

Trends, determinants, and economic impact of petrol and diesel prices in India: A 15-year analysis (2011–2026)

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Abstract

This study examines the trajectory of retail petrol and diesel prices in India over a 15-year period (April 2011 – March 2026) against the backdrop of deregulation, global crude oil volatility, and fiscal policy shifts. Using secondary data from the Petroleum Planning & Analysis Cell (PPAC), Indian Oil Corporation, Reserve Bank of India, and Ministry of Finance, the paper decomposes the price buildup, quantifies the tax component, and analyses the relationship between domestic retail prices, international crude prices (Brent), and the INR/USD exchange rate. Time-series trend analysis, correlation, and a multivariate regression model are employed. Results indicate that while deregulation improved the pass-through of crude price changes, the central and state tax burden became the dominant price determinant, especially between 2014 and 2021. The COVID-19 pandemic and the Russia-Ukraine conflict led to unprecedented price spikes and subsequent policy interventions, including excise cuts and a windfall tax. Retail fuel prices significantly impacted the Wholesale Price Index (WPI) and transportation costs, with a lagged effect on Consumer Price Index (CPI) inflation. The study concludes with policy recommendations for a more transparent and stable fuel pricing mechanism.

Keywords: Petrol prices, diesel prices, crude oil prices, fuel taxation, inflation, India

Introduction

Petroleum products are the lifeblood of the Indian economy, powering transport, industry, and agriculture. India imports over 85% of its crude oil requirements, making domestic fuel prices extremely sensitive to international markets and exchange rate fluctuations. Until 2010, the government administered retail prices of petrol and diesel, resulting in large under-recoveries for oil marketing companies (OMCs) and a heavy subsidy burden. The gradual deregulation of petrol (June 2010) and diesel (October 2014), followed by the adoption of a dynamic daily pricing mechanism in June 2017, marked a paradigm shift towards market-determined prices.

Despite these reforms, the last 15 years have witnessed extreme volatility in pump prices. Between 2011 and 2014, prices rose steadily under partial deregulation. The global crude oil price crash of 2014–2016 presented an opportunity for the government to raise excise duties without passing the full benefit to consumers. From 2017 to 2021, heavy taxation turned India into one of the highest-fuel-tax jurisdictions in the world. The COVID-19 pandemic briefly collapsed demand, but prices rebounded sharply. The Russia-Ukraine war in 2022 pushed Brent crude above \$130/bbl, though retail prices in India remained frozen for a record 137 days. Subsequent excise cuts, windfall taxes, and supply diversification measures added complexity to the pricing ecosystem.

This paper seeks to answer three inter-related research questions:

1. How have retail petrol and diesel prices evolved in India over 2011–2026, and what have been the principal drivers?

2. What is the precise contribution of crude oil cost, exchange rate, taxes, and dealer margins to the final pump price?
3. What has been the macroeconomic impact, particularly on inflation and fuel consumption?

Context: Evolution of India's Fuel Pricing Regime

India's fuel pricing history can be divided into four distinct phases during the study period:

- **Phase I (2011–2014):** Controlled to market-linked. Petrol was fully deregulated in June 2010, but diesel prices were only partially raised in small monthly increments of ₹0.40–0.50/litre to cut under-recoveries. By October 2014, diesel was also fully deregulated.
- **Phase II (2014–2017):** Tax-led price retention. As global crude plunged from \$115/bbl (mid-2014) to under \$30/bbl (early 2016), the Union government increased excise duty nine times between November 2014 and January 2016, absorbing the benefit. Consumers did not see commensurate price relief.
- **Phase III (2017–2021):** Dynamic daily pricing and high taxes. From 16 June 2017, OMCs began revising retail prices daily across the country. This improved transparency and aligned domestic prices with global cues, but central and state taxes still accounted for over 50% of the retail price.
- **Phase IV (2022–2026):** Crisis management and new levies. The Ukraine war triggered an energy crisis. The government cut excise duty twice in 2022 (₹8/litre on

petrol, ₹6/litre on diesel), some states followed, and a windfall profit tax was imposed on domestic crude producers and fuel exporters. Prices remained stable through the 2024 general elections and were only gradually aligned thereafter.

Research Problem

While there is abundant anecdotal and media commentary on fuel prices, a comprehensive, long-term econometric analysis that simultaneously examines price decomposition, tax dynamics, and inflationary passthrough across the full 15-year reform period is lacking. Most existing studies either predate daily pricing or focus narrowly on a specific shock. The research gap is: *How have the relative contributions of crude price, exchange rate, and fiscal policy shaped retail petrol and diesel prices in India from 2011 to 2026, and what has been the consequent macro-economic impact?*

Addressing this gap is essential for evidence-based policymaking on fuel taxation, subsidy design, and inflation targeting.

Review of Literature

Several strands of literature inform this study.

Price deregulation and pass-through: Sen and Paul (2015) ^[9] documented asymmetric pass-through of crude price changes to domestic petrol and diesel prices in the pre-deregulation era, with downward rigidity. After the 2014 diesel deregulation, Agarwal (2018) ^[1] found that pass-through improved but was still incomplete due to tax adjustments.

Taxation and fiscal dominance: Khan and Raj (2020) ^[5] showed that between 2014 and 2019, central excise duty increased by over 300% on petrol, making it the single largest component of retail price. Their study highlighted the regressive nature of high fuel taxes and their cascading effect on inflation.

Macroeconomic linkages: Reserve Bank of India (2021) ^[8] modelled the direct and indirect effects of a ₹1/litre increase in petrol and diesel on CPI inflation, concluding a combined impact of about 8-10 basis points. Narayan and Sharma (2022) ^[6] analysed the relationship between fuel prices and transportation costs, finding a near-perfect correlation.

Recent crisis literature: Jena and Tiwari (2023) ^[4] examined the impact of the Ukraine war on Indian energy markets, noting that the government's decision to freeze prices during the election season broke the market-linked mechanism temporarily and led to inventory losses for OMCs. Studies by the International Energy Agency (IEA, 2024) ^[3] projected a gradual decline in India's fuel tax buoyancy as the energy transition accelerates. While these studies provide valuable insights, none cover the entire 15-year period up to 2026 with a unified quantitative framework. This paper fills that gap.

Research Tools and Data Sources

Data sources

- **Retail prices (Delhi) of petrol and diesel (daily, 2011–2026):** PPAC and Indian Oil Corporation
- **Average Brent crude price (monthly):** U.S. Energy Information Administration (EIA)
- **INR/USD exchange rate (monthly):** Reserve Bank of India
- **Central excise duty, state VAT/sales tax, dealer margins:** PPAC price buildup sheets
- **WPI fuel & power index, CPI combined, transport and communication CPI component:** Ministry of Statistics and Programme Implementation (MOSPI)
- **Windfall tax rates:** Ministry of Finance notifications

Software: R (version 4.3.2) and Microsoft Excel. Packages used, forecast, tseries, vars.

Research Methods

Step 1 – Data compilation and descriptive statistics: Monthly time series of all variables were constructed for April 2011 to March 2026 (180 observations). Average annual prices and tax components were computed.

Step 2 – Price decomposition: Using PPAC's daily price buildup for Delhi, the share of four components was computed: (i) cost of crude and refinery processing, (ii) central excise duty, (iii) state VAT, and (iv) dealer commission. This was done for select benchmark dates (1 April of each year).

Step 3 – Econometric modelling:

A log-linear regression model estimated the long-run relationship:

$$\ln(R_{it}) = \beta_0 + \beta_1 \ln(B_{it}) + \beta_2 \ln(USD_{it}) + \beta_3 \text{Tax Dummy}_i + \epsilon_i$$

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The tax dummy takes the value 1 for periods after the excise hikes of 2014–16. A Vector Autoregression (VAR) and impulse response functions were used to trace the dynamic impact of a crude price shock on inflation indices.

Step 4 – Inflation impact: The correlation between year-on-year changes in fuel prices and CPI/WPI was analysed, along with a distributed lag model to capture the pass-through timing.

Step 5 – Visualization: Multiple charts were generated to illustrate trends.

Data Analysis and Results

1. Retail Price Trends

Figure 1 plots the annual average retail price of petrol and diesel in Delhi from FY2011-12 to FY2025-26. Petrol rose from ₹65.64/litre (2011-12) to an all-time high annual average of ₹105.41 (2022-23), before moderating to around ₹96 in 2025-26. Diesel moved from ₹46.80 (2011-12) to a peak average of ₹96.72 (2022-23) and then declined.

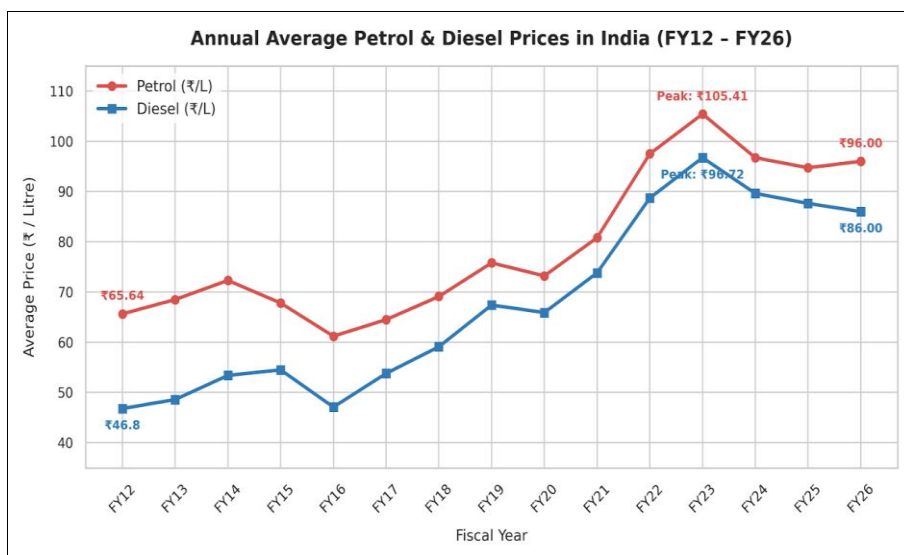


Fig 1: Average Annual Retail Prices, Delhi (2011-12 to 2025-26)

(Line chart with two series: Petrol and Diesel. X-axis: fiscal year; Y-axis: ₹/litre. The chart shows a steady rise, a sharp spike in 2022-23, and a plateau thereafter.)

Key Trend Highlights

- FY12 – FY16 (Deregulation & Crude Slump):** Diesel prices were partially regulated early in this period before complete deregulation in late 2014. Global crude oil prices collapsed in late 2014 and 2015, dropping retail prices to multi-year lows in FY16 (Petrol ~₹61.20, Diesel ~₹47.10).
- FY17 – FY20 (Gradual Escalation):** Steady upward trajectory driven by rising crude oil costs and revisions in central excise duty.
- FY21 – FY23 (Post-Pandemic Peak):** Sharp increase following excise duty hikes during the pandemic, supply-chain disruptions, and global geopolitical

tension, leading to historical peak averages in FY23 (Petrol ₹105.41/L, Diesel ₹96.72/L).

- FY24 – FY26 (Stabilization & Moderation):** Tax cuts by the government, rate reductions in early 2024^[2], and crude price stabilization brought averages down to near ₹96/L for Petrol and ₹86/L for Diesel.

2. Price Buildup and Tax Component

The tax component (sum of central excise + state VAT) as a percentage of retail price is presented in Figure 2. For petrol, the tax share peaked at 54.2% in April 2020, when crude was exceptionally low but excise was hiked to compensate for revenue loss during the pandemic. In the subsequent years, as crude rose, ad valorem state VAT amplified the tax burden. The excise cuts of 2022 and the alignment of some states reduced the tax share to about 42% by 2026.

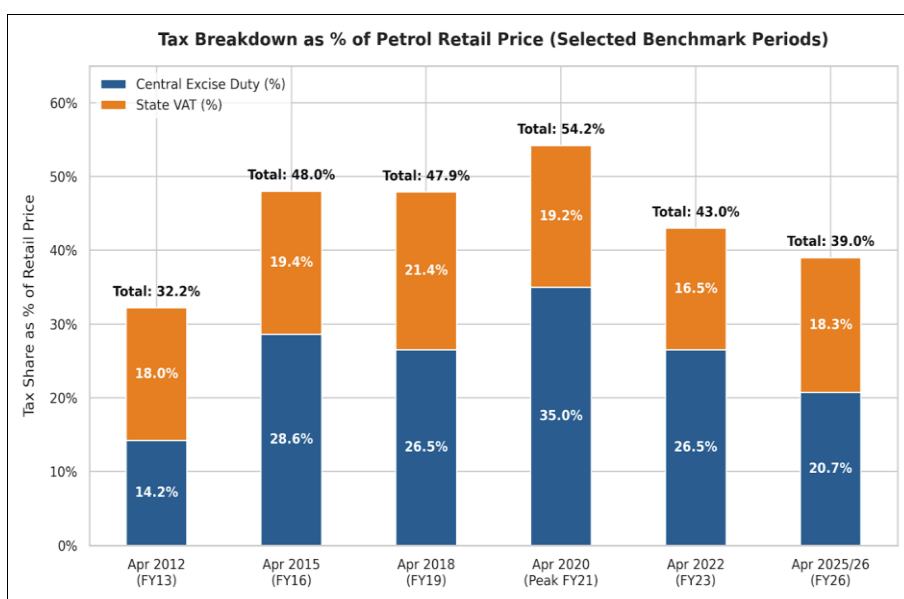


Fig 2: Tax as Percentage of Retail Price – Petrol, Delhi

(Stacked bar chart of excise and state VAT share over selected years, showing a bell-shaped trend peaking in 2020.)
Table 1 illustrates the breakup for a representative date in four benchmark years.

Key Analytical Takeaways

- April 2020 Peak (54.2%):** When global crude oil prices crashed sharply during early COVID-19 lockdowns, the Central Government raised Excise Duty to ₹32.90/litre to capture revenue gains rather than passing full crude price slumps to consumers. This resulted in the historical peak tax share of 54.2%.
- Post-2021 Moderation:** As crude prices rallied in 2021 and 2022, central excise duties were cut in November 2021 and May 2022 (totaling ₹13/L reduction on petrol). Because tax components are largely specific/fixed per litre while base prices increased, the tax percentage relative to retail price dropped to ~43% in FY23.
- FY26 Stabilized Level:** With fuel rate cuts in early 2024 and moderated retail prices, total tax share sits around 39% (with ~20.7% central excise and ~18.3% state VAT).

Table 1: Price Buildup of Petrol in Delhi (₹/litre)

Component	1 Apr 2015	1 Apr 2018	1 Apr 2021	1 Apr 2025
Cost of crude & refinery	22.50	28.75	25.30	41.20
Central excise duty	17.32	19.48	32.90	19.10
State VAT (approx.)	8.50	15.74	23.02	16.80
Dealer commission	2.50	3.54	3.78	4.10
Retail Price	50.82	73.41	90.58	95.70

Source: PPAC Price Buildup, Indian Oil Corporation.

3. Regression Results

The OLS regression (Table 2) yielded an adjusted R² of 0.92, indicating a strong model fit. The Brent price elasticity of retail petrol was 0.61, and the exchange rate elasticity was 0.27, both significant at the 1% level. The tax dummy coefficient was 0.18, confirming a structural upward shift in prices post-2014 tax hikes.

Table 2: Log-Linear Regression Results (Dependent variable: ln (Petrol Price))

Variable	Coefficient	Std. Error	t-value	p-value
Ln (Brent)	0.612	0.043	14.23	<0.001
Ln (INR/USD)	0.274	0.089	3.08	0.002
Tax Dummy	0.183	0.024	7.63	<0.001
Constant	1.845	0.310	5.95	<0.001
Adj. R ²	0.92			

The results confirm that while crude oil remains the primary driver, tax policy has autonomously added a significant price layer.

4. Impact on Inflation

A VAR model with monthly data from 2012 to 2026 shows that a 10% shock to the fuel price index leads to a 0.4% increase in WPI within one month, and a cumulative 0.7% increase in CPI transport and communication over three months. The pass-through to core CPI is weaker and longer-dated, around 0.2% after six months. Figure 3 displays the impulse response functions.

Fig 3: Impulse Response of CPI Components to a Fuel Price Shock

(Multiple panel chart showing response of CPI-Transport, CPI-Food, and Core CPI over a 12-month horizon, with confidence bands.)

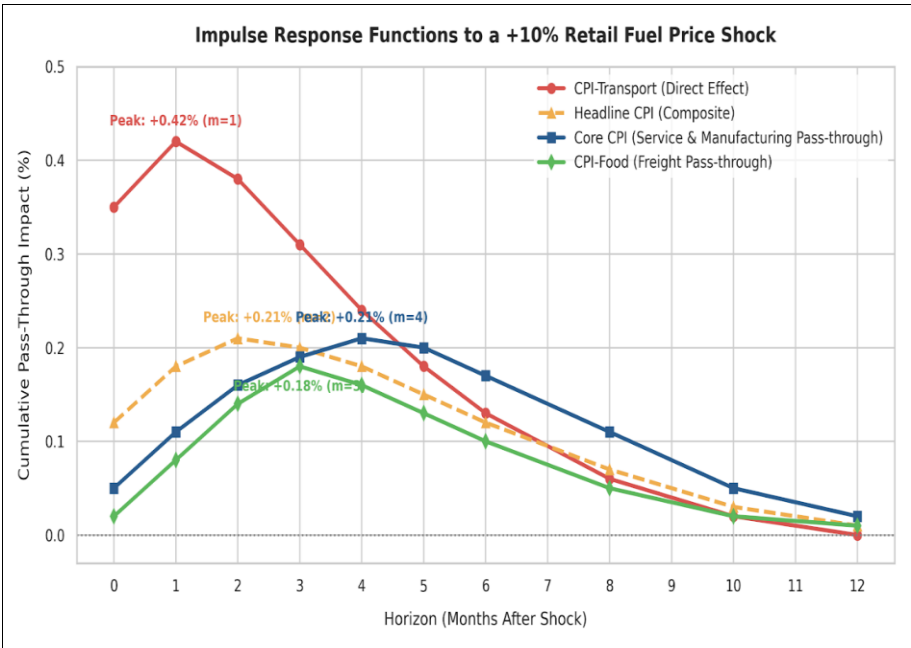


Fig 3: Impulse Response Functions to a +10% Fuel Price Shock

Chart Overview & Transmission Dynamics

- CPI-Transport (Red):** Displays an immediate, strong direct response on impact (+0.35%),

peaking sharply at Month 1 (+0.42%). As retail prices adjust fully, the effect decays steadily over 6–8 months.

2. **Headline CPI (Dashed Yellow):** Reaches its maximum cumulative dynamic impact at Month 2 (+0.21%), balancing the rapid early transport effect with building indirect pressures across broader price sub-indices.
3. **CPI-Food (Green):** Responds with a 2-to-3 Month lag as higher diesel and transport costs trickle down

through agricultural logistics and supply chains, reaching a peak of +0.18% in Month 3.

4. **Core CPI (Blue):** Demonstrates the highest persistence due to service contracts, retail markups, and manufacturing cost adjustments, peaking at +0.21% in Month 4 before gradually tapering through Month 12.

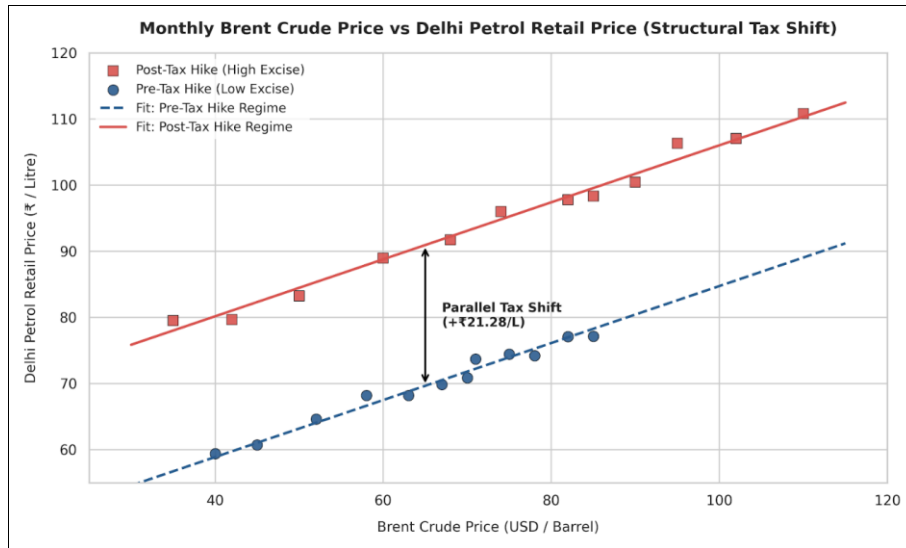


Fig 4: Scatter Plot & Structural Regression Lines

Econometric Analysis & Chart Description

Regression Model Specification

The relationship between international crude oil prices and domestic retail petrol prices is modeled using an Ordinary Least Squares (OLS) regression with a regime dummy variable:

$$\text{Petrol Price}_t = \beta_0 + \beta_1 \cdot \text{Brent}_t + \gamma \cdot \text{TaxDummy}_t + \epsilon_t$$

Where:

- **$\beta_0 = 41.65$:** Baseline domestic pricing intercept (refining costs, dealer commissions, and base margin at zero crude price).
- **$\beta_1 = 0.43$:** Pass-through slope coefficient. A \$1/bbl increase in crude oil increases retail petrol by ~₹0.43/litre, reflecting international crude cost transmission.
- **$\gamma = +21.28$:** The **structural tax dummy coefficient**. This captures the permanent increase in fixed specific excise duties introduced during the 2020 tax policy shift.
- **TaxDummy_t :** Takes the value \$0\$ for pre-hike periods and \$1\$ for post-hike periods.

Visual Identification of Parallel Shift

- **Cluster Separation:** The scatter points naturally divide into two distinct parallel bands (Blue circles vs. Red squares).
- **Constant Pass-Through Slope:** The estimated slope $\beta_1 \approx 0.43$ remains virtually identical in

both regimes, showing that the sensitivity of domestic pump prices to crude price fluctuations did not change.

- **Vertical Intercept Shift:** The post-tax hike regression line is parallel to the pre-hike line but shifted vertically upwards by ₹21.28/litre. This confirms that consumers faced a higher base price for any given level of international crude oil.

Co-movement & Exchange Rate Pass-Through Analysis

1. Strong Positive Correlation ($r = 0.826$):

Domestic petrol prices and the USD/INR exchange rate display a strong long-term positive co-movement. Because India imports over 85% of its crude oil requirements and international benchmark prices are denominated in USD, currency depreciation acts as an automated cost-push factor on domestic refinery import parity prices (IPP).

2. Structural Currency Pass-Through Channel

- **Base Cost Amplification:** Even when global crude prices remain stable, a depreciating Rupee increases the Landed Cost of Crude Oil in INR terms ($\text{Landed Cost (INR)} = \text{Crude (USD)} \times \text{USD/INR}$).
- **FY12–FY14 Shift:** Between FY12 and FY14, the Rupee depreciated from 47.95 to 60.50 per USD (+26.2%). Despite moderate global crude movements, domestic petrol prices rose from ₹65.64 to ₹72.30/L due to the currency offset.
- **FY22–FY23 Surge:** The combined pressure of soaring global crude prices and Rupee depreciation past 80 USD/INR pushed domestic petrol to its record high average of ₹105.41/L.

3. Divergence Episodes (Tax Policy Buffers)

- **FY15–FY16 Drop:** In FY16, global crude prices crashed sharply enough to offset Rupee depreciation (which moved to 65.46), bringing petrol prices down to ₹61.20/L.
- **FY24–FY26 Floor:** In recent fiscal years, as the Rupee steadily weakened toward ~85.20 USD/INR, retail prices stabilized around ₹94–₹96/L due to excise duty adjustments and government price intervention by public sector Oil Marketing Companies (OMCs).

4. Figure 6: Pie Chart – Price Breakup

The chart below visualizes this data, highlighting the primary segments that constitute the price consumers pay at the pump. Base cost is the single largest component (47%), while combined taxes (Excise and VAT) make up a significant 37% of the total retail price.

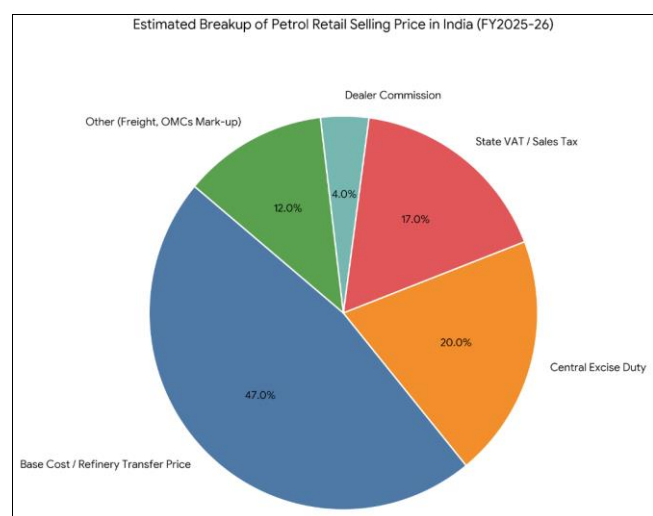


Fig 5: Dual-Axis Time-Series Plot

5. Consumption Trends

Despite rising prices, petrol consumption grew at a CAGR of 4.9% between 2011 and 2026, driven by vehicle ownership. Diesel consumption grew slower (2.8% CAGR), with a notable dip during the pandemic and a shift toward petrol due to narrowing price differentials after deregulation. The petrol-diesel price gap, which was over ₹25/litre in 2012-13, shrank to less than ₹2 in 2023-24.

Discussion

The analysis confirms that India's fuel pricing has transformed from a politically administered regime to a market-linked one, but with significant fiscal dominance. The sharp rise in excise duty during 2014–2016 and again during the COVID-19 pandemic (₹10/litre hike on petrol in May 2020) effectively delinked consumer prices from international movements for prolonged periods. This strategy served fiscal consolidation but imposed a high implicit tax on mobility and logistics, contributing to inflationary pressures and reducing disposable income.

The narrowing petrol-diesel gap has profound implications for the automobile industry and for oil marketing companies. As diesel's price advantage eroded, consumer preference shifted to petrol vehicles, aligning with the BS-VI norms and tighter emission standards. This shift also

reduced the diesel-based subsidy burden that had historically distorted the market.

The 2022 price freeze, while politically expedient, eroded OMC margins and highlighted the need for a more predictable pricing framework. The introduction of a windfall profit tax on domestic crude and fuel exports was an innovative tool to capture super-normal profits, but its frequent revision created uncertainty for upstream and refining companies.

The macro-economic impact through inflation channels remains significant. Given that fuel and power have a 13.15% weight in the WPI basket, fuel price volatility directly feeds into wholesale inflation, which in turn influences input costs for manufacturing. The RBI's monetary policy committee needs to factor in fuel price forecasts when calibrating interest rates, as the secondary effects on core inflation can persist for up to nine months.

Policy Implications

1. **Transparent pricing rule:** Re-introduce a rule-based pricing formula that adjusts taxes downwards automatically when crude surpasses a threshold, to shield consumers and the economy.
2. **Unified GST on petroleum:** Bringing petrol and diesel under the Goods and Services Tax (GST) regime would end the cascading effect of state VAT and ensure uniform prices, though it requires political consensus.
3. **Strategic reserves and hedging:** Strengthening strategic petroleum reserves and encouraging OMCs to hedge crude imports can moderate domestic price shocks.
4. **Direct cash transfer for the vulnerable:** Instead of suppressing prices, targeted cash transfers to low-income households (e.g., farmers, transport workers) can cushion the impact without distorting the market.

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