The 2026 Oil Squeeze: Geopolitical Volatility, Freight Dynamics, And Industrial Cost Structures

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***Abstract*—In 2026, the global oil market experiences heightened instability due to geopolitical disruptions, diminished supply flexibility, and strained maritime logistics. This study investigates the transmission of oil price volatility through freight networks and its impact on industrial cost structures, with Bangladesh serving as a representative import-dependent economy.**

This study uses a mixed-methods approach to develop the Maritime–Industrial Cost Cascade (MICC) model, which integrates geopolitical risk, energy pricing, freight dynamics, and industrial cost behavior into a single framework. Empirical data from Q1 2024 to Q1 2026 show crude oil prices rose by 25 to 30 percent, marine fuel costs increased by up to 96 percent, and freight rates escalated significantly due to route disruptions and logistical inefficiencies.

The findings show a nonlinear cost-transmission mechanism, with maritime logistics acting as a key amplification layer that accelerates energy shock transmission to industrial sectors. This leads to significant margin compression, especially in energy-intensive, export-oriented industries. The analysis also highlights systemic vulnerabilities in emerging economies, such as high energy dependency, exposure to freight volatility, and policy distortions from subsidy regimes.

This study develops an integrated framework linking energy markets, logistics, and industrial cost structures, addressing a key gap in current research. The results indicate that the 2026 oil crisis marks a structural transformation, not a cyclical fluctuation, highlighting the need for policies that promote energy diversification, logistics optimization, and industrial resilience in a volatile global energy environment.

***Index Terms*—Oil Price Volatility; Maritime Logistics; Freight Costs; Industrial Cost Structures; Bangladesh; Energy Economics; Supply Chain Disruption; Geopolitical Risk; MICC Model.**

NOMENCLATURE

Symbol	Description
Po	Crude oil price (Brent benchmark)
Fc	Freight cost factor
Ei	Energy intensity
Gr	Geopolitical risk multiplier
Ds	Supply delay factor
Ic	Industrial cost index

I. INTRODUCTION

1.1. BACKGROUND

The global oil market in 2025–2026 has moved from relative stability to greater volatility. Overlapping geopolitical disruptions, limited supply flexibility, and increased stress on maritime logistics all contribute. Previously, supply–demand adjustments were predictable. Now, structural uncertainty reigns, with political risks and logistical constraints at the core of price dynamics.

In 2025, trade fragmentation, sanctions, and uneven post-pandemic recovery fueled instability in global supply chains. These trends weakened market resilience and reduced producers' ability to handle new shocks. OPEC+ adopted a cautious approach to unwinding production cuts. As economic conditions worsened in late 2025, the group shifted focus from market share to revenue stabilization. This limited spare capacity and made the system more vulnerable to disruption.

In early 2026, geopolitical tensions escalated sharply, particularly in the Persian Gulf. Military events led to supply interruptions. Major producers declared force majeure, effectively removing a significant portion of global oil supply. Crude prices soared, jumping from around USD 65 to over USD 115 per barrel.[1] This episode underlines that geopolitical risk, once a temporary factor, now sits at the heart of oil price dynamics.

At the same time, shipping disruptions further destabilized the market. The maritime sector was already under strain from earlier Red Sea security threats. New pressures forced vessels to pass around the Cape of Good Hope, increasing trip time, fuel use, and costs. This worsened logistics inefficiencies. Partial disruptions in the Strait of Hormuz, a vital energy route, intensified the problem. Blockages in this key passage increased supply constraints beyond production issues.[2]

Together, these events created a dual chokepoint crisis, among the worst since the 1970s oil shocks. Oil availability alone no longer ensures supply stability. Constraints in transport, rising insurance costs, and operational risks now decide market outcomes. Energy and logistics systems are deeply connected. A shock in one quickly affects the other.

1.2. PROBLEM STATEMENT

The 2026 oil crisis has created a rapidly evolving cost-transmission mechanism. Its effect extends beyond the energy sector to maritime logistics and industry. Oil price changes are no longer absorbed slowly. Instead, price shocks now spread rapidly through interconnected systems, causing compounded cost pressures.

Rising maritime transport costs are central to this process. When crude oil prices rise, bunker fuel becomes more expensive, accounting for a larger share of vessel expenses. Shipping firms then raise freight rates and surcharges, pushing these costs to cargo owners. But this process is more complex now. Diversions, higher insurance premiums, and less efficient fleets amplify cost increases.

Higher freight costs raise input prices, especially for industries that rely on imports. Energy-intensive sectors face rising fuel costs and higher logistics costs. This compresses profit margins, especially for exporters who cannot easily adjust prices. With uncertain demand, producers struggle to pass costs to consumers, heightening financial strain.

These factors combine to create stagflationary pressure. Production costs rise, output is limited, and profits weaken. This pattern is strongest in import-reliant countries, those with little fiscal space, and those exposed to global energy and freight costs.

1.3. Research Gap

Despite extensive research on oil price volatility, maritime logistics, and industrial cost structures, these domains have largely been analyzed in isolation. Existing literature typically focuses on individual components—such as energy pricing, freight dynamics, or industrial performance—without adequately capturing their interdependencies.

Research on geopolitical risk often sees disruptions as short-term anomalies. But recent events show these risks are now structural and ongoing. Freight studies mostly focus on basic cost drivers like fuel and ship supply, missing effects from new routes, congestion, and insurance. Cost studies in industry rarely offer broad frameworks that capture the joint impacts of energy and logistics disruptions.

This piecemeal approach weakens policymakers' and the industry's ability to respond to major shocks. A comprehensive framework is needed to incorporate geopolitical, logistical, and industrial factors into a single model for cost transmission.

1.4. OBJECTIVES

In response to the identified research gap, this study aims to develop a structured understanding of the 2026 oil crisis through the following objectives:

- To identify and categorize the primary drivers of oil price volatility, including geopolitical disruptions, supply constraints, and market behavior.
- To analyze the transmission of oil price shocks through maritime logistics, with particular

[1] (n.d.). Oil Market Report - March 2026 – Analysis. https://www.iea.org/reports/oil-market-report-march-2026

[2] (2026). 2026 Strait of Hormuz Disruption: Oil Market Impacts and Supply Risks. LNRG Technology. https://www.lnrg.technology/2026/03/15/2026-hormuz-strait-disruption-oil-market-impacts-and-supply-risks/

emphasis on fuel costs, route dynamics, and freight rate adjustments.

- To evaluate the impact of freight-driven cost escalation on industrial sectors, especially those characterized by high energy intensity and import dependency.
- To propose strategic and policy-oriented recommendations for enhancing resilience in energy, logistics, and industrial systems under conditions of sustained volatility.

1.5. SIGNIFICANCE OF THE STUDY

This study adds theoretical and practical value by integrating energy markets, maritime logistics, and industrial cost structures. By examining their links, the research helps explain how global disruptions spread through economies.

This analysis is especially important for emerging economies, such as Bangladesh. There, industrial growth depends on imported energy and global shipping. The country's features—high energy reliance, dependence on maritime trade, and limited pricing power in export sectors—make it vulnerable to external shocks.

Major sectors, such as ship recycling and steel re-rolling, are directly affected by changes in energy and freight costs. These sectors offer a way to study the combined effects of global volatility. Findings from this study also apply to other countries such as India, Vietnam, and Egypt, which have similar challenges.

By addressing the interconnected nature of energy, logistics, and industrial systems, this research contributes to the development of more resilient economic strategies in an increasingly volatile global environment.

II. LITERATURE REVIEW

Research on oil price volatility, maritime logistics, and industrial cost structures has evolved in parallel but largely isolated streams. Each domain has been extensively examined. However, their systemic interconnections remain underexplored. Recent analyses indicate that energy markets are influenced not only by supply and demand fundamentals, but also by geopolitical risk and logistical constraints. Most existing studies do not integrate these dimensions within a unified framework. This limits their explanatory power during periods of heightened volatility, such as the 2026 oil crisis.

This section critically evaluates the evolution of literature across three key domains: energy pricing, freight dynamics, and industrial cost transmission. It also identifies structural gaps. These gaps motivate the development of an integrated analytical model.

2.1. Oil Price Determination: From Fundamental Equilibrium to Risk-Driven Dynamics

Classical energy economics frameworks, such as resource-based pricing theories, conceptualize oil prices as a function of supply and demand equilibrium and intertemporal optimization. Early studies contend that prices evolve in response to production capacity, consumption patterns, and inventory cycles. Inventories serve as buffers against short-term shocks. Later research broadens this perspective by incorporating marginal production costs and financialization effects. The influence of futures markets and speculative activity on price expectations is especially noted.

Recent studies highlight a structural shift in oil price formation. Contemporary analyses emphasize that declining global inventories and limited spare capacity have weakened traditional buffering mechanisms.[3] As a result, price formation is increasingly influenced by perceived risk, rather than physical imbalances. The emergence of a "war-risk premium" illustrates the growing impact of geopolitical instability on market behavior.

Despite these advances, existing literature frequently treats geopolitical risk as an external or temporary factor. This study builds on prior work by positioning geopolitical risk as a core structural determinant, especially within critical energy corridors. The stabilization of Brent crude prices at elevated levels after sharp spikes suggests that market expectations and risk perception now play a dominant role in price dynamics.

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[3] Galkin, P., Considine, J., Dayel, A. A. & Hatipoglu, E. (2025). The Response of Global Oil Inventories to Supply Shocks. Commodities 4(2). https://doi.org/10.3390/commodities4020010

Table 1: Structural Shift in Oil Pricing Drivers

Pricing Driver	Pre-2020 Model	2026 Market Reality
Supply-Demand Balance	Primary driver	Secondary influence
Inventory Levels	Shock absorber	Severely constrained
OPEC+ Role	Market stabilizer	Strategic actor
Geopolitical Risk	Temporary factor	Structural determinant
Price Behavior	Linear / cyclical	Non-linear / volatile

Insight: The shift from inventory-driven to risk-driven pricing fundamentally alters how oil shocks are transmitted throughout the global economy.

2.2. GEOPOLITICAL RISK AND THE EMERGENCE OF REGIONAL ENERGY PREMIUMS

The transition from inventory-driven to risk-driven pricing constitutes a fundamental transformation in energy economics and necessitates revised analytical frameworks that capture non-linear market behavior and Regionalization of Energy Markets

The literature has long recognized the relationship between geopolitical instability and energy pricing, particularly in the context of regional conflicts and supply disruptions. Traditional studies suggest that these disruptions cause short-term price spikes, followed by stabilization as markets adjust through alternative supply routes or increased production.

Recent evidence challenges this assumption. Emerging research indicates that geopolitical disruptions have become increasingly persistent. These disruptions result in structural changes to global energy flows.[4] The 2026 crisis introduces the concept of a regionalized energy premium, particularly associated with critical chokepoints such as the Strait of Hormuz.

Prior literature acknowledges the importance of chokepoints but often underestimates their systemic impact on global price asymmetry.[5] By demonstrating how disruptions in key transit corridors increase transportation costs and fragment global markets into regions with differing exposure, this study extends existing analyses. As such, the notion of a fully integrated global oil market appears increasingly untenable.

Table 2: Regional Exposure to Oil Supply Disruptions

Region	Import Dependency	Exposure to Hormuz	Cost Impact
United States	Low	Minimal	Limited
Europe	Moderate	Partial	Moderate
South Asia	High	Severe	High
East Asia	Very High	Critical	Very High

Analytical Insight: Geography has reasserted itself as a critical determinant of energy pricing, thereby challenging the notion of a fully integrated global oil market.

2.3. FREIGHT MARKET DYNAMICS AND AMPLIFICATION MECHANISMS

Traditional models describe the relationship between oil prices and freight costs as a linear pass-through process. Increases in bunker fuel prices are transmitted to cargo owners through surcharges. Recent studies, however, contend that this relationship has evolved into a non-linear system with multiple amplification effects.

Empirical observations from 2026 show that marine fuel prices increased disproportionately compared to crude oil prices. This indicates secondary drivers beyond direct fuel costs. These drivers include route diversions, insurance premiums, and operational

[4] restructuring., U. r., restructuring., G. s. & performance., B. r. (2026). Geopolitical disruptions and sustainability imperatives: a structural model of value chain and supply chain transformation in maritime logistics. Transportation Research Part E: Logistics and Transportation Review 145, p. 104733. https://doi.org/10.1016/j.tre.2026.104733

[5] (2025). Systemic impacts of disruptions at maritime chokepoints. Nature Communications. https://doi.org/10.1038/s41467-025-65403-w

inefficiencies. Collectively, these factors amplify the cost impact of energy shocks.

Although existing literature acknowledges these factors individually, it rarely integrates them into a comprehensive framework. This study contributes by conceptualizing freight as a primary amplification layer rather than a passive transmission mechanism. This reconceptualization is essential for understanding how localized disruptions translate into global cost pressures.

Table 3: Freight Cost Amplification Mechanisms

Factor	Direct Impact	Secondary Effect
Fuel Prices	Higher voyage cost	Freight surcharge increase
Route Diversion	Longer transit time	Reduced fleet capacity
Insurance Premiums	Higher fixed cost	Increased freight volatility
Fleet Constraints	Limited availability	Rate escalation

Analytical Insight: Freight systems amplify energy shocks through compounding mechanisms, converting proportional cost increases into exponential economic pressures.

2.4. INDUSTRIAL COST TRANSMISSION AND THE HIGH-VELOCITY EFFECT

Conventional industrial cost models assume that energy price changes are transmitted gradually, typically over several months. Recent studies, however, highlight a significant reduction in transmission lag, driven by digital supply chains, real-time pricing systems, and reduced inventory buffers. This transition has resulted in the emergence of a high-velocity cost-transmission mechanism, where price changes propagate across industrial systems within days rather than months. Consequently, firms experience immediate margin compression, limited pricing flexibility, and increased financial stress.

Although prior literature recognizes faster transmission dynamics, it does not fully account for the combined effects of energy and logistics shocks. This study extends existing frameworks by demonstrating that accelerated transmission significantly amplifies industrial vulnerability during periods of systemic volatility.

Table 4: Traditional vs. High-Velocity Cost Transmission

Parameter	Traditional Model	2026 Reality
Transmission Lag	2–6 months	7–14 days
Pricing Adjustment	Gradual	Immediate
Inventory Buffer	High	Low
Margin Impact	Moderate	Severe

Analytical Insight: The compression of transmission lag constitutes a structural shift that intensifies industrial exposure to external shocks.

2.5. BANGLADESH CONTEXT: STRUCTURAL EXPOSURE AND POLICY DISTORTIONS

The literature on emerging economies often highlights the vulnerability of import-dependent nations to external shocks. Bangladesh is a relevant case because of its high reliance on imported energy and maritime trade.

Existing studies emphasize the role of subsidies in stabilizing domestic markets. However, these policies often create distortions by masking true cost signals and delaying necessary adjustments. The resulting divergence between global and local prices imposes significant fiscal burdens and obscures underlying economic risks. Research by linking subsidy-induced distortions with freight-driven cost escalation demonstrates how multiple layers of exposure interact to create compound risk.

Table 5: Bangladesh Energy Price Gap (April 2026)

Fuel Type	Local Price	Import Cost	Gap
Diesel	100	198.5	98.5
Octane	120	150.7	30.7
LPG	1400	1850	450

Analytical Insight: The subsidy gap highlights a critical disconnect between global market conditions and domestic pricing, thereby reinforcing systemic vulnerability.

2.5.1.Industrial Implications

Bangladesh's industrial sectors face two kinds of exposure:

- Energy dependency: Reliance on imported fuels
- Logistics dependency: Heavy use of maritime transport

This dual exposure causes compound risk. Industries face both higher fuel costs and rising freight rates.

- Rising fuel costs
- Increasing freight rates

2.5.2.Sectoral Paradox: Ship Recycling

The ship recycling sector illustrates a unique paradox:

- Increased vessel supplies due to global shipping stress
- Rising operational costs due to energy price escalation

This dynamic results in margin compression despite robust market activity, illustrating the complexity of cost transmission mechanisms.

Table 6: Bangladesh Energy Subsidy Gap (April 2026) *(Macro–Micro Cost Disconnect)*

Fuel Type	Local Price (BDT/L)	Import Cost (BDT/L)	Subsidy Gap (BDT/L)	Monthly Subsidy (Crore BDT)
Diesel (HSD)	100.00	198.50	98.50	3,200
Octane-95	120.00	150.72	30.72	800
Industrial LPG	1,400 (12kg)	1,850	450	1,000
TOTAL	—	—	—	5,000

2.6. IDENTIFIED RESEARCH GAP: TOWARD AN INTEGRATED FRAMEWORK

The review of existing literature reveals a critical limitation: the absence of an integrated analytical framework that captures the interdependencies among geopolitical risk, freight dynamics, and industrial cost structures. Individual components have been extensively studied. However, their combined effects remain poorly understood.

Specifically, current models fail to simultaneously incorporate:

- Geopolitical disruptions affecting supply routes
- Freight amplification mechanisms driven by logistics constraints
- Industrial cost responses at the microeconomic level

This fragmentation restricts the ability to analyze systemic shocks holistically.

To address this gap, the present study proposes the Maritime–Industrial Cost Cascade (MICC) framework, which integrates these domains into a unified model. By mapping the transmission of shocks from global energy markets via maritime logistics to industrial cost structures, the MICC framework provides a comprehensive framework for understanding the dynamics of the 2026 oil crisis.

III. METHODOLOGY AND PROPOSED ANALYTICAL FRAMEWORK

3.1. RESEARCH DESIGN AND CONCEPTUAL ORIENTATION

The research uses a hybrid mixed-methods design. It combines qualitative geopolitical analysis with quantitative cost-transmission modeling. The focus is on oil price volatility in 2026. It explores how this volatility transmits through maritime logistics and transforms industrial cost structures in Bangladesh.

This research adopts a systems-based conceptual framework. Unlike conventional approaches, it does not treat energy markets, freight systems, and industrial economics as isolated fields.[6] Modern global supply chains are interdependent networks. Disruptions in oil supply quickly affect shipping and industrial production.

To ensure these interconnections are addressed, the research design is structured to capture two critical dimensions:

[6] Jiao, Y., Lan, T., Liu, Y. & Zhao, X. (2026). From Ports to Prices: The Inflationary Effects of Global Supply Chain Disruptions. IMF Working Papers 2026/026. https://doi.org/10.5089/9798229039284.001

- Causal Dynamics: Identification of the origins, evolution, and propagation of shocks across interconnected systems.
- Quantitative Impact: These measures how these shocks escalate costs at both sectoral and national levels.

To use this framework, the study has an integrated analytical approach with distinct layers.

The first analytical layer finds exogenous shocks. It focuses on geopolitical disruptions that change oil supply and maritime transport.

Key drivers identified include:

- Strategic chokepoint disruptions (e.g., Strait of Hormuz)
- OPEC+ production constraints and policy decisions
- Escalation of maritime security risks
- War-risk insurance inflation

To systematically incorporate these variables, the study introduces the:

3.2. GEOPOLITICAL RISK MULTIPLIER

This variable quantifies the extent to which disruptive events affect global trade and energy systems. It is based on several factors.

- Frequency of shipping route deviations
- Insurance premium escalation rates
- Supply disruption estimates (mb/d)
- Market volatility indicators

Table 7: Geopolitical Risk Multiplier Framework

Indicator	Low Risk	Moderate Risk	High Risk (2026 Scenario)
Route Stability	Normal	Partial rerouting	Major rerouting
Insurance Premium	Baseline	+50–100%	+300–400%
Supply Disruption	<2 mb/d	2–5 mb/d	>10 mb/d
Market Volatility	Stable	Fluctuating	Highly volatile

Interpretation: The 2026 crisis clearly falls within the high-risk regime, justifying the use of an amplified transmission model.

3.3. QUANTITATIVE DIMENSION: COST TRANSMISSION MODELING

Building on these qualitative insights, the second component quantifies them using a stepwise cost-cascade model, creating a structured basis for analysis.

Within this model, oil price shocks are not directly transmitted. Rather, they are mediated by an intermediate logistics layer that amplifies costs through specific inefficiencies and constraints.

Key Factors Contributing to Cost Amplification

- Increased bunker fuel consumption
- Extended voyage distances
- Reduced fleet utilization efficiency
- Insurance and compliance costs

Table 8: Cost Transmission Channels

Stage	Input Variable	Transmission Effect	Output Impact
Energy Market	Oil Price (Po)	Direct increase	Fuel cost rise
Logistics Layer	Freight Cost (Fc)	Amplification	Shipping cost surge
Industrial Layer	Energy Intensity (Ei)	Cost absorption	Production cost increase

3.4. Integration and Calibration of Data

The model calibration applies real-time market data from April 2026, drawing on integrated benchmarks and indices to establish empirical validity.

Integrated Data Sources

- Brent crude oil benchmarks
- Marine gas oil (MGO) and very low sulfur fuel oil (VLSFO) bunker indices
- Freight indices and data on shipping routes
- Domestic fuel pricing data from Bangladesh
- Cost indicators for the industrial sector

Table 9: Core Dataset for Model Calibration

Variable	Source Type	Relevance
Brent Oil Price	Global benchmark	Primary shock indicator
MGO / VLSFO	Bunker index	Freight cost driver
Freight Index	Shipping data	Logistics transmission
Fuel Subsidy Data	National data	Industrial distortion

3.5. THE THREELAYER TRANSMISSION FRAMEWORK

To systematically explain cost propagation, the study introduces a three-layer analytical structure:

Layer 1: Geopolitical Trigger Layer: This layer represents the origin of systemic disruption, characterized by:

- High uncertainty
- Rapid escalation
- Strong market sentiment impact

The output of this layer is the Geopolitical Risk Multiplier which determines the intensity of downstream effects.

Layer 2: Market Transmission Layer: This layer captures how geopolitical shocks translate into economic variables, particularly:

- Oil prices
- Bunker fuel costs
- Freight rates

Table 10: Key Empirical Evidence

Indicator	2024	2026	Change
Brent Oil ($/bbl)	85.41	107.50	+25.8%
MGO ($/MT)	820	1,609.79	+96.3%
Freight Index	1,400	1,854.96	+32.5%

Interpretation: Freight systems exhibit disproportionate sensitivity, confirming their role as cost amplifiers.

Layer 3: Industrial Absorption Layer: This layer evaluates how industries respond to cost increases based on:

- Energy intensity
- Import dependency
- Pricing flexibility

Table 11: Industrial Vulnerability Index

Sector	Energy Intensity	Import Dependency	Pricing Power	Vulnerability
Ship Recycling	High	High	Low	Very High
Steel	High	High	Medium	High
RMG	Medium	High	Low	High

3.6. THE MARITIME–INDUSTRIAL COST CASCADE (MICC) MODEL

The transmission mechanism is formalized as:

Ic=f(Po,Fc,Ei,Gr,Ds)

Table 12: Functional Interpretation

Variable	Role	Effect
Po	Shock origin	Direct cost driver
Fc	Amplifier	Multiplies impact
Ei	Sensitivity factor	Determines exposure
Gr	Risk intensity	Controls magnitude
Ds	Delay factor	Adds inefficiency

Transmission Pathways

- Direct: Oil → Energy → Production
- Indirect: Oil → Freight → Input → Production

The indirect pathway is more significant due to compounding effects.

3.7. SECTORAL APPLICATION: BANGLADESH AS A SYSTEMIC STRESS TEST

3.7.1.Structural Context of Bangladesh's Industrial Economy

Bangladesh provides a highly relevant empirical environment for validating the Maritime–Industrial Cost Cascade (MICC) model, as its economy is structurally characterized by:

- High energy import dependency
- Heavy reliance on maritime logistics for trade flows
- Strong presence of energy-intensive industries
- Limited pricing power in global export markets

This combination creates a high-sensitivity system, where external shocks are transmitted rapidly and amplified internally.
To quantify sectoral vulnerability, the study applies a composite framework combining:

- Energy intensity
- Import dependency
- Freight exposure
- Pricing flexibility

Table 13: Sectoral Exposure and Vulnerability Index (Bangladesh)

Sector	Energy Intensity	Import Dependency	Freight Sensitivity	Pricing Power	Overall Vulnerability
Ship Recycling	Very High	High	Medium	Low	Very High
Steel Re-Rolling	Very High	High	High	Medium	High
RMG (Export)	Medium	High	Very High	Very Low	Very High

3.7.2. Ship Recycling Sector: The Cost–Supply Divergence

The ship recycling industry's structural paradox provides an effective context for evaluating the MICC framework, given the intricate interplay of supply and cost variables evident within the sector.

Supply Dynamics

- Increased scrapping due to high fuel costs and regulatory pressure on aging vessels
- Higher inflow of LDT (Light Displacement Tonnage)

Cost Dynamics

- Significant rise in:
  - LPG and oxygen consumption costs
  - Diesel for yard operations
  - Handling and compliance costs

3.8. ANALYTICAL INSIGHT

Unlike standard commodity markets, the ship recycling sector faces persistent cost pressures despite increased supply, due to its sustained energy intensity. This persistent cost–supply divergence, characterized by rising material inflows coinciding with diminishing profitability, underscores a core structural discrepancy within the sector.

3.8.1. Steel Re-Rolling Sector: The Compression Trap

The steel sector faces compounded cost escalation:
Transmission Channels

- Energy Cost Increase (electricity, furnace fuel)
- Scrap Import Cost Increase (freight + raw material)
- Logistics delays further disrupt inventory stability.

Critical Constraint

- Domestic demand limits price adjustments
- Infrastructure projects are price-sensitive

Outcome

- Persistent margin compression
- Reduced reinvestment capacity
- Increased financial stress

3.8.2. RMG Sector: Global Price Rigidity vs. Local Cost Inflation

The Ready-Made Garment sector represents a price-taker model, where:

- Export prices are largely fixed by international buyers
- Freight costs are variable and rising
- Lead times are increasingly uncertain

Key Impact Mechanisms

- Increased cost per TEU (container)
- Delayed shipments → penalty risk
- Reduced competitiveness vs. Vietnam/India

Outcome

- Direct absorption of cost increases
- Erosion of export margins
- Liquidity tightening

3.9. NON-LINEAR COST BEHAVIOR: THE J-CURVE DYNAMICS

3.9.1. Conceptual Basis of the J-Curve in Industrial Systems

The MICC framework reveals that industrial cost behavior follows a non-linear response pattern, best represented by a J-curve relationship between oil price shocks and industrial profitability.

Unlike linear models, where cost increases are gradual and proportional, the J-curve demonstrates:

- Phase 1: Stability under moderate shocks
- Phase 2: Threshold breach
- Phase 3: Rapid margin collapse
- Phase 4: Slow and incomplete recovery

3.9.2. Empirical J-Curve Representation (2025–2026)

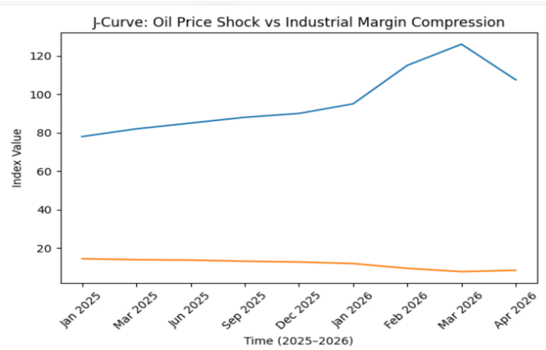

Table 14: Interpretation of the J-Curve

Phase	Period	Market Behavior	Industrial Response
Phase 1	Jan–Dec 2025	Gradual oil increase	Stable margins
Phase 2	Jan–Feb 2026	Sharp oil spike	Early cost pressure
Phase 3	Feb–Mar 2026	Peak volatility	Margin collapse (J-drop)
Phase 4	Mar–Apr 2026	Partial stabilization	Weak recovery

3.10. KEY ANALYTICAL FINDINGS FROM THE J-CURVE DYNAMICS

3.10.1. Threshold Effect and Non-Linear Cost Behavior

The analysis of the J-curve reveals that industrial systems exhibit a pronounced threshold-dependent response to energy shocks. During periods of moderate oil price increases, industries are able to absorb cost pressures through operational adjustments, efficiency gains, or short-term financial buffers. However, once a critical threshold is exceeded—as observed in early 2026—the cost transmission mechanism becomes destabilized. At this stage, the pass-through of energy and logistics costs accelerates beyond managerial control, resulting in a rapid and disproportionate decline in industrial margins. This non-linear behavior underscores the inadequacy of traditional linear cost models in capturing real-world industrial responses under extreme volatility.

3.10.2. Freight Amplification as the Primary Transmission Catalyst

The steep downward trajectory of the J-curve is primarily driven by the amplification effect of maritime logistics. While crude oil prices act as the initial shock, it is the freight system that magnifies this impact through multiple channels. The near doubling of marine fuel costs, combined with extended shipping routes and elevated insurance premiums, significantly increases the total cost of transportation. Additionally, logistical inefficiencies such as port congestion, vessel rerouting, and reduced fleet utilization—further compound these effects. As a result, freight costs emerge not merely as a transmission medium but as a critical multiplier, intensifying the overall cost burden on industrial sectors.[7]

3.10.3. Asymmetric Recovery and Delayed Adjustment Mechanisms

A key insight from the J-curve analysis is the asymmetry between cost escalation and recovery. While costs increase rapidly in response to oil price shocks, the recovery of industrial margins occurs at a significantly slower pace. This asymmetry is driven by several structural constraints. First, many industrial contracts—particularly in export sectors—are fixed in the short term, limiting the ability of firms to adjust prices. Second, input costs such as fuel and freight adjust more rapidly than output prices, creating a timing mismatch. Finally, the

[7] (2025). The impact of oil supply surprises on maritime transport: a temporal and sectoral analysis. Review of World Economics. https://doi.org/10.1007/s10290-025-00596-2

depletion of financial buffers during the shock phase reduces the capacity of firms to recover quickly. Consequently, even after oil prices stabilize, industrial systems remain under prolonged stress.[8]

3.10.4. J-Curve Depth as an Indicator of Structural Damage

The depth and steepness of the J-curve provide a meaningful proxy for assessing the extent of structural damage within industrial systems. A sharp decline in margins reflects not only immediate profitability losses but also deeper systemic impacts. These include erosion of working capital, reduced production capacity due to cost constraints, and delayed investment in capital-intensive sectors. Over time, these effects translate into diminished competitiveness, particularly for export-oriented industries operating in price-sensitive global markets. Thus, the J-curve is not merely a graphical representation of short-term volatility but a diagnostic tool for evaluating long-term industrial resilience.

3.10.5. Synthesis: Industrial Fragility under High-Velocity Shocks

The collective findings from the J-curve analysis led to a critical conclusion: modern industrial systems are fundamentally ill-equipped to withstand high-velocity, high-magnitude shocks. The combination of rapid cost transmission, freight amplification, and delayed recovery creates a fragile economic environment in which even temporary disruptions can have lasting consequences. This highlights the need for structural adaptation in both industrial strategy and policy design.

3.11. LIMITATIONS OF THE METHODOLOGY: A CRITICAL EVALUATION

Despite the robustness and integrative scope of the Maritime–Industrial Cost Cascade (MICC) framework, several methodological limitations must be acknowledged to ensure analytical transparency and rigor.

3.11.1. Data Constraints and Market Opacity

A primary limitation stems from the lack of transparency in global energy and freight markets. A substantial proportion of transactions occur through bilateral agreements, private contracts, and informal trading channels that are not publicly disclosed. Furthermore, shadow markets, especially in oil trading, add additional opacity to price formation. These factors restrict the accuracy of available data and limit the capacity to validate model outputs in real time. Consequently, while the model effectively captures broad trends, quantifying certain variables precisely remains challenging.

3.11.2. Geopolitical Unpredictability and Model Sensitivity

The MICC framework incorporates geopolitical risk through the Geopolitical Risk Multiplier (G_r); however, geopolitical events are inherently unpredictable and can evolve rapidly. Sudden military escalations, policy reversals, or changes in international sanctions may significantly alter market conditions within short periods. This introduces model sensitivity, as projections based on current conditions may quickly become obsolete due to unforeseen developments. Therefore, the model is most appropriate for scenario-based analysis rather than precise forecasting.

3.11.3. Exchange Rate Effects and Secondary Transmission Layers

In the context of Bangladesh, exchange rate fluctuations add an additional layer of complexity that the base model does not fully address. Appreciation of the US dollar raises the cost of imported energy and raw materials, thereby amplifying the effects of global price shocks. Currency volatility thus serves as a secondary transmission mechanism, intensifying cost escalation beyond what oil and freight variables alone predict. Incorporating dynamic exchange rate adjustments in future model iterations would improve predictive accuracy.

3.11.4. Policy-Induced Distortions and Subsidy Effects.

Government intervention through fuel subsidies introduces significant distortions in observed cost structures. Although subsidies offer short-term relief

[8] Ellingsen, T., Friberg, R. & Hassler, J. (2026). Menu Costs and Asymmetric Price Adjustment. International Journal of Industrial Organization 105. https://doi.org/10.1016/j.ijindorg.2026.103259

by stabilizing domestic prices, they obscure the actual relationship between global market conditions and local cost dynamics. This results in a divergence between model outputs and both actual market prices and observed industrial behavior under subsidized regimes. Additionally, subsidies impose substantial fiscal burdens, raising concerns about long-term sustainability. These distortions complicate data interpretation and policy analysis.

3.11.5. Sectoral Heterogeneity and Model Generalization

Industrial sectors display significant diversity in energy intensity, supply chain complexity, and pricing flexibility, shaping how cost shocks propagate within and across sectors. For instance, energy-intensive sectors transmit cost pressures to downstream industries that rely on their outputs, resulting in compounding costs at each production stage. Export-oriented sectors with fixed pricing may face delayed cost pass-through, affecting upstream suppliers and logistics providers by compressing margins along those supply chains. In contrast, domestic sectors with greater pricing discrimination often adjust more rapidly, directly influencing local supply chain responses by passing on cost increases to consumers and related industries. While the MICC model provides a robust system-level analytical structure, its sector-specific applicability may be constrained without explicitly modeling sectoral interlinkages, highlighting the need for tailored extensions for particular industry contexts.

3.12. METHODOLOGICAL CONTRIBUTION AND INNOVATION

3.12.1. Introduction of the Maritime–Industrial Cost Cascade (MICC) Model

In light of the methodological limitations discussed, attention now turns to the distinctive innovations and methodological contributions of the Maritime–Industrial Cost Cascade (MICC) framework that address some of these challenges.

The principal contribution of this study is the development of the Maritime–Industrial Cost Cascade (MICC) model, which represents a significant advancement in assessing energy-driven economic shocks. Unlike traditional methods that analyze energy, logistics, and industrial domains separately, the MICC model integrates these fields into a unified analytical system. This approach enables more accurate evaluation of how shocks propagate through interconnected economic networks.

3.12.2. Key Innovations of the MICC Framework

Multi-Layer System Integration A central innovation of the MICC model is its integration of multiple analytical layers, including geopolitical variables, energy markets, freight operations, and industrial cost structures. By interconnecting these components, the model captures the interdependencies and feedback mechanisms that shape modern supply chains. This integration enables a comprehensive assessment of systemic risk.

3.12.3. Non-Linear Cost Modeling and Threshold Effects

The model advances traditional linear frameworks by explicitly incorporating non-linear dynamics, including threshold effects and amplification processes. The use of J-curve analysis enables the identification of abrupt performance transitions, aligning model outputs with observable industry responses to extreme volatility.[9] This represents a substantive improvement in modeling complex economic phenomena.

3.12.4. Reframing Freight as a Core Economic Variable

Traditional economic models typically treat freight costs as secondary factors. The MICC framework, by contrast, positions freight as a primary driver of cost transmission, recognizing its amplification role in economic dynamics. This analytical reframing aligns the model with current conditions, where logistical disruptions are central to economic outcomes.

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[9] (2022). A multi-criteria fleet deployment model for cost, time and environmental impact. International Journal of Production Economics 243. https://doi.org/10.1016/j.ijpe.2021.108325

3.12.5. Real-Time Analytical and Policy Applicability

The MICC model is designed for practical use in dynamic environments, enabling real-time analysis of market conditions. It offers policymakers, industry stakeholders, and investors a valuable tool for assessing risk exposure, evaluating policy options, and making informed decisions under uncertainty.

3.12.6. Policy and Strategic Relevance

The practical significance of the MICC model spans multiple stakeholder groups. Governments can use the framework to evaluate the sustainability of subsidy regimes and design more effective energy policies. Industrial firms can assess their exposure to cost shocks and develop resilience strategies. Investors can better understand risk transmission across sectors, thereby improving decision-making in volatile markets.

3.12.7. Applicability to Emerging Economies

Although this study focuses on Bangladesh, the MICC model is broadly applicable to other maritime-dependent emerging economies, such as India, Vietnam, Indonesia, and Egypt. These countries share similar structural characteristics, including high import dependency and reliance on global trade, which make them equally vulnerable to energy and logistics shocks. The model thus provides a scalable framework for comparative analysis across regions.

3.12.8. Theoretical Advancement in Energy–Logistics Integration

From an academic perspective, this study contributes to the literature by bridging previously fragmented research domains. It extends traditional energy economics by incorporating logistics as a central component of cost transmission and introduces a system-level perspective that reflects the complexity of modern economic networks. This integrated approach establishes a foundation for future research on interconnected global systems under volatile conditions.

IV. RESULTS AND DISCUSSION

4.1. EMPIRICAL VALIDATION OF THE COST CASCADE MECHANISM

Analysis using the Maritime–Industrial Cost Cascade (MICC) model with April 2026 data shows that oil price volatility is transmitted through a non-linear, multiplicative mechanism. This differs from a proportional pass-through process. Although crude oil prices rose by about 25–30 percent during the study period, downstream variables, especially marine fuel costs and freight rates, experienced much greater increases.

This divergence offers strong empirical support for the central argument. Maritime logistics serve as a critical amplification layer, intensifying energy shocks before they reach industrial systems.

Table 15: Global Energy–Freight Transmission Dynamics *(Q1 2024 vs. Q1 2026 – Demonstrating Cost Cascade)*

Indicator	March 2024 (Avg)	March 2026 (Avg)	% Change	Interpretation
Brent Crude Spot ($/bbl)	85.41	107.50	+25.8%	Baseline energy shock
VLSFO Index ($/MT)	645.00	949.88	+47.2%	Shipping fuel cost escalation
MGO LS Index ($/MT)	820.00	1,609.79	+96.3%	Clean fuel premium surge
Container Freight Index	1,400	1,854.96	+32.5%	Logistics cost transmission

The large rise in refined marine fuel prices versus crude prices signals a shift. Pricing is moving from commodity-driven to logistics-constrained cost formation.

4.2. FREIGHT AMPLIFICATION AND STRUCTURAL MARKET DISTORTION

4.2.1. Decoupling of Crude and Bunker Markets

A main finding is the decoupling between crude oil prices and bunker fuel costs. Traditional pricing models assume a stable link between crude inputs and refined fuel outputs. Now, marine fuel prices have risen much more than crude prices. This shows the breakdown of that relationship.

This decoupling results from the refinement of constraints, distribution inefficiencies, and the high demand for compliant fuels. As a result, maritime fuel markets now behave as semi-independent pricing systems. Logistics and regulations have more influence than upstream crude supply. Freight costs are driven more by downstream bottlenecks than by upstream commodity availability.

4.2.2.Operational Amplification Mechanisms

Freight cost increases come from several operational factors. These include longer voyage distances, more fuel use, and lower fleet efficiency. Empirical observations show the following: Voyage duration increased by about 10–15 days.

- Fuel consumption per voyage increased by ~40%
- Effective fleet utilization declined by 12–15%

Also, war-risk insurance premiums now account for a large share of voyage costs. In some cases, they account for 8–10% of total expenses.[10] These factors interact and amplify baseline increases in energy cost. As a result, cost escalation is exponential, not linear.

4.3. EMERGENCE OF REGIONAL ENERGY PRICE ASYMMETRY

The results confirm increasing fragmentation within global energy markets. Pricing structures differ across regions. Import-dependent economies, especially in Asia, face higher energy costs. These costs rise due to disrupted supply routes and volatile freight.

This segmentation challenges the assumption of a unified global oil market and underscores the growing importance of geography and logistics in shaping effective energy pricing. Energy markets are thus no longer globally uniform but are increasingly shaped by regional exposure and logistical constraints.

4.4. ACCELERATED COST TRANSMISSION AND INDUSTRIAL IMPACT

The MICC model shows a big reduction in cost transmission lag. Industrial systems now respond to energy shocks within 7–14 days. Faster pass-through comes from real-time pricing, smaller inventory buffers, and more integrated supply chains.

As a result, industries face immediate cost pressures with little time to adjust. The shorter response time increases exposure to volatility. It also limits firms' ability to use traditional buffering strategies.

4.5. SECTORAL IMPACT ANALYSIS: BANGLADESH AS A SYSTEMIC CASE

4.5.1.Ship Recycling Sector: Cost–Supply Divergence

The ship recycling sector shows a divergence between more supply and higher costs. Increased scrapping creates more material, yet costs for fuel, gas, and compliance have also risen sharply.

This dynamic produces a paradox in which increased input availability does not yield improved profitability. Rather, rising operational costs offset gains from higher material inflows, illustrating a fundamental imbalance between supply dynamics and cost structures.

4.5.2.Steel Sector: Margin Compression under Demand Constraints

The steel sector faces added cost pressures. Energy costs rise, and scrap imports are more expensive. At the same time, domestic demand constraints make it hard to raise output prices.[11]

This gap between higher costs and fixed output prices leads to persistent margin compression. As a result, the sector has less capacity to reinvest and faces more financial strain. In the Ready-Made Garment (RMG) sector, export prices are set mostly by global buyers. Rising freight costs and longer delivery times add risk and limit revenue adjustments.

Consequently, producers absorb cost increases, resulting in margin erosion and diminished competitiveness in global markets.

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[10] (2025). War Risk Insurance Premiums: 2025 Pricing Trends. Freight Amigo. https://www.freightamigo.com/en/blog/logistics/war-risk-insurance-premiums-2025-pricing-trends/

[11] (March 30, 2026). Ship Recycling Market Under Strain as Geopolitical Factors Weigh on Economics. Maritime Activity Reports, Inc. https://www.marinelink.com/news/ship-recycling-market-strain-geopolitical-537510

4.6. J-CURVE DYNAMICS AND INDUSTRIAL MARGIN BEHAVIOR

The link between oil price shocks and industrial profits follows a J-curve. In moderate price rises, margins stay steady. But when a threshold is crossed, margins fall sharply. After that, recovery is slow and incomplete.[12]

This pattern results from freight amplification, fast cost transmission, and low pricing flexibility. It shows that industrial systems become fragile during fast shocks.

4.7. STRUCTURAL DISTORTIONS AND POLICY IMPLICATIONS

4.7.1. Subsidy-Induced Market Distortion

Fuel subsidies generate a divergence between global and domestic pricing, obscuring true cost signals and imposing significant fiscal burdens. While subsidies offer short-term stability, they postpone necessary market adjustments and introduce inefficiencies across the economy. Consequently, subsidies redistribute cost pressures rather than eliminate them, resulting in longer-term structural distortions.

4.7.2. Logistics as a De Facto Trade Barrier

Maritime disruptions raise import costs but offer no fiscal benefit. Unlike tariffs, these costs are volatile and originate outside the system.

This dynamic diminishes trade efficiency, intensifies foreign exchange pressure, and introduces additional uncertainty into economic planning.

4.8. SYNTHESIS: TOWARD A NEW INDUSTRIAL COST PARADIGM

The findings suggest that the 2026 oil crisis constitutes a structural transformation rather than a temporary disruption. Industrial competitiveness is now increasingly determined not only by energy prices but also by the efficiency and resilience of integrated supply chain systems.

Freight now serves as a primary determinant of industrial viability, where traditional linear cost models have proven inadequate under conditions of high-velocity, nonlinear shocks. This shift necessitates a redefinition of cost-management frameworks within industrial strategy.

4.9. STRATEGIC IMPLICATIONS

The results indicate that future industrial resiliency requires a systemic approach, including the following elements:

- Reducing energy intensity
- Enhancing logistics efficiency
- Diversifying supply chains
- Increasing pricing flexibility

Industrial strategy must transition from isolated cost control to integrated system optimization, reflecting the interconnected nature of contemporary global economic systems.

V. CONCLUSION

5.1. SYNTHESIS OF KEY FINDINGS

This section examines the structural impact of the 2026 oil squeeze. It focuses on how geopolitical and energy shocks, especially changes in oil prices, propagate through systems such as maritime logistics and raise industry costs. The MICC (Maritime–Industrial Cost Cascade) model shows that oil price volatility now affects the system as a whole, not just individual markets.

Findings show cost transmission is no longer proportional. Logistics systems now amplify energy shocks, causing downstream costs to rise more sharply. This shift means supply chain dynamics now shape industrial performance.

Analysis shows a sharp drop in transmission lag. Cost impacts now appear in days, not months. This quick adjustment limits firms' ability to absorb shocks and increases systemic vulnerability.

5.2. STRUCTURAL TRANSFORMATION OF THE GLOBAL COST ENVIRONMENT

Due to these dynamics, the 2026 oil squeeze represents a structural turning point. It is not a temporary disruption. The analysis identifies three main transformations.

Cost structures, or the ways costs are spread across production, are now more complex. Increases have

[12] Balke, N. S., Brown, S. P. & Yücel, M. K. (2008). Oil Price Shocks and Industrial Production: Is the Relationship Linear? Macroeconomic Dynamics 12(2), pp. 193-218. https://doi.org/10.1017/S1365100507070190

shifted from being linear to non-linear. Industrial systems now react by thresholds: costs stay steady until a point, then jump rapidly and cut into profit margins.

Maritime logistics is now the main driver of industrial competitiveness. Freight costs, route changes, and insurance risks matter as much as upstream energy prices. Logistics has become a central part of cost strategies.

Energy markets are more fragmented by geography. Economies that depend on vulnerable shipping lanes pay higher energy costs. This causes spatial inequality—unequal access to resources and varying costs across regions.

5.3. BANGLADESH AS A CASE OF SYSTEMIC VULNERABILITY

For instance, these global vulnerabilities can be illustrated by Bangladesh, an import-dependent, maritime-reliant economy. The study identifies three interconnected risks.

Energy dependency means industries are exposed to global price shifts. Logistics exposure increases production costs as shipping prices fluctuate and routes lengthen. Subsidies, or government financial support, distort cost signals and add fiscal pressure.

These issues are connected. Ship recycling faces rising costs even as more ships arrive. The steel sector has shrinking margins due to high input costs and weak pricing power. The RMG (Ready-Made Garment) sector pays higher logistics costs and loses competitiveness because prices cannot be adjusted.

These converging forces trigger stagflation: costs rise while output and profits stagnate.

5.4. POLICY IMPLICATIONS AND STRATEGIC DIRECTIONS

Policy must shift from reaction to deep structural reform.

Energy diversification is key to cutting dependence on imports. Investment in renewables and efficiency should support this. At the same time, logistics must be improved. Better ports, more shipping capacity, and stronger supply chain coordination can limit freight cost hikes.

Subsidy reform is also needed. Moving from broad to targeted, transparent subsidies will ease fiscal burdens and improve price signals. At the industrial level, resilience needs more flexible, adaptive models. Firms should diversify their supply chains, manage costs more effectively, and respond quickly to market changes

5.5. CONTRIBUTION TO THEORY AND PRACTICE

This study adds to the literature by introducing the MICC framework. MICC combines analysis of energy markets, logistics, and industrial cost behavior. It uses non-linear dynamics, where effects are not always proportional to causes, and studies how logistics amplify cost changes. This expands on traditional energy economics and supply chain research.

The study offers practical insights for policymakers and industry. It highlights logistics' central role in economic results. These findings help build strategies to manage systemic risk in volatile times.

The study uses a comprehensive framework, but still faces limits. Data in the energy and freight markets is often hard to access, which reduces the precision of some variables. Geopolitical changes introduce additional uncertainty into projections. Exchange rates and sector trends may also affect outcomes. Future work should focus on quantitative MICC tests, real-time data, and cross-country comparisons.

The 2026 oil squeeze changes how energy, logistics, and industry interact. Now, industrial competitiveness requires managing risks across supply chains, not just costs. For Bangladesh and similar countries, the focus must shift from absorbing shocks to adapting to volatility. They must build systems that are resilient, efficient, and strategically integrated to thrive amid ongoing uncertainty.

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