



CHOKEPOINTS AND THE NEW GEOGRAPHY OF POWER

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EXECUTIVE SUMMARY

The global economy is entering a new era in which chokepoints are no longer peripheral risks but central features of international power. Traditionally, chokepoints have been understood as narrow geographic passages such as the Strait of Hormuz, the Suez Canal, the Panama Canal, or the Strait of Malacca. These remain vitally important: disruption in any one of them can affect global energy markets, shipping costs, insurance rates, trade flows, and inflation. Recent turmoil around the Strait of Hormuz has once again shown how quickly a localized security crisis can become a global economic concern.

But the modern chokepoint problem extends far beyond geography. Over the past three decades, globalization has created deep concentrations of production, infrastructure, capital, data, and natural resources. Supply chains have become more efficient, but also more dependent on a small number of critical nodes. Digital systems have become more powerful, but rely on vulnerable physical backbones. Energy systems have become more interconnected, but remain exposed to pipelines, ports, LNG terminals, and electricity grids.

This paper defines chokepoints as concentrated points of passage or dependency through which wider systems must move, and where disruption can produce effects well beyond the immediate location or sector. Not every constraint or vulnerability is a chokepoint. The concept is most useful when it identifies specific places, systems, or relationships where power is concentrated and where targeted disruption, control, or investment can have outsized consequences.

SIX CATEGORIES OF CHOKEPOINTS



GEOGRAPHY

such as Hormuz, Malacca, Bab el-Mandeb, Suez, and Panama, where maritime trade and energy flows are concentrated.



INFRASTRUCTURE

such as pipelines, ports, LNG terminals, logistics hubs, and electricity grids, which sustain global flows but often lack redundancy.



MANUFACTURING

such as advanced semiconductor production in Taiwan, critical minerals processing in China, and battery supply chains.



DIGITAL

such as subsea cables, cloud platforms, data centers, and network infrastructure, which underpin the global flow of information.



CLIMATE AND WATER

where drought, water scarcity, and environmental stress constrain shipping, agriculture, mining, manufacturing, and energy production.



MONEY AND FINANCE

such as the US dollar, SWIFT, correspondent banking networks, capital markets, and sanctions systems, which shape the movement of capital and the use of economic statecraft.

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Chokepoints are therefore not only sources of risk. They can also become sites of opportunity.

Across these domains, chokepoints are deeply interconnected. A drought affecting the Panama Canal can disrupt shipping, LNG flows, and supply chains. Water scarcity can constrain semiconductor manufacturing and critical mineral processing. Cyberattacks can affect financial infrastructure, electricity grids, and logistics networks. Financial sanctions can reshape trade routes and investment decisions.

Chokepoints are therefore not only sources of risk. They can also become sites of opportunity. Because they concentrate flows of goods, capital, people, energy, data, and resources, they can become places of innovation, negotiation, and cooperation. Border regions, ports, canals, energy corridors, and digital hubs can generate new forms of resilience if managed wisely.

The challenge is not to eliminate chokepoints. Modern economies will always depend on critical nodes, specialized capabilities, and concentrated systems. The real task is to understand where chokepoints exist, how they are changing, and how they can be managed through diversification, redundancy, resilient infrastructure, stronger alliances, and strategic investment. In the 21st century, power will increasingly belong to those who understand, manage, and shape the chokepoints through which the global economy moves.



INTRODUCTION AND ANALYTICAL FRAMEWORK

In recent months, global attention has returned to one of the world's most familiar strategic vulnerabilities: the Strait of Hormuz. As tensions in the Middle East escalated and threats to shipping intensified, energy markets reacted immediately. Oil prices surged, insurance premiums spiked, and governments once again confronted a basic reality of the global economy: dependence on a handful of narrow passages through which a disproportionate share of critical resources must flow.

Yet focusing on Hormuz alone risks missing a much broader transformation. The global economy is not simply exposed to a few isolated chokepoints; it is increasingly structured around them. From the Strait of Malacca to the Panama Canal, from semiconductor fabrication in Taiwan to rare earth processing in China, and from subsea data cables to water-stressed industrial zones, the modern world is defined by

systems in which concentration, constraint, and vulnerability intersect.

Chokepoints are no longer peripheral risks in the global system; they are central to how power is exercised, contested, and redistributed in the 21st century. Control over chokepoints (whether geographic, infrastructural, industrial, or environmental) has become a defining feature of economic statecraft. At the same time, the disruption of these chokepoints, whether through conflict, climate stress, or policy intervention, represents one of the most significant sources of systemic risk to the global economy.

Understanding chokepoints, therefore, is not simply a matter of mapping physical geography. It requires a broader analytical lens that captures how flows of energy, goods, capital, data, and natural resources are organized and where they can be constrained.

A FRAMEWORK FOR UNDERSTANDING CHOKEPOINTS

Chokepoints can be understood as occurring across six interconnected domains: Geography, Infrastructure, Manufacturing, Digital, Climate and Water, Money and Finance. Together, these categories capture the full range of constraints shaping the global economy.



FROM GEOGRAPHY TO SYSTEMS

Traditionally, chokepoints have been understood in geographic terms: narrow maritime passages through which large volumes of trade must pass. The Strait of Hormuz, the Bab el-Mandeb, the Suez Canal, and the Strait of Malacca have long occupied a central place in strategic thinking. Their importance is undeniable. Roughly a fifth of globally traded oil transits Hormuz; a significant share of Europe-Asia trade flows through Suez; and the Indo-Pacific's commercial arteries depend heavily on Malacca.

But geography alone no longer captures the full picture. Over the past three decades, globalization has created new forms of concentration that function as chokepoints even in the absence of narrow physical corridors. Supply chains have become more complex, but also more geographically concentrated. Infrastructure networks have expanded, but often around key nodes that are difficult to substitute. Digital systems have enabled unprecedented connectivity but rely on highly vulnerable physical backbones. At the same time, environmental constraints are emerging as critical limits on economic activity. The result is a global system in which chokepoints exist not only where geography constrains movement, but wherever concentration creates dependency.

Physical chokepoints often emerge where geography, sovereignty, and culture meet. Straits, canals, mountain passes, border crossings, ports, and energy corridors are rarely just technical pieces of infrastructure; they are frequently located at the intersection of nations, civilizations, trading systems, and political traditions. The Bosphorus, the Strait of Malacca, the Suez Canal, the Panama Canal, the US–Mexico border,

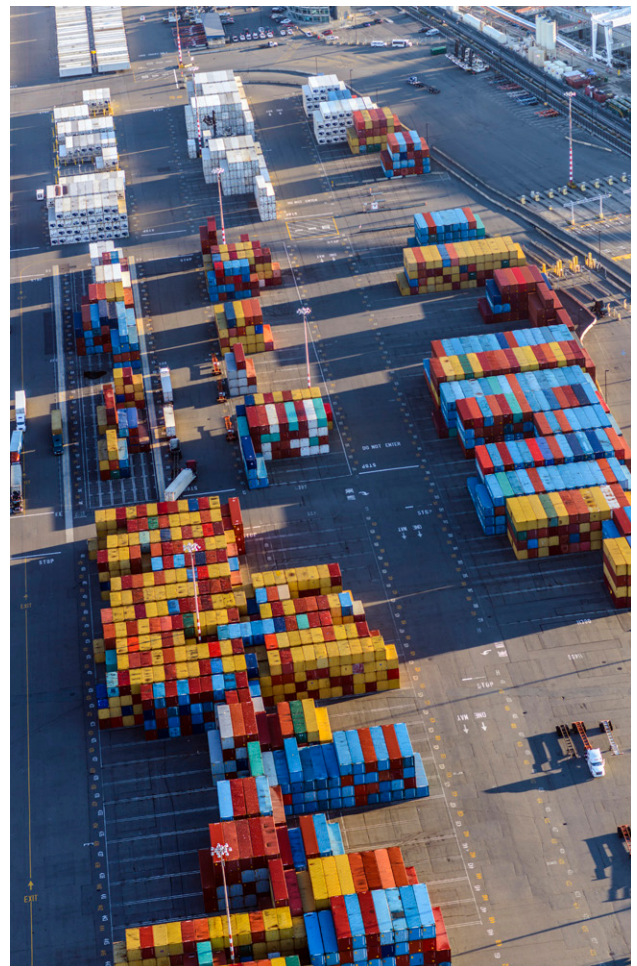
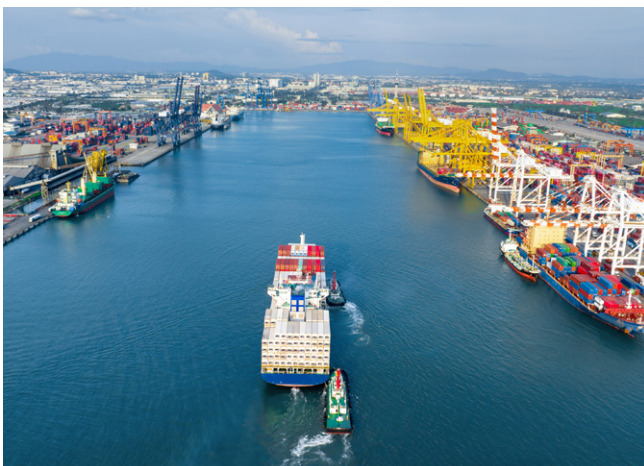
and Central Asia's transport corridors all illustrate the same basic pattern: the places where the world narrows are also places where different societies are forced into contact. This makes chokepoints vulnerable to friction, competition, and coercion, but it also gives them a deeper historical and human significance. They are not merely bottlenecks in the global economy; they are meeting points where commerce, migration, diplomacy, technology, and identity converge.

Seen in this way, chokepoints are not only sources of risk. They can also be engines of opportunity. Because they concentrate flows of goods, capital, people, energy, and data, chokepoints often become places of innovation, negotiation, and institutional development. Border regions and transit corridors can generate new forms of economic integration, shared infrastructure, cultural exchange, and cross-border problem solving. Ports become logistics hubs; canals become platforms for global services; frontier regions become laboratories for binational cooperation; and contested corridors can become incentives for diplomacy. The challenge for policymakers and business leaders is therefore not simply to avoid chokepoints or reduce dependence on them, but to manage them wisely. Investing in resilience, redundancy, and trust while recognizing that the very places where systems are most exposed may also be where new forms of connectivity and cooperation are born.



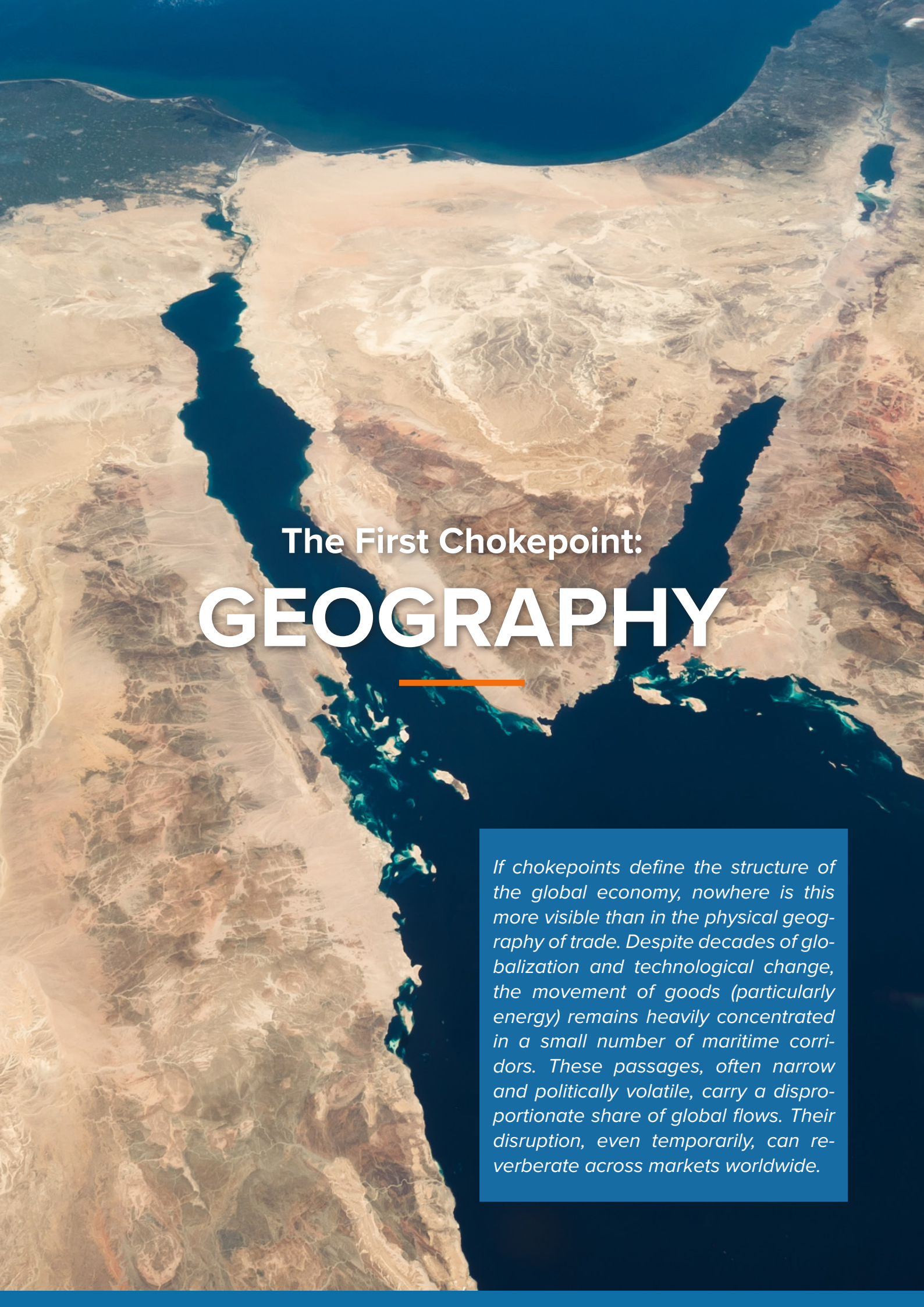
NOT EVERYTHING IS A CHOKEPOINT

At the same time, it is important not to stretch the concept of chokepoints so far that it loses analytical value. Not every constraint, bottleneck, vulnerability, or policy failure should be described as a chokepoint. A true chokepoint involves a concentrated point of passage or dependency through which wider systems must move, and where disruption can produce effects well beyond the immediate location or sector. Human capital, for example, may be a profound constraint on economic development, industrial policy, technological upgrading, or supply chain resilience, but it is not necessarily a chokepoint in the same sense as a port, canal, semiconductor node, payment system, or critical mineral processing hub. A shortage of skilled workers may slow growth, raise costs, or weaken competitiveness, but it is better understood as a structural obstacle or capacity gap unless it is concentrated in a specific node whose failure blocks a larger system. Preserving this distinction matters. If everything becomes a chokepoint, then the term ceases to identify the specific places, systems, and dependencies where power is concentrated and where targeted action can have outsized effects.



CHOKEPOINTS AS INSTRUMENTS OF POWER AND RISK

States and corporations alike are seeking to secure their position within these systems—by controlling physical passages, investing in infrastructure, reshoring or diversifying supply chains, and managing access to critical resources. At the same time, the risk of disruption is growing, driven by geopolitical tensions, technological change, and environmental stress. The result is a global economy that is both more interconnected and more fragile, one in which the smooth functioning of complex systems depends on a relatively small number of critical nodes.



The First Chokepoint: GEOGRAPHY

If chokepoints define the structure of the global economy, nowhere is this more visible than in the physical geography of trade. Despite decades of globalization and technological change, the movement of goods (particularly energy) remains heavily concentrated in a small number of maritime corridors. These passages, often narrow and politically volatile, carry a disproportionate share of global flows. Their disruption, even temporarily, can reverberate across markets worldwide.

MARITIME ARTERIES OF THE GLOBAL ECONOMY

At the center of the global chokepoint system are a handful of maritime passages that function as arteries of international trade. The Strait of Hormuz remains the most critical energy chokepoint in the world. According to the US Energy Information Administration (EIA), approximately 20–21 million barrels of oil per day transited the strait in 2023, roughly 20 percent of global petroleum liquids consumption.ⁱ In addition, around one-fifth of global liquefied natural gas (LNG) trade also passes through Hormuz, largely from Qatar.ⁱⁱ The concentration of flows through such a narrow corridor (just 21 miles wide at its narrowest point) creates an enduring vulnerability, particularly in times of geopolitical tension.

Further east, the Strait of Malacca connects the Indian and Pacific Oceans and serves as the primary conduit for energy and goods flowing to East Asia. The EIA estimates that roughly 16 million barrels per day of oil passed through Malacca in 2023, making it the second most important oil chokepoint globally.ⁱⁱⁱ For major importers such as China, Japan, and South Korea, Malacca represents a critical dependency, one that has driven strategic efforts to diversify routes and reduce exposure.

Between the Arabian Peninsula and the Horn of Africa lies the Bab el-Mandeb Strait, a gateway between the Red Sea and the Gulf of Aden. Approximately 8–9 million barrels per day of oil and petroleum products transited this chokepoint in recent years. Its importance is magnified by its connection to the Suez Canal, which together form a vital corridor linking Europe and Asia.

The Suez Canal itself handled approximately 12–15 percent of global trade by volume prior to recent disruptions, including the 2021 *Ever Given* incident and subsequent security challenges in the Red Sea.^{iv} In energy terms, the canal and its parallel SUMED pipeline are critical for transporting crude oil and refined products from the Middle East to Europe. Any disruption to this route forces tankers to reroute around the Cape of Good Hope, adding significant time and cost.

On the other side of the globe, the Panama Canal serves as a key link between the Atlantic and Pacific Oceans. While less central to oil flows than Hormuz or Malacca, it is essential for containerized trade and increasingly important for LNG shipments from the United States to Asia. In 2023–2024, however, severe drought conditions reduced water levels in the canal's reservoirs, forcing authorities to limit vessel transits. This led to delays, higher shipping costs, and a shift in trade routes, an early indication of how environmental stress can disrupt even long-established chokepoints.^v

CONCENTRATION AND FRAGILITY

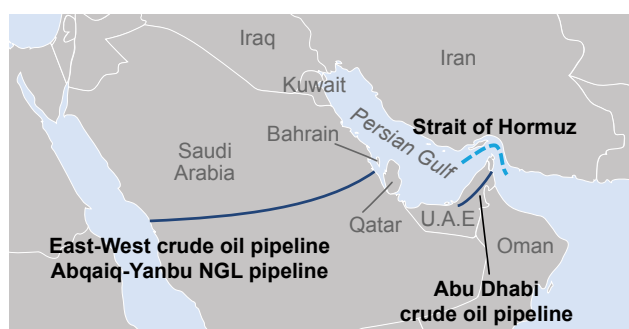
What makes these chokepoints so consequential is not simply their location, but the degree of concentration they impose on global flows. Roughly 60 percent of global oil trade moves by sea, and a significant portion of that volume passes through just a handful of narrow straits.^{vi} This creates a system in which disruption at a single point can have cascading effects. The temporary blockage of the Suez Canal in March 2021, for example, halted an estimated \$9–10 billion in trade per day, underscoring the scale of dependence on these routes.^{vii}

Similarly, recent attacks on shipping in the Red Sea have demonstrated how quickly insecurity can alter global logistics. Shipping companies have rerouted vessels around southern Africa, increasing transit times by 10–15 days and raising freight costs. These disruptions feed directly into higher prices for energy and goods, amplifying inflationary pressures and complicating economic management.

ENERGY FLOWS AND STRATEGIC VULNERABILITY

For example, the closure of the Strait of Hormuz has affected not only Gulf producers such as Saudi Arabia, Iraq, and the United Arab Emirates, but also major consumers around the world. While some alternative export routes exist, such as Saudi Arabia's East-West pipeline to the Red Sea and the UAE's pipeline to Fujairah, these bypass options cover only a portion of total capacity.^{viii}

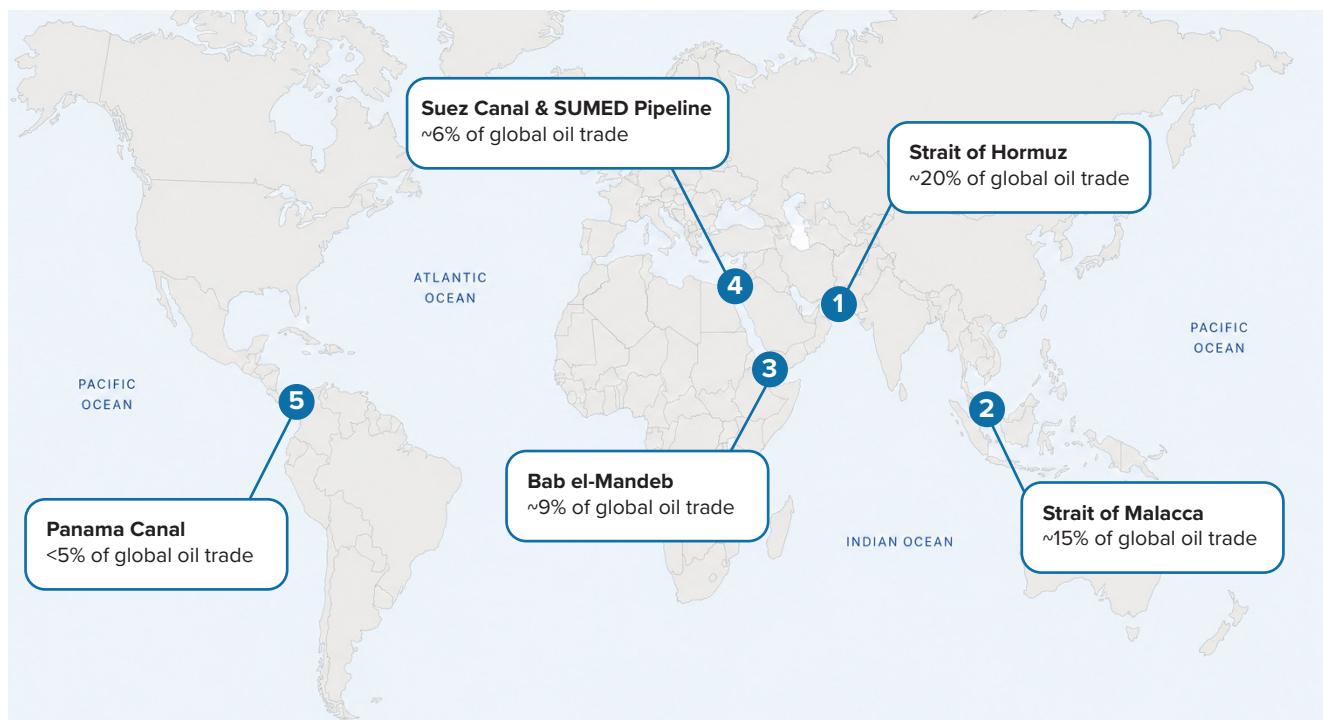
LNG markets, once considered more flexible than oil, are also increasingly exposed to choke-point risks. The rapid growth of global LNG trade has intensified reliance on key transit routes, including Hormuz, Suez, and Panama. Disruptions to any of these corridors tightens supply and drives price volatility across regions.



CHANGING CLIMATE CONDITIONS

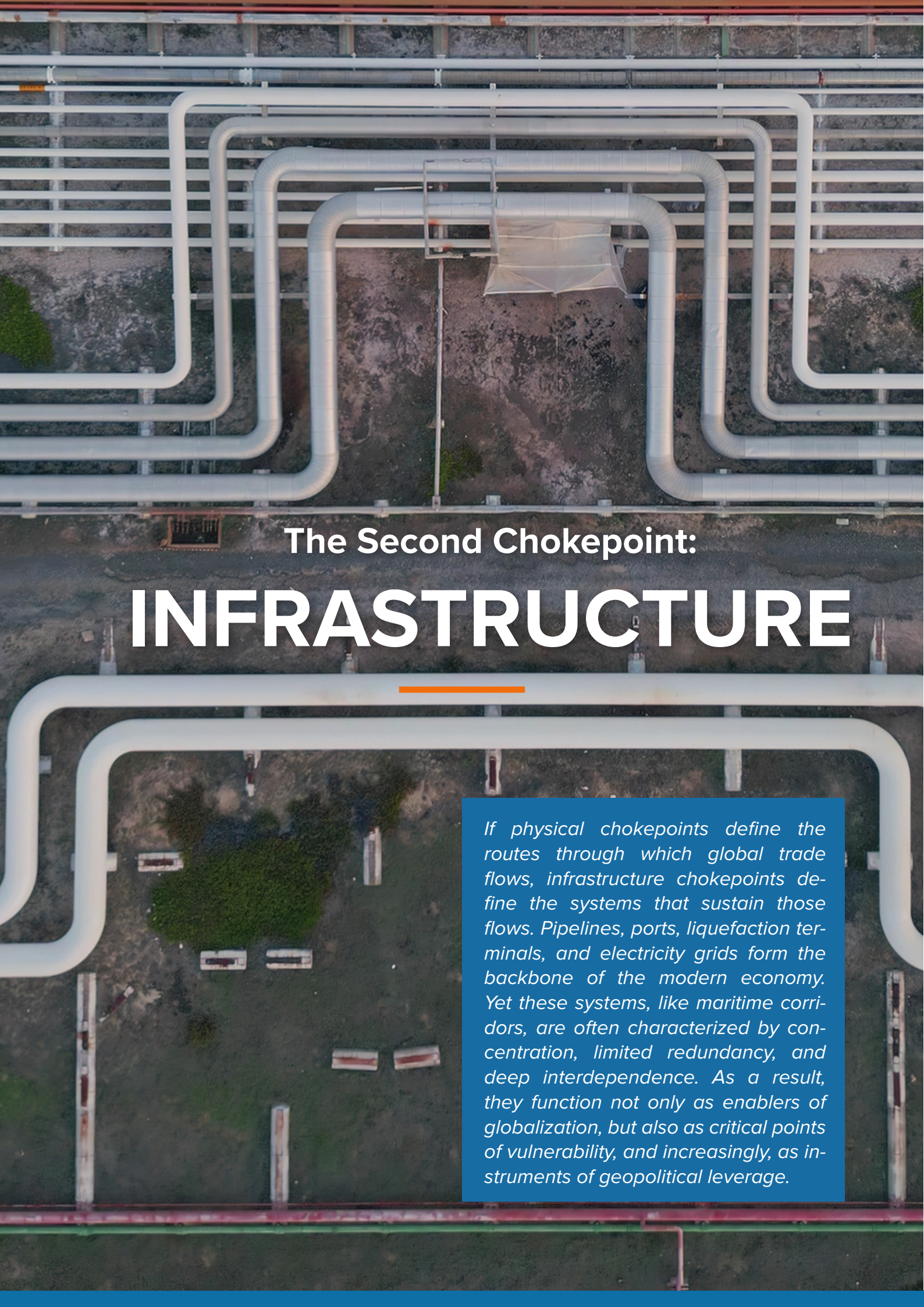
While geopolitical risk has long been the primary concern associated with chokepoints, changing weather and climate patterns are emerging as an equally important factor. The Panama Canal offers a clear example. Its operation depends on freshwater from surrounding reservoirs, which are replenished by rainfall. Prolonged drought conditions, linked in part to El Niño and broader climate trends, have reduced water availability, forcing authorities to cut the number of daily transits.^{ix} This has disrupted global shipping schedules and highlighted the vulnerability of even well-established infrastructure to environmental stress. Similarly, extreme weather events are affecting ports, shipping lanes, and coastal infrastructure worldwide. Rising sea levels, stronger storms, and changing precipitation patterns all have the potential to degrade the reliability of key trade routes.

MAJOR MARITIME CHOKEPOINTS AND ESTIMATED TRANSIT VOLUMES^x



CHOKEPOINT	LOCATION	OIL TRANSIT (mb/d)	SHARE OF GLOBAL OIL TRADE (%)	LNG SIGNIFICANCE	KEY RISKS
1 Strait of Hormuz	Persian Gulf (Iran–Oman)	20–21 mb/d 	~20% 	Very high (Qatar exports)	Military conflict, blockades, regional escalation
2 Strait of Malacca	Indian Ocean– South China Sea (Malaysia– Indonesia–Singapore)	~16 mb/d 	~15% 	High (Asia-bound LNG)	Congestion, piracy, geopolitical tension
3 Bab el-Mandeb	Red Sea–Gulf of Aden (Yemen– Djibouti/Eritrea)	~8–9 mb/d 	~9% 	Moderate	Armed conflict, shipping attacks, regional instability
4 Suez Canal & SUMED Pipeline	Egypt (Mediterranean– Red Sea)	~6–7 mb/d 	~6% 	Moderate	Blockage, political instability, spillover from Red Sea insecurity
5 Panama Canal	Atlantic–Pacific (Central America)	~2–3* mb/d 	<5% 	Growing importance (US LNG exports)	Drought, capacity limits, climate variability

^xOil figure for Panama Canal reflects crude and refined product flows; its strategic importance is also increasingly tied to LNG and containerized trade.



The Second Chokepoint: **INFRASTRUCTURE**

If physical chokepoints define the routes through which global trade flows, infrastructure chokepoints define the systems that sustain those flows. Pipelines, ports, liquefaction terminals, and electricity grids form the backbone of the modern economy. Yet these systems, like maritime corridors, are often characterized by concentration, limited redundancy, and deep interdependence. As a result, they function not only as enablers of globalization, but also as critical points of vulnerability, and increasingly, as instruments of geopolitical leverage.

PIPELINES AND THE POLITICS OF DEPENDENCE

Few examples illustrate the strategic importance of infrastructure chokepoints more clearly than pipeline networks. By their nature, pipelines create fixed, long-term connections between producers and consumers. While this can enhance efficiency and reduce costs, it also creates structural dependencies that are difficult to unwind.

Europe's reliance on Russian natural gas prior to 2022 provides a stark example. At its peak, Russia supplied approximately 40 percent of the European Union's natural gas imports, much of it delivered via pipelines such as Nord Stream, Yamal-Europe, and Brotherhood.^{xii} This infrastructure created a system in which energy flows could be (and ultimately were) weaponized. The sharp reduction of Russian gas exports following the invasion of Ukraine triggered a supply shock that forced Europe into a rapid and costly diversification effort, including increased LNG imports and accelerated investment in renewables.



LNG AND THE RISE OF FLEXIBLE, BUT CONSTRAINED INFRASTRUCTURE

The United States has emerged as the world's largest LNG exporter, with export capacity exceeding 11–12 billion cubic feet per day (bcf/d) in 2024.^{xiii} Much of this capacity is concentrated along the Gulf Coast, where facilities such as Sabine Pass, Corpus Christi, and Freeport serve as key export hubs. A disruption at any of these sites—whether due to extreme weather, industrial accidents, or cyberattacks—can have global repercussions.

Similarly, LNG shipping is heavily dependent on maritime chokepoints such as the Panama Canal and the Suez Canal. The recent constraints on Panama Canal transits due to drought have already affected LNG flows from the United States to Asia, forcing some cargoes to take longer routes around South America or Africa, and the Canal itself has become even more essential during the Iran conflict.^{xiii} What appears to be a flexible system is, in practice, still highly dependent on a limited number of critical infrastructure nodes.

PORTS, LOGISTICS HUBS, AND THE FRAGILITY OF TRADE NETWORKS

Ports and logistics hubs represent another category of infrastructure chokepoint. Modern supply chains depend on the efficient movement of goods through a relatively small number of high-capacity ports. Disruptions at these nodes can cascade through the global economy.

The COVID-19 pandemic provided a clear demonstration of this vulnerability. Congestion at major ports such as Los Angeles and Long Beach led to significant delays, increased shipping costs, and shortages of key goods. At one point in 2021, dozens of container ships were anchored offshore waiting to unload, highlighting the limited surge capacity of even the most advanced logistics systems.^{xiv}

More broadly, containerized trade is highly concentrated. According to the United Nations Conference on Trade and Development, a relatively small number of ports handle a disproportionate share of global container traffic.^{xv} This concentration increases efficiency under normal conditions but reduces resilience in the face of disruption.

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A relatively small number of ports handle a disproportionate share of global container traffic.





ELECTRICITY GRIDS AND THE HIDDEN CHOKEPOINTS OF THE ENERGY TRANSITION

As the global economy electrifies, electricity grids are emerging as critical infrastructure chokepoints in their own right. Unlike oil and gas systems, which rely on the movement of physical commodities, electricity systems depend on real-time balancing of supply and demand across interconnected networks.

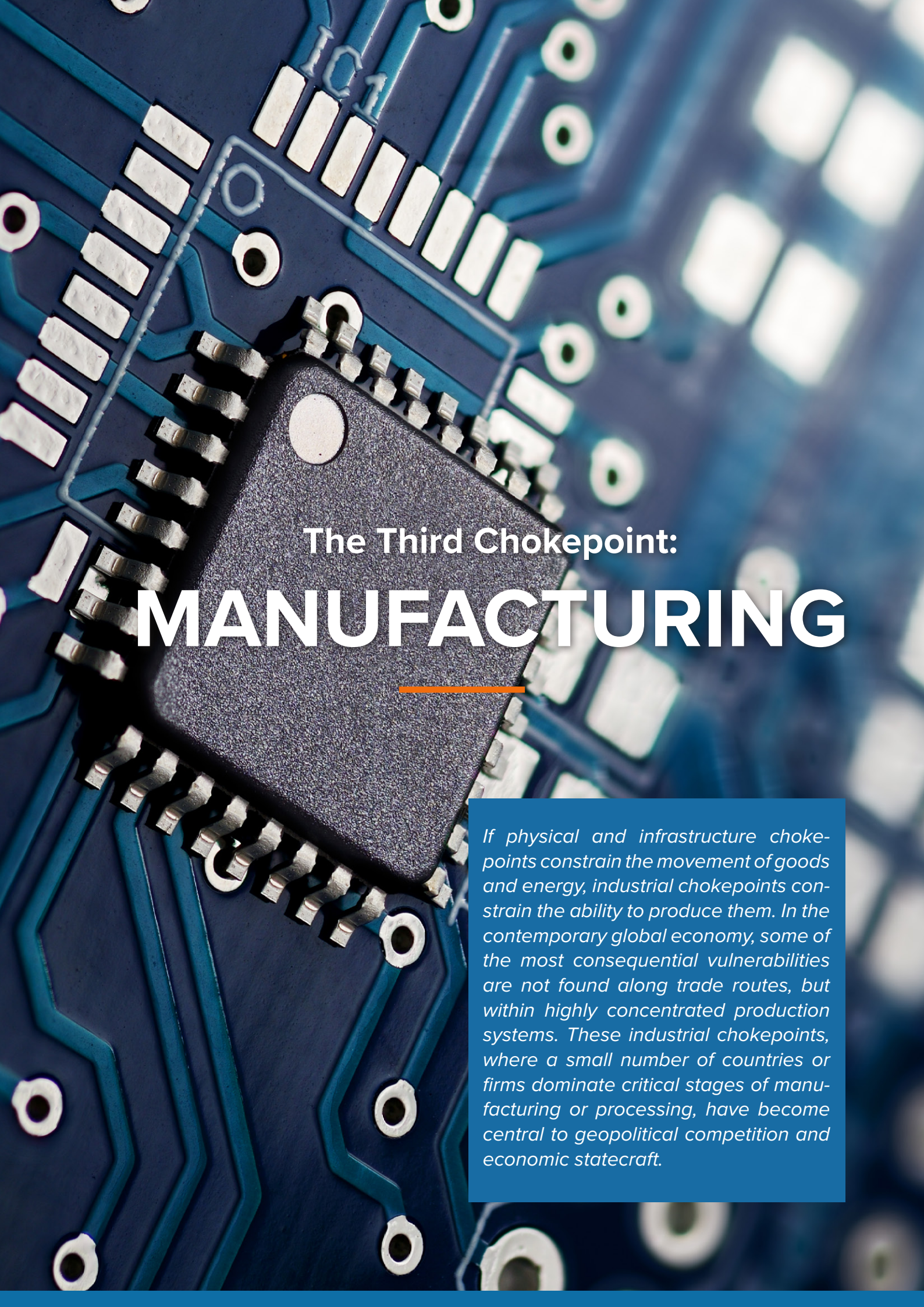
This creates a different kind of vulnerability. Failures in one part of the grid can propagate rapidly, leading to cascading outages. The 2021 winter storm in Texas, which caused widespread power failures affecting millions of people, demonstrated how extreme weather can overwhelm grid infrastructure.^{xvi} Similarly, large-scale blackouts in regions ranging from California to South Asia have underscored the fragility of electricity systems under stress.

INFRASTRUCTURE AS AN INSTRUMENT OF ECONOMIC STATECRAFT

Taken together, these examples highlight a broader shift. Infrastructure is no longer simply a means of facilitating economic activity; it is increasingly a tool of economic statecraft. States are investing in infrastructure not only to support growth, but also to shape geopolitical outcomes. China's Belt and Road Initiative (BRI), for example, has focused heavily on building ports, pipelines, and transport corridors that expand its influence over global trade routes. Similarly, Western countries are increasingly using financing tools such as development banks and export credit agencies to support strategic infrastructure projects.

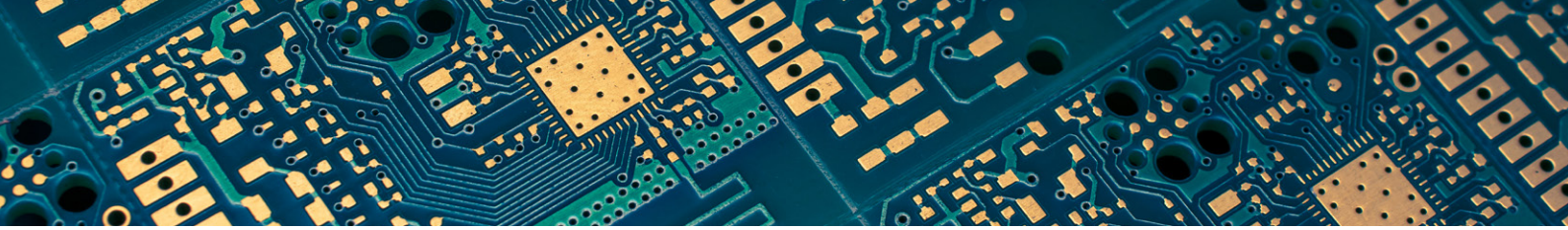
RESILIENCE, REDUNDANCY, AND THE LIMITS OF ADAPTATION

The growing importance of infrastructure chokepoints raises a fundamental policy question: how can governments and firms balance efficiency with resilience? Globalization has been built on optimizing for cost and speed, often at the expense of redundancy. Infrastructure systems have been designed to maximize throughput, not to absorb shocks. As a result, disruptions (caused by conflict, climate, or technical failure) can have outsized impacts.



The Third Chokepoint: **MANUFACTURING**

If physical and infrastructure chokepoints constrain the movement of goods and energy, industrial chokepoints constrain the ability to produce them. In the contemporary global economy, some of the most consequential vulnerabilities are not found along trade routes, but within highly concentrated production systems. These industrial chokepoints, where a small number of countries or firms dominate critical stages of manufacturing or processing, have become central to geopolitical competition and economic statecraft.



SEMICONDUCTORS: THE STRATEGIC EPICENTER

At the leading edge, semiconductor manufacturing is one of the clearest examples of an industrial chokepoint in the global economy. Advanced chips are essential to artificial intelligence, smartphones, cloud computing, electric vehicles, defense systems, and almost every major platform of technological competition. Yet the ability to manufacture the most sophisticated chips is concentrated in a very small number of firms and locations. Taiwan Semiconductor Manufacturing Company remains the dominant player. Taiwan alone accounts for roughly 60 percent of global foundry capacity and more than 90 percent of advanced (sub-10 nanometer) chip production.^{xvii} This level of concentration creates a chokepoint of extraordinary strategic significance.

The reason this concentration matters is that advanced semiconductor manufacturing is not easily replicated. Building a leading-edge fabrication plant requires tens of billions of dollars in capital, access to extreme ultraviolet lithography equipment, highly specialized engineers, ultra-pure water, stable electricity, complex chemicals, and a dense ecosystem of suppliers. It also requires years of accumulated manufacturing know-how. Even countries with enormous financial resources cannot simply decide to build a TSMC equivalent overnight. The chokepoint is therefore not only geographic; it is technological, institutional, and human. It rests on capabilities that have been built over

decades and are embedded in a particular industrial ecosystem.

This vulnerability has become more important because demand for advanced chips is rising sharply. The growth of artificial intelligence has intensified pressure on leading-edge capacity, particularly for high-performance processors and advanced packaging. Nvidia, Apple, AMD, Qualcomm, Google, and other major technology companies all depend heavily on TSMC for their most sophisticated chips. As a result, a disruption in Taiwan would not be confined to the semiconductor sector. It would ripple through cloud computing, consumer electronics, automotive production, telecommunications, defense procurement, and the broader digital economy. In chokepoint terms, Taiwan is not simply a supplier; it is a critical node through which much of the future economy must pass.

Governments and companies are now trying to reduce this exposure through industrial policy and diversification. The United States, Japan, Europe, and others are investing heavily in domestic semiconductor capacity, while TSMC itself is expanding production in Arizona, Japan, and Germany. These efforts are important, but they should not be mistaken for a rapid solution. Much of the most advanced manufacturing, research and development, and production know-how will remain centered in Taiwan for the foreseeable future. The latest thinking, therefore, is not that the semiconductor chokepoint can be eliminated, but that it must be managed: by building redundancy, deepening alliances, protecting Taiwan's stability, strengthening supply chains, and ensuring that the concentration of chip manufacturing does not become a single point of failure for the global economy.

CRITICAL MINERALS: PROCESSING POWER AND STRATEGIC DEPENDENCY

If semiconductors represent the technological apex of industrial chokepoints, critical minerals represent their material foundation. Modern technologies, from electric vehicles to wind turbines to defense systems, depend on a range of minerals that must be extracted, processed, and refined before they can be used.

While many of these minerals are geographically dispersed, processing and refining capacity is highly concentrated, particularly in China. For several key materials, China dominates the midstream stages of the supply chain:

RARE EARTH ELEMENTS

China accounts for approximately 85–90 percent of global processing capacity. ^{xviii}

LITHIUM

China processes roughly 60–70 percent of global lithium supply. ^{xix}

COBALT

Around 70–75 percent of global cobalt refining takes place in China. ^{xx}

GRAPHITE

China controls more than 90 percent of battery-grade graphite processing. ^{xxi}

This concentration creates a chokepoint that is not immediately visible on a map but is no less consequential. Even when raw materials are mined in countries such as Australia, Chile, or

the Democratic Republic of Congo, they are often shipped to China for processing before being incorporated into final products.

The strategic implications have become increasingly clear. Export controls, investment restrictions, and industrial policy measures are being used to secure access to these materials and to reduce dependence on single-country suppliers. The United States and its allies have launched a range of initiatives aimed at diversifying supply chains, including partnerships, financing mechanisms, and incentives for domestic processing.

BATTERY SUPPLY CHAINS AND THE NEW INDUSTRIAL CORE

The rapid growth of electric vehicles and energy storage has created a new set of industrial chokepoints centered on battery supply chains. These systems integrate multiple layers of dependency, from critical minerals to chemical processing to cell manufacturing.

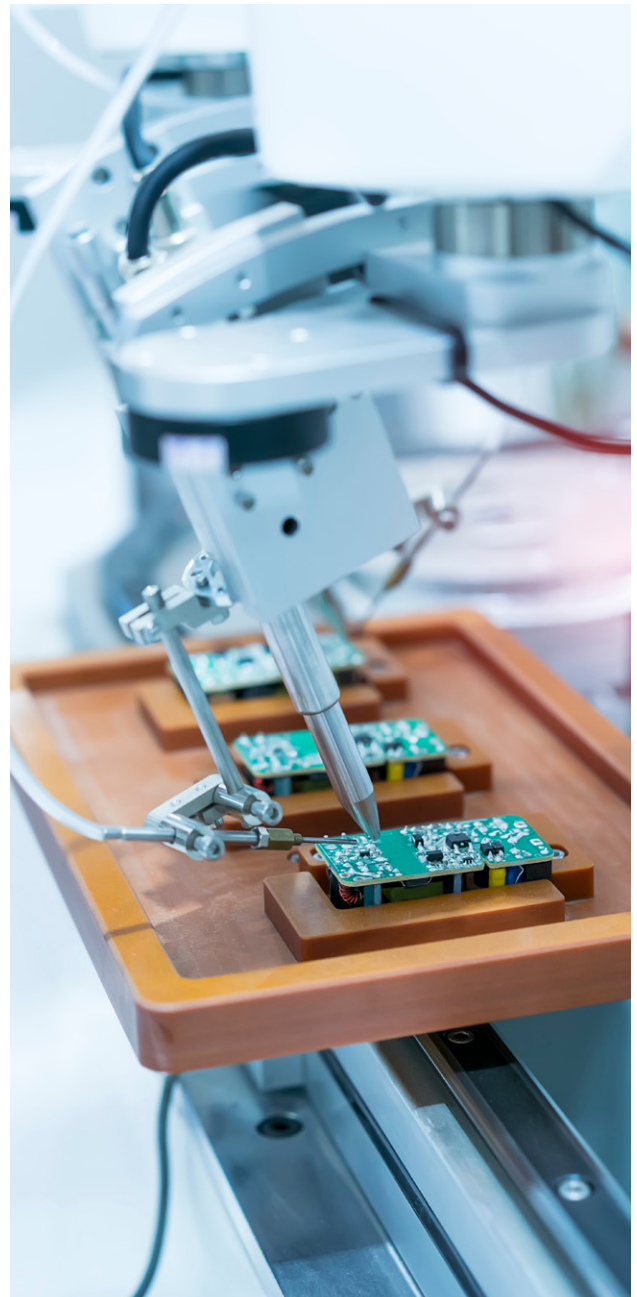
China's dominance extends across much of this value chain. It is the world's leading producer of lithium-ion batteries, accounting for more than 70 percent of global manufacturing capacity. ^{xxii} It also plays a central role in cathode and anode production, as well as in the refining of key inputs.

However, these efforts face structural constraints. Battery supply chains are deeply integrated, and shifting production involves not only building new factories, but also securing reliable supplies of upstream materials. This creates a layered system of chokepoints, in which vulnerabilities at one stage can propagate through the entire chain.

INDUSTRIAL CHOKEPOINTS AS INSTRUMENTS OF STATECRAFT

As industrial chokepoints have become more visible, they have also become more politicized. States are increasingly using their position within these systems to exert influence. China's export controls on rare earth elements and other critical materials provide a clear example.^{xxiii} By restricting access to key inputs, it can shape global supply and influence downstream industries. Similarly, US export controls on advanced semiconductors and manufacturing equipment are designed to limit China's ability to develop cutting-edge technologies.

These measures reflect a broader shift toward what might be termed “chokepoint economics”: the use of control over critical nodes in the global economy as a tool of strategic competition. Unlike traditional trade policy, which focuses on tariffs and market access, chokepoint economics operates through control of production, processing, and technology.



THE LIMITS OF DIVERSIFICATION

While these strategies can enhance resilience, they also face practical limits. Industrial ecosystems are complex, and building new capacity takes time. In some cases, alternative suppliers simply do not exist at scale. In others, cost considerations make diversification economically challenging.

In this sense, industrial chokepoints are not easily eliminated; they are reconfigured. The challenge for policymakers is not to remove chokepoints entirely (a near impossibility) but to manage their risks and reduce their most acute vulnerabilities.

The Fourth Chokepoint: **DIGITAL**

If physical, infrastructure, and industrial chokepoints constrain the movement and production of goods and energy, digital chokepoints constrain the flow of information that increasingly underpins the global economy. In an era defined by data, connectivity, and artificial intelligence, control over digital infrastructure has become a critical dimension of economic and strategic power.

Unlike traditional chokepoints, which

are often visible and geographically fixed, digital chokepoints are less apparent but no less consequential. They are embedded in the physical and institutional architecture of the internet: subsea cables, data centers, cloud platforms, and network infrastructure. Together, these systems form the backbone of the digital economy, enabling everything from financial transactions to global communications to advanced computing.

SUBSEA CABLES: THE HIDDEN ARTERIES OF THE DIGITAL ECONOMY

At the foundation of the global internet lies a vast network of subsea cables that carry more than 95 percent of international data traffic.^{xxiv} These cables, stretching across oceans and connecting continents, are the digital equivalent of maritime trade routes: high-capacity conduits through which enormous volumes of information flow.

As with trade routes, subsea cables are highly concentrated and vulnerable. A relatively small number of routes carry a large share of global data traffic, and key landing points, such as those in the United States, Western Europe, and parts of East Asia, serve as critical nodes in the system.

Disruptions to these cables, whether caused by natural events, accidents, or deliberate actions, can have significant consequences.^{xxv} Cable cuts in regions such as the Mediterranean and the South China Sea have periodically disrupted internet connectivity, highlighting the fragility of the system. More concerning is the potential for intentional interference in a context of geopolitical tension, where digital infrastructure could become a target of strategic competition.



Credit: Google

CLOUD INFRASTRUCTURE AND PLATFORM CONCENTRATION

Above the physical layer of cables lies the cloud infrastructure that powers the digital economy. Cloud computing has enabled the centralization of data storage and processing, allowing firms and governments to access computing resources on demand. However, this centralization has also created new chokepoints.

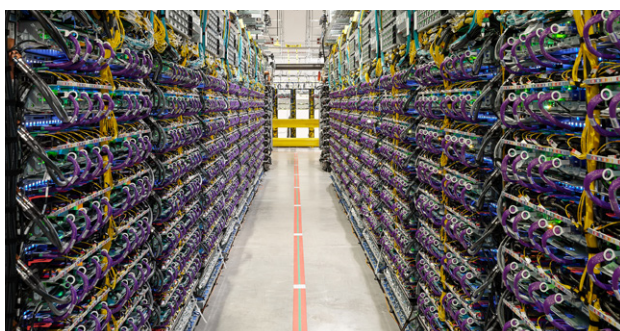
A small number of firms dominate the global cloud market, account for a substantial share of global cloud infrastructure, hosting critical applications, data, and services. This concentration creates both efficiencies and vulnerabilities.^{xxvi} On the one hand, large-scale cloud providers offer reliability, scalability, and security that would be difficult for individual firms to replicate. On the other hand, dependence on a small number of platforms introduces systemic risk. Outages at major cloud providers have, on multiple occasions, disrupted services across a wide range of sectors, from finance to health-care to transportation.

DATA CENTERS, ENERGY, AND THE PHYSICAL LIMITS OF THE DIGITAL ECONOMY

While digital systems are often perceived as intangible, they are deeply dependent on physical infrastructure, most notably data centers. These facilities, which house the servers that process and store data, are becoming increasingly central to economic activity.

The rapid growth of artificial intelligence and digital services is driving a surge in demand for data center capacity. This, in turn, is creating new forms of concentration. Data centers are often clustered in regions with access to reliable electricity, cooling capacity, and network connectivity. As a result, certain geographic areas, such as Northern Virginia in the United States, parts of Western Europe, and select locations in Asia, have emerged as major hubs.

However, this concentration introduces new vulnerabilities. Data centers are highly energy-intensive, and their operation depends on stable electricity supply.^{xxvii} They also require significant amounts of water for cooling, linking digital infrastructure directly to environmental constraints. In regions already experiencing water stress, the expansion of data centers can create competition between industrial, agricultural, and residential users.

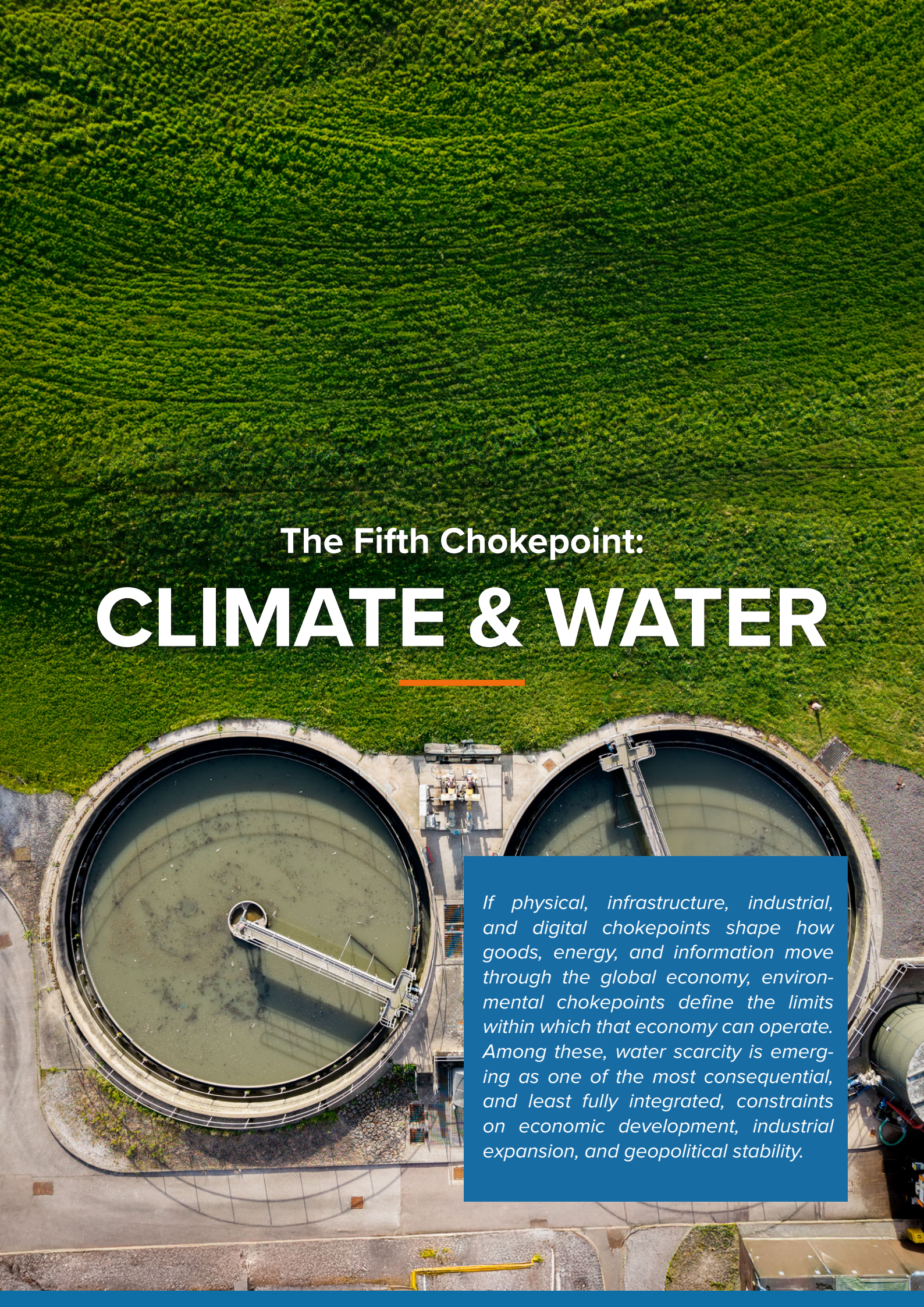


DIGITAL CHOKEPOINTS AND STRATEGIC COMPETITION

As with other categories of chokepoints, digital infrastructure is increasingly a domain of geopolitical competition. States are seeking to secure their position within the digital economy by investing in infrastructure, regulating platforms, and shaping standards.

THE CONVERGENCE OF PHYSICAL AND DIGITAL SYSTEMS

This interdependence creates new forms of systemic risk. A cyberattack on a digital system can disrupt physical infrastructure, while a failure in physical systems (such as power outages) can affect digital operations. The boundaries between different categories of chokepoints are therefore becoming increasingly blurred.



The Fifth Chokepoint: **CLIMATE & WATER**

If physical, infrastructure, industrial, and digital chokepoints shape how goods, energy, and information move through the global economy, environmental chokepoints define the limits within which that economy can operate. Among these, water scarcity is emerging as one of the most consequential, and least fully integrated, constraints on economic development, industrial expansion, and geopolitical stability.

WATER AS AN ECONOMIC CHOKEPOINT

Water is foundational to virtually every sector of the modern economy. It is essential for agriculture, energy production, mining, and manufacturing. Yet in many regions, water availability is no longer sufficient to meet rising demand.

This is not a distant or abstract risk. Water scarcity is already constraining economic activity in key industrial regions. In northern Mexico and the US Southwest, prolonged drought conditions have limited agricultural output, reduced hydropower generation, and raised concerns about the sustainability of industrial expansion. In northern China and parts of India, water stress is affecting both agricultural productivity and manufacturing capacity.

What distinguishes water as a chokepoint is not only its scarcity, but its non-substitutability. Unlike energy sources, which can be diversified, or supply chains, which can be reconfigured, water has few viable substitutes at scale. When water is unavailable, production slows or stops.



THE WATER–ENERGY–FOOD NEXUS

Understanding water as a chokepoint requires moving beyond sector-specific analysis to consider the interdependencies between water, energy, and food systems. This is the central insight of the water–energy–food nexus framework developed and advanced by the World Economic Forum (WEF). [xxviii](#)

As the WEF has emphasized, efforts to decarbonize energy systems are deeply intertwined

with water availability. The expansion of renewable energy, while reducing carbon emissions, introduces new resource demands and trade-offs. Solar and wind power are less water-intensive than fossil fuels, but the broader energy transition (including hydrogen production, battery manufacturing, and grid expansion) still depends on reliable water supplies. [xxix](#)

WATER AND INDUSTRIAL SUPPLY CHAINS

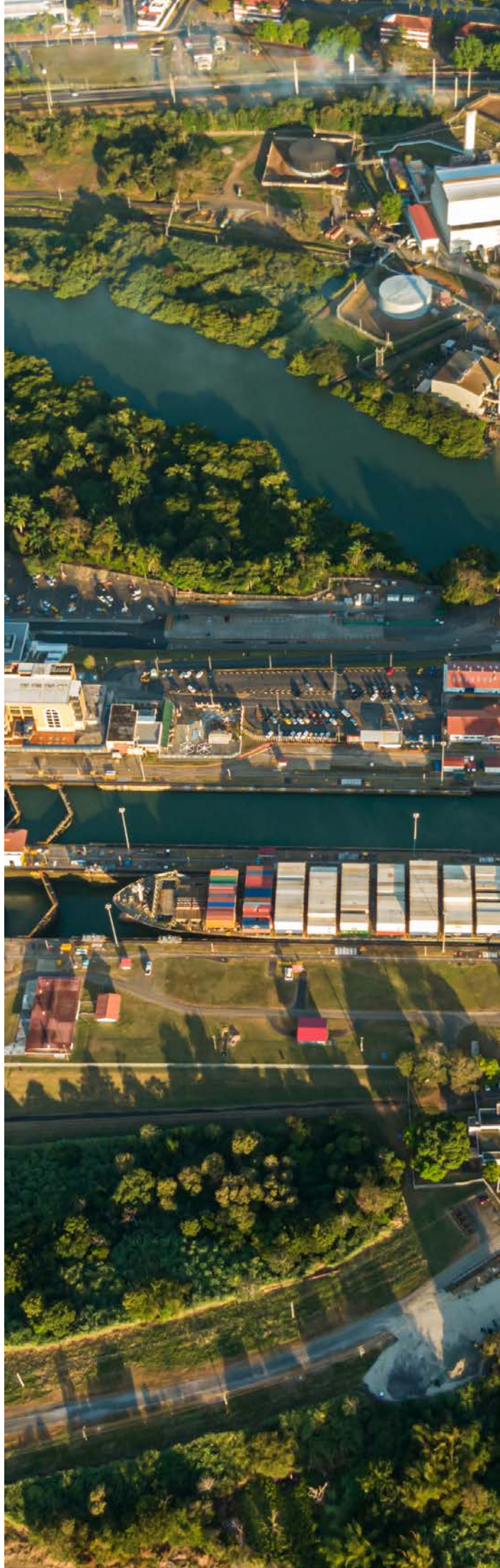
Environmental chokepoints are increasingly intersecting with industrial chokepoints, creating compound vulnerabilities. Many of the industries central to the energy transition are highly water-intensive. Lithium extraction, copper mining, and rare earth processing all require significant water inputs. Semiconductor manufacturing is another notable example, with advanced fabrication facilities consuming large volumes of ultra-pure water.

CLIMATE CHANGE AND THE INTENSIFICATION OF CONSTRAINTS

Climate change is amplifying the impact of environmental chokepoints by increasing variability and uncertainty in water availability. Droughts are becoming more frequent and severe in many regions, while changes in precipitation patterns are affecting river flows and reservoir levels.

These dynamics are already affecting infrastructure systems. The reduced capacity of the Panama Canal due to drought is one example; declining water levels in major river systems are another. In Europe, low water levels in the Rhine have disrupted inland shipping and industrial activity. In South Asia and Africa, changing hydrological patterns are affecting both agriculture and energy production.

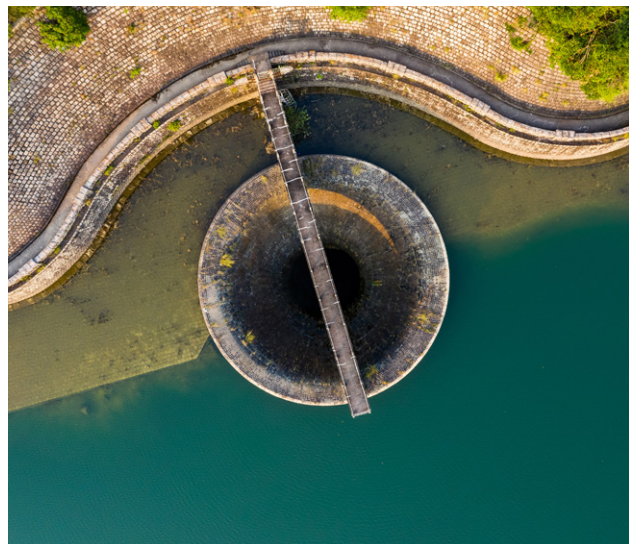
The insurance sector is beginning to recognize these risks. Climate-related disruptions to water and energy systems are increasing the frequency and severity of economic losses, creating new challenges for risk management and financial stability.^{xxx}



WATER AS A SOURCE OF GEOPOLITICAL TENSION

In addition to its economic implications, water is emerging as a source of geopolitical friction. Many of the world's major river systems are shared by multiple countries, creating potential for conflict over access and control. The Nile Basin provides a prominent example, where tensions between Ethiopia, Sudan, and Egypt have been shaped by the construction of the Grand Ethiopian Renaissance Dam. The Indus Basin, shared by India and Pakistan, represents another long-standing source of tension, particularly in the context of broader political disputes.

Even in regions with strong institutional frameworks, water scarcity is creating new challenges. The Colorado River, which supplies water to both the United States and Mexico, is under increasing stress due to prolonged drought and over-allocation. Negotiations over water sharing are becoming more complex, with implications for agriculture, urban development, and cross-border relations.^{xxxix}



FROM CONSTRAINT TO STRATEGY

The growing importance of environmental chokepoints is forcing a shift in how policy-makers think about economic development and security. Water can no longer be treated as a background variable; it must be integrated into strategic planning across sectors. The World Economic Forum's work on the nexus emphasizes the need for systems-level approaches that recognize interdependencies and seek to optimize outcomes across water, energy, and food systems.^{xxxix} This includes environmental chokepoints in the architecture of global power. Taken together, these dynamics suggest that environmental constraints are becoming central to the architecture of global power. They shape where economic activity can occur, how supply chains are configured, and how states interact with one another. In this sense, environmental chokepoints represent both a constraint and a catalyst. They limit certain forms of activity, but also drive innovation, investment, and new forms of cooperation. Managing these chokepoints will be one of the defining challenges of the coming decades.



The Sixth Chokepoint: MONEY & FINANCE

If physical chokepoints constrain the movement of goods, industrial chokepoints constrain production, and digital chokepoints constrain information flows, financial chokepoints constrain the movement of capital and the functioning of the global monetary system itself. As Edward Fishman has argued, in the 21st century global economy, control over financial infrastructure has become one of the most powerful, and often least visible, forms of strategic leverage. ^{xxxiii}

Unlike maritime passages or industrial supply chains, financial chokepoints are institutional rather than geographic.

They are embedded in the structures through which money moves: reserve currencies, payment systems, correspondent banking networks, clearing mechanisms, sovereign debt markets, and capital markets. Together, these systems form the circulatory system of the global economy. Their concentration creates enormous efficiencies under normal conditions but also provides states and institutions with unprecedented capacity to monitor, restrict, or weaponize financial flows. As a result, finance has become one of the central domains of modern economic statecraft.

THE DOLLAR SYSTEM AS A GLOBAL CHOKEPOINT

At the center of the contemporary financial system lies the US dollar. Despite repeated predictions of decline, the dollar remains the dominant reserve currency, the principal medium for international trade settlement, and the foundation of global liquidity. A majority of global foreign exchange reserves continue to be held in dollars, while a substantial share of international trade, including oil and commodity transactions, is denominated in the US currency.^{xxxiv}

This dominance creates a structural financial chokepoint. Because international dollar transactions frequently pass through US-regulated financial institutions and clearing systems, the United States possesses extraordinary visibility into, and influence over, global financial flows. Access to dollar liquidity and the US financial system has become essential for states, banks, multinational corporations, and investors alike.

The implications are profound. The global role of the dollar gives the United States a level of structural power unmatched by any other actor in the international economy. This power does not derive solely from military strength or market size, but from the centrality of US-based financial infrastructure to the operation of the global system itself.

In practical terms, this means that exclusion from the dollar system can function as a form of economic isolation. States or firms cut off from dollar clearing mechanisms face severe constraints on trade, financing, and investment. In this sense, the dollar system operates as both an enabler of globalization and a chokepoint through which pressure can be applied.



SWIFT, PAYMENTS INFRASTRUCTURE, AND FINANCIAL CONNECTIVITY

Beyond the dollar itself, the infrastructure of global payments constitutes another critical financial chokepoint. The Society for Worldwide Interbank Financial Telecommunication (SWIFT), headquartered in Belgium, facilitates secure financial messaging between thousands of financial institutions worldwide. Although SWIFT does not itself transfer money, it provides the communications architecture through which international payments are coordinated.

Because of its centrality, access to SWIFT has become strategically significant. The removal of Iranian banks from SWIFT in 2012, and the partial exclusion of Russian banks following the invasion of Ukraine in 2022, demonstrated the extent to which participation in the global financial system can be restricted through control of key financial infrastructure.

These measures revealed a broader reality: financial connectivity is not politically neutral. Participation in the global economy increasingly depends on access to networks governed by regulatory frameworks, compliance systems, and geopolitical alignments.

At the same time, the concentration of payments infrastructure creates systemic vulnerabilities. Cyberattacks on financial institutions, disruptions to settlement systems, or failures in clearing mechanisms could generate cascading effects across the global economy. As financial systems become increasingly digitalized and interconnected, these risks are likely to grow.^{xxxv}



CAPITAL MARKETS AND THE GEOGRAPHY OF FINANCIAL DEPENDENCE

Global capital markets also function as chokepoints through the concentration of liquidity, investment capacity, and financial intermediation. A relatively small number of financial centers, New York, London, Hong Kong, Singapore, and increasingly a handful of Gulf and Asian hubs, dominate cross-border finance.

This concentration gives major financial centers disproportionate influence over access to capital. Sovereign borrowing costs, corporate financing, and investment flows are shaped not only by domestic economic conditions, but also by perceptions within global financial markets. Ratings agencies, institutional investors, and large asset managers therefore exert considerable indirect influence over national economic trajectories.

For emerging markets, this creates a structural vulnerability. Dependence on external financing exposes countries to shifts in global liquidity conditions, interest rate cycles, and investor sentiment. US Federal Reserve policy decisions, for example, can trigger capital outflows, currency depreciation, and financial instability far beyond US borders.

In this sense, global finance functions as a chokepoint not because capital cannot move, but because it is highly concentrated and deeply hierarchical. Access to affordable capital remains unevenly distributed, and disruptions at major financial nodes can propagate rapidly throughout the system.

FINANCIAL SANCTIONS AND THE RISE OF ECONOMIC STATECRAFT

The growing strategic importance of financial chokepoints has transformed sanctions into one of the defining instruments of modern economic statecraft. Historically, sanctions were often blunt and relatively ineffective tools. Today, however, the integration and transparency of the global financial system have dramatically increased their reach and potency.

Modern sanctions operate by restricting access to critical financial infrastructure: dollar clearing systems, correspondent banking networks, sovereign reserves, export financing, and capital markets. Because so much of global commerce depends on these systems, sanctions can exert pressure far beyond the targeted jurisdiction.

The freezing of Russian central bank reserves following the invasion of Ukraine represented a particularly significant evolution.^{xxxvi} It demon-



strated that sovereign reserves held within the Western financial system could themselves become vulnerable to geopolitical conflict. This raised fundamental questions about the neutrality of reserve assets and accelerated discussions among some states about diversification away from Western-controlled financial infrastructure.

At the same time, financial sanctions have become increasingly targeted and sophisticated. Rather than imposing broad trade embargoes alone, governments now focus on specific banks, firms, sectors, technologies, and individuals. This reflects the emergence of what might be termed “networked coercion”: the use of centrality within financial networks to impose economic costs on adversaries.



DE-DOLLARIZATION AND THE SEARCH FOR STRATEGIC AUTONOMY

The weaponization of financial infrastructure has also generated efforts to reduce dependence on existing chokepoints. China, Russia, and several other countries have sought to develop alternative payment systems, increase the use of local currencies in trade, and diversify reserve holdings.

China's Cross-Border Interbank Payment System (CIPS), efforts to expand renminbi-denominated trade settlement, and discussions among BRICS countries about alternative financial arrangements all reflect attempts to reduce vulnerability to Western-controlled systems.^{xxxvii}

However, the limits of these efforts remain substantial. The dominance of the dollar is reinforced not only by US economic power, but also by the depth and liquidity of US financial markets, the rule of law, institutional credibility, and the absence of fully comparable alternatives. Financial chokepoints are difficult to replicate because they depend on trust as much as infrastructure.

Nevertheless, the broader trend is clear: states increasingly view financial dependence as a strategic risk. Just as countries are seeking to diversify supply chains and energy systems, they are also seeking greater financial optionality.

DIGITAL FINANCE AND EMERGING FINANCIAL CHOKEPOINTS

Technological change is introducing new dimensions to financial chokepoints. Digital payment platforms, fintech systems, stablecoins, and central bank digital currencies (CBDCs) are beginning to reshape the architecture of global finance. [xxxviii](#)

These technologies could reduce transaction costs and enhance financial inclusion, but they may also create new forms of concentration and vulnerability. Large technology firms are increasingly involved in payments infrastructure, while CBDCs could alter the balance between national monetary systems and cross-border finance.

Competition over digital finance is therefore becoming part of broader geopolitical competition. Control over standards, platforms, payment rails, and digital currencies may shape future patterns of influence in much the same way that reserve currencies and banking systems have shaped the present.

At the same time, digitalization increases exposure to cyber risk. Financial systems are now deeply dependent on digital infrastructure, making them vulnerable to cyberattacks, system failures, and technological disruption. In this sense, financial chokepoints are increasingly converging with digital chokepoints.

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Financial systems are now deeply dependent on digital infrastructure.





FINANCIAL CHOKEPOINTS AS INSTRUMENTS OF ECONOMIC STATECRAFT

The strategic significance of financial chokepoints lies not simply in their existence, but in their usability as tools of coercion, leverage, and influence. In the contemporary international system, states increasingly employ financial infrastructure as an instrument of economic statecraft alongside tariffs, export controls, industrial policy, and sanctions.

This shift reflects a broader transformation in global power. Economic interdependence, once widely viewed primarily as a source of mutual benefit, is increasingly understood as a source of leverage. Financial networks, because they are highly centralized and difficult to bypass, are particularly susceptible to this logic.

The United States has been the principal practitioner of financial statecraft because of the central role of the dollar and the depth of US

financial markets. Sanctions regimes targeting Iran, Russia, Venezuela, and other states have demonstrated the ability of Washington to impose substantial economic costs through restrictions on financial access. Secondary sanctions, which threaten penalties against third parties engaging with sanctioned actors, further extend this reach by leveraging the global dependence on US financial infrastructure.

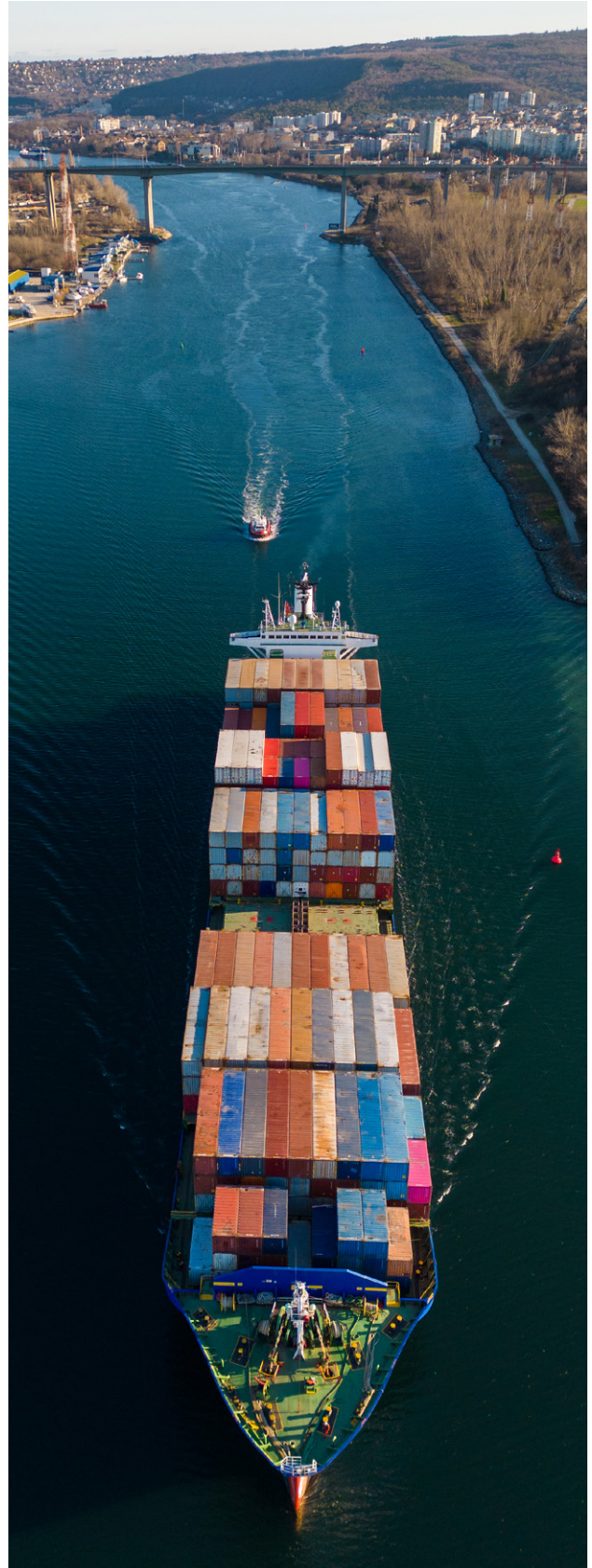
Yet financial statecraft is not limited to sanctions alone. Access to development finance, export credit, sovereign lending, and multilateral financial institutions can also function as tools of influence. China's overseas lending through state-backed institutions and infrastructure financing initiatives represents another model of financial leverage, one that ties capital flows to strategic and geopolitical objectives.

CONCLUSION: CHOKEPOINTS AND THE FUTURE OF GLOBAL POWER

The global economy is entering a new era in which vulnerability, concentration, and interdependence are becoming defining features of international affairs. For much of the post–Cold War period, globalization was understood primarily through the lens of efficiency: reducing costs, accelerating flows, integrating markets, and maximizing connectivity. Yet the very systems that generated unprecedented prosperity have also created new forms of fragility. The world economy now depends on a relatively small number of critical nodes through which energy, goods, capital, data, and resources must pass. These chokepoints are increasingly shaping the distribution of power in the international system.

These chokepoints are deeply interconnected. A drought affecting the Panama Canal disrupts energy flows and supply chains. Water scarcity constrains semiconductor manufacturing and critical mineral processing. Cyberattacks on digital systems threaten financial infrastructure and electricity grids. Financial sanctions reshape trade routes and industrial investment decisions. The architecture of globalization is therefore no longer best understood as a series of separate systems, but as a dense and overlapping network of dependencies.

The challenge, therefore, is not to eliminate chokepoints, but to manage them intelligently: diversifying where possible, building redundancy where necessary, and treating resilience as a strategic asset.



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