this gap likely requires both greater visibility and the ability to act on it: mapping dependencies beyond direct suppliers (tier one) to suppliers further upstream in the value chain (tiers two and three); monitoring real-time disruptions through digital control towers that can provide a bird's-eye view across supply chain planning; and embedding agile scenario planning and operations to reallocate supply as needed.[41] For example, DHL established a proprietary DHL Globalization Tracker which functions as an early-warning system and maps potential exposures for the company, continuously monitoring shifting trade policies and broader global developments.[42]

Similarly, Walmart has strengthened its supply chain agility by scaling AI and automation across its global operations. Its systems predict demand, reroute inventory, and optimize fulfillment. Beyond its internal operations, Walmart has developed Scintilla, an insights platform that provides suppliers with actionable data and AI-powered insights to support more effective coordination and informed decision-making in response to changing market conditions.[43]

Turn resilience gaps into investable opportunities

Resilience is not only a cost to manage. It can also provide upside. Outperformers are more prepared to manage disruptions better than their competitors or use disruption to strengthen their competitive position. They identify new markets, including areas where governments are willing to support new capacity; invest in resilience; and offer customers ways to reduce supply chain risks.

BASF illustrates how resilience can protect against downside during disruptions. Despite Middle East supply disruptions, volumes rose 7 percent year over year in the second quarter of 2026, supported by a diversified production footprint, flexible operations, and trading capabilities that enabled it to secure alternative supplies and continue serving customers.[44]

For businesses, trade vulnerabilities can also signal where future investments may flow. For instance, India has identified roughly $51 billion of strategic imports where it aims to build domestic capacity, providing a signal to private investors on where government priorities could create new manufacturing opportunities.[45] This kind of policy action effectively acts as an opportunity map where companies can identify products adjacent to their existing capabilities, anticipate where new supplier ecosystems may emerge, and use partnerships or industrial-policy support to close competitiveness gaps. Often, companies can work with governments to capture these emerging markets.

Resilience investments can create opportunities across entire ecosystems. Efforts to diversify rare-earth magnet supply, for example, are attracting public and private capital into new capacity, supported by mechanisms ranging from direct investment to long-term offtake and price guarantees. Opportunities extend beyond rare-earth producers themselves to the businesses that finance, build, insure, and connect new capacity. Lynas Rare Earths has expanded its role in the global rare-earth value chain, supported by long-term customer commitments and government-backed initiatives. The company contributes additional processing capacity to a market where supply remains concentrated, helping customers enhance supply chain resilience for applications including automotive, advanced manufacturing, and robotics.[46]

Companies can design geopolitical optionality into their products. Customers' Achilles' heels can create markets for new product designs. For example, suppliers can develop electric-vehicle motors that eliminate heavy rare earths such as dysprosium and terbium for automakers seeking to diversify critical-mineral exposure, while one high-tech company developed different product specifications to serve markets facing different trade restrictions. This optionality can also help companies expand into adjacent markets—for example, some automakers are adapting commercial technologies and products to serve growing defense demand.

Software companies now sell sub-tier supply chain visibility as a commercial service so that corporations can better identify potential concentration risks further up in their own value chains. For example, companies have leveraged AI and supplier-verified data to map these extended networks continuously, alerting clients to financial distress, sanctions exposure, and geopolitical events that propagate up through sub-tiers.

Build coalitions for problems no company can address alone

Structural bottlenecks cannot be solved in isolation. Disruptions may cross borders and require corporate ecosystems designed to collectively mitigate shared risks, integrate complementary industrial capabilities, and navigate complex cross-border jurisdictions.

US hospitals did that through the formation of a nonprofit generic drug company. Seven major hospital systems built collective purchase commitments large enough to ensure sufficient buffer inventories for generic drugs. This had not been possible previously because manufacturers were not incentivized to invest in resilient supply chains for low-margin drugs.[47]

Collaboration is also relevant in R&D, as evidenced by the development of the Interuniversity Microelectronics Centre (IMEC), a research institute co-funded by leading semiconductor players globally. The institute enables industry players to share the high up-front costs and risks of pre-competitive semiconductor research while preserving proprietary development of next-generation semiconductor process technology.[48] To date, IMEC has translated this collaborative model into concrete technological advances, including demonstrating next-generation chipmaking technologies that could help continue the advancement of the semiconductor road map and commercial production of advanced chips.

Policymakers can play an integral role in setting businesses up for success

The starting point for policymakers is a clear view of where their economy's vulnerabilities lie, and which matter most. Not every dependency warrants intervention, and different vulnerabilities call for different responses. With that in mind, policymakers could translate resilience into investment road maps: enabling businesses to act quickly and invest with confidence; intervening selectively where markets fall short; and working with partners in areas where no economy can build resilience alone.

Create an enabling environment for the Six R's to move quickly and flexibly

Putting these responses into practice often depends on conditions outside the control of individual businesses. As governments identify strategic dependencies, they may direct where investment opportunities emerge and support long-term resilience initiatives by streamlining regulation, building infrastructure, cultivating specialized talent, and improving access to finance.

Clear, long-term policy signals can give businesses the confidence to invest, particularly in future-shaping industries where capacity and capabilities take years to build. For companies weighing where to relocate or expand production, industrial policy can help close competitiveness gaps in cost, infrastructure, or capabilities, making otherwise marginal locations viable. Policy uncertainty, in contrast, can weaken the economic case and delay investment precisely when it matters most.

From the EU's Critical Raw Materials Act to the US FAST-41 program, economies seeking to lower dependence on critical minerals have introduced initiatives to streamline multiple, overlapping approval processes that could previously take decades.[49] The United States has extended this approach to coordinate permitting timetables and interagency reviews for qualifying infrastructure projects across energy, semiconductors, and AI.[50]

Intervene strategically and efficiently when markets fall short

Policy interventions would not necessarily benefit all of the $19 trillion in global imports we examined. But targeted state support could be helpful when market forces alone fail to address strategic vulnerabilities. They could be designed as part of broader frameworks that address specific problems and act as a market catalyst within time and budget constraints.

For example, Japan's support for TSMC's first Kumamoto fabrication plant illustrates a state-funded catalytic capital approach that later unlocked more than $20 billion of investment to expand Japan's domestic semiconductor ecosystem.[51] Other tools exist apart from capital. The United States can assign priority ratings to specific orders via the US Defense Priorities and Allocations System to ensure sufficient national supply even if it requires companies to break existing commercial agreements or sacrifice higher-margin private contracts. This mechanism was invoked for ventilator production during the COVID-19 pandemic, and recently for infant formula and semiconductor materials during supply chain shortages.[52]

Build resilience through alliances that no single economy could achieve alone

More than 50 percent of economies see similar products in their Achilles' heel such as smartphones, memory chips, and lithium-ion batteries, a scale far too large to tackle alone. Different models of multilateral collaboration are emerging with the aim of combining scale and capabilities to protect shared economic interests.

For instance, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership pooled the collective scale of 12 nations that represent roughly 16 percent of global imports, creating an independent, multicontinental economic corridor.[53] A sector-specific example includes the ASEAN Framework Agreement on Petroleum Security, which coordinates emergency fuel-sharing during severe supply disruptions.[54]

Even as the immediate pressures on global supply chains ebb and flow, our analysis reveals the surprising flexibility of global trade despite its structural fragilities. True resilience is not about achieving complete self-sufficiency, but about building a more diversified, agile, and collaborative global system. Forging this new era of trade security will likely require strategic alignment from both public and private sectors, and continued collaboration for economies to safeguard their interconnected prosperity.

Technical appendix

US and China case studies

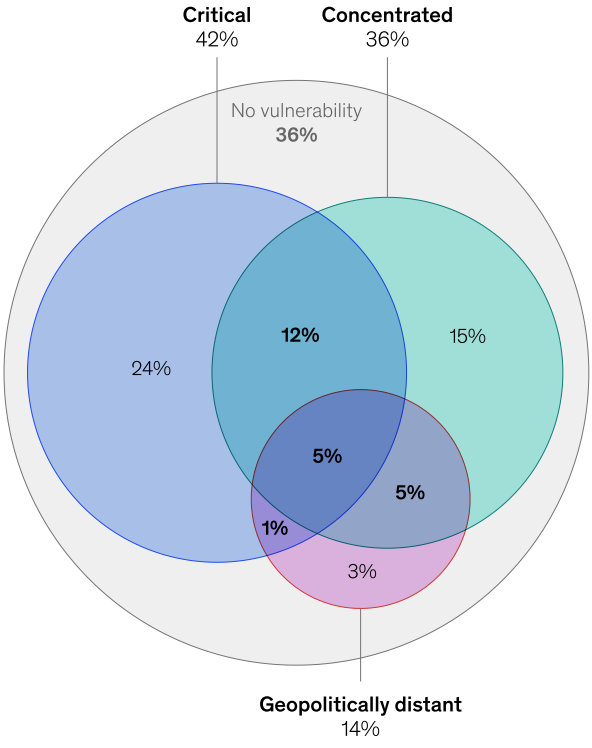
Much of this research has focused on the world's largest individual economies, the United States and China. They make up most of the biggest shares of trade and reflect many of the dependencies affecting trade in both directions.

About one-fifth of US imports face two or more trade vulnerabilities, of which 5 percent faces all three, including permanent magnets, smartphones, and lithium-ion batteries (Exhibit 17).

Exhibit 17

About one-fifth of US imports are exposed to at least 2 trade vulnerabilities, and 5 percent carry all three.

Total imports and exposure to trade vulnerabilities, 2024, % of $3.4 trillion



Selected products

All three

- Smartphones
- Lithium-ion batteries
- Permanent magnets[1]
- Laptops

Critical and concentrated

- Crude oil
- Advanced chips
- Polypeptide and protein hormones, eg, GLP-1

Critical and distant

- Solar photovoltaic modules
- Transmission apparatus

Concentrated and distant

- Toys
- Footwear

Note: Figures may not sum to 100 percent because of rounding. Product vulnerability is based on majority exposure: If more than 50 percent of imports come from geopolitically distant partners, all imports in that product category are classified as distant.
[1] Includes rare-earth permanent magnets.
Source: UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

Electronics dominate, accounting for about 40 percent of its most vulnerable imports. Crucially, vulnerability spans entire value chains; smartphones alone represent over $50 billion, or 7 percent, of exposed imports. Resilience requires securing both upstream inputs and downstream assembly at the same time. Fixing just one node leaves the chain exposed.

For highly vulnerable inputs that require natural endowments such as rare earths and permanent magnets, which are vital for electric vehicles, wind turbines, and defense, the United States is ramping up domestic capacity via the Department of Defense, also known as the Department of War, "mine-to-magnet" initiative by investing in rare-earth mining and processing through to magnet manufacturing. The Department of Energy is supporting domestic rare-earth supply chains, including recovery from mine tailings, e-waste, and other waste materials.[55]

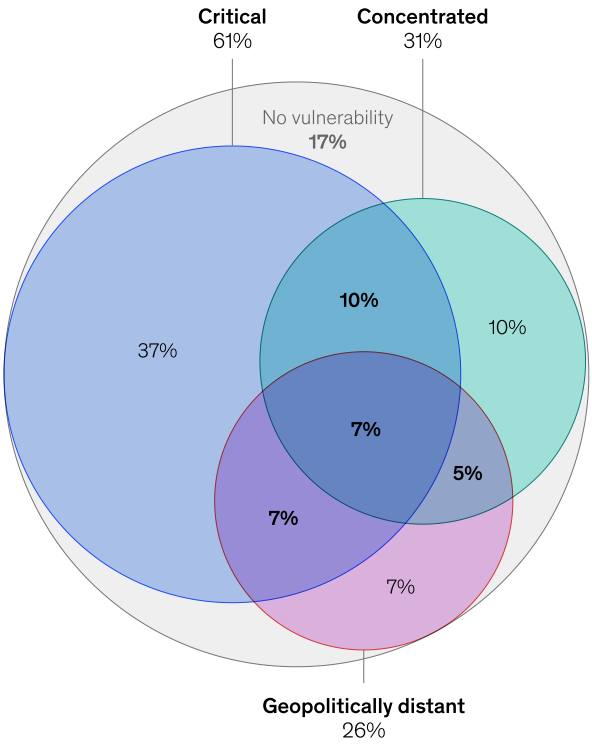
For advanced chips, the CHIPS Act–driven fab expansion depends on securing upstream foundational materials like wafers and high-purity silicon, requiring a balanced mix of domestic scaling and robust international sourcing.[56]

Of China's $2.6 trillion imports in 2024, approximately 30 percent face two or more trade vulnerabilities. At 7 percent, China has a larger exposure to all three vulnerabilities than the United States. China's self-reliance efforts for critical inputs across commodities and electronics face clear structural limits, with many metals and minerals in China's Achilles' heel (Exhibit 18).

Exhibit 18

A 29 percent Achilles' heel puts China among the more trade-vulnerable economies.

Total imports and exposure to trade vulnerabilities, 2024, % of $2.6 trillion



Selected products

All three

- Iron ore
- Vaccines
- Photographic chemicals used in electronics manufacturing

Critical and concentrated

- Integrated memory chips
- Aluminum ores and concentrates

Critical and distant

- Semiconductor manufacturing machines
- Retail medication

Concentrated and distant

- Aircraft
- Aircraft components, eg, engines
- Canola oil

Note: Product vulnerability is determined by majority exposure: If more than 50 percent of imports come from geopolitically distant partners, all imports in that product category are classified as distant.
Source: UN Comtrade; US Draft List of Critical Supply Chains (2022); McKinsey Global Institute analysis

McKinsey & Company

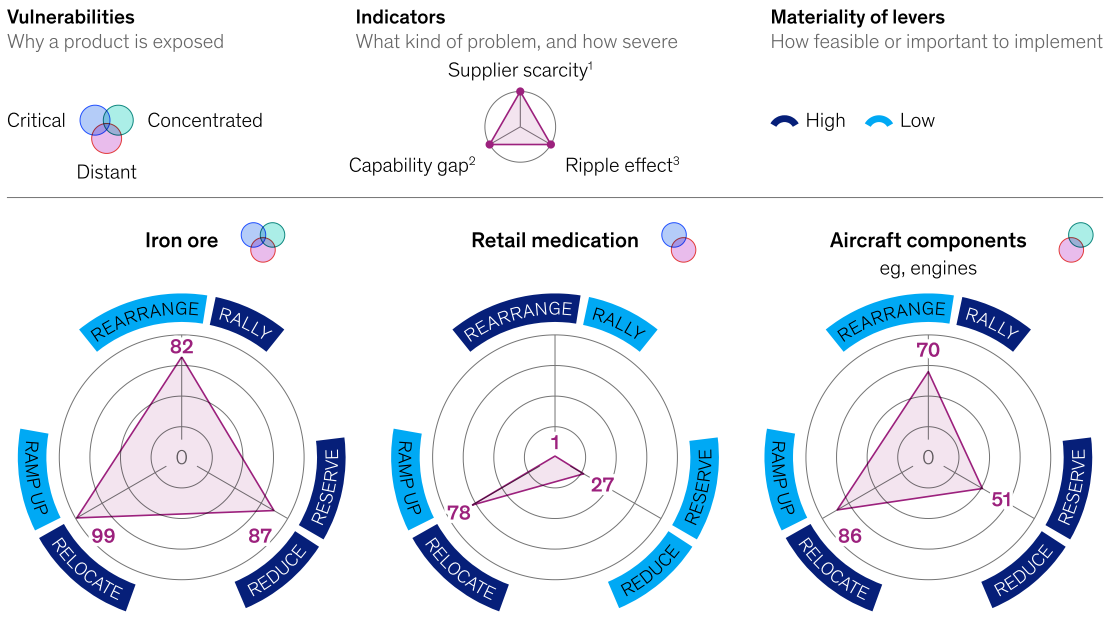
For instance, China's domestic iron ore is generally lower-grade and more costly to process, while global exports are dominated by Australia and Brazil. China is pursuing a diversified resilience strategy, developing alternative overseas resources such as Simandou in Guinea, building inventories, and promoting scrap-based electric-arc-furnace steelmaking.[57]

However, aerospace and semiconductor manufacturing equipment still face significant technology gaps. China imports 59 percent of its aircraft from the United States. Alternative suppliers like France and Germany exist, and China is supporting domestic capabilities through its five-year plan to power the expansion of its local manufacturing and aero-engine development.[58] Similarly, state support for R&D has enabled local champions to gain ground in deposition, chemical mechanical planarization, and etching, narrowing gaps with established international suppliers (Exhibit 19).[59]

Exhibit 19

China requires resource or technology unlocks to ramp up domestic capabilities.

Select China imports resilience map, 2024; each indicator shown as a percentile rank from 0 to 100 across all traded products



[1] Supplier scarcity (global concentration in the methodology): Herfindahl-Hirschman Index of global exporter shares, converted to a percentile rank. A higher percentile means supply is held by fewer exporters.
[2] Capability gap (capability adjacency in the methodology): based on Harvard Growth Lab's Distance indicator, converted to a percentile rank. A higher percentile means the product sits further from the capabilities the economy already has.
[3] Ripple effect (trade adjacency impact in the methodology): trade value of downstream products that use the focal product as an input, converted to a percentile rank. A higher percentile means a disruption cascades further downstream.
Source: AI-Generated Production Network; Growth Lab at Harvard University, "The Atlas of Economic Complexity"; UN Comtrade; McKinsey Global Institute analysis

McKinsey & Company

Our methodology

Our analysis combines measures of trade vulnerabilities, exposure to maritime disruption, and capacity to respond in the most effective way. The framework is designed to provide a consistent lens across products and economies, not to rank vulnerabilities or prescribe specific investments.

Trade vulnerabilities and Achilles' heel

We assess products at the six-digit Harmonized System (HS6) level, providing an internationally comparable classification of roughly 6,000 product categories across the three dimensions.[60]

Criticality identifies products important to essential sectors, based primarily on the US Draft List of Critical Supply Chains (2022), one of the most comprehensive critical-product classifications available at the HS-code level.[61] We acknowledge that criticality is neither universal nor static.[62]

However, this list represents one of the most comprehensive data sets available at the HS code level, covering critical sectors like metals, electronics, and pharmaceuticals, with the United States serving as a highly diverse and robust proxy due to its large and diversified import base.

Concentration measures reliance on a small number of suppliers. Consistent with prior MGI research, we define trade as concentrated where the Herfindahl-Hirschman Index (HHI) exceeds 3,000, typically indicating reliance on three or fewer major suppliers.[63]

Geopolitical distance uses MGI's measure derived from UN General Assembly voting patterns from 2005 to 2022, positioning economies on a 0–10 spectrum of geopolitical alignment.[64]

Maritime chokepoints

Although there is no universally agreed-upon quantitative definition, maritime chokepoints tend to be defined as capacity-constrained through either narrowness or shallowness and have the potential to be disrupted or closed, which would have significant impact on the global economy. We estimate the share of seaborne trade structurally routed through major maritime chokepoints. Bilateral flows are allocated across actual export and import ports and routed along navigable sea paths to identify the chokepoints they cross. The measure therefore captures structural route dependence rather than observed vessel movements or the impact of a specific disruption.[65]

Resilience maps

Three guiding questions inform potential choices among the Six R's of resilience. Alongside concentration, we use Capability Adjacency, based on Harvard Growth Lab's Product Space Distance, as an indicator of how closely production of a product relates to an economy's existing capabilities.[66] Downstream impact, using the AI-Generated Production Network (AIPNET), estimates potential downstream reach by measuring trade in products up to two production steps downstream.[67] These indicators are intended to guide the selection of suitable resilience levers rather than prescribe investments. They should be assessed alongside other indicators including economic feasibility, implementation costs, or production capabilities when making decisions.

Key data sources

The core trade analysis draws on 2024 trade statistics from the UN Comtrade Database, compiled by the United Nations Statistics Division, covering approximately 200 economies and more than 99 percent of global merchandise trade. In this report, Europe-30 economies are treated as a single importing bloc, with intra-Europe-30 trade excluded to avoid counting trade within the bloc as external dependency.

For maritime trade, data from UN Comtrade is combined with that of S&P Global Trade Analytics Suite and Container Trades Statistics to distinguish seaborne trade and cargo type. Port allocation and routing follow the Verschuur et al. port network framework.[68]

Chokepoints are based on IMF PortWatch's list, excluding Kerch, Bering, Balabac, and Mindoro straits because of their limited materiality to global trade volumes.[69] Here, the analysis should be interpreted as where trade is structurally routed through narrow passages given port geography and shortest-path assumptions, rather than as forecasts of disruption impacts or exact vessel traffic.

Other inputs as described above include the US Draft List of Critical Supply Chains for criticality, UN General Assembly voting data for geopolitical distance, Harvard Growth Lab Product Space data for Capability Adjacency, and AIPNET for downstream production linkages.

Limitations

Data granularity, including product and indicator level

Most analysis is conducted at the HS6 level, which supports international comparability but can mask important differences in product specifications, technologies, and end uses. Some complementary indicators, like Capability Adjacency, are available only at the HS4 level.

Bilateral trade data may also obscure ultimate production origin because of transshipment, reexporting, and intermediate processing. Maritime chokepoints are modeled from port allocation and routing, rather than observed shipping routes or forecasts of disruption impacts.

The presence of alternative suppliers indicates potential sourcing optionality but does not mean products are readily substitutable given differences in scale, cost, or specifications. Similarly, the use of downstream impact is a proxy of impact and does not systematically capture other important dimensions including domestic consumption, inventories, spare capacity, and regulatory or labor constraints. Further, using trade as a proxy may not fully reflect products' functional importance to economies. For example, certain chemical inputs could be low in import value but indispensable to economies' supply chains.

Static and simplified scope

While the analysis effectively captures core structural trade vulnerabilities based on historical and snapshot data, it is ultimately a simplification of complex global interdependencies. We acknowledge that the model cannot fully anticipate changing geopolitical landscapes nor other factors that contribute to supply chain resilience, such as regulatory barriers, currency fluctuations, or labor constraints.

Acknowledgments

The research was led by Jeongmin Seong, a McKinsey Global Institute (MGI) partner in the Tokyo office; **Tiago Devesa,** an MGI senior fellow in the Madrid office; **Nick Leung,** a director of MGI and senior partner in the Hong Kong office; **Shubham Singhal,** MGI chairman and a senior partner in the Detroit office; **Qianyi Khor,** a consultant in the Singapore office; and **Lea Nakao Chang,** a consultant in the Tokyo office.

Many McKinsey colleagues also participated in this research. Team members were Alejandro Morales, Charlotte Yong, Daniel Zou, Jeffrey Condon, Mario Rojas, and Tejesh Pradhan.

Other colleagues contributed their expertise and support. They include Anna Kortis, Apostolos Zampelas, Arjen Kersing, Axel Spamann, Chris Bradley, Christian Doppler, Henry Marcil, Jan Mischke, Konstantin Wirth, Ludwig Hausmann, Matt Watters, Maya Horii, Mihir Mysore, Mukund Sridhar, Neelesh Mundra, Philip Schäfer, Rebecca J. Anderson, Sal Arora, Tarek Mansour, Timo Möller, Yuito Yamada, and Ziad Haider.

We would also like to thank Mark Staples, MGI editorial director; Rachel Robinson, director of MGI editorial operations; Rishabh Chaturvedi, MGI assistant managing editor; Rebeca Robboy, Suzanne Albert, and Cathy Gui in MGI external communications; and David Batcheck, MGI social media editor.

The report was edited by MGI senior editor Brian Blackstone. Juan M. Velasco provided expert support with data visualization.

We are grateful to MGI's academic advisers, Matthew J. Slaughter of the Tuck School of Business at Dartmouth and Pierre Yared of the Columbia Business School for their guidance.

As with all MGI research, this work is independent and has not been commissioned or sponsored in any way by any business, government, or other institution. We seek to provide business and policy leaders with the facts and insights needed to better understand the forces shaping the global economy. Any errors are our own.

Endnotes

Introduction

1 To quantify geopolitical alignment in a way analogous to geographic distance, prior MGI research developed a measure based on UN General Assembly voting records from 2005 to 2022. Please refer to previous MGI publications, including the global trade 2026 update: "Geopolitics and the geometry of global trade: 2026 update," McKinsey Global Institute, March 19, 2026.

2 Global Trade Outlook and Statistics, WTO, March 2026; Global Trade Outlook and Statistics: October 2026 update, WTO, October 8, 2026; World Economic Outlook, IMF, October 2026.

Chapter one

3 This work builds on a wide literature on the trade resilience space. At MGI, we have studied sources of risk: "Risk, resilience, and rebalancing in global value chains," McKinsey Global Institute, August 6, 2020; concentration: "The complication of concentration in global trade," McKinsey Global Institute, January 12, 2023; and how geopolitics is reshaping global trade: "Geopolitics and the geometry of global trade: 2026 update," McKinsey Global Institute, March 19, 2026. Others have also studied this field, including Christine Arriola et al., "Towards demystifying trade dependencies: At what point do trade linkages become a concern?," OECD Trade Policy Papers, number 280, April 2024; Maria-Grazia Attinasi et al., "Unveiling the hidden costs of critical dependencies," *ECB Economic Bulletin*, 2025, Number 5; and JaeBin Ahn and Brandon Joel Tan, *Supply chain diversification and resilience*, International Monetary Fund working paper number 2025/102, May 2025.

4 There is no objective definition of criticality of a given good, but many attempts at defining a list of critical goods. Research from "Economic security in a changing world," OECD, September 11, 2025, highlights that a nation's ability to protect its economic stability and growth relies heavily on managing supply chain resilience, emphasizing the importance of semiconductor, energy, and critical raw material value chains. As part of our analysis, we reference the US list of critical goods under Executive Order 14017. While recognizing that what constitutes a critical product will somewhat vary across countries, modern economies all rely on a similar set of inputs.

5 "The complication of concentration in global trade," McKinsey Global Institute, January 12, 2023.

6 As of 2026, China faces export controls that restrict its access to some advanced semiconductor manufacturing equipment. See US Department of Commerce, Bureau of Industry and Security, "Commerce Strengthens Export Controls to Restrict China's Capability to Produce Advanced Semiconductors for Military Applications," December 2, 2024; and "Department of Commerce Closes Export Controls Loophole for Foreign-Owned Semiconductor Fabs in China," August 29, 2025; Annual Report to Congress, US–China Economic and Security Review Commission, 2024; Colin Caines, Sharon Jeon, and Cheyenne Quijano, "Developments in Chinese Chipmaking," Federal Reserve, 2025; and "China's semiconductor manufacturing equipment imports hit record levels in 2025," Silverado Policy Accelerator, February 17, 2026.

7 Other research has also examined the role of economies positioned between major geopolitical blocs including Gita Gopinath et al., "Changing global linkages: A new Cold War?," International Monetary Fund working paper number 2024/076, April 2024; Nuri Baek et al., *ASEAN-5: Further harnessing the benefits of regional integration amid fragmentation risks*, International Monetary Fund working paper number 2023/191, September 2023; and Giovanni Donato and Emmanouil Kitsios, *ASEAN's trade and investment in a fragmented world*, International Monetary Fund working paper number 2026/118, June 2026.

Chapter two

8 We analyze maritime chokepoints as distinct from the Achilles' heel for two reasons. First is the granularity of available data (chokepoint attribution is modeled at a sector level instead of the six-digit Harmonized System [HS6]), and second is that maritime trade is only a subset of trade, while the Achilles' heel applies to all international goods trade regardless of the transit method.

9 "Chokepoints: How to respond when the global economy gets squeezed," McKinsey, July 22, 2026.

10 *The Commentaries of the Great Alfonso Dalboquerque*, translated by Walter de Gray Birch, Cambridge University Press, 2010.

11 The Kiel Canal serves as an alternative route to the Danish Straits but is accessible only by smaller ships, so we still categorize the Danish Straits as non-reroutable. See "World oil transit chokepoints," US Energy Information Administration, updated March 3, 2026.

12 Others have studied this topic, including: *Review of maritime transport 2025*, UN Trade and Development (UNCTAD), September 2025, which documents the scale of disruption absorbed by shipping over the past year and the geopolitical context in which these disruptions occur; and Jasper Verschuur et al., "Systemic impacts of disruptions at maritime chokepoints," *Nature Communications*, November 24, 2025, which classifies maritime passages and quantifies chokepoint-dependent trade.

13 *Data blog*, "Fertilizer prices surge as Strait of Hormuz disruptions tighten supplies," blog entry by John Baffes and Kaltrina Temaj, World Bank, May 14, 2026; and Lee Ying Shan, "A global food price shock looms as Middle East war rages on. Here's who will be hit hardest," CNBC, March 11, 2026.

14 "Daily briefing," Lloyd's List, March 25, 2021; and Theo Notteboom, Hercules Haralambides, and Kevin Cullinane, "The Red Sea crisis: Ramifications for vessel operations, shipping networks, and maritime supply chains," *Maritime Economics & Logistics*, February 20, 2024, Volume 26.

15 Samuel E. Muñoz, Lindsay Lawrence, and Shuochen Wang, "Drying of the Panama Canal in a Warming Climate," *Geophysical Research Letters*, September 17, 2025, Volume 52; and Nic Wirtz, "Panama: Crisis in the Canal," Global Finance Magazine, February 1, 2024.

16 While we categorize the 24 chokepoints by reroutability, this measure assesses only the availability of alternative routes, not the likelihood of disruption. The latter is dependent on factors such as geopolitical tensions and the incentives and capabilities of actors to interfere with trade, as well as accidents and natural disasters. Therefore, not all chokepoints in the same category of reroutability will pose the same level of total risk.

17 Hanna Duggal, Marium Ali, and Mohamed Hussein, "How a 95 percent drop in Hormuz traffic changed global shipping," Al Jazeera, August 27, 2026; and "World oil transit chokepoints," US Energy Information Administration, updated March 3, 2026; https://www.eia.gov/international/content/analysis/special_topics/World_Oil_Transit_Chokepoints/

18 "Aftershocks: Energy security beyond the Strait of Hormuz crisis," McKinsey Global Institute, September 17, 2026.

19 Koh Ewe and Flora Drury, "South Korea to Sri Lanka: How the Iran war impacts you if you live in Asia," BBC, April 3, 2026.

20 Sakura Murakami, "Takaichi says 100% of Japan's oil supply to avoid Hormuz in July," Bloomberg, June 11, 2026; and Parul Bakshi and Samriddhi Vij, "Why Asia cannot replace Gulf crude easily," Observer Research Foundation, May 1, 2026.

Chapter three

21 We use the global Herfindahl-Hirschman Index (HHI) as a key indicator, in line with our previous work.

See "The complication of concentration in global trade," McKinsey Global Institute, January 12, 2023. In the underlying analysis, "concentrated imports" is defined as all imports with a Herfindahl-Hirschman Index (HHI) over 3,000 (this approximately represents cases where a product is supplied to an importer by three or fewer economies).

22 *Industrial policy and territorial development: Lessons from Korea*, OECD Development Centre Studies, OECD Publishing, 2012.

23 We reference the Capability Adjacency indicator which measures alignment with an economy's existing industrial base. Atlas of Economic Complexity database, Harvard Growth Lab, Harvard Kennedy School, 2024. This indicator is limited by its coverage of products at the HS4 level, while our products are classified at the HS6 level. Research on economic complexity finds that economies are more likely to successfully diversify into products that require capabilities similar to those embedded in their existing productive base. See C. A. Hidalgo et al., "The product space conditions the development of nations," *Science*, July 27, 2007, Volume 317, Number 5837; and C. A. Hidalgo and Ricardo Hausmann, "The building blocks of economic complexity," *PNAS*, June 30, 2009, Volume 106, Number 26.

24 We assess potential downstream impact by estimating the value of downstream production reliant on a specific input or intermediate product, using trade in the relevant downstream products as a proxy for the scale of associated economic activity. This approach provides an indication of the potential magnitude of downstream exposure rather than an estimate of production losses resulting from a trade disruption. In particular, it does not account for other important factors including domestic production and capacity, inventories, the intensity with which the affected input is used, or firms' ability to adjust production over time.

25 The Six R's build on MGI's earlier framework—reduce, replace, ramp up, and rearrange—introduced in "The great trade rearrangement," McKinsey Global Institute, June 25, 2025. Here, "replace" is incorporated into a broader definition of "reduce," while "relocate," "reserve," and "rally" are added to capture a broader set of resilience responses. Research from the OECD, IMF, WTO, and other institutions similarly identify a portfolio of approaches to supply-chain resilience, where the appropriate mix varies across products and sectors, and entails trade-offs among resilience, cost, and efficiency. See David Crowe and Łukasz Rawdanowicz, *Risks and opportunities of reshaping global value chains*, OECD Economics Department working paper number 1762, June 2023; JaeBin Ahn and Brandon Joel Tan, *Supply chain diversification and resilience*, International Monetary Fund working paper number 2025/102, May 2025; and *World trade report 2023: Re-globalization for a secure, inclusive and sustainable future*, World Trade Organization, September 2023.

26 Yuka Obayashi, "Japan refiners to diversify crude sources, explore support for Hormuz bypass routes," Reuters, July 15, 2026; and "Fact sheet: President Donald J. Trump implements a historic U.S.-Japan framework agreement," The White House, September 5, 2025.

27 We retain "Rearrange" from our previous report to describe shifts toward existing alternative suppliers, while introducing "Relocate" as a distinct response involving additional investment and effort to establish or expand new sources of supply in alternative economies. "The great trade rearrangement," McKinsey Global Institute, June 25, 2025. Additional references include Rolfe Winkler, "Apple says most of its devices shipped into U.S. will be from India, Vietnam," *Wall Street Journal*, May 1, 2025.

28 We adapted "Ramp up" from our previous report to focus on expanding domestic manufacturing capacity, while introducing "Relocate" as a distinct lever for establishing or expanding production capacity in alternative economies. See "The great trade rearrangement," McKinsey Global Institute, June 25, 2025. Other references include "Trump administration secures an additional $100 billion U.S. semiconductor manufacturing investment for a total of $265 billion from TSMC," US Department of Commerce, July 16, 2026; and "America projected to triple semiconductor manufacturing capacity by 2032, the largest rate of growth in the world," Semiconductor Industry Association press release, May 8, 2024.

29 "Stockpiling: Metals," Japan Organization for Metals and Energy Security, accessed October 20, 2026.

30 We adapted "Replace" from our previous report by incorporating product and material substitution into a broader definition of "Reduce," reflecting a more holistic set of resilience levers to reduce overall demand. "The great trade rearrangement," McKinsey Global Institute, June 25, 2025.

31 US Department of State, "Minerals Security Partnership," Archived content.

32 Research suggests that limited domestic capabilities and economies of scale can constrain diversification in smaller economies, increasing the importance of trade integration, international diversification, and regional cooperation for resilience. See Arnold McIntyre et al., *Economic benefits of export diversification in small states*, International Monetary Fund working paper number 2018/086, April 2018; Dongyeol Lee and Huan Zhang, *Export diversification in low-income countries and small states: Do country size and income level matter?*, International Monetary Fund working paper number 2019/118, May 2019; *OECD supply chain resilience review: Navigating risks*, OECD, June 2, 2025; *Global value chain development report 2023: Resilient and sustainable GVCs in turbulent times*, a joint report from the Asian Development Bank, Institute of Developing Economies–Japan External Trade Organization, Research Institute for Global Value Chains at the University of International Business and Economics, and World Trade Organization, 2023; and *Global value chain development report 2025: Rewiring GVCs in a changing global economy*, a joint report from the University of International Business and Economics, Asian Development Bank, Institute of Developing Economies–Japan External Trade Organization, World Economic Forum, and World Trade Organization, 2025.

33 Smartphones have more than 950 upstream inputs and intermediates at the HS6 level for tier one and two levels. This references AIPNET, https://aipnet.io/.

Chapter four

34 While the scope differs, other analysis reaches similar conclusions on taking a balanced approach to building supply chain resilience including *OECD supply chain resilience review: Navigating risks*, OECD, June 2, 2025; and JaeBin Ahn and Brandon Joel Tan, *Supply chain diversification and resilience*, IMF working paper number 2025/102, May 2025.

35 Antton Haramboure et al., "Special focus: Semiconductor value chains," in *Economic security in a changing world*, OECD, September 11, 2025. The OECD finds that approximately 75 percent of global semiconductor value added is generated by five economies, four of which are in Asia.

36 "Executive summary," in *Gas market report, Q3-2026*, International Energy Agency, 2026.

37 Research on supply-chain resilience emphasizes the importance of end-to-end visibility and granular mapping of supply-chain dependencies to identify emerging risks for companies. See *OECD supply chain resilience review: Navigating risks*, OECD, June 2, 2025; and Sarah Maria Lang, Christoph Zanker, and Simon Glöser-Chahoud, "From risk to resilience: A multi-layered framework for supplier risk assessment to strengthen supply chain resilience," *International Journal of Physical Distribution & Logistics Management*, June 8, 2026, Volume 56, Number 5.

38 While this section refers to specific facilities, the analysis is illustrative and based on economy-level import data rather than facility-specific sourcing information.

39 "Catalyzing competitiveness: Where investment happens and why," McKinsey Global Institute, June 30, 2026.

40 Alfonso Natale and Ziad Haider with Andreas Raggl, "How companies can strengthen their geopolitical risk readiness," McKinsey, June 25, 2026.

41 "Digital twins: The key to unlocking end-to-end supply chain growth," McKinsey, November 20, 2024.

42 "DHL Globalization Tracker," DHL, October 2024.

43 "Walmart's US supply chain playbook goes global—and it's reinventing retail at scale," Walmart, July 17, 2025; and "Walmart Data Ventures shapes the next era of insight-driven retail innovation," Walmart, October 29, 2025.

44 "BASF conference call: Q2 2026," BASF, July 29, 2026.

45 Nikunj Ohri and Shivangi Acharya, "India identifies $51 billion in critical imports for domestic manufacturing push, sources say," Reuters, July 16, 2026. https://www.reuters.com/world/india/

india-identifies-51-bln-critical-imports-domestic-manufacturing-push-sources-say-2026-07-16/

46 "DoD awards key contract for domestic heavy rare earth separation capability," US Department of Defense, September 19, 2023; and Rare Earth Exchanges, "Japan quietly secures the West's only heavy rare earth supply: Sojitz begins imports from Lynas," blog entry by Daniel O'Connor, November 15, 2025.

47 Carter Dredge and Stefan Scholtes, "The health care utility model: A novel approach to doing business," *NEJM Catalyst*, July 8, 2021.

48 "Apple, ASML and other major companies joined the Belgian microelectronics sustainable semiconductor research program," SIC Electronics, updated May 21, 2022.

49 Referring to Regulation (EU) 2024/1252 establishing a framework for ensuring a secure and sustainable supply of critical raw materials.

50 "Current FAST-41 covered projects," Permitting Council, accessed September 30, 2026.

51 Takashi Mochizuki, "Japan to give extra $4.86 billion to expand TSMC Kumamoto plant," Bloomberg, February 24, 2024.

52 "Defense Priorities & Allocations System (DPAS)," US Defense Contract Management Agency, accessed October 9, 2026.

53 Based on UN Comtrade statistics for both import and export trade, 2024.

54 "ASEAN Petroleum Security Agreement (APSA) Secretariat," ASEAN Centre for Energy, accessed October 15, 2026.

55 "DOE's Office of Critical Minerals and Energy Innovation announces $134 million to bolster rare earth element supply chains," US Department of Energy, June 2, 2026; and C. Todd Lopez, "DOD looks to establish 'mine-to-magnet' supply chain for rare earth materials," US Department of Defense, March 11, 2024.

56 "The CHIPS Program Office vision for success: Two years later," US Department of Commerce, CHIPS Program Office, 2025.

57 Katherine Matthews and Jason Holden, "Simandou iron ore project: A game changer for global supply," S&P Global Market Intelligence, September 4, 2025; Clyde Russell, "China's robust iron ore imports are going into storage, not steel," Reuters, updated March 19, 2026; and "Guiding opinions on promoting the high-quality development of the iron and steel industry," Ministry of Industry and Information Technology, National Development and Reform Commission, and Ministry of Ecology and Environment of China, February 8, 2022.

58 "Outline of the 15th Five-Year Plan for national economic and social development (2026–2030)," National Development and Reform Commission of China, March 2026, Chapter 5, Section 1; and "15th Five-Year Plan for accelerating new industrialization and building a modern industrial system," Shanghai Municipal People's Government, July 24, 2026.

59 Center for Security and Emerging Technology blog, "Inside Beijing's chipmaking offensive: Where is China gaining ground?" blog entry by Jacob Feldgoise and Hanna Dohmen, July 14, 2025.

60 This research was as comprehensive as possible based on publicly reported information. Other similar assessments that we draw inspiration from included Antoine Berthou, Antton Haramboure, and Lea Samek, "Mapping and testing product-level vulnerabilities in granular production networks," OECD Science, Technology, and Industry working paper number 2024/02, March 2024; and Cyrille Schwellnus et al., "Global value chain dependencies under the magnifying glass," OECD Science, Technology, and Industry policy paper number 142, March 2023, which include additional dimensions such as size of foreign exposures and the length of foreign value chains.

61 "Draft Harmonized System (HS) code list of critical supply chains," *Federal Register*, October 4, 2022, Volume 87, Number 191.

62 Other economy- and sector-specific lists exist, including *Global critical minerals outlook 2026*, International Energy Agency, July 16, 2026; and "Critical raw materials," European Commission, accessed October 15, 2026.

63 "The complication of concentration in global trade," McKinsey Global Institute, January 12, 2023. Other indicators include UNCTAD, which uses similar assessment of market and product concentration.

64 "Geopolitics and the geometry of global trade: 2026 update," McKinsey Global Institute, March 19, 2026.

Technical appendix

65 We reviewed other prominent maritime chokepoint classifications, including work by Notteboom, Pallis, and Rodrigue; Pratson; Wang, Du, and Peng; and recent analyses by the *Financial Times* and *The Economist*. These largely align with our selection or identify a smaller subset of the same straits and canals. Differences primarily reflect whether broader maritime regions, such as the South and East China seas, or lower-materiality passages, such as the La Perouse Strait, are treated as chokepoints. Sources include: Jasper Verschuur, Johannes Lumma, and Jim W. Hall, "Systemic impacts of disruptions at maritime chokepoints," *Nature Communications*, November 24, 2025, Volume 16; Jean-Paul Rodrigue and Theo Notteboom, "Interoceanic passages," in *Port Economics, Management and Policy*, Routledge, 2022; "Maritime chokepoints," *Financial Times*, June 2026; https://ig.ft.com/maritime-chokepoints/; Lincoln F. Pratson, "Assessing impacts to maritime shipping from marine chokepoint closures," *Communications in Transportation Research*, December 2023, Volume 3; "The nightmare scenario for global trade," *Economist*, March 27, 2026; and Xue Wang, Debin Du, and Yan Peng, "Assessing the importance of the marine chokepoint: Evidence from tracking the global marine traffic," *Sustainability*, 2024, Volume 16, Issue 1.

66 "Product Space," The Atlas of Economic Complexity, Growth Lab at Harvard University, accessed October 1, 2026; "Atlas data downloads," The Atlas of Economic Complexity, Growth Lab at Harvard University, accessed October 1, 2026.

67 "AI-generated Production Network," AIPNET, accessed October 1, 2026.

68 J. Verschuur, E. E. Koks, and J. W. Hall, "Ports' criticality in international trade and global supply-chains," *Nature Communications*, July 27, 2022.

69 "Chokepoints," PortWatch database, International Monetary Fund, data updated April 30, 2026.

McKinsey Global Institute
November 2026
Copyright © McKinsey & Company
Designed by the McKinsey Global Institute

mckinsey.com/mgi

@McKinsey_MGI
@McKinseyGlobalInstitute
@McKinseyGlobalInstitute

Subscribe to MGI's LinkedIn newsletter,
Forward Thinking: mck.co/forwardthinking