



From Interdependence to Vulnerability: The Political Economy of Maritime Chokepoints and Economic Security in the Contemporary International System

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ABSTRACT

This essay examines how maritime chokepoints become focal points of global trade networks that introduce vulnerabilities. This study challenges the assumption of early International Political Economy (IPE) theory and literature, which regarded complex interdependence as a stabilizing force in global politics, and argues that states can exploit strategic vulnerabilities in shipping, such as chokepoints like the Straits of Malacca, Hormuz, Bab-el-Mandeb, the Turkish Straits and the Suez and Panama Canals, for political ends. By combining structural realism, the weaponised interdependence conceptual frameworks and Robert Keohane and Joseph Nye's interdependence theory, we illustrate how the structural constraints become a source of asymmetric shocks, state-sponsored coercion, and non-state disruptions to states. This article illustrates how localised disturbances lead to global supply chain failures using case studies, such as the Red Sea security issue and the Panama Canal's architectural vulnerabilities. We argue that rather than being based on market efficiency, state-enforced marine governance, strategic redundancy, and multilateral infrastructure security are essential to economic security.

Keywords: *Vulnerability, Exploitation, Strategic Planning, Structural Realism, Chokepoints.*

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Introduction

Today's global value chains are important for connecting long-distance manufacturing plants to consumer markets. The paradigm of International Political Economy (IPE) for decades has been that these close commercial linkages would avoid conflict, minimize transaction costs, and foster peaceful cooperation (Gilpin 2001, 14–22). This globalised trade, and its attendant security interests, was viewed from a complex interconnectedness and neoliberal institutionalism perspective that argued that shared security interests were inevitable (Keohane and Nye 2011, 4-11). Yet this systemic reliance on international trade elides an important geographical reality: the world economy is reliant on a few very narrow maritime choke points (Rodrigue 2020).

More than 80% of global trade (by volume) and 70% (by value) is carried out through sea transport (IMO 2024). Much of this traffic passes through narrow straits, such as the Strait of Malacca, the Strait of Hormuz, Bab-el-Mandeb, the Turkish Straits, the Suez Canal, and the Panama Canal. These chokepoints are part of global logistics, and are particularly vulnerable to disruption since they are natural physical choke points where the flow of shipping is limited due to the presence of small rivers (Stopford 2009, 322-328).

This article explores the challenges that come with traditional understandings of economic interdependence due to these physical constraints. We ask the question: How do states use maritime chokepoints for economic coercion and national security and how do they render economic interdependence into systemic vulnerability?

We believe that structural risks have emerged as a result of the pursuit of supply chain efficiency. Interdependence is said to become asymmetric if marine movements are confined to a few key corridors. This structural asymmetry allows both state and non-state actors to use these choke points to help them exercise their sovereignty and influence over international trade routes (Farrell and Newman 2019, 45).

1.1 Interdependence, Realism and Maritime Geopolitics in Literature

The relationship between State security and international trade is one of the main issues in international relations. The section highlights the

evolution of views that had regarded commercial weakness as a strategic vulnerability to a perception of the commercial potential as a force for peace.

1.2 The Liberal Commerce Paradigm is a product of Complex Interdependence

The liberal view on political economy predicts that, the more integrated the economy, the less likely it is to be a cause for interstate conflict (Luttwak 1990, 18). The traditionalists argued that trade strengthens the ties of economic intercourse between the two sides, making war anything but worthwhile. In the late 20th century, Robert Keohane and Joseph Nye (2011) refuted this concept with their theory of complex interdependence. They argued that the growing trade, financial and corporate networks were destroying existing state hierarchies, making collaboration more likely and armed force less effective. Sensitivity and vulnerability are two crucial aspects of interdependence, as argued by Keohane and Nye (2011, 12–15).

The sensitivity measures how quickly a change in one system component leads to costs in other parts of the system in advance of changes to regulations. In fact, vulnerability is a state's long-term potential for costs due to outside events, even when domestic policies have been adjusted to find alternate suppliers or routes. Early liberal research focused on these relationships, and they were seen as reducing conflict, but often failed to account for the possibility of geographic concentration of these vulnerabilities (Spykman 1944).

1.3 The Security Dilemma and the Structural Realism Approach

The Security Dilemma and Structural Realism approach. It is not, however, the economic interconnectedness that is considered to bring peace by structural realists, but rather as a potential cause of conflict. The state becomes vulnerable when it relies on a market and resources that are not managed by itself, as per Kenneth Waltz (1979, p.104-107). This dependence can create competitive situations as states fear losing out on profits and getting cut off from crucial supplies in disaster scenarios.

According to this viewpoint, economic reliance can quickly lead to a security conundrum. Rivals often consider a state's actions to protect its trade lanes or expand its navy as aggressive (Posen 2003, 8).

This is especially true in the maritime strategy. As pointed out by Albert Mahan (1890), control of sea lanes is a strong point of any nation. Realist academics argue that governments would try to block or direct the use of vital maritime routes to protect themselves and assert authority over other states as long as the international system is anarchic (Till 2018). When it comes to weapons, there are interdependence and networked vulnerabilities.

With their concept of weaponised interdependence, academics like Henry Farrell and Abraham Newman (2019) have recently questioned the conventional distinction between liberalism and realism. They argue that globalisation has not generated a level playing field or decentralised marketplace. Rather, it has resulted in highly centralised networks that are controlled by a small number of important hubs (Farrell and Newman 2023). These information or physical centres can be strategically controlled by the states that can help them to gain a strategic edge.

1.4 Critical Infrastructure and Maritime Geopolitics

Sea lines of communication (SLOCs) are extremely vulnerable to both state activities and non-state threats, as maritime security scholars have long noted (Kraska 2011). Sea lanes are never land, and cannot therefore be secured or occupied as such, as traditional maritime theorists such as Julian Corbett (1911) have pointed out. Current research focuses on technical and operational risks these marine corridors are currently subject to, such as piracy, grey-zone tactics and regional wars (Fels and Truong-Minh 2020). The research, however, still does not connect specific, regional geopolitical struggle around the maritime bottlenecks and the macroeconomics models. This article is an example of the ways in which geographical and physical constraints can help to create market-driven interdependence that can be used as a geopolitical weapon.

Our desire is to develop an integrated paradigm that takes into account the concepts of network theory, structural realism and neoliberal institutionalism, in order to understand the role maritime chokepoints play in shaping world stability. This section explains how these numerous theories are linked together in the formation of systemic vulnerabilities due to physical obstacles.

2.1 Characterising the Physical Space Chokepoint Effect

In network theory, betweenness centrality is the number of shortest paths between two nodes that pass through a third node, highlighting the importance of the node in the network (Rodrigue 2020). Maritime chokepoints have extremely high betweenness centrality. If a regular maritime route is unavailable, shippers are forced to take longer routes and higher costs to get around (Stopford 2009).

Asymmetric reliance occurs if there is a high betweenness centrality of a maritime corridor, but few viable alternatives (Farrell and Newman 2019). If they can control, interrupt or influence this corridor, a state or actor gains structural power over any country that relies on this corridor to survive or thrive (Keohane and Nye 2011).

2.2 The Relationship between Geography and Power

This dynamic modifies our understanding of the connection between military might and economic prosperity in a number of ways:

Asymmetric Costs: A state can interfere with international trade without a large blue-water fleet. If it controls territory directly next to a chokepoint, it may be able to project a great deal of influence over international trade, with proxy, low-cost, asymmetrical weapons such as land-based anti-ship missiles, naval mines, or uncrewed surface boats (USVs) (Till 2018).

Highly developed economies which rely primarily on importation from just in time supply chains are often more vulnerable to such shocks than less connected economies (Nordhaus 2024). They have had lesser margins for safety due to their drive for economic efficiency, making them very sensitive to delays.

This structural imbalance could be used to weaponize the "chokepoint effect" for economic statecraft by states (Farrell and Newman 2023). A state might be able to put pressure on its foes without resorting to war by imposing delays on inspections, imposing higher transit fees or threatening to shut down a waterway.

2.3 The Matrix of Analysis

These chokepoints can be analysed through three main lenses that can be used to systematically

evaluate these risks (adopted from Rodrigue 2020, Gholz 2020).

3.1 The Malacca Strait

The Strait of Malacca (Chang 2018), which lies between the Malay Peninsula and the island of Sumatra in Indonesia, is 550 miles (880 km) long. This is the chief sea corridor connecting the South China Sea, the Indian Ocean and the greater Pacific Ocean.

Economic cargo: The strait is used by more than 90,000 vessels annually on average, for an economic cargo of roughly 40% of all international trade (IMO 2024). This comprises more over 16 million barrels of oil per day, the most of which are headed for South Korea, Japan, and China (Ross 2023).

Geographic bottlenecks: The shipping channel is as narrow as only 1.7 miles at the narrowest point, the Phillips Channel in the Singapore Strait. This natural bottleneck puts vessels at risk of impact and sudden disruptions (Rodrigue 2020).

Chinese planners call this tiny strait the “Malacca Dilemma” (Chang 2018). In case of a geopolitical crisis, China is afraid that other countries could seal off the strait, depriving it of the raw materials and energy supplies (Mirski 2023). It is this fear that drives China's plans to build overland energy pipelines through Central Asia and Myanmar and its expansion in the Indian Ocean navy (Kaplan 2010).

3.2 The Hormuz Strait

The Strait of Hormuz links the Arabian Sea, the Gulf of Oman and the Persian Gulf. It is the most important energy corridor in the world (Al-Tamimi 2021).

Between one and two million barrels of oil pass through the strait every day, making it 20% of the world's liquid petroleum consumption (Gholz 2020). Moreover, it's an integral path for LNG, particularly Qatar's.

Geographic bottlenecks: There is a two-mile buffer zone between the two-mile-wide inbound and outbound shipping lanes of the strait. These kinds of channels are within the territorial waters of Iran and Oman (Al-Tamimi 2021).

Strategic Vulnerabilities: The small configuration of the strait makes it very vulnerable from a regional

conflict point of view. The waterway has been a source of strength for Iran, who has long threatened to close the strait when diplomacy is tense, from its position on the northern coast of the strait (Gholz 2020).

Hormuz is a constant reminder of the dangers that Iran poses to international trade, particularly by using naval mines, fast attack craft and shore-based anti-ship missiles (Black and Mitchell 2022).

3.3 Suez Canal and Bab-el-Mandeb

The Bab-el-Mandeb and the Suez Canal (Hayuth 2022) create an important marine route linking the Indian Ocean with the Mediterranean Sea through the Red Sea.

Combined they handle 12-15 percent of the world's trade, including a significant share of gas and oil flowing from the Gulf to Europe, and 30 percent of all container traffic (IMO 2024).

Geographical bottlenecks: The Bab-el-Mandeb (the gateway of the teeth), an 18-mile-wide strait separates Yemen in the Arabian Peninsula and Djibouti and Eritrea in the Horn of Africa. The 120-mile long man-made Suez Canal connecting Egypt requires careful transport management (Blaydes 2024).

Strategically sensitive: Small configuration makes the strait a high-risk area in case of regional conflict. In many instances when diplomatic relations between Iran and its neighbors reach their highest levels of conflict, Tehran has threatened to close the waterway by asserting itself from its vantage point along the northern shore of the strait (Gholz 2020).

Hormuz is a constant battleground for global energy security as Iran is easily capable of threatening international commerce with naval mines, fast attack craft and shore-based anti-ship missiles (Black and Mitchell 2022).

4.1 Case Study 2 is a study on the Climate Crisis in the Panama Canal (2023–2024).

The disruptions in the Panama Canal were caused by environmental concerns and the Red Sea crisis by geopolitical turmoil, both during the same time period (Evans 2024). The Canal of Panama suffered its lowest water levels in history because of the exceptionally strong El Niño trend (National Research Council 4.4 The Canal of Panama) over

the entire Central American region during the period of extreme drought.

The Panama Canal is an artificial waterway which cuts through the Panamanian Isthmus and links the Atlantic and Pacific Oceans (National Research Council 2023).

ESR: It is the largest category of container traffic in the United States, representing 40% of all container traffic in the United States and about 5% of all marine trade in the world (IMO 2024). It is an essential route for shipments of liquefied petroleum gas (LPG) and agricultural products from the US Gulf Coast to Asia.

In contrast to sea-level straits (Evans 2024) the Panama Canal relies on a complicated set of locks fed by freshwater from Gatun Lake.

Geographic bottlenecks: The Panama Canal relies on an intricate network of locks fed by freshwater from Gatun Lake, in contrast to a sea-level strait (Evans 2024).

Environmental Concerns: the canal poses significant environmental risks. Severe droughts can cause lower water levels in Gatun Lake, which could require the Panama Canal Authority to limit daily transits and/or vessel drafts (National Research Council 2023). The impacts of climate change on maritime networks are not only geopolitical, but also natural, as in this instance.

Cascading Vulnerabilities: Macroeconomic Transmission of Shocks, is the title of the article. The article's title is Cascading Vulnerabilities: Macroeconomic Transmission of Shocks.

Rising costs of closing or disrupting a key maritime chokepoint are seldom confined to that chokepoint. Rather, they have an impact on far-off markets and sectors through global supply chains. The particular mechanisms in which these localised disruptions become more widespread economic shocks are explained in this section.

Chokepoint Disruption

The diverted traffic can be redirected to other routes, leading to a rise in ton miles demand and consequently freight rates.

This is an important point to keep in mind. Delayed Cargoes are items that are overdue, which is also known as Warehouse Drawdowns, and which may trigger Inventory Shortages.

Increasing Insurance ———▶ Risk Premiums
————▶ Consumer Price Inflation

Ships and containers are kept at sea for longer periods of time due to this longer voyage, which lowers the total number of vessels available globally and raises freight rates (Becker and Morgan 2024).

4.2 Logistics Just in Time (JIT) and Disruption of Microeconomics

Just in time (JIT) inventory systems which are designed to reduce the cost of inventory holding by keeping a minimum amount of stock on hand and ensuring that the inventories are replenished regularly and in predictable quantities are the key to successful modern production (Stopford 2009). This very efficient system breaks down on delays at chokepoints (Nordhaus 2024):

Deliveries missing within days can cause factories to be exposed to shortages of key components, resulting in production lines being halted or slowed (Becker and Morgan 2024).

Capital Inefficiencies: Companies have to keep larger levels of inventories (stockpiles), meaning that capital is tied up and increases storage costs, which offsets the Just-In-Time (JIT) models.

- **Port Congestion:** Late arrivals at large ports lead ships to gather, at places where local trucking and offloading systems are overloaded, thus contributing to further delays in the domestic trade (Stopford 2009).

These three areas of the economy are closely interconnected. The three sectors of the economy are closely linked.

Another path through which the costs of marine disruptions cascade is through financial channels (Nordhaus 2024). The War Risk Premiums are applicable to Maritime insurers where a chokepoint becomes a war area (McNickle 2024). These additional fees can add hundreds of thousands of dollars to the cost of a single trip, and are often calculated as a percentage of the ship's value.

These increasing expenses, such as increased fuel consumption, freight rates and insurance premiums, are usually not footed by shipping companies. Instead, they raise the prices of landed commodities and push their cost up the commodity chain (Becker and Morgan 2024). Practice Tasks: Make Sure Your Class Writing and Media Skills are Current

To see how these theoretical concepts can be seen in action, we can take a look at two recent maritime crises: the Red Sea security issues and the climate change challenges at the Panama Canal.

5.1 Case Study 1: Security Crisis in the Red Sea (2023–2025)

In the aftermath of the outbreak of the conflict in late 2023, commercial vessels traversing the Bab-el-Mandeb strait came under attack via a series of drone and missile strikes by the Houthis, based in Yemen (Houthi Movement Research Group 2024).

The Houthis also used low-cost commercial drones, anti-ship cruise missiles and unmanned surface vehicles provided by external networks (Black and Mitchell 2022) to successfully challenge multibillion dollar naval air defence systems.

In terms of commercial repercussions, the volume of containers transiting the Suez Canal was reduced by over 50% by the start of 2024 (IMO 2024). Major shipping alliances redirect hundreds of vessels around the Cape of Good Hope, resulting in spot freight rates being tripled between Asia and Europe, as well as disrupting European industrial schedules (McNickle 2024).

In this instance, the issue is an example of the non-state actors dynamic of weaponised interdependence (Farrell and Newman 2023). It illustrates the potential impact of a geographical 'bottleneck' for an asymmetric group to obstruct international trade networks, which puts significant economic pressure on distant economies and complicates any international naval response operations (Houthi Movement Research Group 2024).

2023). Panama Canal Authority estimated the impact as forcing it to reduce average vessel transits from 36 to 22 or fewer per day, as per the National Research Council (2023). They also placed a number of restrictions on ships when they were drafting, making it harder for large ships to carry cargo as they had to sit high in the water. (Evans 2024)

A lack of transit slots created long backlogs of ships waiting at anchor, causing some economic costs. Some companies shifted their freight to the US West Coast ports or to longer voyages around South America, while others bid millions of dollars in auctions to not use the line (McNickle 2024).

Maritime chokepoints are vulnerable to both political and ecological shifts, as highlighted in this scenario (De Sombre 2017). Its message is that global economic security demands stable environmental conditions, and that climate volatility can highlight the same basic issues and vulnerabilities in global supply chains that military blockades can.

The security risks outlined in this paper (Nordhaus 2024) are raised by using only market-driven efficiency. Governments and companies need to develop strategies with a focus on network resilience and strategic redundancy to safeguard international trade (Black and Mitchell 2022).

6.1 Alternative corridors and infrastructure redundancy

One approach in the longer-term for reducing dependence on chokepoints (Rodrigue 2020) is to develop alternative trade corridors. This includes looking into alternate geographic routes and making investments in new physical infrastructure:

Northern Sea Route (NSR): Northern Sea Route is the route over the top of Eurasia which is becoming more viable due to melting of the sea ice in the Arctic (De Sombre 2017). It bypasses Malacca and Bab-el-Mandeb straits altogether, making a journey between East Asia and Europe some 40% shorter than going via the Suez Canal. However, it faces the drawbacks of high insurance costs, variable ice conditions and geopolitical control in Russia, rendering it not a reliable replacement (Fels and Truong-Minh 2020).

Land-Based Alternatives: Projects like the International North-South Transport Corridor (INSTC) and China's Belt and Road Initiative (BRI) are looking to provide land-based transport options across Eurasia (Ross 2023). Although rail may not be able to compete with the great bulk capacity of ocean shipping, these overland networks are useful backups for valuable goods during marine crises.

Nearshoring and friendshoring: Companies are relocating manufacturing to more geographically close countries to their destination or to allied countries, to mitigate risks with distant maritime chokepoints. This reduces their lines of supply and dependence on vulnerable sea lanes (Farrell and Newman 2023).

6.2 The development of defence systems and technological adjustments

There is a need to update naval technology and operational tactics to protect marine technologies (till 2018). Naval forces are deploying directed-energy weapons (lasers) and cheap missile interceptors to counter the threat from low-cost, asymmetric drones, and are not diminishing expensive defensive stocks. (Black and Mitchell 2022)

Unmanned Underwater Vehicles (UUVs) are being used to quickly and safely detect and destroy naval mines within tight confines, thereby safeguarding vital shipping lanes, enabling navies to continue their operations.

Enhanced Satellite Tracking: AI analytics and advanced marine surveillance technologies enable operations centres to more effectively monitor ship activity and plan for emergencies in the grey zone.

6.3 International Maritime Governance Reform

Clear international legal frameworks and cooperative governance must be combined with technical and physical solutions (Young 1994). The guidelines for passing through international straits are found in the United Nations Convention on the Law of the Sea of 1982 (UNCLOS 1982) but they need to be revised to account for current issues (Kraska 2011).

Multilateral naval cooperation is crucial to ensure

freedom of navigation, for example, through international formations such as Combined Task Force 153 in the Red Sea (Black and Mitchell 2022). Long-term security will require stronger international agreements that regard important maritime chokepoints as global infrastructure and ensure their protection from unilateral coercion and war (Young 1994).

7. Conclusion

This essay has examined the linkage of economies, and how economic interdependence can be rendered strategic vulnerability, because of the geography of global trade. The prosperity of the world has been advanced by the large seas, and the chokepoints of the sea have obvious structural issues. In these small corridors, the dynamics of interdependence can be weaponized either by the state or by non-state actors, and cause a localized disruption to become a global economic shock that can trigger global disruption of supply chains.

By studying key waterways like the strait of Bab-el-Mandeb, Hormuz and Malacca, we have been able to see that maritime security is not a secondary concern anymore. Efficient business operations driven by the market need to be balanced by proactive risk management; as evidenced by the weakness identified due to environmental changes in the Panama Canal and geopolitical conflicts in the Red Sea.

Conflict of Interest

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