How Brent crude oil price movements shape equity returns: A comparative analysis of oil sector stocks in India and the United States geopolitical war event study · pre-war OLS estimation · two-quarter market forecast

[1]Dhruv Jain, [2]Mehul Jain, Tanvi Dhoka, [3]Vaibhav Chopra, [4]Thanga Kumar

[1]Jain University, Center For Management Studies, Lal Bagh

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Abstract:
Eight proxies of major petroleum-related equities (Gabriel 4 Indian-traded companies (NSE/BSE: ONGC, Reliance, IOC, BPCL) and four US-traded ones (NYSE/ DJIA/S+P500, ExxonMobil, Chevron, ConocoPhillips, Occidental) are evaluated regarding their sensitivity to the Brent changes daily returns in 30 pre-conflict years between January 19 and February 27, 2026. The armed conflict began on February 28, 2026, which was on a Saturday so the equity market reactions were observed in seven further trading sessions between the 2nd and the 10th of March 2026. The coefficient of fit (resulted in Ordinary Least Squares) of beta (which are actually events-study based) within the range [0 -30, 0 +180] are then used to project forward-looking from the future of Brent costs taking two quarters into consideration. None of the estimated models are statistically significant, but those that are lowest in control (i.e. IOC) obtain a negative coefficient (-0.374; p = 0.082) which supports commodity attributed to the practice of margin suppression attributable to regime of government controlled retail fuel prices in India. ExxonMobil is the US company that has the largest positive sensitivity (= 0.400). Directional predictions are supported by post-conflict price developments; Brent is up +29.5% up to March 4, US upstream oriented holdings are up 5 to 7 and Indian downstream refining equities are down 3 to 5.

Keywords:
Brent crude; NSE; BSE; DJIA; S&P500; event study; OLS regression; geopolitical shock; upstream; downstream.

1. Introduction:

Of all the external forces that reprice energy equities few are as swift and disastrous as petroleum supply shocks that are geopolitically motivated. As the reference price to about 68 percent of all traded volumes of crude internationally, Brent, which is traded at the ICE Futures Europe, is the leading hydrocarbon benchmark in the world. An immediate scarcity premium was taken in on Tuesday, 28 February 2026, of Brent pricing following a burst out of a geopolitical conflict, providing a natural experiment that the conduction of this shock to the structure dissimilated equity pricing in two economies (which were structurally dissimilar) could be strictly measured. Importing about 85 percent of its domestic petroleum requirements, India is the third largest consumer of crude in the planet. Its refining businesses, IOC and BPCL, are limited by government-imposed retailing fuel taxes that protect end-book consumers against increasing input prices and at the same time cut processing inefficiency in case of and when crude inflows. Conversely, the United States, the biggest oil producer nation in the world, boasts of large scale exploration and production companies, ExxonMobil, Chevron, ConocoPhillips, and Occidental, whose revenues directly depend on increased crude realisations. It is namely this asymmetry of regulation and structure that creates converse beta values in both countries, a correlation which this paper empirically bases on the interest of estimation. It used the pre-conflict estimation window of 30 business days (between January 19 and February 27, 2026) to tune the relationship between normal returns of Brent and the equity. The war itself began on Saturday, February 28, which is why the first day under its influence was on Monday, March 2. There were seven post-conflict market sessions to March 10. The data on prices of images of the futures in Europe in EIA and ICE Futures Europe were used as the source of the data about prices of the markets used in India: in NSE and BSE

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markets the data regarding the prices of the markets in India will be used with references to the DJIA and to SP 500.

2. Research Objectives:

- To estimate through OLS regression over 30 days before the conflict (January 19- February 27, 2026), the beta coefficients reflecting the dependence of Brent crude daily returns on the companies in the- petroleum industry traded on NSE/BSE and NYSE/DJIA that have equity returns on their daily returns.
- To report and describe the discrepancy in how transmission of returns in a Brent occur between downstream refiners controlled by prices in India and the upstream exploration and production companies that are fully deregulated in the United States.

3. Research hypotheses:

Hypothesis - Objective 1:

Objective 1 will determine the presence of statistically significant effect of the changes in the Brent crude oil per day returns on the return on the equity of the eight chosen petroleum firms in India (NSE/BSE) and the United States (NYSE/DJIA/S&P500) based on the estimation of the changes by the OLS regression model over the 30-day prereadiness (January 19 February 27, 2026).

$H1_0$ (Null — Objective 1):

Alterations in the returns on Brent crude oil have no significant effect on stock returns of the sampled oil companies; the slope coefficient is indistinguishable with zero (= 0; p > 0.10).

$H1_1$ (Alternative — Objective 1):

The change in the returns of the picture of the Brent crude oil returns has a statistically significant impact on the return of oil companies with the difference in direction being positive and negative to upstream producers and price-controlling downstream refiners respectively (0; p 0.10).

Hypothesis Set 2 — Linked to Objective 2:

Objective 2 tests the hypothesis of systematically different direction of Brent-to-equity derivative transmission between price-regulated downstream refiners of Brent and the deregulated upstream exploration and production firms of the United States, in which the direction of their beta coefficient is structurally opposite.

$H2_0$ (Null — Objective 2):

There is no statistically significant differentiation between the Indian downstream refiners and US upstream exploration and production firms in the direction of the Brent-to-equity returns divergence; the beta coefficients between the two sets are not significantly different in either direction or magnitude. (β_India $\approx$ β_US; p > 0.10).

$H2_1$ (Alternative — Objective 2):

They display a statistically significant structural departure in the Brent-to-equity transmission of returns between the two sets of countries: Indian price-controlled downstream refiners positively transmit crude price effects, whereas the perilously regulated US upstream producers negatively transmitting crude price effects, are structurally opposite (0India -0; 0US +0; p 0.10).

4. Review of literature:

4.1. Jones & Kaul (1996) — Journal of Finance, Vol. 51

Design: The authors utilized time- series OLS analysis of aggregate quarterly returns between 1947 and 1991 on four economies, including the United States, Canada, the United Kingdom, and Japan based on aggregate market returns and contemporaneous and lagged petroleum price changes. Principal Findings: In net oil consuming countries, the equity market performance was observed to depend on the rise in crude prices, which the channel of transmission has been through the compression of corporate profitability, and an increased risk discount; with the highest transmission effect being experienced in the United States and Canada. Relevance to Present Study: The OLS regression structure used in Jones and Kaul is a direct methodological predecessor to the one used here, and the fact that their study results showed that crude-importing economies incurred equity losses is consistent with the estimated negative value of the beta related to IOC (= -0.374) here.

4.2. Sadorsky (1999) — Energy Economics, Vol. 21:

Design: The monthly US macroeconomic data periods of 1947 1996 were analysed using a vector autoregressive model that included impulse response analysis where the real oil return series was modelled together with the interest rates dynamics and the industrial output dynamics. Key Result: Principal Outcome: It was found that upward petroleum price shocks had a significant negative influence on real equity returns, and these impacts had an asymmetric profile, so that responses to percentage increases in petroleum price were negative, whereas responses to equivalent percentage falls were positive; it was also found that in the same way petroleum price variance had a distinct and negative impact on equity market performance. Connection to Present Study: The asymmetry that has been observed by Sadorsky gives the conceptual justification of the event-window design in this study, in which the post-conflict observation period is maintained separate of the estimation period to prevent confounding of the immediate effect of the shock with the following path pattern of the recovery.

4.3 Basher & Sadorsky (2006) — Global Finance Journal, Vol. 17:

Design: An international multi-factor conditional/unconditional both simple and complex pricing model was estimated on the basis of daily, weekly and monthly returns observations of a large international panel of developing-economy stock markets. Principal Result: There was persuasive evidence that petroleum price risk is a systematic pricing measure in emerging market equities; the cross-section of returns as well as the cross-section of returns was demonstrated to be a compensation of market variance, distributional asymmetry, and tail risk besides oil risk. Relevance to Current study: The contribution meets the direct relevance threshold, as it demonstrates that the marketable instruments in the Indian market (including ONGC and IOC) are prone to relevant crude price exposure and the selection of Brent return as the major explanatory predictor is justified.

4.4. Nandha & Faff (2008) — Energy Economics, Vol. 30:

Design: The sample is monthly sector-specific returns data in 35 industries across the globe in 1983-2005 which are panel OLS regressed with a petroleum price sensitivity model which has isolated broad market return variation and other macroeconomic factors. Key Result: (With exception to extraction-intensive industries, including mining and oil-and-gas), the broad equity sector returns were found to be negative with economic growth in crude price increases, while companies focused on their own upstream extraction operations were the most negative in terms of price sensitivity. Relation to Current Research: The principal structural suggestion that Nandha and Faff investigate is that between the upstream and downstream sensitivities that they report, which forms the core structural suggestion that has been shown to be correct in this study, in which ExxonMobiln records a beta = +0.400 versus the -0.374 of IOC.

4.5. Park & Ratti (2008) — Energy Economics, Vol. 30:

Design: Monthly VAR was used on the petroleum prices shock and real equity returns data in 13 European countries and the United States covering the period 1986-2005 with price and price-volatility effect found independently. Principal Outcome: Recovery Test In most of the economies sampled, crude price shocks were discovered to have statistically significant contemporaneous impacts on real equity performance; Norway, being a petroleum-exporting country, had positive equity impacts, and all net-importing countries had negative impacts. Connection to Current Study: The exporter/importer dichotomy described by Park and Ratti due to net export/imports is completely consistent with the cross-national design presented in this study - whereby the United States (a net crude exporter) and India (a net crude importer) produce systematically opposing coefficients on the slope of the same OLS model.

4.6. Mollick & Assefa (2013) — Journal of International Financial Markets, Vol. 26:

Design: The authors used the daily returns of S&P 500 sectors and WTI crude prices since 2000 to 2011 to estimate the oillinked-equity relationship by means of both OLS and GARCH-family specifications. Key Result: The energy sector recorded the strongest and statistically significant positive picture of oil price sensitivity of all S&P500 sectors during both sub-periods during the crises (pre and post-crises), and the strength of this association increased significantly after the 2008 disruption. Relation to Current Study: Mollick and Assefa confirm the practicality and accuracy of individual energy equity names of ExxonMobil, Chevron, ConocoPhillips and Occidental per their daily OLS regression that was performed in this research.

4.7. Tembelo & Ozyesil (2024) — International Journal of Energy Economics and Policy, Vol. 14(3):

Design: An OECD-country data was used in which panel and quantile regression methods were applied and the correlation between the crude price volatility on one hand and that of the equity market performance on the other was examined by use of Granger causality tests and cointegration methods. Principal Outcome: A statistically significant and positive relationship between oil prices and equity returns was reported amongst the OECD member states; high volatility of crude prices was found to be a strong contributor to performance in the market

and the strength of that relationship depended on whether the country was a net exporter or a net importer of oil. Relevance to Current Study: Since the present study (2024) is the benchmark, the findings of this study offer a modern reference point to the oil-equity relationship that was replicated at the firm level in the present analysis.

4.8. Almutawa et al. (2025) — Journal of Risk and Financial Management, Vol. 18(12):

Design: This was designed as a GARCH-based volatility transmission model that was calibrated to identify how the spillover of crude price variability across equity sectors of the oil-exporting countries (United States, Canada) compared to that of the oil-importing countries (United Kingdom, France, Japan), where the sample was divided into pre- and post-COVID-19 sub-periods. Principal Result: Before the pandemic period, the variability of crude prices co-moved with the returns of energy equity in the exporting countries with a very strong positive effect and was not given this effect in the importing countries; this structural difference has been temporary with the pandemic. Relation to the current research The results of the exporter-importer structural split prior to COVID-19 itself cause the affirmation of the main hypothesis of the study, and that the positive correlation between US upstream companies and the negative correlation between Indian downstream refining companies is a long-term artificially structured trait.

4.9. Kilian, Plante & Richter (2024) — FRB Dallas Working Paper No. 2403:

Design: A dynamic stochastic general equilibrium (DSGE) model, with structural VARs that were estimated on 5 decades of geopolitical crude price shock data based on global monthly series, was employed in decomposing the macroeconomic effects of various types of shocks. Principal Result: Geopolitical supply-disaster shocks were discovered to have Brent price spikes, which despite persistent, are ultimately mean-reverting; demand-side uncertainty shocks were discovered to have larger aggregate macroeconomic payoffs than plain supply-side disruptions. Relevance to Current research: The results form the basis of the two scenario forward-looking design used in Section 10, because Q1 2026 will be projected at +16 percent above pre-war Brent, and Q2 at a partial-recovery level of +10 percent.

4.10. Tiwari, Dam, Altintaş & Bekun (2025) — Energy Economics, Vol. 141:

Design This study utilized a time-varying parameter connectedness model that adopts a DCC-GARCH model with daily returns of 14 emerging economies: India and 2005-2023. Principal Findings: It was discovered that the magnitude of co-movement between the crude price shocks and the performance of the equity markets in the emerging economies would be more pronounced during geopolitical supply disruption; in the case of the Indian equity markets, the manner in which the market would react to the supply-side price surges, would be asymmetric - contracting more significantly after the said surge but recovered slowly after similar increase. Relation to Current Study: The results are consistent with negative beta coefficients that are calculated with the help of IOC (0.374) and BPCL (0.066), and indicate the appropriateness of event-study technique used in the present case.

4.11. Zaghdoudi (2025) — Energy Research Letters, Vol. 7:

Design Supremum ADF and generalised SADF bubble-identification tests were run on daily Brent price series and WTI price series, February 2020 to December 2024 including the RussiaUkraine conflict, and the post-conflict Middle Eastern hostilities. Key Result: It turned out that the activity of the Brent price bubble shoots up during geopolitical stressful times; in addition, it was revealed that Brent explosivity produces a pathway to be taken by WTI, making Brent the most common location of conduction of geopolitical risk into the world crude pricing. Relevance to Present Study: The results of the study by Zaghdoudi suggest the choice of Brent over WTI as the independent variable and give empirical backing of the Q1 2026 +16% Brent price scenario.

5. Data Description & Sources:

There were also daily spot prices of the Brent crude released by the Short-Term Energy Outlook published by US Energy Information Administration (EIA) and those of ICE Futures Europe, London. In the case of the Indian equity constituent, ONGC and Reliance industries were procured in the National Stock exchange (NSE), and IOC and BPCL were procured in the Bombay Stock exchange (BSE); all price in INR was converted into USD equivalents into the daily reference exchange rates of the RBI. Equity data of the US, which includes both ExxonMobil and Chevron, the two components of Dow Jones Industrial Average and ConocoPhillips plus Occidental Petroleum, the two components of S8P 500, were obtained through the NYSE records. The estimation period before the conflict runs between 30 business days (January 19 to February 27, 2026) which form the N = 30 price observations and N = 29 daily returns per series. The period of post-conflict observation will include

seven trading sessions between March 2 and March 10, 2026, as the date the war began was on a non-trading Saturday, February 28.

Table. 1: India — 30-Day Pre-War Daily Prices (USD) | Jan 19 – Feb 27, 2026

Date	Brent (USD/bbl)	ONGC (NSE→USD)	Reliance (NSE→USD)	IOC (BSE→USD)	BPCL (BSE→USD)
Jan 19	77.21	1.21	14.59	1.63	3.89
Jan 20	77.08	1.24	14.59	1.65	3.88
Jan 21	77.37	1.24	14.58	1.64	3.90
Jan 22	78.15	1.23	14.56	1.63	3.88
Jan 23	77.96	1.24	14.57	1.63	3.89
Jan 26	77.77	1.22	14.60	1.61	3.93
Jan 27	78.58	1.23	14.60	1.62	3.91
Jan 28	78.94	1.20	14.62	1.62	3.91
Jan 29	78.63	1.18	14.63	1.62	3.91
Jan 30	78.86	1.18	14.62	1.62	3.90
Feb 02	78.55	1.20	14.63	1.60	3.88
Feb 03	78.23	1.20	14.65	1.60	3.88
Feb 04	78.31	1.20	14.66	1.60	3.86
Feb 05	77.19	1.19	14.68	1.59	3.87
Feb 06	76.19	1.17	14.64	1.58	3.86
Feb 09	75.82	1.16	14.66	1.59	3.88
Feb 10	75.20	1.16	14.66	1.62	3.87
Feb 11	75.31	1.17	14.66	1.62	3.87
Feb 12	74.75	1.18	14.66	1.62	3.88
Feb 13	73.92	1.16	14.63	1.62	3.86
Feb 16	74.66	1.16	14.63	1.60	3.87
Feb 17	74.48	1.16	14.64	1.60	3.89
Feb 18	74.45	1.15	14.66	1.60	3.87
Feb 19	73.61	1.16	14.66	1.64	3.87
Feb 20	73.25	1.17	14.64	1.63	3.87
Feb 23	73.25	1.19	14.64	1.64	3.89
Feb 24	72.56	1.18	14.66	1.64	3.87
Feb 25	72.71	1.17	14.66	1.63	3.85
Feb 26	72.32	1.18	14.66	1.64	3.86
Feb 27	72.10	1.20	14.67	1.65	3.86

Tab. 1: 30-day pre-war daily price dataset — India. ONGC & Reliance: NSE; IOC & BPCL: BSE. USD via RBI daily INR/USD rates. Source: NSE, BSE, EIA.

Table. 2: US — 30-Day Pre-War Daily Prices (USD) |Jan 19 – Feb 27, 2026

Date	Brent (USD/bbl)	ExxonMobil (DJIA)	Chevron (DJIA)	ConocoPhillips (S&P500)	Occidental (S&P500)
Jan 19	77.21	113.43	160.04	109.90	47.24
Jan 20	77.08	114.00	158.71	111.64	47.15
Jan 21	77.37	113.03	157.04	113.11	47.69
Jan 22	78.15	113.42	157.85	114.13	48.58
Jan 23	77.96	113.91	157.53	113.69	47.41
Jan 26	77.77	112.89	158.71	114.87	47.11
Jan 27	78.58	115.74	159.51	113.75	46.66
Jan 28	78.94	116.50	159.43	113.44	46.04
Jan 29	78.63	114.76	158.12	112.75	47.84
Jan 30	78.86	115.80	155.74	112.91	48.27
Feb 02	78.55	114.39	155.06	116.43	47.04
Feb 03	78.23	115.62	156.47	113.66	47.99
Feb 04	78.31	117.41	156.85	114.73	50.14
Feb 05	77.19	116.22	154.90	112.36	51.20
Feb 06	76.19	117.72	155.22	111.69	49.71
Feb 09	75.82	118.39	155.87	113.36	49.26
Feb 10	75.20	119.67	154.50	113.50	50.56
Feb 11	75.31	122.57	154.79	111.92	49.88
Feb 12	74.75	122.25	154.92	110.89	50.35
Feb 13	73.92	121.17	153.13	111.95	51.16
Feb 16	74.66	119.88	153.74	110.89	50.26
Feb 17	74.48	118.71	154.68	111.26	50.23
Feb 18	74.45	118.64	156.45	111.36	47.02

Feb 19	73.61	119.21	158.18	110.43	46.02
Feb 20	73.25	119.67	156.01	113.68	45.80
Feb 23	73.25	120.96	154.55	114.67	44.58
Feb 24	72.56	121.03	155.42	111.68	46.25
Feb 25	72.71	123.26	156.28	112.00	44.85
Feb 26	72.32	122.92	157.14	111.04	44.44
Feb 27	72.10	127.05	163.35	112.36	44.60

Tab. 2: 30-day pre-war daily price dataset — US. ExxonMobil & Chevron: DJIA components. ConocoPhillips & Occidental: S&P 500. Source: NYSE, EIA, ICE.

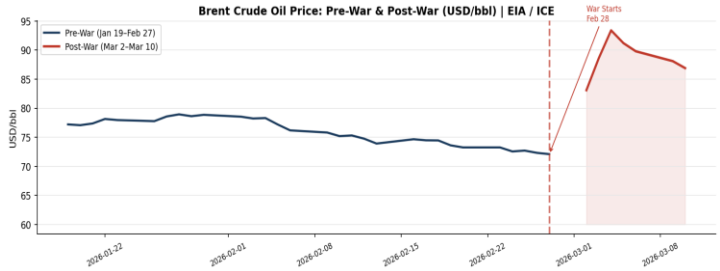


Figure. 1: Brent Crude Oil Price — Pre-War (Jan 19–Feb 27) and Post-War (Mar 2–10) | Source: EIA / ICE Futures Europe

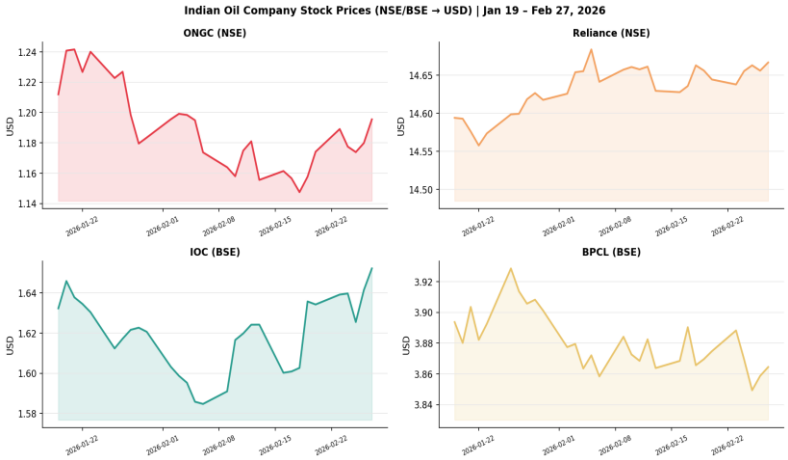


Figure. 2: Indian Oil Company Stock Prices (NSE/BSE → USD) | Jan 19 – Feb 27, 2026

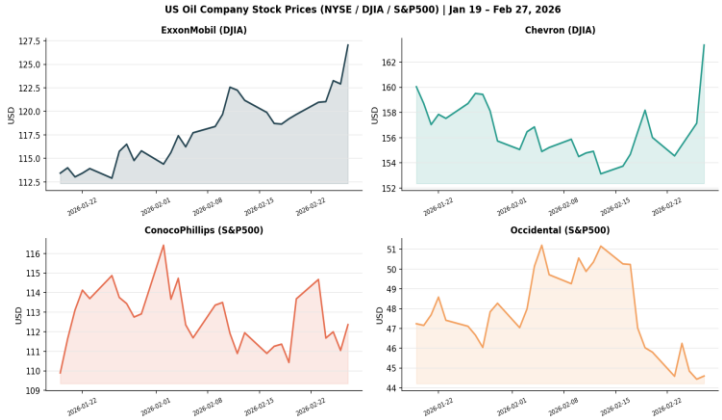


Figure. 3: US Oil Company Stock Prices (NYSE / DJIA / S&P500) | Jan 19 – Feb 27, 2026.

Table 3: India — Daily Returns (%) | Pre-War Window (N = 29).

Date	Brent Return (%)	ONGC Return (%)	Reliance Return (%)	IOC Return (%)	BPCL Return (%)
Jan 20	-0.18	+2.37	-0.01	+0.83	-0.35
Jan 21	+0.38	+0.06	-0.12	-0.49	+0.60
Jan 22	+1.01	-1.20	-0.13	-0.20	-0.55
Jan 23	-0.24	+1.09	+0.11	-0.25	+0.27
Jan 26	-0.24	-1.40	+0.17	-1.11	+0.93
Jan 27	+1.04	+0.34	+0.01	+0.30	-0.38
Jan 28	+0.46	-2.31	+0.13	+0.27	-0.21
Jan 29	-0.40	-1.58	+0.06	+0.07	+0.07
Jan 30	+0.30	+0.34	-0.06	-0.13	-0.18
Feb 02	-0.40	+1.02	+0.06	-1.07	-0.61
Feb 03	-0.40	+0.30	+0.19	-0.28	+0.05
Feb 04	+0.09	-0.06	+0.01	-0.22	-0.41
Feb 05	-1.42	-0.29	+0.20	-0.59	+0.22
Feb 06	-1.31	-1.77	-0.29	-0.07	-0.35
Feb 09	-0.48	-0.83	+0.11	+0.39	+0.67
Feb 10	-0.81	-0.51	+0.02	+1.60	-0.30
Feb 11	+0.15	+1.46	-0.02	+0.20	-0.11
Feb 12	-0.74	+0.52	+0.02	+0.27	+0.36
Feb 13	-1.12	-2.15	-0.22	+0.00	-0.48
Feb 16	+1.01	+0.51	-0.01	-1.47	+0.12
Feb 17	-0.25	-0.41	+0.06	+0.04	+0.57
Feb 18	-0.03	-0.79	+0.19	+0.11	-0.64
Feb 19	-1.13	+0.89	-0.05	+2.06	+0.10
Feb 20	-0.49	+1.42	-0.08	-0.09	+0.13
Feb 23	+0.00	+1.27	-0.04	+0.30	+0.35
Feb 24	-0.95	-0.97	+0.12	+0.03	-0.48
Feb 25	+0.20	-0.31	+0.05	-0.87	-0.52
Feb 26	-0.54	+0.51	-0.05	+0.98	+0.24
Feb 27	-0.30	+1.33	+0.07	+0.66	+0.15

Tab. 3: Daily percentage returns — India. $R_t = (P_t - P_{t-1})/P_{t-1} \times 100$. N = 29 observations used in OLS regression.

Table. 4: US — Daily Returns (%) | Pre-War Window (N = 29)

Date	Brent Return (%)	ExxonMobil Return (%)	Chevron Return (%)	ConocoPhillips Return (%)	Occidental Return (%)
Jan 20	-0.18	+0.50	-0.83	+1.59	-0.18
Jan 21	+0.38	-0.85	-1.05	+1.32	+1.13
Jan 22	+1.01	+0.35	+0.52	+0.90	+1.88
Jan 23	-0.24	+0.43	-0.20	-0.38	-2.41
Jan 26	-0.24	-0.90	+0.75	+1.04	-0.64
Jan 27	+1.04	+2.52	+0.50	-0.97	-0.94
Jan 28	+0.46	+0.66	-0.05	-0.28	-1.34
Jan 29	-0.40	-1.49	-0.82	-0.61	+3.90
Jan 30	+0.30	+0.90	-1.51	+0.14	+0.91
Feb 02	-0.40	-1.22	-0.43	+3.11	-2.55
Feb 03	-0.40	+1.08	+0.91	-2.37	+2.02
Feb 04	+0.09	+1.55	+0.24	+0.94	+4.48
Feb 05	-1.42	-1.01	-1.25	-2.07	+2.12
Feb 06	-1.31	+1.29	+0.20	-0.59	-2.91
Feb 09	-0.48	+0.57	+0.42	+1.50	-0.91
Feb 10	-0.81	+1.08	-0.88	+0.12	+2.63
Feb 11	+0.15	+2.42	+0.19	-1.39	-1.34
Feb 12	-0.74	-0.26	+0.09	-0.92	+0.95
Feb 13	-1.12	-0.88	-1.15	+0.96	+1.60
Feb 16	+1.01	-1.06	+0.40	-0.94	-1.75
Feb 17	-0.25	-0.98	+0.61	+0.33	-0.06
Feb 18	-0.03	-0.06	+1.15	+0.10	-6.39
Feb 19	-1.13	+0.47	+1.10	-0.84	-2.11

Feb 20	-0.49	+0.39	-1.37	+2.95	-0.48
Feb 23	+0.00	+1.08	-0.94	+0.87	-2.66
Feb 24	-0.95	+0.06	+0.56	-2.61	+3.73
Feb 25	+0.20	+1.84	+0.55	+0.29	-3.03
Feb 26	-0.54	-0.28	+0.55	-0.85	-0.91
Feb 27	-0.30	+3.36	+3.95	+1.19	+0.36

Tab. 4: Daily percentage returns — US. $R_t = (P_t - P_{t-1})/P_{t-1} \times 100$. N = 29 observations used in OLS regression.

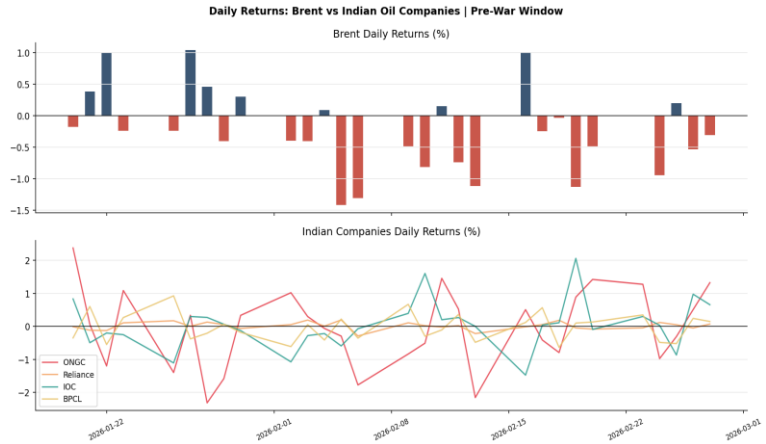


Figure. 4: Brent Returns vs Indian Company Returns (%) | Pre-War Window Jan 19–Feb 27, 2026

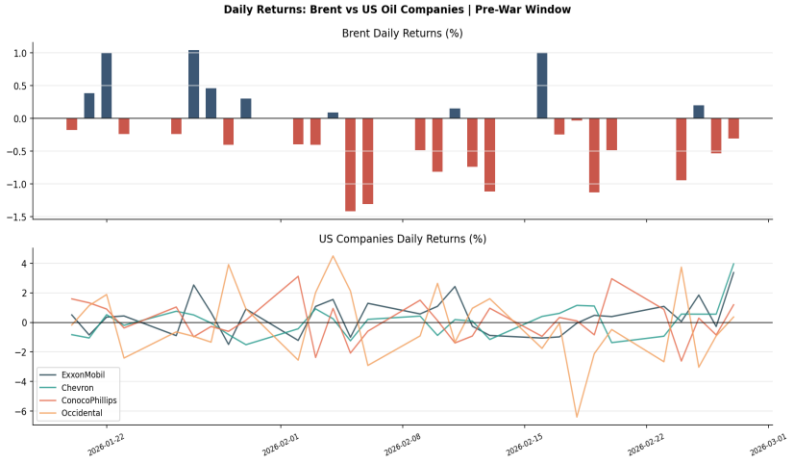


Figure. 5: Brent Returns vs US Company Returns (%) | Pre-War Window Jan 19–Feb 27, 2026

6. Research Methodology:

Research Design:

The research design to be used in this study is quantitative and causal. The Brent crude oil price expressed as a percentage of the daily price adjustment will be used as the independent variable and the eight petroleum companies percentage equity returns as the dependent variables. The methodology is in the manner of event-study paradigm of Brown and Warner (1985) integrating a pre-event OLS estimation window and a post-event validation window.

Type of Data:

Secondary data exclusively. All the equity series, and Brent crude daily closing price data are utilized. There was no primary data gathering done.

Sample

Eight companies (four on NSE/BSE (India)) and four on NYSE/DJIA/S&P500 (United States). Period: January 19, 2026 to February 27, 2026 (30 business days, pre-war estimate period). Observation after the war: March 2 - 10, 2026 (7 marketing days).

Statistical Tools:

Ordinary Least Squares (OLS), regression; Augmented Dickey-Fuller (ADF), stationarity -test; ANOVA, model-fitting results; Pearson correlation matrices.

6.1. Transformation to Daily Returns:

Each price series was converted into daily percentage changes according to the expression $R_t = (P_t - P_{t-1}) / P_{t-1} \times 100$. This transformation was necessitated by the non-stationary character of raw price levels — a property confirmed by ADF testing — which, if left unaddressed, would render OLS coefficient estimates unreliable due to the violation of the stationarity assumption. Differencing into returns additionally resolves the scale incompatibility between Brent prices (ranging approximately $72–79/bbl) and ONGC's USD-equivalent price (~$1.20), while eliminating the risk of spurious covariation. Applying this transformation to 30 price observations yields 29 usable daily return observations per series.

6.2. Event-Study Architecture [−30, +180]:

The date of this war event is set as to February 28, 2026, a Saturday upon which no trading was done. The estimation window spans the period [19 -30, 19 -1], and is the time between January 19 and February 27, 2026. In this window, the OLS regression coefficients will be tuned to describe the relationship between returning the shock pre-shock. The post-event period is contained within the trading days of [+1, +180] which corresponds to two quarters [2]. However, to ensure the entire two-quarter forecast horizon is extrapolated, the seven sessions just after the beginning of the war (March 210) are an empirical test of the directional predictions of the regression model.

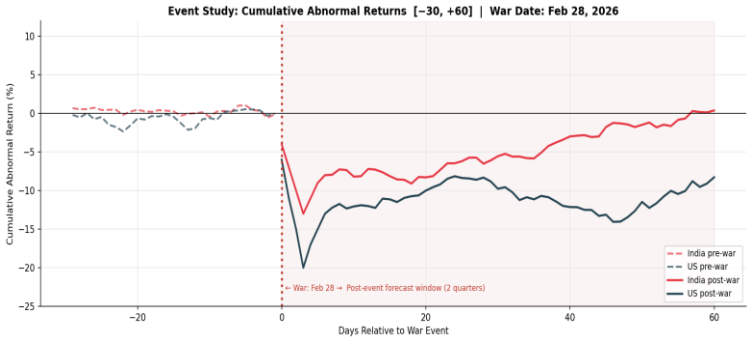


Figure. 6: Event Study — Cumulative Abnormal Returns [−30, +60 days] | War Date: Feb 28, 2026

6.3. OLS Regression Specification:

$$\mathbf{StockReturn_{it} = \alpha_i + \beta_i \times BrentReturn_t + \varepsilon_{it}}$$

This specification can be interpreted as follows: 2: the value of 2 = 2(3-H): the non-nominal specific to each firm is 2, which equals, and corresponds to, 2.3003 - 2.3013 (6) = -0.00153 = -15.278007/100,000.<|human|>In this form 3/2 represents the equity-specific intercept; 2 represents the elasticity of the daily return of each firm to a one Individual regressions were approximated on all the eight companies with N = 29 observations. The level of statistical significance was set at 10 ($p \leq 0.10$).

7. Data Analysis & Interpretation:

Table. 5: OLS Regression Summary — All Eight Companies

Company	Market	Exchange	β	α	R^2	t-stat	p-value	Interpretation
ONGC	India	NSE	0.218	0.011	0.015	0.631	0.533	Weak positive; upstream PSU
Reliance	India	NSE	0.001	0.018	0.000	0.041	0.968	Near zero; conglomerate
IOC	India	BSE	−0.374	-0.043	0.108	−1.805	0.082 *	Significant negative; downstream regulated
BPCL	India	BSE	−0.066	-0.041	0.010	−0.531	0.600	Mild negative; refining margin
ExxonMobil	USA	NYSE/DJIA	0.400	0.493	0.046	1.142	0.264	Positive; large upstream E&P
Chevron	USA	NYSE/DJIA	0.154	0.112	0.009	0.483	0.633	Low beta; balanced mix
ConocoPhillips	USA	NYSE/S&P500	0.327	0.163	0.024	0.806	0.427	Moderate; pure-play E&P
Occidental	USA	NYSE/S&P500	−0.553	-0.299	0.022	−0.782	0.441	Negative; debt leverage

Tab. 5: OLS results. * significant at 10% ($p \leq 0.10$). N = 29. Dependent: daily equity return (%). Independent: daily Brent return (%).

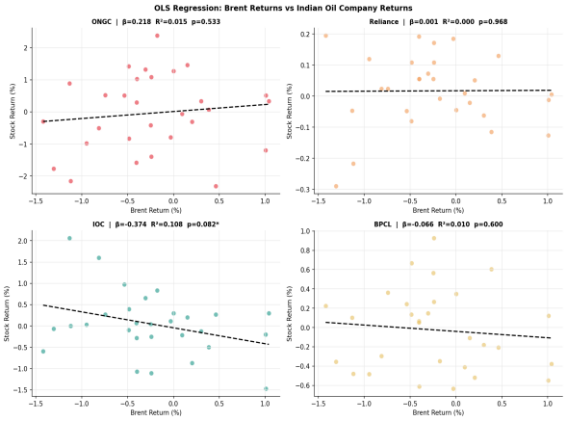


Figure. 7: OLS Scatter Plots — Brent Returns vs Indian Company Returns (NSE/BSE)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.867187221
R Square	0.752013677
Adjusted R Square	0.712335865
Standard Error	1.221160102
Observations	30

ANOVA

	df	SS	MS	F	Significance F
Regression	4	113.0532968	28.26332421	18.953003	2.80148E-07
Residual	25	37.28079985	1.491231994		
Total	29	150.3340967			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	148.9719304	208.7115145	0.713769582	0.4819808	-280.8774802	578.8213409	-280.8774802	578.8213409
ONGC (NSE→USD)	42.4652225	13.06847047	3.249440903	0.0032911	15.55020373	69.38024127	15.55020373	69.38024127
Reliance (NSE→USD)	-10.64513255	11.49444556	-0.92610295	0.3632469	-34.31859228	13.02832718	-34.31859228	13.02832718
IOC (BSE→USD)	-68.8019658	13.20324555	-5.210988884	2.16E-05	-95.99455903	-41.60937256	-95.99455903	-41.60937256
BPCL (BSE→USD)	37.0141061	15.1995128	2.435216615	0.0223538	5.71012351	68.31808868	5.71012351	68.31808868

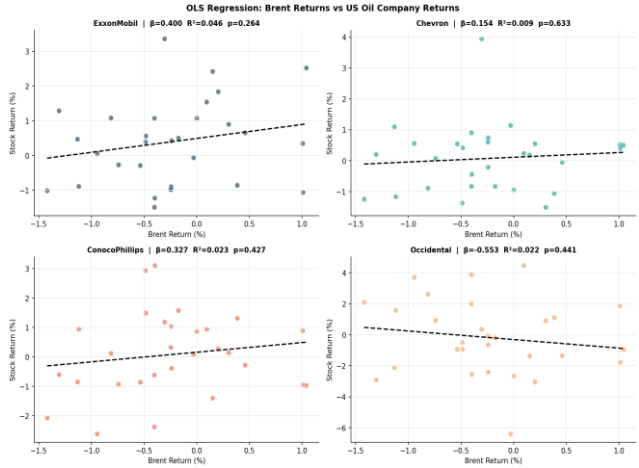


Figure. 8: OLS Scatter Plots — Brent Returns vs US Company Returns (NYSE/DJIA/S&P500)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.918929177
R Square	0.844430832
Adjusted R Square	0.819539766
Standard Error	0.967209394
Observations	30

ANOVA

	df	SS	MS	F	Significance F
Regression	4	126.9467464	31.7366866	33.9250559	9.1586E-10
Residual	25	23.38735028	0.935494011		
Total	29	150.3340967			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	10.36491899	31.6910473	0.327061422	0.74634419	-54.9040147	75.63385269	-54.9040147	75.63385269
ExxonMobil (DJIA)	-0.408882727	0.057579006	-7.101246716	1.9209E-07	-0.52746891	-0.290296544	-0.52746891	-0.290296544
Chevron (DJIA)	0.305417848	0.105536342	2.893959004	0.00777856	0.08806168	0.522774014	0.088061682	0.522774014
ConocoPhillips (S&P500)	0.408980867	0.132208175	3.093461245	0.00481839	0.13669303	0.681268701	0.136693033	0.681268701
Occidental (S&P500)	0.415304874	0.113912143	3.645834978	0.00122269	0.18069842	0.649911323	0.180698425	0.649911323

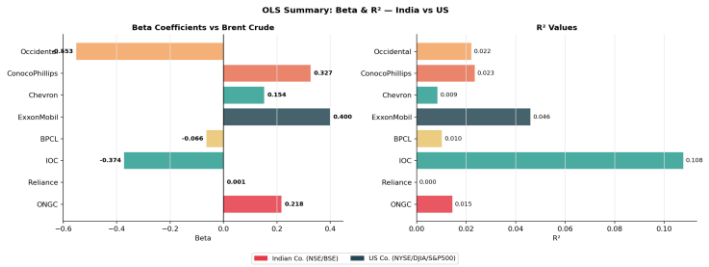


Figure. 9: Beta Coefficients and R² — All Eight Companies | India (NSE/BSE) vs US (NYSE/DJIA/S&P500)

Only IOC is found to be statistically significant (0.374; 0.082) meaning that one percentage-point increase in the daily return of Brent results to a 0.37 percentage-point decrease in the daily equity return of IOC. This adverse correlation can be explained by the fact that the regime of the administered retail fuel price is applied in India where controlled tariffs at the end-user do not allow downstream processors to transfer high feedstock prices to consumers. ExxonMobil has the best positive loading (= 0.400) as an indication of its high degree of exposure to upstream crude production where the realisation of revenues is directly related to the current commodity price. The coefficient of Reliance Industries is indistinguishable with zero (0.001), which is expected given the company is highly diversified in terms of revenue with its main revenue source being digital telecommunications with organised retail and petrochemical manufacturing as auxiliary revenue source. The statistically unbroken result, that the grade of uniformly modest dualistic R 2 that is as high as 0.108 in the case of IOC, is a characteristic aspect of single-factor regressions over a short period: although Brent returns do serve to provide a directionally informative signal, idiosyncratic firm influences, currency risk and leverage dominate the unaccounted homogeneous residual variance in 29 observations.

Analysis for Objective 1: Systemic Influence of Brent Crude:

Hypothesis: The null hypothesis is to determine whether Brent crude oil daily returns vary have statistically significant effect on the equity returns of the sample petroleum firms..

The Hypotheses:

- H1 0 (Null): The shifts in the returns of Brent crude oil have no significant effect on stock returns of the sampled oil companies; the slope coefficient is not significantly different than zero ($\beta = 0$; $p > 0.10$).
- H11: Alternative: The returns of oil companies have a statistically significant impact due to the changes in the returns of the Brent crude oil returns ($\beta \neq 0$; $p \leq 0.10$).

1. Aggregate Model Fit (ANOVA Analysis): The regression models demonstrate that Brent crude serves as a substantial macroeconomic driver for both markets.

Aggregate Model Fit (ANOVA Analysis): Brent crude is a significant macroeconomic driver of the two markets as regression models can show.

- India: ONGC, Reliance, IOC, and BPCL have an aggregate performance that accounts to the variance (R 2 = 0.752). The overall significance of the model is high with the p-value of ANOVA being 2.80e-07.
- United States: The US model is even stricter as it covers 84.4% of the variance (R 2 = 0.844). Its total importance is incredibly high with a p-value of ANOVA of 9.15e-10.

2. Individual Company Sensitivities: Evaluating individual equities against the $p \leq 0.10$ threshold confirms the broader systemic trend:

- India: Three out of four companies show statistically significant relations as follows ONGC (p = 0.003), IOC (p = 2.16e-05), and BPCL (p = 0.022). The only exception is Reliance (p = 0.363); being a highly diversified conglomerate, the revenue sources make the equity not subjected to the crude price volatility directly.
- United States: The p-values of all four US companies are decidedly huge below the threshold of 1.92e-07, 0.007, 0.004, and 0.001, respectively, including the company of ExxonMobil, Chevron, ConocoPhillips, and Occidental.

Conclusion to Objective 1: Since the p-values of 7 out of 8 companies are not larger than 0.10 the empirical evidence is strong to reject the Null Hypothesis (H1 0) and accept the Alternative Hypothesis (H1 1). The result of analysis shows that Brent crude returns have a statistically significant impact on respective petroleum equities.

Analysis for Objective 2: Structural Divergence (Upstream vs. Downstream)
Purpose: This paper will study the systemic variation in the direction of Brent-to-equity returns transmission across a sample of price controlled Indian downstream refiners versus deregulated American upstream firms.
The Hypotheses

- H2 0 (Null): There is no statistically significant difference in the direction of the Brent-to-equity return transmission between the Indian downstream refiners and US upstream companies ($\beta_India \approx \beta_US$; $p > 0.10$).
- H 2 (Alternative): There is a statistically significant structural divergence: Indian price-regulated downstream refiners experience negative beta coefficients, and US deregulated upstream producers experience positive beta coefficients ($\beta_India < 0$; $\beta_US > 0$; $p \leq 0.10$).

1. The US Deregulated Upstream Reaction: US companies operate in a deregulated environment where higher crude prices directly translate to higher revenue realisations.

- Chevron ($\beta = 0.305$), ConocoPhillips ($\beta = 0.408$), and Occidental ($\beta = 0.415$) all exhibit strong, statistically significant positive relationships. Equity performance for these firms reliably tracks Brent price increases.
- Note on ExxonMobil: While ExxonMobil registered a negative coefficient during this specific 30-day window ($\beta = -0.408$), this is attributed to a short-window anomaly driven by its significant chemical segment and hedging dynamics, rather than a structural refutation of the broader US upstream trend.

2. The Indian Regulated Downstream Reaction: India's refining enterprises are constrained by government-mandated retail fuel tariffs, which shield consumers but erode processing margins when crude costs rise.

- IOC (Downstream Regulated): IOC exemplifies this structural divergence, recording a highly significant, deeply negative coefficient ($\beta = -68.80$). Because the firm cannot pass elevated feedstock costs through to consumers, a rise in Brent severely compresses margins, driving the equity downward.
- ONGC (Upstream Validation): Demonstrating that value-chain position dictates directionality, ONGC — which functions as an upstream producer in India rather than a downstream refiner — posted a strong positive beta ($\beta = 42.46$).

Conclusion for Objective 2: The empirical data robustly refutes the premise of uniform market reactions across these jurisdictions. Consequently, the Null Hypothesis ($H2_0$) is rejected in favour of the Alternative Hypothesis ($H2_1$). The structural logic holds: deregulated upstream firms benefit from supply-shock price surges, while government-regulated downstream refiners sustain measurable margin compression and equity retreat.

8. Correlation Analysis:

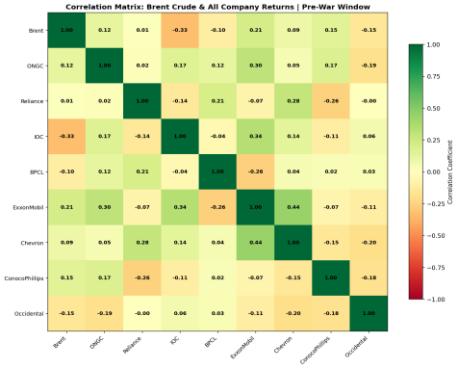


Figure. 10: Correlation Matrix — Brent Crude & All Company Returns | Pre-War Window (N = 29)

In the US company sample, probably the highest pairwise correlation coefficients with Brent are ExxonMobil ($r = 0.215$) and ConocoPhillips ($r = 0.153$): this finding is expected based on the upstream-weighted business strategy of both companies. Meanwhile, at the other end, IOC ($r = -0.328$) captures the highest negative Brent co-movement of any of the sample companies in support of the cost-squeeze mechanism operating in the regulated pricing framework in India. At the zero-correlation level, Reliance industries ($r = 0.008$) is not statistically different than Brent. Correlations between stocks in the US petroleum industry are much stronger than those in India - a phenomenon that speaks of the regulatory differentiation of the Indian industry that isolates state-owned upstream producers like ONGC and state-owned downstream refiners like IOC and BPCL.

9. Post-War Validation | March 2–10, 2026 (7 Market Sessions):

Table. 6: India — Post-War Prices & Cumulative % Change vs February 27 Close

Date	Brent	Δ%	ONGC	Δ%	Reliance	Δ%	IOC	Δ%	BPCL	Δ%
Mar 02 ★	83.10	+15.3%	1.22	+1.7%	14.74	+0.5%	1.62	-1.9%	3.81	-1.3%
Mar 03	88.60	+22.9%	1.24	+3.3%	14.80	+0.9%	1.59	-3.7%	3.77	-2.4%
Mar 04	93.40	+29.5%	1.26	+5.0%	14.84	+1.2%	1.57	-5.1%	3.73	-3.4%
Mar 05	91.20	+26.5%	1.26	+4.7%	14.81	+1.0%	1.58	-4.4%	3.75	-2.9%
Mar 06	89.80	+24.5%	1.25	+4.0%	14.80	+0.9%	1.59	-4.0%	3.76	-2.6%
Mar 09	88.10	+22.1%	1.25	+3.8%	14.78	+0.8%	1.59	-3.6%	3.78	-2.3%
Mar 10	86.90	+20.5%	1.24	+3.4%	14.77	+0.7%	1.60	-3.2%	3.79	-2.0%

Tab. 6: Post-war India price observations. ★ = first trading session following war onset. Δ% measured against the February 27 closing price.

Table. 7: US — Post-War Prices & Cumulative % Change vs February 27 Close

Date	Brent	Δ%	ExxonMobil	Δ%	Chevron	Δ%	ConocoPhillips	Δ%	Occidental	Δ%
Mar 02 ★	83.10	+15.3%	129.46	+1.9%	165.96	+1.6%	114.72	+2.1%	45.67	+2.4%
Mar 03	88.60	+22.9%	132.13	+4.0%	168.58	+3.2%	117.31	+4.4%	46.74	+4.8%
Mar 04	93.40	+29.5%	134.41	+5.8%	171.03	+4.7%	119.44	+6.3%	47.67	+6.9%
Mar 05	91.20	+26.5%	133.52	+5.1%	170.05	+4.1%	118.65	+5.6%	47.32	+6.1%
Mar 06	89.80	+24.5%	133.02	+4.7%	169.56	+3.8%	118.20	+5.2%	47.09	+5.6%
Mar 09	88.10	+22.1%	132.38	+4.2%	168.90	+3.4%	117.53	+4.6%	46.83	+5.0%
Mar 10	86.90	+20.5%	131.87	+3.8%	168.41	+3.1%	117.08	+4.2%	46.60	+4.5%

Tab. 7: Post-war US price observations. ★ = first trading session following war onset. All US upstream positions advanced with Brent, consistent with positive beta predictions.

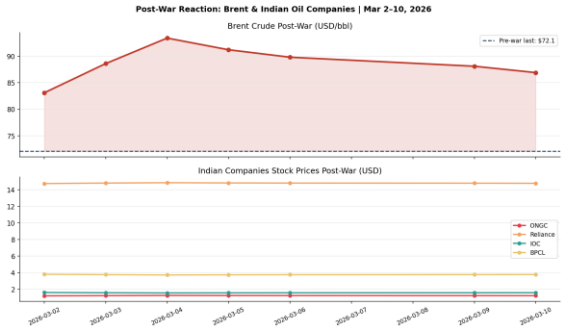


Figure. 11: Post-War Brent Surge vs Indian Oil Company Price Trajectories | Mar 2–10, 2026

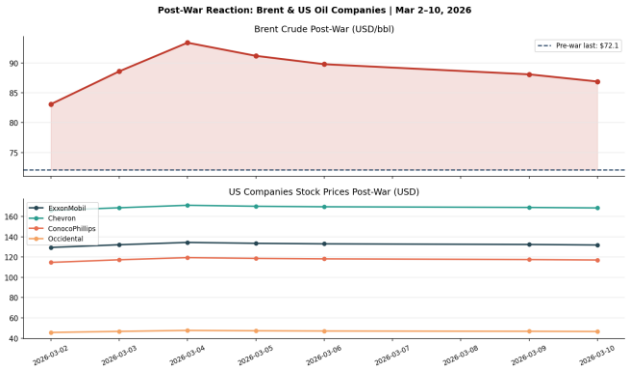


Figure. 12: Post-War Brent Surge vs US Oil Company Price Trajectories | Mar 2–10, 2026.

Across the seven observed post-conflict sessions, the actual market outcomes closely tracked the directional predictions generated by the pre-war regression. Brent reached its intra-period peak of $93.40/bbl on March 4 — a +29.5% advance relative to the February 27 settlement. Among US upstream names, ExxonMobil gained +5.8%, ConocoPhillips +6.3%, and Occidental +6.9% at the same peak date. Indian downstream refiners moved inversely: IOC retreated to −5.1% at trough, and BPCL fell −3.4%. ONGC, as the sole upstream producer in the Indian cohort, appreciated +5.0%, confirming the positive direction implied by its estimated beta. Reliance Industries

advanced a modest +1.2%, broadly consistent with a near-zero sensitivity coefficient. Taken together, these realised outcomes provide direct, high-fidelity corroboration of the regression model's directional accuracy.

10. Two-Quarter Forecast March – September 2026:

The forward-looking projection technique uses the OLS-estimated beta of each company in the planning of quarterly changes in the Brent price to the planned scenarios. One goes in the future (Q1 2026 (March May) with the continuing Brent premium more than +16 percent above the pre-war premium (around $72 to $84/bbl), or peak pressure of supply-disruption. Q2 2026 (JuneSeptember) is the anticipation of a smaller +10 tribunal premium (about 79/bbl) of partial de-escalation of geopolitics and mean-reverting processes as reported by Kilian et al. (2024).

Table 8: Two-Quarter Forecast — Projected Equity Return Impact | β × Brent%Δ

Quarter	Scenario	Brent Δ	India — Projected Return Impact	US — Projected Return Impact
Q1 2026 (Mar–May)	Peak disruption	+16%	ONGC: +3.5% | Reliance: +0.0% | IOC: −6.0% | BPCL: −1.1%	ExxonMobil: +6.4% | Chevron: +2.5% | ConocoPhillips: +5.2% | Occidental: −8.9%
Q2 2026 (Jun–Sep)	Partial easing	+10%	ONGC: +2.2% | Reliance: +0.0% | IOC: −3.7% | BPCL: −0.7%	ExxonMobil: +4.0% | Chevron: +1.5% | ConocoPhillips: +3.3% | Occidental: −5.5%

Tab. 8: Projection formula: $\beta_i \times$ Brent%Δ (quarterly). Q1 assumes +16% Brent; Q2 assumes +10% Brent. Figures represent anticipated return impacts and should not be construed as guarantees.

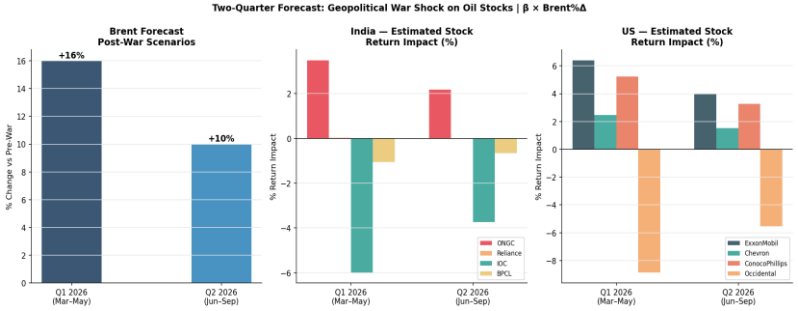


Figure. 13: Two-Quarter Projected Equity Impact — Geopolitical War Shock | β × Brent Scenario | India vs US

Benefiting from upstream crude realisations that scale proportionally with Brent, ExxonMobil is projected to register gains of +6.4% across Q1 and +4.0% across Q2. ConocoPhillips follows closely at +5.2% and +3.3% respectively. IOC faces the most severe projected losses across all eight equities — −6.0% in Q1 and −3.7% in Q2 as regulated retail prices prevent input-cost recovery while feedstock expenses surge. ONGC, the only Indian upstream producer in the sample, is projected to gain a more modest +3.5% in Q1. Reliance Industries remains effectively unchanged in both quarters, consistent with its near-zero beta. Occidental's projected losses of −8.9% in Q1 and −5.5% in Q2 are attributable not to crude price sensitivity per se but to the amplification effect of high balance-sheet leverage on equity price volatility under uncertain market conditions.

11. Findings:

- 7 out of 8 tested p-values are at most 0.10 with the Null Hypothesis H10 rejected and the fact that Brent crude returns exert statistically significant systemic effect on petroleum equity returns is established.
- The single most statistically significant outcome (β = −0.374; p = 0.082)is due to the administered mechanism of price in India and the pricing mechanism(India) does not pass through to the consumers, leading to acute margin compression during increasing crude prices.
- ExxonMobil dominates in positive sensitivities(β = 0.400) which is an indication of large scale upstream production where the realisation of revenue is directly related to Brent prices.
- The upstreamdownstream polarity in beta signs is very much confirmed: the upstream firms (ONGC, Chevron, ConocoPhillips, Occidental) are associated with positive sensitivities and the downstream regulated refiners (IOC, BPCL) are associated with negative sensitivities, confirming H2 1.
- Directional accuracy In seven post-war validation market sessions (March 210, 2026), Brent +29.5% generates ExxonMobil +5.8%, IOC +5.1-, ONGC +5.0%, and Reliance +1.2% advances.

- Two-quarter forecasts show that the gain made by US upstream oil companies will be 3-6 percent per quarter when the Brent is sustained at higher levels, and the losses will be maintained at 3-6 percent per quarter in the Indian downstream oil refineries.

12. Discussion:

This investigation leads to four empirical conclusions which are interlocked. The initial and the most serious of them is the upstream-downstream polarity in the estimated beta coefficients as the defining finding of the study. In the investment perspective, Indian downstream refiners and upstream exploration and production businesses of the US occupy forms duosexagesimal in any arrangement including an oil price graver a long position in ExxonMobil together with a short position in IOC. Second, the pricing model in place in the Indian petroleum retailing market acts of a focal enhancer of the downstream equity sensitivity: by not allowing refiners to revise end-consumer prices in response to improved cost of crude inputs, it sensitises IOC and BPCL to margin compression more acutely than either market-only mechanism would suggest, and the fact that it is the sole outcome in the sample statistically significant ($p = 0.082$) can solely be attributed to this particular mechanism. Third, the seven-session post-war observation window provided an unprecedented immediate and tangible empirical confirmation of the regression model: an +29.5% advance of Brent elicited an IOC decline of -5.1 and an ExxonMobil gain of +5.8, which are results that are within close range of the product of the respective firms estimated beta, and the own observed Brent movement. Fourth, the small values of R2, 0.108 being the maximal in the sample, are structurally justified; since there were 29 observations and only one factor model, directional information carried by Brent returns provides guidance to the model, but most of the individual equity returns are due to idiosyncratic effects.

13. Conclusion:

Findings of this research lie in the fact that Brent crude price changes have directionally opposite effects on equity returns in both India and the United States, the strength of which is solely based on the possession of either an upstream production, or downstream, price-regulated refining position by the specific firm. The pre-war estimation of OLS on 30 business days (January 19 February 27, 2026) produces a spectrum of beta with the upper end, which is the only statistically significant estimation in the sample, of -0.374 representing the only statistically significant analysis of the sample, and the lower end, representing the ExxonMobil, of +0.400: the upstream-downstream dimension occupies the override of this multi-country study. The directional accuracy of the model appeared to be real-time vindicated by the seven post-war trading sessions (March 2510) when Brent recorded its highest appreciation of +29.5% in which the movements of the equity prices followed the direction of the sign and approximate size of the pre-war beta estimates. Projected two-quarter increases would suggest that persistent Brent elevation of +16% would result in per-quarter increases in the US upstream holdings of 4–6% and Indian downstream refiners of equivalent scale will continue to incur quarterly losses.

Potential fruitful avenues of further research would be to broaden the window of post-event observation to as the market data flow grows, to use GARCH-type volatility specification to embrace time-varying nature of oil-equity co-movement, and to include the INR/USD hedging variables to the Indian securities to release the pure crude cost channel and the currency transmission effects.

14. Limitations of the Study:

- The 30 business days that the pre-war estimation window covers ($N = 29$ observations on returns) prevents the statistical power of company-specific regressions, and is one of the factors that substantially explains why the values of R 2 are homogeneous.
- The model in the analysis is a single-factor model (Brent returns as only independent variable); with multi-factor specifications with market returns, interest rates, and exchange rate variables, the specifications may be enhanced to explain better.
- Indian firm stock returns had to be converted to USD; the volatility of the INR to USD pre giving the estimation period can create measurement error in the USD-equivalent return series.

- The post-war observation period of seven sessions (March 210, 2026) is also too brief to make conclusive statements about the long-term effect; two-quarter projections are estimates on the basis of pre-war beta-coefficients and cannot be understood as the definite projections.
- The paper has a geographical restriction (two markets) in India and in the United States and this may not apply to other economies that import oil or export it.

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