



INDIA'S REFINING RENAISSANCE

Seizing the Discounted Crude Opportunity

India refined petroleum export boom since 2022 marks one of the most notable realignments in the global energy market to date. While Western sanctions aimed to punish Russia for its invasion of Ukraine, they unintentionally created an opportunity for India's advanced refineries to import heavily discounted Russian crude and ship high-value products back to Western markets at Brent prices. This episode highlights the strategic importance of refining expertise, macroeconomic discipline, and flexible trade policies; however, it also raises important questions about long-term sustainability and geopolitical risks.

India's Unique Refining Advantage

At the heart of this export growth is the Nelson Complexity Index (NCI), a measure of a refinery's capacity to process heavy, sour grades of crude oil into lighter products such as gasoline and diesel. Indian refineries rank among the highest globally, surpassing competitors in Brazil and Malaysia, owing to private investments in hydrocracking, cokers, and residue upgrading units. This is driven by the government's long-term commitment to such projects, which encourages private-sector investment. These facilities allow processors to

convert heavily discounted Urals crude into valuable middle distillates, capturing margins that increased from 0.23 in 2021 to over 0.40 by 2023.

By contrast, Brazil's Petrobras complex and Malaysia's Petronas plants, although technologically sophisticated, lacked the confluence of state support and sheer scale to exploit the discounts as effectively. In short, India combined the right mix of technical capacity, geographic proximity to key shipping lanes, and government will to become the world's "connector country, linking Russian supply with Western demand.

Geopolitics Meets Refining Sophistication

The onset of the Russia-Ukraine war in February 2022 precipitated crude price volatility that had not been seen since the 1970s. Brent briefly touched \$120 per barrel, while Urals, Russia's flagship export grade, traded at discounts exceeding \$20 per barrel relative to Brent. Sanction restrictions barred most Western refiners from purchasing Urals, but India's non-aligned stance and absence of secondary sanctions enabled its state-owned and private refiners to ramp imports from under 300,000 bpd in early 2022 to nearly 1.2 million by mid 2023.

With shipping and insurance costs included, at an all-in price, Urals arrived at the Indian coast averaging \$77 per barrel in 2024 nearly \$3 cheaper than Oman crude, and over \$15 below Europe's Brent spot price. European Brent and Oman prices exclude insurance and other logistic costs. This arbitrage underpinned India's refined product exports, which climbed from 40 million tonnes in 2021 to a record 56 million tonnes in 2023, valued at approximately \$45 billion.

Empirical Validation: Difference-in-Differences and VAR

The study, "Discounted Crude Drives India's Export Boom? A Difference-in-Differences Analysis of the Post-2022 Refined Petroleum Market", employs rigorous econometric techniques to assess the causal impact of discounted crude inflows on India's export performance. A difference-in-differences (DID) analysis comparing India with a control group of peer refining economies confirms that the post-2022 export surge is statistically significant and causally linked to discounted crude access. The interaction term ("Post*India") is positive and highly significant ($p < 0.01$), indicating a disproportionately large increase in exports for India relative to its peers. A complementary regression on the margin ratio likewise shows that profitability gains from discounted crude bolstered exports ($p < 0.05$). The placebo result ($p = 0.073$) does not suggest early divergence, reinforcing the robustness of the findings.

In addition, a Vector Autoregression (VAR) impulse response reveals that shocks to the margin ratio generate immediate but rapidly mean-reverting spikes in profitability. This short-lived response indicates that, while windfall gains materialize sharply, they lack persistence without sustained arbitrage opportunities. In simple terms, India's export surge was not random; it was systematically tied to discounted crude access.

Macroeconomic Management: The RBI's Crucial Role

Beyond refining prowess, India's macroeconomic policy framework has played an indispensable role. The Reserve Bank of India maintained measured

interest rates and sterilised foreign exchange interventions to prevent rupee volatility, thereby insulating domestic fuel prices and containing inflationary spillover. This stability allowed private refiners, such as Reliance and state giants, such as the Indian Oil Corporation, to concentrate on export volumes without triggering a domestic price spiral.

In contrast, several key competitors encountered currency depreciation or domestic fuel subsidies that eroded their export margins or constrained their exportable volumes. India's combination of fiscal prudence and exchange rate flexibility exemplifies how macroeconomic discipline underpins industrial competitiveness.

Risks to Sustainability

India's recent export boom, while impressive, is not immune to challenges. Three interrelated risks could undermine its sustainability. First, the reintegration of Russian supplies into Europe remains a possibility. Should sanctions ease or logistical barriers be resolved, Russian Urals crude could return to European markets at narrower discounts, eroding the arbitrage margins that India currently enjoys. Second, the external regulatory environment could tighten. If importing countries impose more stringent norms on the acceptance of Russian sourced oil, even when supplied through partner nations, Indian refiners could face higher compliance costs or restrictions that would reduce competitiveness. Third, India's refining sector is heavily concentrated among a handful of dominant players. Excessive reliance on this limited set of actors risks complacency, underinvestment in upgrading refining complexity, and heightened exposure to domestic policy changes.

These risks highlight that technological sophistication alone is not sufficient to secure a lasting advantage; sustaining momentum will require continuous adaptation and strategic foresight.

Policy Implications and Strategic Recommendations

To secure long-term resilience, India must broaden its strategy beyond its current advantages. Diversifying feedstocks by building processing capacity for

discounted crudes from countries such as Venezuela and Iran would help mitigate overdependence on a single source. Parallelly, investment in green refining—through carbon capture, hydrogen integration, and renewable feedstocks—would future-proof facilities against the tightening environmental standards and potential carbon pricing regimes in major export markets. Equally important is the expansion of downstream export corridors. Strengthening port infrastructure and inland connectivity to accommodate larger VLCC shipments would lower logistics costs and enhance competitiveness. Finally, forging durable trade agreements with consuming countries, alongside mutual recognition of product quality standards, can lock in market share and preempt regulatory barriers.

Implementing these measures would both shore up resilience against geopolitical shifts and position India as a premier global refining and petrochemicals hub through the 2030s.

A Model for Emerging Refining Nations

India's recent experience offers lessons for emerging refining nations seeking to ascend the value chain. First, technical complexity is vital but must be complemented by macroeconomic stability and a strategic trade policy. Second, nimbleness, the ability to swiftly redirect crude supply chains and product flows, can unlock transient arbitrage that, if captured timely, yields outsized gains. Third, regulatory foresight, including environmental and

trade standards alignment, is essential to ensure that profits do not falter under changing global norms. Countries such as Vietnam, Indonesia, and select Gulf states may emulate India's model by investing in mid-to high-complexity units while cultivating export corridors to Asia, Europe, and Africa. However, they must also heed India's cautionary tale: dependence on a single discounted supply source can backfire if geopolitical tides turn.

Conclusion: From Crisis to Opportunity and Back Again

The war in Ukraine reconfigured energy trade routes in ways that few anticipated. India, leveraging world-class refining infrastructure and sound policy, transformed a geopolitical crisis into an export bonanza. However, this bonanza rides on discounted Russian crude oil prices, which could narrow rapidly.

Sustaining the refining renaissance demands that India does not rest on past gains. It must diversify crude sourcing, green its operations, and deepen its foreign market ties. Otherwise, the very factors that propelled the export boom, discounts born of crisis, could prove fleeting.

In the volatile global energy market, seizing opportunities is only the first step. Ensuring their endurance is the real test of strategic mastery, and India's next act in this refining saga must meet that challenge or risk being left behind.●

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